**SCADA\_DEV\_PRM**

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| **Version** | **Release Notes** |
| 1.0 | Initial Release |

**Description**: This UDT is used for mapping of data from Rockwell Automation 5000 series power monitors, model 1426-M5E.

**Naming Convention**: Tags using this UDT should be named using the first three fragments as defined in the tagging standard. Typically this will be BXX\_PRM1, incrementing the power monitor number as required for the area. Fragments 4-6 are defined as child members of the UDT.

**UDT Members**

| **UDT Member** | **Datatype** | **Description** | **Usage** |
| --- | --- | --- | --- |
| ADDON | Power\_Monitor\_5000\_v1 | Power Monitor Data Mapping and Power Consumption AOI | Within Device Program of PLC |
| COMM\_CONFIG | INT[12] | Power Monitor IP Configuration | Destination address of IP data read from Power Monitor |
| LINE\_POWER | REAL[3] | Power Readings for Each Individual Phase | Destination address of data read from Power Monitor |
| IP1AI\_CV | DINT | IP Octet 1 | On HMI |
| IP2AI\_CV | DINT | IP Octet 2 | On HMI |
| IP3AI\_CV | DINT | IP Octet 3 | On HMI |
| IP4AI\_CV | DINT | IP Octet 4 | On HMI |
| GW1AI\_CV | DINT | IP Gateway Octet 1 | On HMI |
| GW2AI\_CV | DINT | IP Gateway Octet 2 | On HMI |
| GW3AI\_CV | DINT | IP Gateway Octet 3 | On HMI |
| GW4AI\_CV | DINT | IP Gateway Octet 4 | On HMI |
| SM1AI\_CV | DINT | Subnet Mask Octet 1 | On HMI |
| SM2AI\_CV | DINT | Subnet Mask Octet 2 | On HMI |
| SM3AI\_CV | DINT | Subnet Mask Octet 3 | On HMI |
| SM4AI\_CV | DINT | Subnet Mask Octet 4 | On HMI |
| E1AI\_CV | REAL | L1-N Voltage | On HMI |
| E2AI\_CV | REAL | L2-N Voltage | On HMI |
| E3AI\_CV | REAL | L3-N Voltage | On HMI |
| E4AI\_CV | REAL | L1-L2 Voltage | On HMI |
| E5AI\_CV | REAL | L2-L3 Voltage | On HMI |
| E6AI\_CV | REAL | L3-L1 Voltage | On HMI |
| E7AI\_CV | REAL | 3 Phase Average L-N Voltage | On HMI |
| E8AI\_CV | REAL | 3 Phase Average L-L Voltage | On HMI |
| HZ1AI\_CV | REAL | Cycle Frequency | On HMI |
| II1AI\_CV | REAL | Line 1 Current | On HMI |
| II2AI\_CV | REAL | Line 2 Current | On HMI |
| II3AI\_CV | REAL | Line 3 Current | On HMI |
| II4AI\_CV | REAL | Line 4 (Neutral) Current | On HMI |
| II5AI\_CV | REAL | Demand Current | On HMI |
| II6AI\_CV | REAL | 3 Phase Average Current | On HMI |
| JI1AI\_CV | REAL | Line 1 Real Power | On HMI |
| JI2AI\_CV | REAL | Line 2 Real Power | On HMI |
| JI3AI\_CV | REAL | Line 3 Real Power | On HMI |
| JI4AI\_CV | REAL | Total Real Power | On HMI |
| JI5AI\_CV | REAL | Total Reactive Power | On HMI |
| JI6AI\_CV | REAL | Demand Power | On HMI |
| RP1AI\_CV | REAL | Power Factor | On HMI |
| C21AI\_CV | DINT | Power Factor Sign | On HMI |
| JH1AI\_CV | REAL | Net Real Energy Consumption | Use Optionally On HMI |
| JH2AI\_CV | REAL | Net Reactive Energy Consumption | Use Optionally On HMI |
| JI4AI\_TD | REAL | Energy Consumed Today | Use Optionally On HMI |
| JI4AI\_YT | REAL | Energy Consumed Yesterday | Use Optionally On HMI |
| JI4AI\_WT | REAL | Energy Consumed This Week | Use Optionally On HMI |
| JI4AI\_YW | REAL | Energy Consumed Last Week | Use Optionally On HMI |
| JI4AI\_MT | REAL | Energy Consumed This Month | Use Optionally On HMI |
| JI4AI\_YM | REAL | Energy Consumed Last Month | Use Optionally On HMI |
| JI4AI\_TY | REAL | Energy Consumed This Year | Use Optionally On HMI |
| JI4AI\_YL | REAL | Energy Consumed Last Year | Use Optionally On HMI |
| JI4AI\_QT | REAL | Energy Consumed This Quarter | Use Optionally On HMI |
| JI4AI\_YQ | REAL | Energy Consumed Last Quarter | Use Optionally On HMI |
| JI4AI\_TB | REAL | Energy Consumed Biannual Total | Use Optionally On HMI |
| JI4AI\_YB | REAL | Energy Consumed Previous Biannual Total | Use Optionally On HMI |

**AOI**

Each device will have its own routine in the device program in which the AOIs will be deployed. Unlike other devices the power monitor requires substantial programming within the ladder diagram (discussed below).

| **AOI Parameter** | **Requirement** | **Default Value** | **Description** | **Implementation Guideline** |
| --- | --- | --- | --- | --- |
| Power\_Monitor\_5000\_V1 | Mandatory | *Tagname*.ADDON | Power Monitor AOI | N/A |
| Total\_kW | Mandatory | *Tagname*:I.Total\_kW | Power Monitor total real power | Actual name of the base tag will depend on IO tree configuration |
| MSG\_PRM\_1 | Mandatory | MSG\_READ\_BXXPRM1\_1 | IP Address Message Read | This tag must be explicitly created as a controller tag |
| MSG\_PRM\_2 | Mandatory | MSG\_READ\_BXXPRM1\_2 | Line Power Message Read | This tag must be explicitly created as a controller tag |
| MW\_Conversion\_Factor | Mandatory | 1000 | Division Factor for Converting Power Monitor Power Readings to Megawatts | Adjust as required. The default power units at the time of writing are Kilowatts. |
| Totalizer Start | Mandatory | 1 | Controls Energy Consumption Totalizing | Can be programmed as a control bit if required |
| Daily\_Reset\_Request | Optional | *Tagname*.ADDON.Daily\_Reset\_Request | Reset Daily Energy Consumption Totalizer | Handled by SYS\_PRM\_RESET Subroutine |
| Weekly\_Reset\_Request | Optional | *Tagname*.ADDON.Weekly\_Reset\_Request | Reset Weekly Energy Consumption Totalizer | Handled by SYS\_PRM\_RESET Subroutine |
| Monthly\_Reset\_Request | Optional | *Tagname*.ADDON.Monthly \_Reset\_Request | Reset Monthly Energy Consumption Totalizer | Handled by SYS\_PRM\_RESET Subroutine |
| Quarterly\_Reset\_Request | Optional | *Tagname*.ADDON. Quarterly\_Reset\_Request \_Reset\_Request | Reset Quarterly\_Reset\_Request Energy Consumption Totalizer | Handled by SYS\_PRM\_RESET Subroutine |
| Biannual\_Reset\_Request | Optional | *Tagname*.ADDON.Biannual \_Reset\_Request \_Reset\_Request | Reset Biannual \_Reset\_Request Energy Consumption Totalizer | Handled by SYS\_PRM\_RESET Subroutine |
| Yearly\_Reset\_Request | Optional | *Tagname*.ADDON.Yearly \_Reset\_Request | Reset Yearly Energy Consumption Totalizer | Handled by SYS\_PRM\_RESET Subroutine |
| MWh\_Today | Optional | *Tagname*.ADDON.MWh\_Today | Energy Consumed Today | Mapped to JH4AI\_TD |
| MWh\_Yesterday | Optional | *Tagname*.ADDON.MWh\_Yesterday | Energy Consumed Yesterday | Mapped to JH4AI\_YT |
| MWh\_ThisWeek | Optional | *Tagname*.ADDON.MWh\_ThisWeek | Energy Consumed This Week | Mapped to JH4AI\_WT |
| MWh\_LastWeek | Optional | *Tagname*.ADDON.MWh\_LastWeek | Energy Consumed Last Week | Mapped to JH4AI\_YW |
| MWh\_ThisMonth | Optional | *Tagname*.ADDON.MWh\_ThisMonth | Energy Consumed This Month | Mapped to JH4AI\_MT |
| MWh\_LastMonth | Optional | *Tagname*.ADDON.MWh\_LastMonth | Energy Consumed Last Month | Mapped to JH4AI\_YM |
| MWh\_ThisQuarter | Optional | *Tagname*.ADDON.MWh\_ThisQuarter | Energy Consumed This Quarter | Mapped to JH4AI\_QT |
| MWh\_LastQuarter | Optional | *Tagname*.ADDON.MWh\_LastQuarter | Energy Consumed Last Quarter | Mapped to JH4AI\_YQ |
| MWh\_ThisHalfYear | Optional | *Tagname*.ADDON.MWh\_ThisHalfYear | Energy Consumed This Half Year (Biannual) | Mapped to JH4AI\_TB |
| MWh\_LastHalfYear | Optional | *Tagname*.ADDON.MWh\_LastHalfYear | Energy Consumed Last Half Year (Biannual) | Mapped to JH4AI\_YB |
| MWh\_ThisYear | Optional | *Tagname*.ADDON.MWh\_ThisYear | Energy Consumed This Year (Biannual) | Mapped to JH4AI\_TY |
| MWh\_LastYear | Optional | *Tagname*.ADDON.MWh\_LastYear | Energy Consumed Last Year (Biannual) | Mapped to JH4AI\_YL |

**AOI Operation Description**

The first two rungs of the AOI continuously read the IP configuration and Line Power readings from the Power Monitor, as this data is not available in the standard IO map. Message instructions cannot be members of a UDT and so these tags must be created and configured as controller scoped tags in order to be mapped as inputs to the AOI.

MSG\_PRM\_1 configuration is as follows:

Message Type: SLC Typed Read

Source Element: N13:1

Number of Elements: 12

Destination Element: *Tagname*.COMM\_CONFIG[0]

Communication Path: The name given to the power monitor in the IO Tree

MSG\_PRM\_2 configuration is as follows:

Message Type: SLC Typed Read

Source Element: F53:19

Number of Elements: 3

Destination Element: *Tagname*.Line\_Power[0]

Communication Path: The name given to the power monitor in the IO Tree

The remaining rungs of the AOI compute Power Consumption for the various defined periods. Prior to each totalizer block the reset request will move the current total to the previous periods total when a reset is detected. Each totalizer is hard coded with a time base of hours in order to yield a consumption value in Megawatt-hours. The Totalizer Target is set to an arbitrarily high number so that value rollover is not a factor.

**Programming Examples**

This UDDT makes use of two source-protected subroutines to handle standard control and mapping functions. The first rung of the power monitor routine is a call to the SYS\_PRM\_RESET subroutine, with the power monitor UDT tag as the input and return parameter. This subroutine handles totalizer resets. Subsequent rungs of the routine should be any configuration logic for the Power Monitor AOI, and the call to the Power Monitor AOI itself. The final rung of the routine should be a call to SYS\_PRM\_MAP, with the Power Monitor UDT and the Power Monitor Input Image as Input Parameters, and the Power Monitor UDT as return parameters. This Subroutine handles the mapping of data from the AOI and input image to SCADA tags.

**HMI Integration**

This AOI is primarily intended for use with the following pop-ups

* Power Monitor V1\_0

Note that, due to minor changes in available data points and units of measurement, this power monitor AOI is not compatible with the existing power monitor screen in SCADA applications and the above version must be used. However, the above screen is backwards compatible with existing power monitor installations. On some older systems the power factor may not currently be read by SCADA and the developer will have to make the necessary programming adjustments to obtain the data.

A standard button exists on the “Symbols Library – Power I” window on the InTouch Baseload that holds the action script for mapping tags to the pop-up. Developers can perform a Substitute Tag option on this object to replace the placeholder tags with the correct device tagging. There are no manual adjustments that need to be made to this script.