

WattNode for LonWorks - Invert CT Polarity

Overview

Historically, the WattNode® for LonWorks® models could not invert the polarity of current transformers (CTs) in software. There are cases where CTs are installed with reversed polarity: either the label is facing the load (instead of the source) or the white and black wires are reversed at the meter screw terminals. Without a software feature to invert (reverse) the CT polarity, an electrician or installer must physically correct the problem.

Starting with the following firmware versions, the WattNode for LonWorks includes commands to invert the CT polarity using the SNVT *nviResetPkDemand*.

- **WattNode Plus for LonWorks:** 3.39
- **WattNode Logger for LonWorks:** 3.69

This feature reuses an existing network variable (*nviResetPkDemand*) instead of adding a new variable, so that the interface (XIF, program ID, and resource files) can stay the same, making it compatible with existing installations.

This feature is not available with options B, BI, or PT. It is also not available in WattNode Revenue models because it could allow remote tampering. There is no need to order a special version or an option to get the “Invert CT Polarity” feature.

Command Summary

The following commands flip the polarity for each of the three CTs. If a CT polarity is flipped twice, it returns to the original polarity.

- **Flip phase A CT:** *nviResetPkDemand* = 101
- **Flip phase B CT:** *nviResetPkDemand* = 102
- **Flip phase C CT:** *nviResetPkDemand* = 103
- **Restore all CTs to original polarity:** *nviResetPkDemand* = 109

Once a value is written to *nviResetPkDemand*, it will read back as **0**. There is no way to determine which CTs are inverted unless you keep track of which have been flipped or you restore them all to their original polarity.

Note: the *nviResetPkDemand* SNVT is also used to reset the peak demand, so do not write a value of **1** to this SNVT unless you want to reset the peak demand value. Writing **101**, **102**, **103**, or **109** will not affect the peak demand.

Correcting CT Polarity

After installing the meter and current transformers, check for any phases reporting negative power (*nvoPowerA*, *nvoPowerB*, or *nvoPowerC*). If you find any, this could indicate either a flipped CT or a CT on the wrong phase (not matched with the corresponding voltage phase).

Note: be sure there is a reasonable load active when you are making this determination. The EMI filter network for some equipment (particularly inverters) contain significant capacitance and may appear as a small positive or negative load when they are inactive.

Start by using the flip CT command for each of the phases reporting negative power and verify that the power becomes positive (it may take 5-10 seconds to see the effect of flipping the CT).

Once all active phases are reporting positive power, verify that the power factor values are reasonable. This is important, because if the problem was the CTs installed on the wrong phase (e.g. the ϕA CT is installed around the ϕB conductor) then flipping the CT polarity may result in positive power, but the measured power and energy will not be correct. The power factor will be either too high or too low, generally by 0.3 or more.

It is possible to detect CTs on the wrong phase by checking the sign of the reactive power (*nvoReacPwrA*, *nvoReacPwrB*, and *nvoReacPwrC*). Inductive loads, like motors, should have a positive reactive power. If it is negative, this may indicate a phasing error.

Detailed Changes

- **XIF (external interface file):** no changes
- **Program IDs:** no changes
- **LonMark:** no changes (these models are LonMark 3.4 certified)
- **LonMark Resource Files:** no changes
- **Firmware Version Updates:**
 - WattNode Plus: 3.39
 - WattNode Logger: 3.69
- **User Manual:** no changes (this manual supplement provides documentation)
- This feature is not available with options B, BI, or PT and is not available in WattNode Revenue models because it could allow remote tampering.
 - Attempting to invert CTs on WattNode Revenue models will result in an error 32.
- The invert CT settings are saved to non-volatile memory so that they will be preserved through power cycling.
- On Logger models, changing inverting CT polarity is considered a configuration change and will result in the “Configuration Change Flag” being set in the log for the time interval in which it was changed.

Upgrades

If you already have a WattNode for LonWorks meter and would like to add this capability, check the website for a firmware image that can be used for field upgrades.

- http://www.ccontrolsys.com/w/WattNode_for_LonWorks_Firmware_Versions
- [WattNode Plus for LonWorks - Firmware Version 3.39](#)
- [WattNode Logger for LonWorks - Firmware Version 3.69](#)

Additional Information

See the full manuals for information not in this supplement:

- **WattNode Plus for LonWorks - Installation and Operation Manual**
- **WattNode Logger for LonWorks - Installation and Operation Manual**