

## EN-41: The Consumption Meter application

- The **Consumption Meter** application is one of several standard applications that are available within the palette of Vykon HVAC. This engineering note describes its features and illustrates how it can be embedded within Vykon HVAC super applications and included in their graphical views
- The **Consumption Meter** Application has the following features:
  - Input source from either a Pulse Meter or Counter Value
  - Optional views allow it to be included in any Vykon HVAC application graphic
  - Data logging option for cumulative, daily, weekly, monthly and annual cumulative values
  - Control to enable or disable consumption operation
  - Flexible selection of meter data units using NiagaraAX Framework® 'facets'
  - Pulse factor adjustment for defining the value of each counter increment
  - 'Roll-over' algorithm eliminates errors caused by the input device 'rolling-over' its maximum value
  - 'False count' prevention by setting a maximum expected count increment rate
  - Meter may be 'preset' to a start count value if 'current meter reading' compatibility is required
  - User access to configuration and log data views controlled by username and password
  - Cumulative value stored within the application and is therefore fault tolerant to I/O input reset
- Here are the two view options:

Timestamp	Trend Flags	Status	Value (m³)
02-Jul-10 3:44:38 PM BST	{}	{ok}	0 m³
02-Jul-10 3:44:39 PM BST	{}	{null}	0 m³
04-Jul-10 12:00:00 AM BST	{}	{ok}	522 m³
05-Jul-10 12:00:00 AM BST	{}	{ok}	18 m³

**Configuration**

**Note:**  
Configuration is available to 'admin' level users

**Configuration**

Current state  
Enabled   
Disabled

**Application name**

**Consumption Meter**  
517 m<sup>3</sup>

**Cumulative consumption value**

Configuration window details:  
units=m<sup>3</sup>,precision=0,min=-inf,max=+inf  
Type of meter: Pulse counter  
Logging: Cumulative, day, week  
Pulse factor: 1.00000  
Rollover value: 65535  
Maximum value per hour: 3600 m<sup>3</sup>

**Calibration of the meter to a 'start count' value**

Calibrate the utility meter...  
If you proceed the current history content will be deleted.  
Do you wish to proceed?  
Yes No

**Value Input**  
7010 m<sup>3</sup>  
OK Cancel

Background window details:  
Cumulative consumption: 6805 m<sup>3</sup>  
Daily consumption: 6258 m<sup>3</sup>  
Weekly consumption: 0 m<sup>3</sup>  
Monthly consumption:  
Annual consumption:

**Configure**

**Signals configuration**

Meter name: Floor 1 water  
Meter tag code: S88443  
Enable: Common Meter enable CME  
Pulse meter: Floor 1 water S88443

## Application description

The Consumption Meter application has two 'Types' of meter operation; 'Pulse Meter' and 'Count Value' and they operate in a similar manner. The difference between them is the 'Pulse Meter' type accumulates and records the count from a pulse counting meter. The 'Count Value' type records a value from a numeric point which would typically be representing the value from an M-Bus or a Modbus connected meter. The Pulse Meter type is illustrated in Figure 1 and described below:

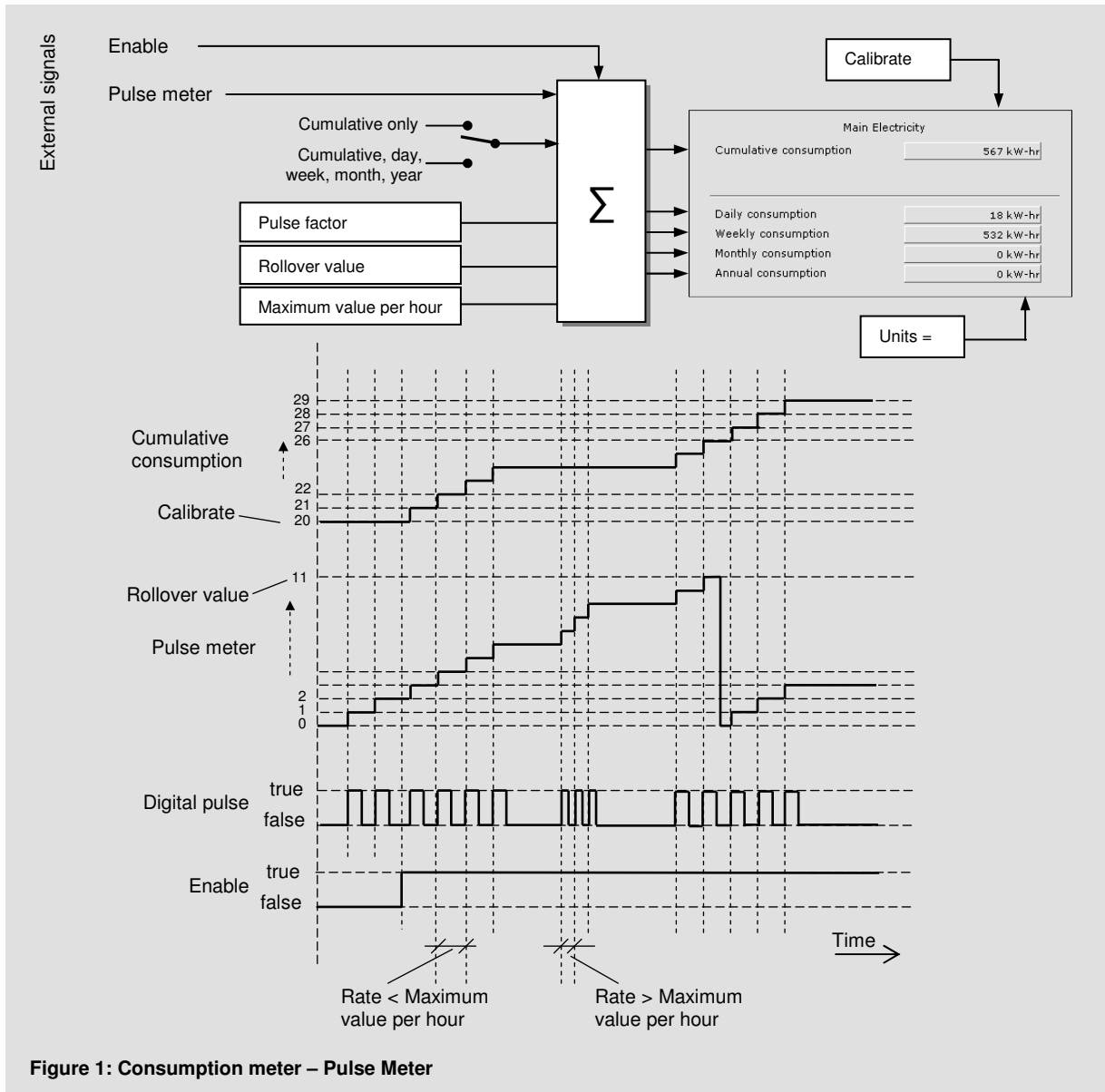


Figure 1: Consumption meter – Pulse Meter

- **Units:**  
'Units' sets the engineering meaning of each increment of the incoming counter, for example kW-hr or m<sup>3</sup>. You can allocate any of the units available within the 'AX facets' library and these will be used for all the meter histories
- **Pulse factor:**  
The pulse factor is the 'weighting' that you put upon each increment of the meter count. It is used within the algorithm to calculate the consumption value

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- **Rollover value:**

The rollover value setting is used by the counter algorithm to protect against counting errors which can be caused by the input device 'rolling over' its maximum count. The count value of each input channel of the Vykon HVAC 10-DI module for example, will increment from zero to 65565 and then rollover to zero. The roll-over value is the maximum value that the counter will reach before it resets to zero. In the example illustrated in Figure 1, the rollover value is set to 11 because the incoming pulse counter rolls over at that value. Note that the consumption meter ignores the decrementing count value and continues without interruption on the next incrementing count.

- **Maximum value per hour:**

This setting provides an error prevention facility. If the incoming count rate exceeds this then the count will be ignored by the meter. The meter transforms the 'maximum value per hour' value into a frequency period time. You should set this to a value which is the 'maximum count increment value' you would expect to see in one hour. For example if this is set to 3,600 kW-hr and the pulse factor is unity (1.00) then the meter will not count if the incoming count increments more frequently than 1 per second. In the example illustrated in Figure 1, some of the digital pulses cause the counter to increment at a rate which is greater than the maximum value per hour. Notice how these counts are ignored by the consumption meter

- **Cumulative consumption:**

If 'Enable' is linked and then providing it is at a true state, the cumulative consumption value will increment according to the following algorithm:

$$\text{'Cumulative value'} = \text{pulse count} \times \text{'Pulse factor'}$$

A log which records the cumulative value at midnight (12:00 AM) of every day can be viewed from within the application

- **Daily consumption:**

The consumption value displayed is a view of the previous day's consumption. Every 24 hours at midnight (12:00 AM), the day's consumption is stored as a history log. The history can be viewed within the application and all previous daily consumptions can be easily inspected

- **Weekly consumption:**

The consumption value displayed is a view of the previous week's consumption. Every 7 days at midnight (12:00 AM) on the Sunday, the week's consumption is stored as a history log. The history can be viewed within the application and all previous weekly consumptions can be easily inspected

- **Monthly consumption:**

The consumption value displayed is a view of the previous month's consumption. Every calendar month at midnight (12:00 AM) on the last day of the month, the month's consumption is stored as a history log. The history can be viewed within the application and all previous monthly consumptions can be easily inspected

- **Annual consumption:**

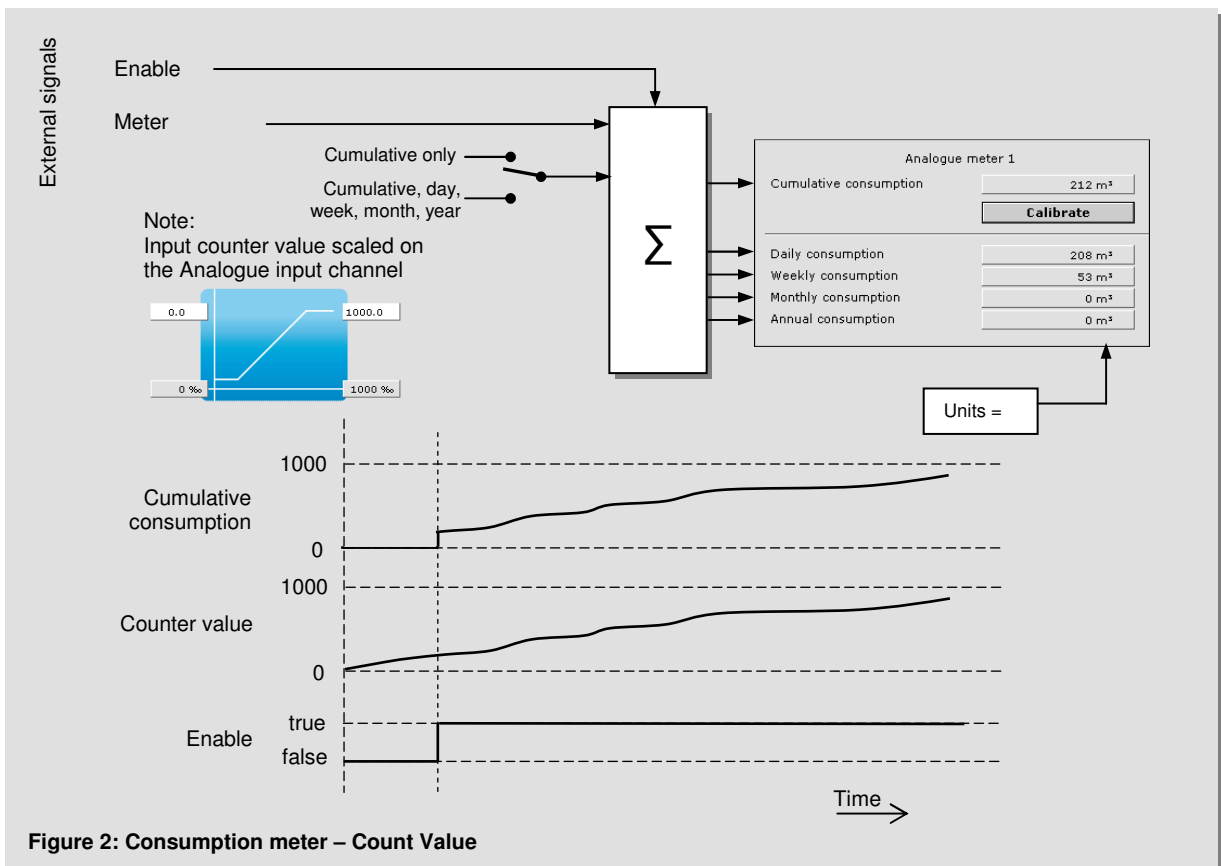
The consumption value displayed is a view of the previous year's consumption. Every year at midnight (12:00 AM) on the last day of the year, the year's consumption is stored as a history log. The history can be viewed within the application and all previous yearly consumptions can be easily inspected

- **Calibrate:**

The meter may be preset to count from a value and the 'Calibrate' function is used to set it. You are invited to set a value to preset the cumulative value and the meter will count from this point. This is typically done when the cumulative meter needs to show the same value as displayed on the meter itself. It may also be used in tenanted space applications where a new tenant requires a new start value. Note that the current Histories will be deleted when this is carried out. In the example illustrated in Figure 1, calibrate has been used to set the start count of the consumption meter to 20

The Count Value type of consumption meter is illustrated in Figure 2 and described below. Several of the functions are the same as for the Pulse Meter type:

- **Units:**  
‘Units’ sets the engineering meaning of the count value, for example kW-hr or m<sup>3</sup>. You can allocate any of the units available within the ‘AX facets’ library and these will be used for all the meter histories
- **Cumulative consumption:**  
If ‘Enable’ is linked and then providing it is at a true state, the cumulative consumption value will be the same as the output of the Analogue input value. The history log can be viewed within the application.
- **Daily, Weekly, Monthly and Annual consumption,**  
The consumption value displayed for these is as described earlier for the pulse meter



## Linking a 'pulse meter' or 'counter value' input

The 'default' meter source of the consumption meter is a Vykon HVAC I/O module. However you can link an alternative source providing that it presents itself to the consumption meter appropriately. Here is an illustration of the options available for each type of consumption meter:

### 'Pulse Meter' type:

**The default input arrangement:**

10-DI Vykon HVAC I/O module

DI pulse contact

Linked Digital pulse input object

**Substation 2 Electricity**  
Verbruik Monitoring  
Enabled - {null}  
Consumption 20.0 {ok}  
ApplicationName Substation 2 Electricity

The default Pulse meter link is a Vykon HVAC 'Digital pulse input' object type which it expects from an I/O module

Select the desired module slot for  
10DI | Module 05 | 10DI | Input 05

Enter name and (optionally) tag code for this point

Name: Digital pulse input  
Tag code: Substation 2 Electricity

OK Cancel

You can **alternatively** link the consumption meter to a different pulse meter input as illustrated here with a simulated input and some wire sheet logic...

This logic **resets** the counter at a roll-over value of 5

Linked Digital pulse input object

This is your **DI pulse** input simulated here by a 'Periodic Trigger'

Here is the 'Counter'

This is a **Digital pulse input** object (created by the 'Object Creator')

Enable Toggle  
Out true {ok}  
Enable true {ok}  
Reset false {ok}  
Toggle

Pulse Simulator  
PeriodicTrigger  
Trigger

Counter  
CountUp false {ok}  
CountDown false {ok}  
Reset false {ok}  
EnableCountUp true {ok}  
Out 2.0 {ok}  
CountUpTrigger

Invert  
Invert  
Out false {ok}  
In true {ok}

Equal  
Equal  
Out false {ok}  
In1 2.0 {ok}  
In2 5.0 {ok}

On delay  
On delay  
In false {ok}  
Out false {ok}

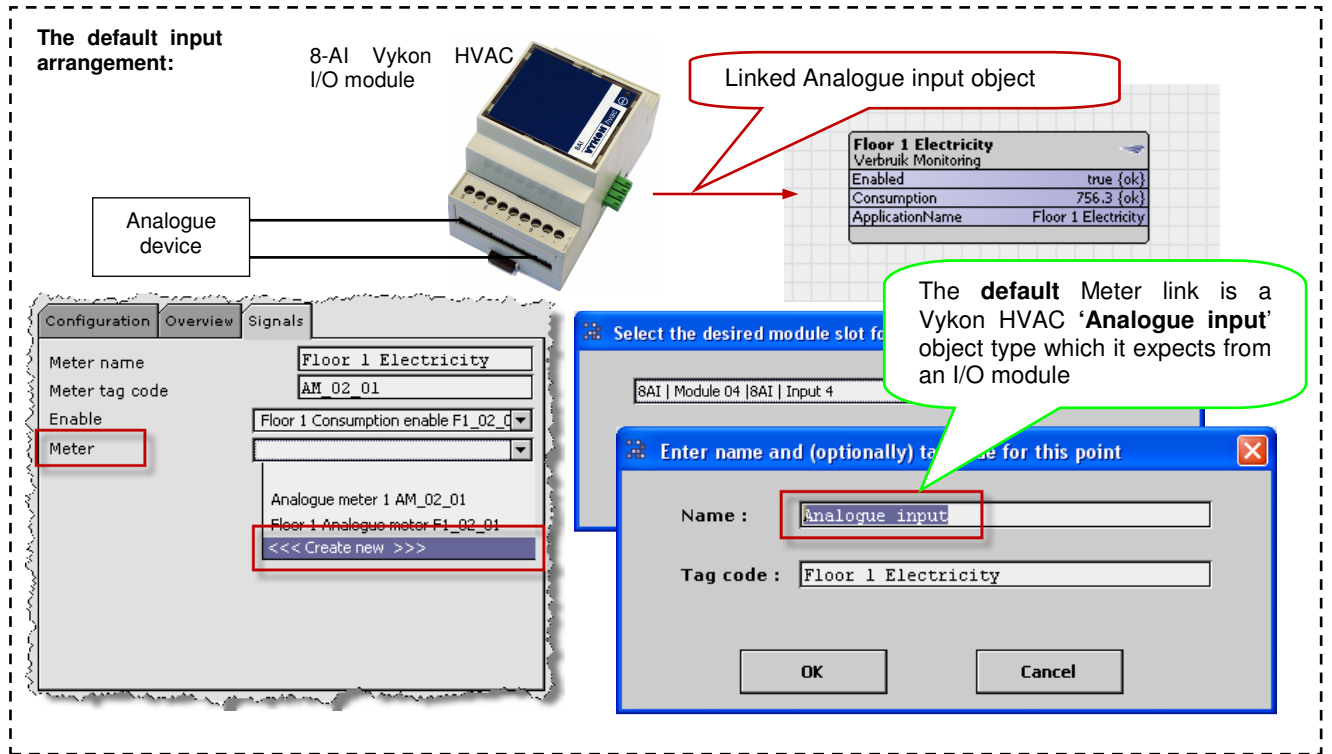
Or  
Or  
Out false {ok}  
In1 false {ok}  
In2 false {ok}

Digital pulse input  
Name EN41 Pulse input  
Tag code  
In false {ok}  
Out true {ok}  
Pulse count value 2.0 {ok}

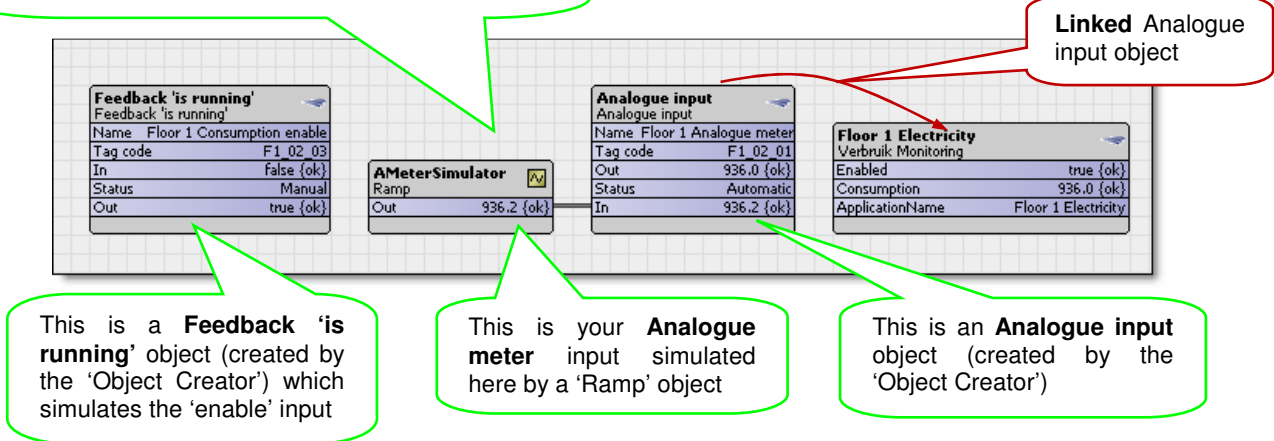
Substation 3 Electricity  
Verbruik Monitoring  
Enabled - {null}  
Consumption 207.0 {ok}  
ApplicationName Substation 3 Electricity

vykonHvacPalette  
Elements  
Miscellanies  
+ Clock  
+ Toggle  
+ Counter  
+ BooleanStatus  
+ NumericStatus  
+ Setpoints

**'Counter Value' type:**



You can **alternatively** link the consumption meter to a different counter value input as illustrated here with a simulated input and some wire sheet logic...



## Embedding the application within Vykon HVAC

The consumption meter is available as a Standard Application within the **vykonHVACPalette**

The 'Consumption Meter' is available in the **vykonHvacPalette**

Drag it into your Wire Sheet and configure its operation and IO signals

The Consumption Meter has **two** views

All the consumption values are stored as '**AX Histories**'

Drag a PxPane widget into the custom view of your super application

Select the ord of your chosen view of the Consumption meter

**Heating Plant**  
Heat demand

Main gas meter  
5739 m<sup>3</sup>

44.0 °C  
54.1 °C

## Count value Facets

You can change the facets of the consumption meter to reflect the incoming measurement type:

**Use the facet property of the configuration tab to change the facets of the consumption meter**

**Note:**  
When you change facets you will be prompted to recalibrate the meter in order that your recorded histories are consistent

**Cumulative energy unit changed...**

Vykon HVAC Workbench AX - HVAC.2.2

Gas meter  
10580 ft³

Mozilla Firefox

http://localhost/...ax\$2010\$20boilers

Gas meter  
300 m³

**Warning:**  
You may find that the facets display differently in the Workbench to the Browser

**Edit**

Name	Full Name	Enabled	Expiration	Permissions	Network User	Protoc
admin		true	Never	super	false	

Name: admin  
 Full Name:   
 Enabled: true  
 Expiration: Never Expires Expires On 11-May-2011 11:59 PM B  
 Permissions: Super User (access entire station, file system) super  
 Network User: false  
 Prototype Name:   
 Language:   
 Password: Password: Confirm:   
 Email:   
 Facets: Time Format: D-MMM-YY HH:mm  
 Unit Conversion: None  
 Nav File: File: ^Navigs None t.nav  
 Auto Logoff Enable: Metric  
 Web Profile: Auto Logoff Period: 00000h 15m 00s [5mins - +inf]  
 Type: HVAC Web Profile

If the facets do not display correctly in the browser then you should change the **Facet Unit Conversion** property in the user profile to 'None'

