

Current Cost Envi & Envi-R Display Unit

XML OUTPUT DESCRIPTION - v0.19

1. Serial Port

The Current Cost Envi Display outputs ASCII text over its serial port at 57600 baud, 1 start, 8-bit data, 1 stop, no parity, no handshake. This version does not listen for incoming data.

Using the optional Current Cost serial port cable, a standard PC's COM1 Port will receive the raw data for display using a terminal emulator program like Windows HyperTerminal or the Current Cost Terminal utility, which may be downloaded from www.currentcost.com. Alternatively, a batch command like the following works on some PC systems. Edit the "com1" text to match the Com port in use.

```
@echo off
title CurrentCost Data Display
color f0
prompt ""
mode con: cols=100 > nul
mode com1: baud=57600 parity=n data=8 stop=1 > nul
echo Displaying data received from com1 serial port. Press Ctrl-C to stop...
echo.
type com1
pause
```

If the PC does not have a COM serial port, the optional Current Cost USB cable can be used in conjunction with driver software to create a virtual COM port. The Prolific PL-2303 Drivers support Windows 98/ME/2K/XP/Vista/7/CE/Mobile, MacOS (8, 9 and 10.x PowerPC and Intel), PocketPC and RedHat Linux (some Linux kernels include support without additional drivers).

If the data is captured to a text file, some HTML browsers will open this to display the block of XML for easier reading, but the text must be prefixed and post fixed with a block label, eg <xml>...</xml>. MS Excel will read this data after generating a schema on the fly. The resulting sheet can be auto filtered. Alternatively there are free XML viewers available. All these programs load very slowly with file sizes above 2MB. There is no separate schema available, the programs will create their own.

The intention of providing the xml data is to enable custom software to be created to use the information in whatever way meets your personal or company objectives or interests.

2. Real-Time Output from "Watts" sensors

The Display Unit outputs Sensor data whenever a Sensor Transmission is successfully received.

The message structure comprises text fields within tags. Please note that all fields are variable length and may or may not contain leading spaces or zeros or sign characters. The parser should not assume any fields contain fixed-position text, either in the particular field or in the XML string as a whole.

<code><msg></code>	start of message
<code><src>CC128-v1.29</src></code>	source and software version**
<code><uid>161A582015AA09B</uid></code>	unique ID* (see text†)
<code><dsb>00089</dsb></code>	days since birth, ie days run
<code><time>13:02:39</time></code>	24 hour clock time*
<code><tmpr>18.7</tmpr></code>	temperature as measured in degC*
<code><tmprF>72.3</tmprF></code>	temperature as measured in degF*
<code><sensor>1</sensor></code>	Appliance Number as displayed
<code><id>01234</id></code>	radio ID received from the sensor
<code><type>1</type></code>	sensor Type, "1" = electricity
<code><ch1></code>	sensor channel*
<code><watts>00345</watts></code>	data and units
<code></ch1></code>	
<code><ch2></code>	sensor channel*
<code><watts>02151</watts></code>	
<code></ch2></code>	
<code><ch3></code>	sensor channel*
<code><watts>00000</watts></code>	
<code></ch3></code>	
<code></msg></code>	end of message

This message is sent out for each paired Appliance Sensor transmission received (sensor 1 to 9) plus the "Whole House" Sensor, which is listed as sensor 0.

** This data may not be present, depending on the capability level of the source units and the sensor channels in use. The XML parser must be able to handle the unavailability of data items as required by the end application. It is recommended to check the XML source and version number in the parser and process the data accordingly, to recognise different levels of device capability.*

† This is a reasonably unique non-determinate number which is intended to be used to check that xml data from this individual Display Unit is captured only to the external database associated with this Display. It is a 60-bit number expressed as hexadecimal characters. The number is generated on the fly by the first use of a new Display Unit. The number is permanently erased and a new non-determinate reasonably unique number is generated when the unit's history data memory is wiped. (This can be done by the user applying power at the same time as holding down any two buttons, until the lamp flashes twice).

*** Software version numbers are allocated according to client requests. A higher number does not necessarily denote a later version.*

The temperature string is formatted with any + symbol suppressed, eg "-0.9" to "-0.1" then " 0.0" to " 9.9" then "10.0" to "29.4"

3. Real-Time Output from "Meter Impulse" sensors

The Display Unit outputs Sensor data whenever a successful Sensor Transmission is received, as follows:

<code><msg></code>	start of message
<code><src>CC128-v1.29</src></code>	source and software version**
<code><uid>161A582015AA09B</uid></code>	unique ID* (see previous text†)
<code><dsb>00089</dsb></code>	days since birth, ie days run
<code><time>13:02:39</time></code>	24 hour clock time*
<code><tmpr>18.7</tmpr></code>	temperature as measured in degC*
<code><tmprF>72.3</tmprF></code>	temperature as measured in degF*
<code><sensor>9</sensor></code>	Appliance Number as displayed
<code><id>01234</id></code>	radio ID received from the sensor
<code><type>2</type></code>	sensor Type, 2=electric impulse
<code><imp>0000089466</imp></code>	Meter Impulse Count
<code><ipu>1000</ipu></code>	Meter Impulses Per Unit
<code></msg></code>	end of message

This message is sent out for each paired Meter Impulse Sensor transmission received (sensor 1 to 9), although there is no bar on the User pairing one to the "Whole House" default channel, which is listed as sensor 0.

The data will report "Type 2" for an Electricity Meter, "Type 3" for a Gas Meter and "Type 4" for a Water Meter.

The Impulse Count records the number of Meter Impulses seen since the sensor was paired. It is not updated in real-time per-pulse, but the latest count received will always include all impulses detected since pairing, in order that missing transmissions do not affect the accuracy of the latest count. It is up to the receiving software to keep track of the counts and the rate of count increase, if that is of interest.

The Impulses Per Unit refers to the User-set number which in theory the User has noted from the Meter Faceplate, eg 1000 imp/kWh. However, although this is available as a User Option on pairing a new sensor, it is not a pre-requisite that Users take positive action to change this from the default. The default is "1000" for an Electricity Meter.

** This data may not be present, depending on the capability level of the source units and the sensor channels in use. The XML parser must be able to handle the unavailability of data items as required by the end application. It is recommended to check the XML source and version number in the parser and process the data accordingly, to recognise different levels of device capability.*

*** Software version numbers are allocated according to client requests. A higher number does not necessarily denote a later version.*

4. History Output

History is stored for Watts Sensors, but not for Meter Pulse Sensors.

A full cycle of History messages are output starting at 1 minute past every odd hour, ie 17:01, 19:01 etc. A burst of data is sent once every 10 seconds. History Data is sent for all 10 sensors regardless if they are now present or not.

Four items of sensor data for each of 10 sensors are sent each xml burst, ie 40 items. When the data from one store is completely sent, the data from the next store is sent. When the cycle is completed, the wire is quiet of history data until the start of the next cycle.

A full cycle of output can be initiated for download on demand by pressing and holding the Down and OK buttons together until the LED flashes. Real-time XML output and all on-screen update including the time stops while this is happening.

4.1 Two-Hourly History Store

The last 31 days Energy Usage is output as 2-hour aggregates of KWHr (3720 values covering 9 Appliances plus Whole House), the data being aggregated starting at odd hours, eg 23:00 to 01:00, 01:00 to 03:00 etc. This accommodates industry requests to view evening and night data segments distinguished at 23:00.

"Sensor 0" refers to the "Whole House" and Sensors 1 to 9 are Appliance Sensors.

Where sensors have more than one channel, the value presented is the total of all channels.

<pre><msg> <src>CC128-v0.19</src> <uid>161A582015AA09B</uid> <dsb>00089</dsb> <time>13:10:50</time> <hist> <dsw>00032</dsw> <type>1</type> <units>kwhr</units> <data> <sensor>0</sensor> <h024>001.1</h024> <h022>000.9</h022> <h020>000.3</h020> <h018>000.4</h018> </data> ... <data> <sensor>9</sensor> <units>kwhr</units> <h024>000.0</h024> <h022>000.0</h022> <h020>000.0</h020> <h018>000.0</h018> </data> </hist> </msg></pre>	<pre>start of message [as for Real-Time] [as for Real-Time] [as for Real-Time] [as for Real-Time] start of history days since wipe of history sensor Type, "1" = electricity units of data eg KWHr start of data burst historic Appliance Number h="hours", 24="22 to 24 hrs ago" h="hours", 22="20 to 22 hrs ago" h="hours", 18="18 to 20 hrs ago" h="hours", 22="16 to 18 hrs ago" [Sensor 1 to 8 data here] end of message</pre>
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4.2 Daily History Store

The last 90 days Energy Usage is output as daily aggregates of KWHr (900 values covering 9 Appliances plus Whole House).

For simplicity, this data overlaps the 2-hr history store in the present version.

"Sensor 0" refers to the "Whole House" and Sensors 1 to 9 are Appliance Sensors.

Where sensors have more than one channel, the value presented is the total of all channels.

```
<msg>
  <src>CC128-v0.19</src>
  <uid>161A582015AA09B</uid>
  <dsb>00089</dsb>
  <time>13:10:50</time>
  <hist>
    <dsw>00032</dsw>
    <type>1</type>
    <units>kwhr</units>
    <data>
      <sensor>0</sensor>
      <units>kwhr</units>
      <d055>012.9</d055>
      <d054>011.0</d054>
      <d053>014.3</d053>
      <d052>019.5</d052>
    </data>
    ...
    <data>
      <sensor>9</sensor>
      <units>kwhr</units>
      <d055>000.0</d055>
      <d054>000.0</d054>
      <d053>000.0</d053>
      <d052>000.0</d052>
    </data>
  </hist>
</msg>
```

d="days", 055="55 days ago"

[Sensor 1 to 8 data here]

4.3 Monthly History Store

The last 84 months Energy Usage is output as monthly aggregates of KWHr (840 values covering 9 Appliances plus Whole House).

For simplicity, this data overlaps the 2-hr and Daily history stores in the present version [*subject to review*].

"Sensor 0" refers to the "Whole House" and Sensors 1 to 9 are Appliance Sensors.

Where sensors have more than one channel this is stored totalled.

```
<msg>
  <src>CC128-v0.19</src>
  <uid>161A582015AA09B</uid>
  <dsb>00089</dsb>
  <time>13:10:50</time>
  <hist>
    <dsw>00032</dsw>
    <type>1</type>
    <units>kwhr</units>
    <data>
      <sensor>0</sensor>
      <units>kwhr</units>
      <m002>257.0</m002>
      <m001>340.0</m001>
    </data>
    ...
    <data>
      <sensor>9</sensor>
      <units>kwhr</units>
      <m002>000.0</m002>
      <m001>000.0</m001>
    </data>
  </hist>
</msg>
```

m="month", 002="2 months ago"

[Sensor 1 to 8 data here]

4.4 Yearly History

Yearly data is not output in the XML as annual totals, but can be calculated by the recipient system by summing the appropriate monthly figures.

The monthly data covers a 7-year span.

5. Data Volume

The serial data XML output comprises real-time information and history.

If there are no paired or received sensors then there is no real-time output, only history. History output builds up from zero slots to fully populated slots as time passes, for all ten sensors regardless if they are paired. This is because the Display does not remember if sensors have been paired in the past and then removed, and assumes any stored history of these is of interest.

For real-time Watts messages (only) over 24-hours, with a good signal from the sensor(s):

- a standard one-channel home system will probably send about 2.64 MB
- a three-phase system will send 3.5MB
- a fully populated system of 10 three-phase sensors could send up to 35.5MB per day.

To this is added the history data, which will be sent in 12 two-hourly bursts per day as described in Section 3 above.

- After one day's system use the history data volume over 24-hours will be about 43kB
- After 90 days system use, the history data volume over 24-hours will be about 1.7MB
- After 84 months system use, the history data volume over 24-hrs will be just over 2MB.

5. Document Version

This Description was issued on 11th January 2011 and is subject to change without notice. The authors, copyright holders and publishers carry no liabilities whatsoever for losses of any sort, primary or secondary, time or money or anything else. All information must be verified before use by examination of actual data structures and timings by the practitioner. Accuracy of transmitted or received data is not warranted under any circumstances. Anyone using data derived from the product or any product description must perform their own risk assessment.

Having said that, we will try to notify interested folks of any changes as soon as practicable either directly or through web sites or blogs, and we will gratefully receive comments, criticism and suggestions for improvements from anyone.

Current Cost Ltd