Converter AC Line Monitoring Attributes

These are the converter AC line monitoring attributes associated with the AC Line input to a Converter.

AC Line Frequency

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Required - G	Get	T	REAL	-	-	-	Hertz

The AC Line Frequency attribute represents the measured AC line frequency.

AC Line Current

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Required - G	Get	T	REAL	-	-	-	Amps (RMS)

The AC Line Current attribute represents the average RMS AC line current for all three phases as measured over an AC cycle.

AC Line Voltage

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Required - G	Get	T	REAL	-	-	-	Volts (RMS)

The AC Line Voltage attribute represents the average RMS AC line-to-line voltage for all three phases as measured over an AC cycle.

AC Line Voltage - Nominal

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	Volts (RMS)

The AC Line Voltage - Nominal attribute represents the filtered average RMS AC line-to-line voltage based on a time constant. The low pass filter time constant is factory set or configurable using the optional AC Line Voltage Filter Time Constant.

AC Line Voltage Time Constant

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Set		REAL	360	0		Seconds

The AC Line Voltage Time Constant attribute sets the low pass filter time constant applied to the AC Line Voltage to determine the AC Line Voltage Nominal attribute value.

AC Line Active Power

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values

Optional - G	Get		REAL	-	-	-	Kilowatts

The AC Line Active Power attribute represents the measured active AC Line power. A positive value indicates motoring power and a negative value indicates regenerative power. See diagram below.

AC Line Reactive Power

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	kVAR

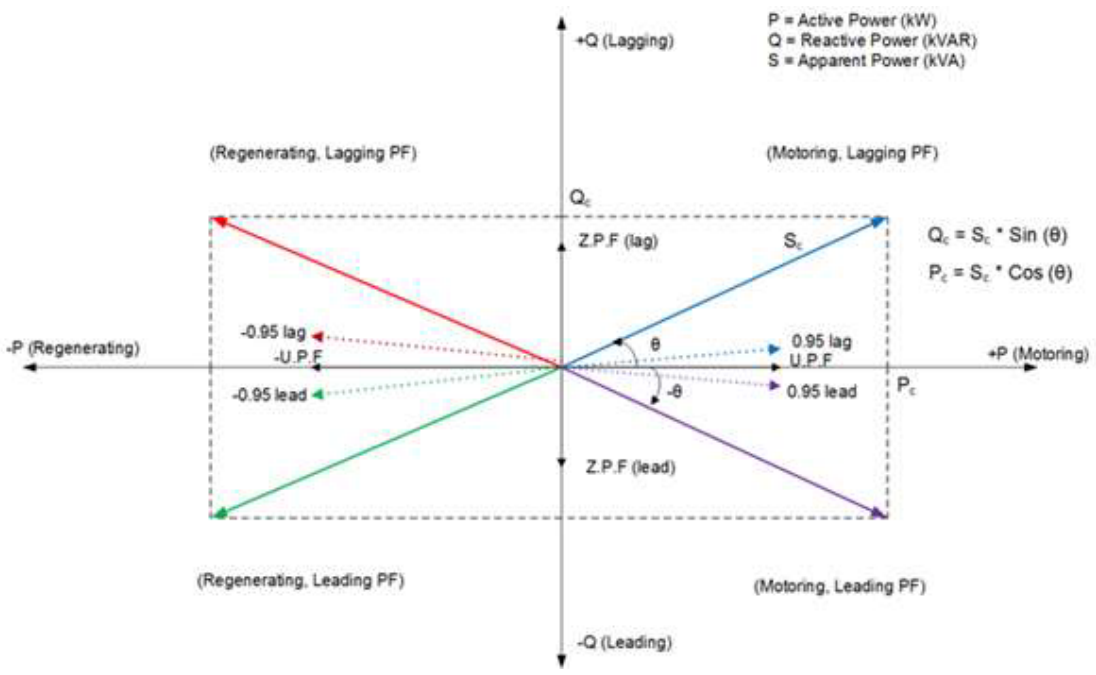
The AC Line Reactive Power attribute represents the measured reactive AC Line power. A positive value indicates lagging power is consumed by the converter and negative value indicates leading power is produced by the converter. See diagram below.

AC Line Apparent Power

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	kVA

The AC Line Apparent Power attribute represents the measured apparent AC Line power representing the magnitude of the vector sum of active and reactive power. This value is strictly positive.

The following diagram illustrates the definition for Leading and Lagging Power Factor, Active Power, and Reactive Power for Regenerative Converters.



Apparent Power, Sc, is the vector sum of active and reactive power and is always a positive value. It is specified in Volt-Amperes. Active power, Pc, is the real or active component of apparent power delivered to the load and can be positive (motoring) or negative (regenerating). Reactive power, Qc, is the imaginary or reactive component of apparent power delivered to the AC line. A positive value of reactive power indicates that reactive power is absorbed (lagging reactive power) from the line by the converter. A negative value of reactive power indicates that reactive power is delivered (leading reactive) to the AC line from the converter.

AC Line Power Factor

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	

The AC Line Power Factor attribute represents the measured input power factor defined as the ratio of active power over apparent power. The value ranges from -1 to +1. A

positive value indicates motoring power and a negative value indicates regenerative power.

AC Line 1 Current

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	Amps (RMS)

The AC Line 1 Current attribute represents the AC Line current in phase L1 on the converter-side of the AC Line Filter measured over an AC cycle.

AC Line 2 Current

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	Amps (RMS)

The AC Line 2 Current attribute represents the AC Line current in phase L2 on the converter-side of the AC Line Filter measured over an AC cycle.

AC Line 3 Current

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	Amps (RMS)

The AC Line 3 Current attribute represents the AC Line current in phase L3 on the converter-side of the AC Line Filter measured over an AC cycle.

AC Line Current Unbalance

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	% Rated (RMS)

The AC Line Current Unbalance attribute represents the estimated AC Line current unbalance, which is the ratio of negative sequence current (counter-clockwise) to positive sequence current (clockwise). When AC Line is in perfect balance and properly phased, negative sequence current is zero and positive sequence current is the full magnitude of the AC line current vector in RMS units. The AC Line Current Unbalance value can be approximated by the following equation:

$$\text{Unbalance } (\%) = 100 * (I_{L\#(max)} - I_{avg})/I_{rated}$$

Where:

$I_{avg} = (I_{L1}+I_{L2}+I_{L3})/3$

$I_{L\#(max)} = \text{Max}(I_{L1},I_{L2},I_{L3})$

AC Line Ground Current

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	Amps

The AC Line Ground Current attribute represents the ground current typically measured as the instantaneous sum of the AC Line currents for all three phases

as the instantaneous sum of the AC Line currents for all three phases.

AC Line 1 Voltage

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	Volts (RMS)

The AC Line 1 Voltage attribute represents the AC Line-to-Line voltage between phase L1 and L2 on the grid-side of the AC Line Filter.

AC Line 2 Voltage

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	Volts (RMS)

The AC Line 2 Voltage attribute represents the AC Line-to-Line voltage between phase L2 and L3 on the grid-side of the AC Line Filter.

AC Line 3 Voltage

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	Volts (RMS)

The AC Line 3 Voltage attribute represents the AC Line-to-Line voltage between phase L3 and L1 on the grid-side of the AC Line Filter.

AC Line Voltage Unbalance

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	% of Volts (RMS)

The AC Line Voltage Unbalance attribute represents the estimated AC Line voltage unbalance. Voltage unbalance is defined as the ratio of negative sequence voltage (counter-clockwise) to positive sequence voltage (clockwise). When AC Line is in perfect balance and properly phased, negative sequence voltage is zero and positive sequence voltage is the full magnitude of the AC line voltage vector (line to line) in RMS units. The AC Line Voltage Unbalance value can be approximated by the following equation:

$$\text{Unbalance } (\%) = 100 * (V_{LL(max)} - V_{LL(avg)})/V_{LL(avg)}$$

Where:

$V_{LL(avg)} = (V_{L1}+V_{L2}+V_{L3})/3$

$V_{LL(max)} = \text{Max}(V_{L1},V_{L2},V_{L3})$

AC Line Sync Error

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	Degrees

The AC Line Sync Error attribute represents the phase error associated with the AC line synchronization function of the regenerative converter.

AC Line Filter Derating

AC Line Filter Derating

Usage	Access	T	Data Type	Default	Min	Max	Semantics of Values
Optional - G	Get		REAL	-	-	-	% Converter Rated

The AC Line Filter Derating attribute indicates the percent derating applied to the converter power when the AC Line Filter is operating above its rated thermal capacity and the converter's Bus Voltage Reference Source is set to Manual. Derating shall not be applied when Bus Voltage Reference Source is set to Automatic. When applied in an AC Line filter overload condition, the AC Line Filter Derating value directly impacts attribute values for Reactive Power Available, Converter Rated Output Power, Converter Rated Input Power, and Converter Capacity.

The AC Line Filter Derating value is calculated based on the time averaged voltage difference between the DC Bus Voltage and the optimal Bus Voltage Reference determined by the Converter based on AC line input voltage and the thermal limits of the AC Line Filter. For example, a value of 70% indicates that the converter can only run at 70% rated continuous power when the AC line filter has reached its rated thermal capacity. If converter power exceeds the 70% derating, the converter's thermal overload protection function is activated leading to the configured Converter Overload Action or a Converter Thermal Overload FL or UL exception.

Converter Rated is defined as the Converter Rated Input Power attribute value.

See also

Converter AC Line Configuration Attributes

- Select/Limit Instructions
- Sequential Function Chart (SFC) Instructions
- Statistical Instructions
- Safety Instructions

Studio 5000 Logix Designer Glossary

How are we doing?