Application Paper **AP042004EN**

Effective May 2016
New information

Power Xpert® C445 motor management relay restarts motors after voltage loss without user intervention

Why Voltage Loss Restart matters

Coordinating restart of motors after a voltage loss event is critical to prevent system damage and provide fast recovery. If too many motors try to start at the same time, the power distribution system can experience additional voltage dip events due to motor inrush current. These additional voltage dip events can prevent motor starting, trip circuit breakers and fuses, and cause premature aging of motors and contactors.

The C445 motor management relay maximizes uptime using advanced protections and tools for fast recovery from a power loss event. The Voltage Loss Restart algorithm allows facilities to implement automatic staggered restart of motors following a voltage loss or voltage dip without manual intervention or PLC programming.

Voltage Loss Restart provides three settings that allow the user to define the category of the voltage loss event and customize the way motors are restarted based on the length of the event. There are two programmable time delays for restart based on the length of the event. These delays can be used to stagger starting on a group of motors or set individually in each relay for unique motor starting times.

Using the Voltage Loss Restart algorithm embedded directly within the motor protective relay can eliminate the need for costly PLC hardware and the expense of programming a PLC or DCS system to perform this functionality. It also ensures operations are brought back online as fast as possible without the need for manual intervention or additional power problems.

How it works

The Voltage Loss Restart protection offers several options that allow the user to select how the C445 unit responds to a mains voltage loss condition. The feature is designed to safely reclose any contactor(s) that have opened during the voltage loss event. It is not intended to hold the contactor closed through the voltage loss. When Voltage Loss Restart is enabled, traditional undervoltage protection should be disabled. For the C445 to provide the most complete functionality in mains voltage loss conditions, it must maintain control power. Under most conditions, the C445 can withstand control power drops as low as 65% (70% default) for up to 200 ms (default) without the need for a separate power source and/or a UPS device.

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Voltage loss and return levels

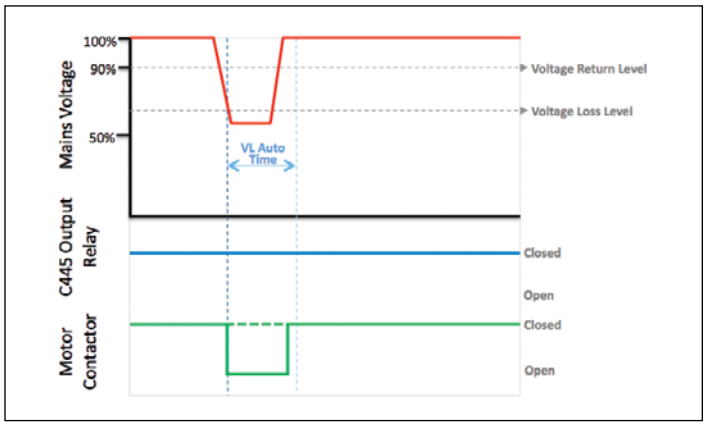
Users can set what they define as voltage loss and voltage return levels to be used by the protection feature. Each time interval in the software uses the same values for defining voltage loss and voltage return.

Parameter	Modbus	Units	Minimum	Maximum	Default
Voltage loss level	1032	%	65	90	70
Voltage return level	1033	%	80	100	90

Voltage loss auto

The auto-time feature allows immediate restarts after very short periods of voltage loss without separate/backed-up control power to the device. The default auto-time is 200 ms. The C445 will hold the motor output contact shut during this time period after voltage loss (default voltage loss level is 70%) so that motors immediately come back online if voltage returns within the time window. No time delay is used in auto time. If a voltage dip occurs in excess of 70% and/or 200 ms, C445 may power down. The contactor may drop out from voltage dip assuming no third-party device is used to hold it in.

Parameter	Modbus	Units	Minimum	Maximum	Default
Voltage loss auto	1034	Seconds	0.1	0.4	0.2

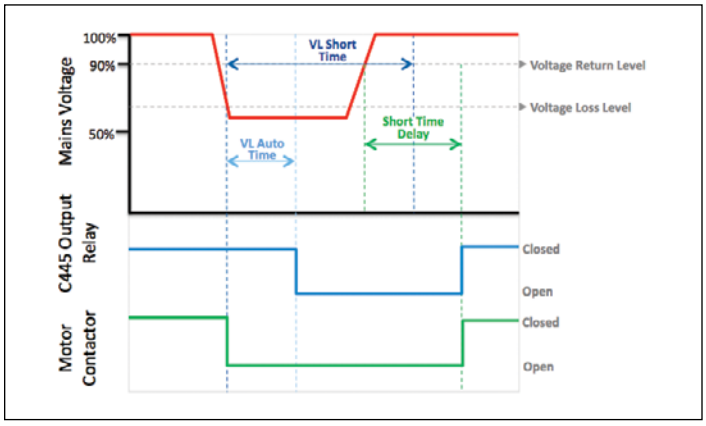


Example 1: Voltage returns within auto time

Voltage loss short

Users can define a "short" time interval to look for voltage to return to the specified level. If mains voltage does return within this interval, C445 will re-close its output contact after a user-specified delay time to bring motor back online. This delay time can be customized in each device/motor to stagger the starts. Voltage loss short requires the C445 to have control power.

Parameter	Modbus	Units	Minimum	Maximum	Default
Voltage loss short	1037	Seconds	0.2	5.0	0.4
Voltage loss short delay	1035	Seconds	0.1	500.0	1.0

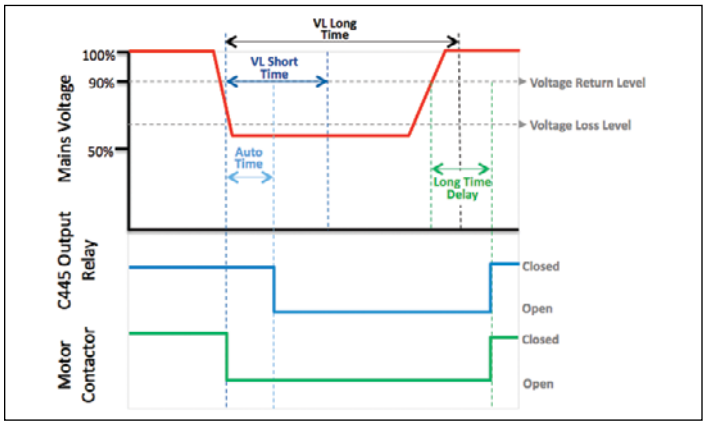


Example 2: Voltage returns within short time

Voltage loss long

Users can define a second "long" time interval to look for voltage to return to the specified level. If mains voltage does return within this interval, C445 will re-close its output contact after a user-specified delay time to bring motor back online. This delay time can be customized in each device/motor to stagger the starts. The short and long time intervals can both be used to provide different settings in each device based on the duration of the voltage event. Voltage loss long and short require the C445 to have control power.

Parameter	Modbus	Units	Minimum	Maximum	Default
Voltage loss long	1040	Seconds	0	3600	4
Voltage loss long delay	1039	Seconds	1	3600	110



Example 3: Voltage returns within long time

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