



SLATE™ Application Note



Totalizer Application Blocks

This application note provides a brief overview of several SLATE totalizer functions and associated support logic. These applications are included within the zip file, “Totalizer Applications”, as a single file, “exportedTotalizerApps.jar”, that can be imported into a SLATE Library within SLATE Ax. (See the Application Note, “Instructions for Importing Macros and Applications” on the SLATE website under SLATE Canned Programs.) When imported, 9 application blocks and 1 macro will be available to use in a SLATE wiresheet.

These applications together with some support logic provide a totalizing capability for any process variable, event, or time. Logic is provided to manually preset the day’s total or yesterday’s total to any value. For each daily totalizer, the day’s total is automatically set to 0 at midnight. Therefore, the SLATE battery-backed real time clock must be set to the local site time since the Base register, r128, Day-Seconds, is used to detect midnight, and transfer the day’s total to yesterday’s total.

When these totals are polled by Honeywell’s remote monitoring offering, Thermal IQ, valuable trend information can be historized, accessed, and analyzed in real time. This data can provide early warning problem indicators with the controlled combustion equipment or process.

A SLATE wiresheet (Totalizer_Examples.sde) is also provided to show the use of each daily totalizer type for monitoring a burner. This wiresheet (.sde file) can be imported into a SLATE station, compiled, and loaded as a kit for use on a SLATE Base module. This example application provides network setpoints for simulating flame status, gas flow, and burner state so that operation of the totalizer can be tested.

Process Variable (PV) Totalizing

Totalizing a process variable such as natural gas flow is a common need for combustion applications when fuel or production cost, combustion/thermal efficiency, or burner emissions are being monitored. Four process variable totalizing applications are provided:

- **Total_PV:** Totalizes any analog process variable with a least significant (LS) and most significant (MS, 1×10^7) output register. The MS register is incremented by 1 when the LS register rolls over from 9,999,999 to 0. This application is useful when the totalizer is manually reset by the user infrequently – or never. A SLATE floating point wiresheet register is limited to a maximum integer count of 16,777,215. This is the reason for the 2 register, LS and MS implementation, as well as the automatic rollover to 0.
- **Total_PV_Daily:** This function incorporates the Total_PV application but adds a register for yesterday’s total, daily reset logic, as well as registers and control logic to manually preset either the day’s total or yesterday’s total.
- **Total_PV_r1:** Totalizes any analog process variable with only one total register with a maximum count 16,777,215. No most significant (MS) register is included. The totalizer must be reset by the user before this maximum count is reached or it will not update correctly (due to SLATE’s single precision, 32-bit floating point math).

- **Total_PV_Daily_r1:** This function incorporates the Total_PV_r1 application. It is identical to the Total_PV_Daily application above but includes only one total register with a maximum count 16,777,215. This application reduces the overall function block count compared with the Total_PV_Daily application and this allows many daily totalizers to be included in a single SLATE application.

The most common use of these applications is the daily totalization of fuel flow to assess gas usage/costs or thermal/combustion efficiency.

Time Totalizing

The following time totalizers are provided:

- **Elapsed_Time_r1:** This application accumulates time for any A set of output registers allow a user friendly HMI display format of Days:Hours:Minutes:Seconds.
- **Totalize_Time_Daily:** This application accumulates daily and yesterday elapsed time for any input variable with a 0 or 1 state. It incorporates the Elapsed_Time_r1 application but adds a register for yesterday's total, daily reset logic, as well as registers and control logic to manually preset either the day's total or yesterday's total. A set of output registers allow a user friendly HMI display format of Days:Hours:Minutes:Seconds.

A common use for this application is the daily totalizing burner lockout time to assess return-to-service and maintenance response.

Event Totalizing

The following event totalizer is provided:

- **Totalize_Events_Daily:** This application totalizes daily and yesterday's events for any input variable in which the transition from 0 to 1 defines the "event" of interest. Included in the application is logic that transfers the daily total to yesterday's total at midnight followed by the resetting of the daily total. In addition, control logic and registers are provided to manually preset either the day or yesterday event total.

A common use for this application is the totalizing of daily burner lockouts.

Supporting Logic Functions

The following totalizer related support functions are provided:

- **Clock_Generator_r1:** This application creates a 0.5Hz waveform (2 seconds at a state of 1 and then 2 seconds at 0) continuously if enabled. This is used in each PV totalizer applications for timing the addition of a 2-second total to the existing total. It can be used in conjunction with the SLATE counter library function in many count-up and count-down applications as an alternative to the runtime accumulator library function.
- **Power_Up_Enable:** This application is used to inhibit any totalizer application during a power up sequence. This prevents corruption of the non-volatile total registers when the SLATE Base module is powered up.
- **Totalizer_Input_Ctrl_r1:** This application is used to facilitate testing of any totalizer application by simulating Base register, r128, day-seconds, on a live SLATE system without changing the SLATE real time clock. This facilitates testing of the midnight transfer of the day's total to yesterday's total and can also be used to confirm the HMI display of these totalizer output registers.