User manual

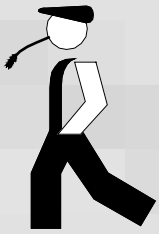
BigFarmNet Manager

OPC Server

Code No. 99-97-0069

Edition: 05/2010 GB

BigFarmNet Manager
OPC Server
User Manual



Code No: 99-97-0069
Edition: 05/2010 GB

Big Dutchman

Product information

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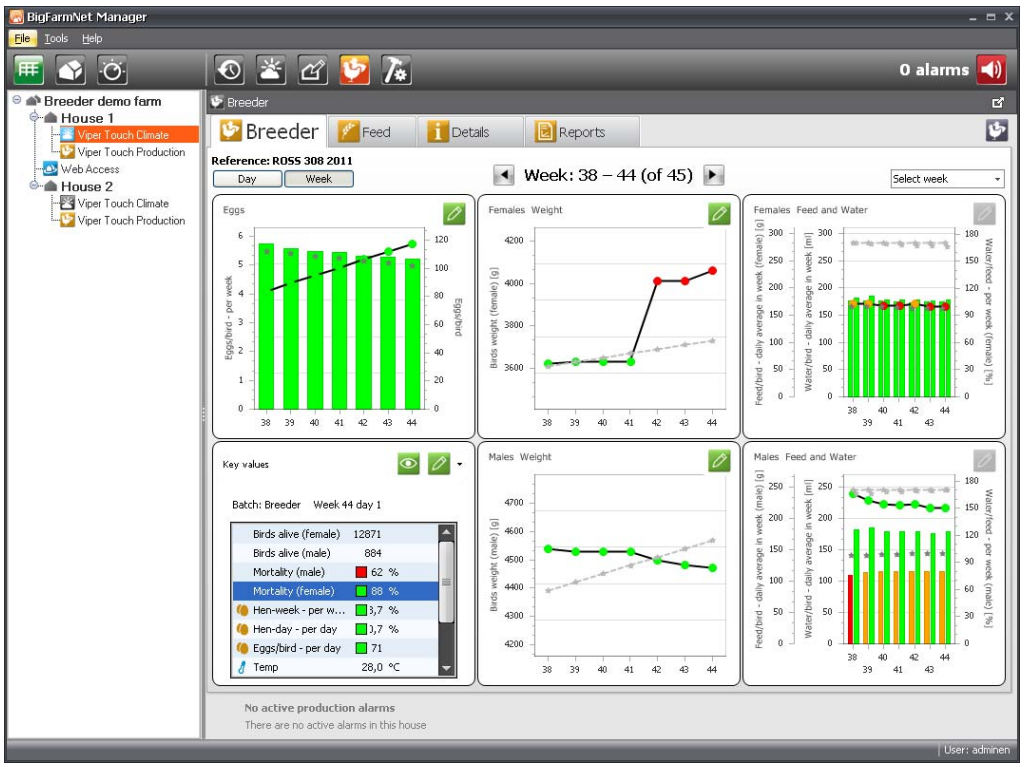
No. 1585 February 17, 2015

BigFarmNet-Manager 3.0



The new BigFarmNet-Manager 3.0 is released. The main new features are:

- Breeder production module and more functionality in broiler.
  - ➲ Interface for data registration (mortality, inspection weight, counted eggs)
- Additional report generator with selectable key values.

Compared to the Broiler production program the higher costs for the new Breeder license are justified by much more features. The new code number, now available for BigFarmNet is:

Code no.	Description	Pcs.
60-43-0607	Program BigFarmNet Manager production breeder, 1-house license	1 x per house

IMPORTANT:

ViperTouch Breeder needs program version 2.2.0 or higher to support all functions!

The BFN Calculation Tool in Enterprise II has been updated and is recommended to use for initial offers or updates. Choose Submenu 1.3.1.5.7.

In the past, some breeder customers have used the broiler production license as in between solution. If they now use the breeder software on the ViperTouch, they also need to upgrade the BFN-Manager to version 3.0 and exchange the broiler with a breeder production license. Until May 31, 2015 this upgrade will be possible without additional costs for the licence if the original BFN-order was done before January 1, 2015. In the BFN Calculation Tool in such a case it is needed to tick:

☑ Previous broiler lic for breeder

Note! Do not miss to check the network components:

For new projects for which BigFarmNet-Manager is offered it is necessary to include the Ethernet network installation. Especially the switches are not included by default in ViperTouch. Therefore, please add the Ethernet-switches to the switchboxes, or use following pre-mounted units.

Code no.	Description
91-02-6305	Ethernet-switch BFN Box 8xRJ45 (with 8 connectors*)
91-02-6304	Ethernet-switch BFN Box 4xRJ45 1xFiberCable (with 4 connectors*)
91-02-6306	Ethernet-switch BFN Box 6xRJ45 2xFiberCable (with 6 connectors*)

* Each switchbox comes with one plug per RJ45-connector (91-02-0123). This plug does not require special tools. For more network details, such as fiber cable usage, please see product information no. 1151 and 1296.

BigFarmNet Manager Handbücher:

99-94-0366	Manual uni: BigFarmNet manager - Poultry / UM
99-94-0367	Manual uni: BigFarmNet manager - Poultry / TM

We recommend using the latest BFN calculation tool (Enterprise II ➲ 1.3.1.5.7.)

Current presentations with an overview of the most important BFN-Manager functions are placed in the Infothek.

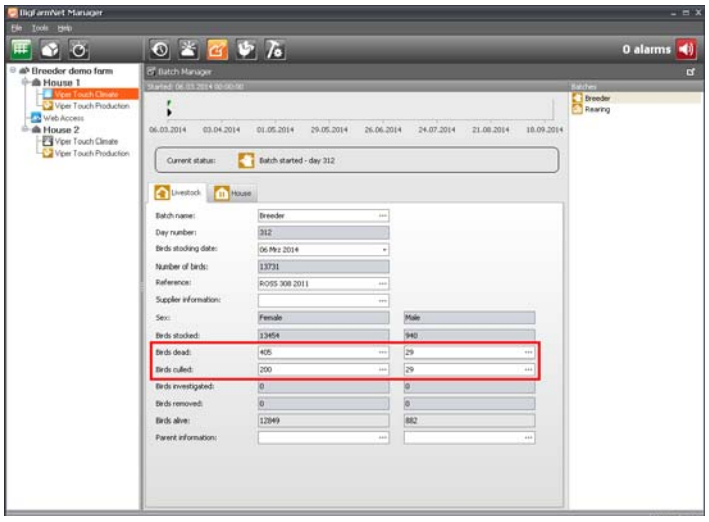
A demo version of BFN-manager is available: **Download** DEMO of BFN-Manager 3.0 now!

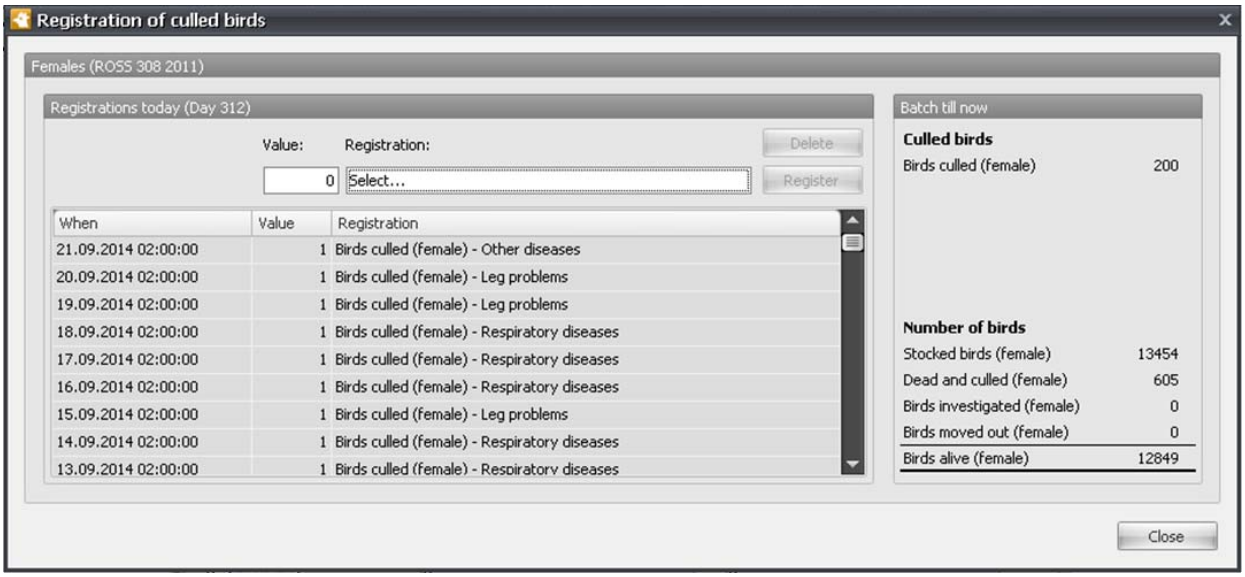
The new features with more details

Batch manager

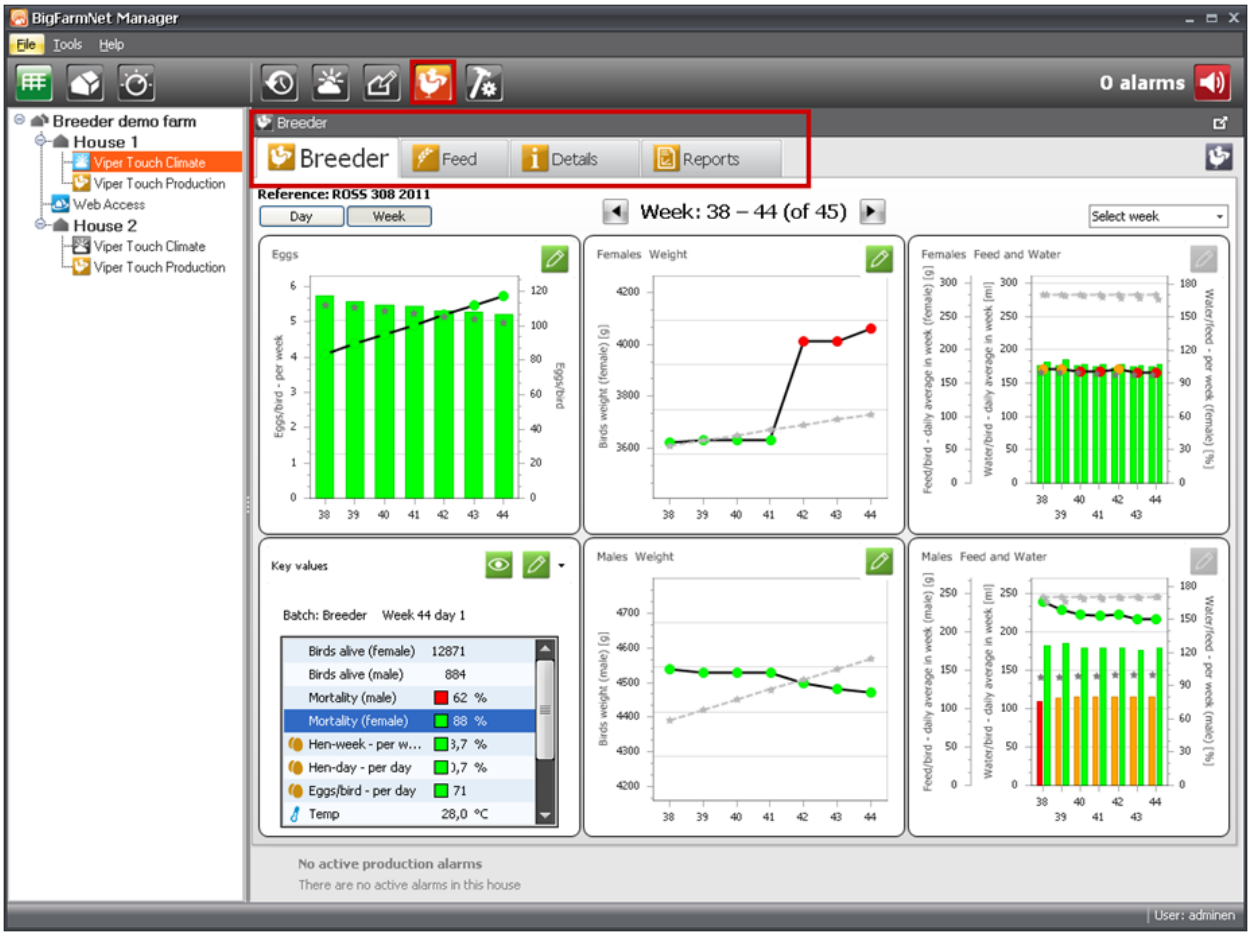
The batch manager has been changed. Information about dead and culled animal is now possible to be updated in this page.

Also the report utility has been moved to the production module.



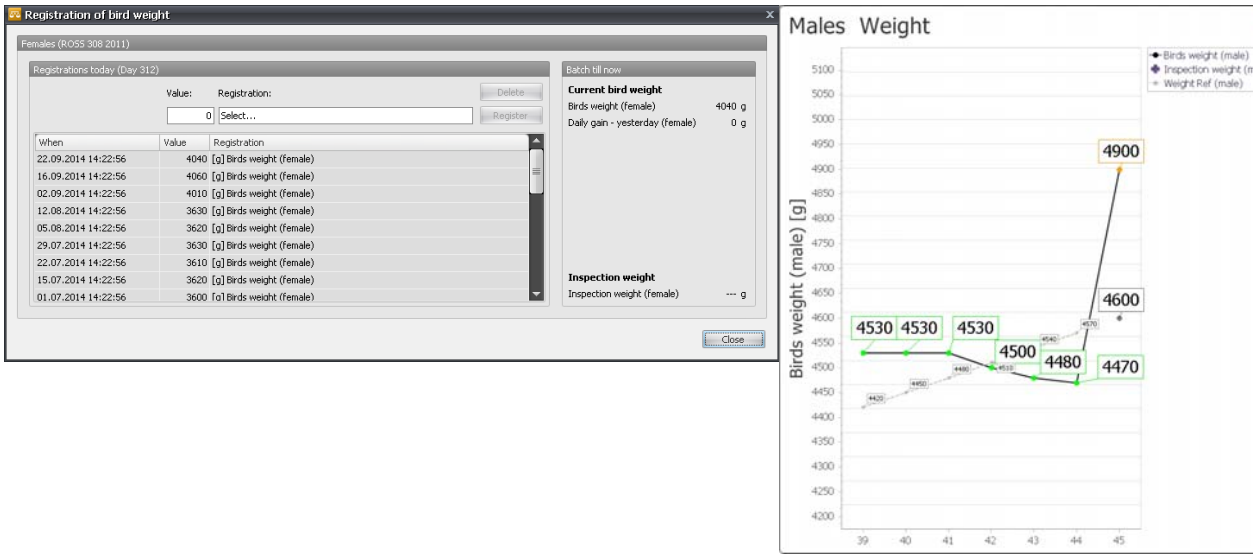


The production, broiler or breeder, has new tabs so that the layout is more similar to the climate module. The new tabs are **Breeder/Broiler, Feed** (only breeder), **Details** and **Reports.**

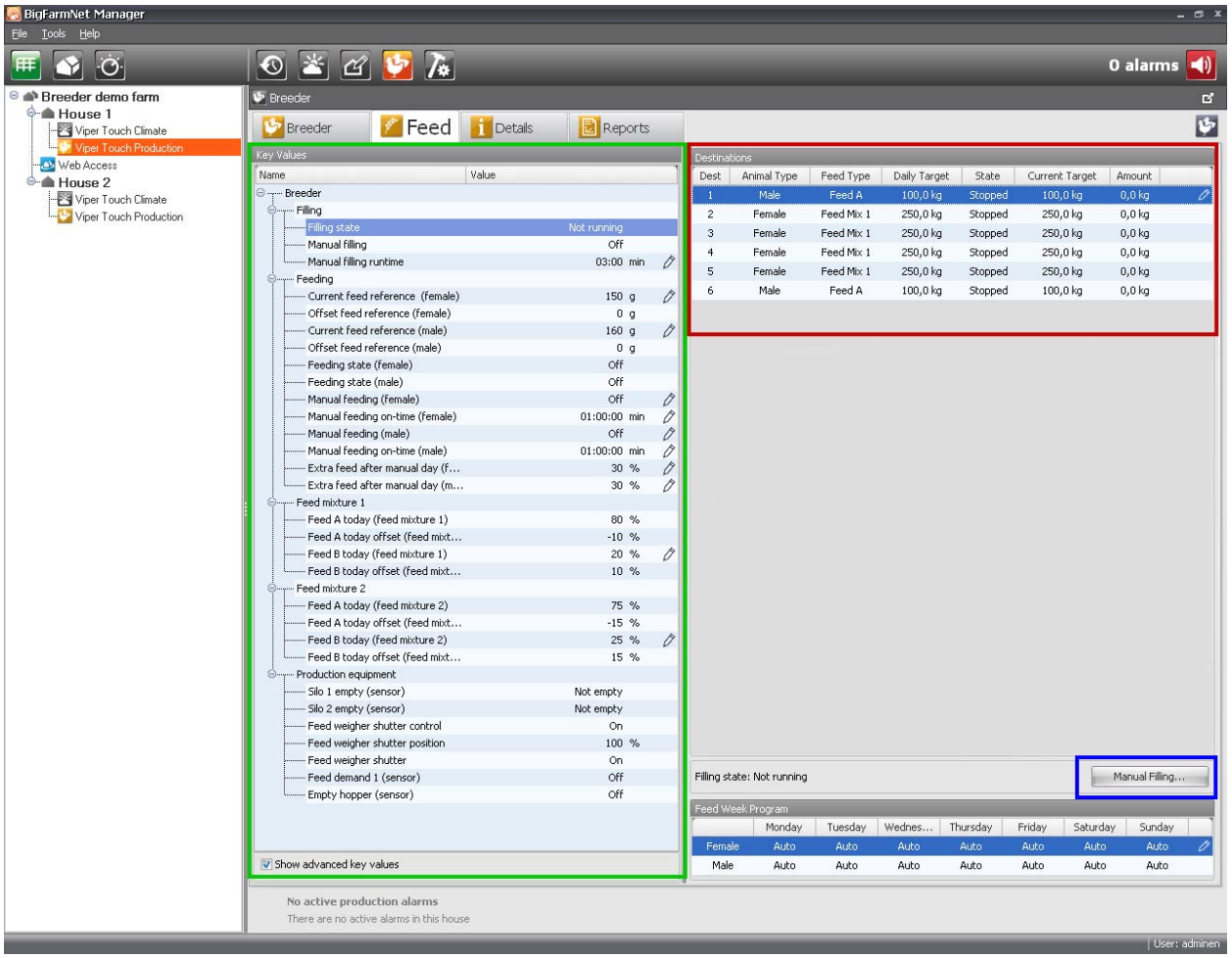


The breeder tab is completely new. Several important key values are shown and also in some of them it is possible to enter data in a table view with edit possibilities by pressing the pen icon colored in green.

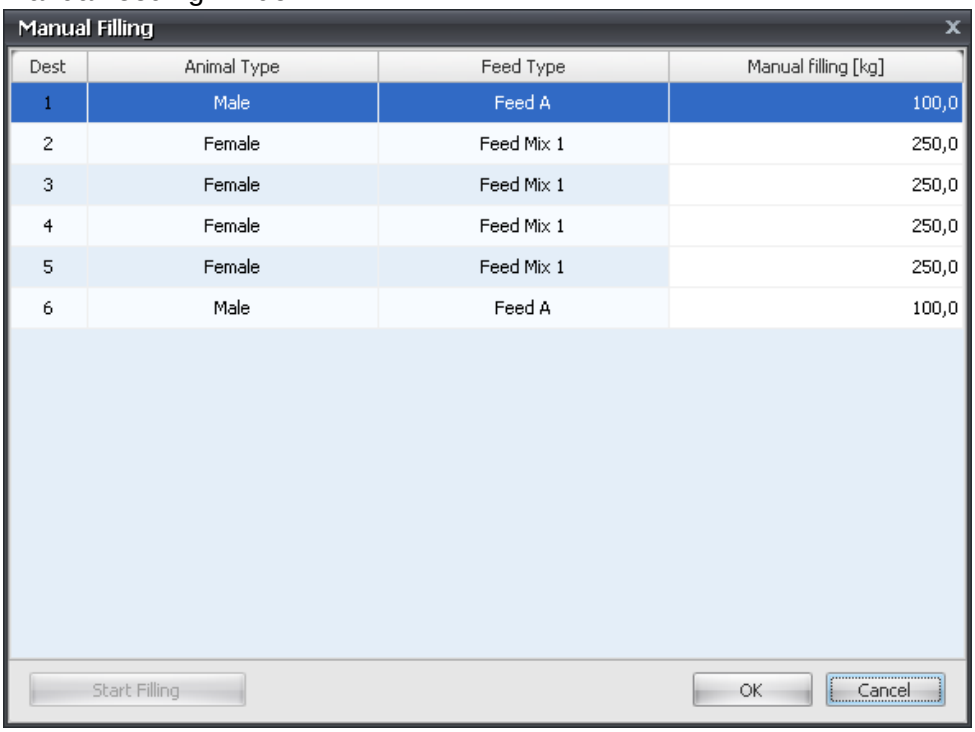
Now it is possible to enter the inspection weight as a complement to the automatic weight.



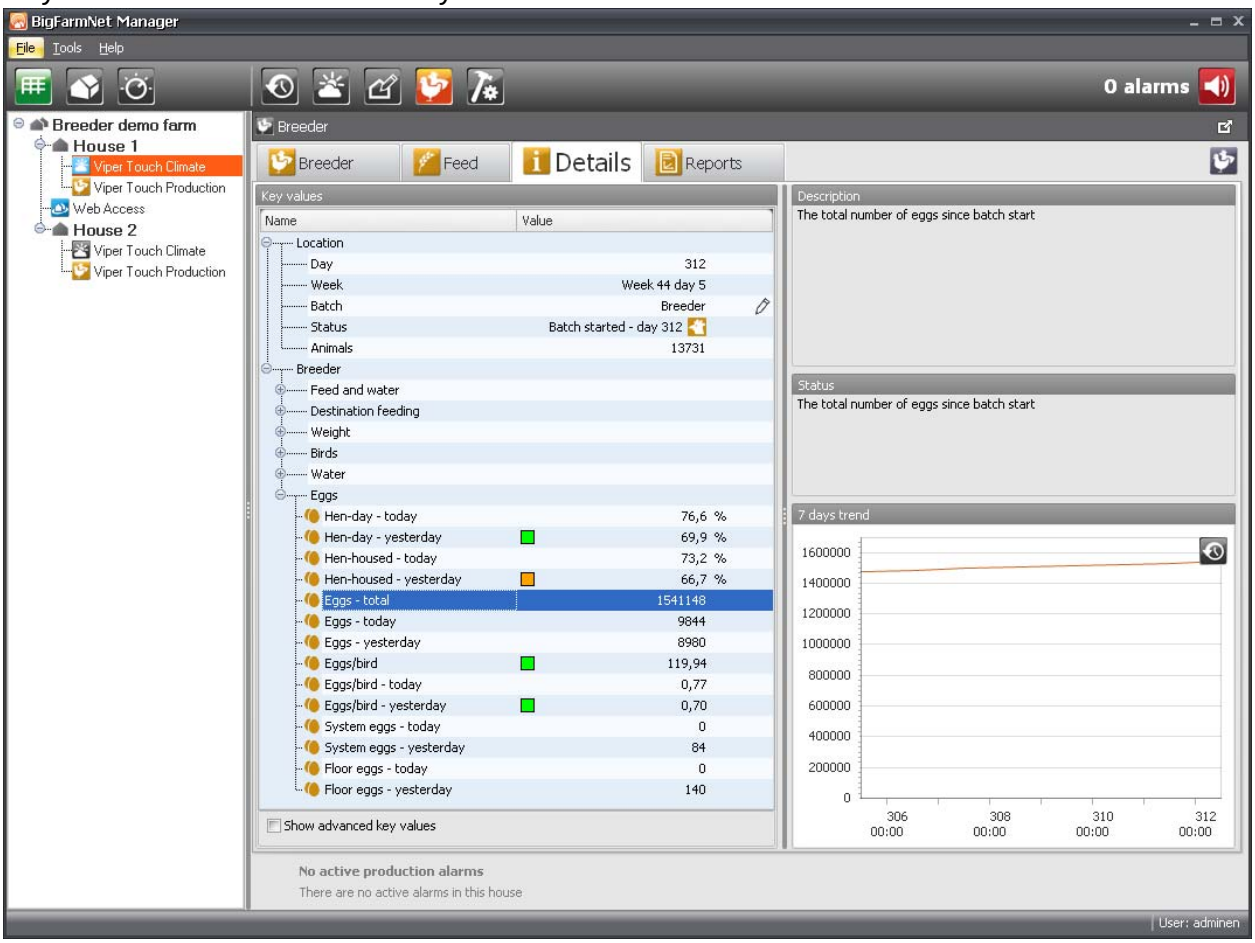
Only for breeder computers the next tab is the **feed** control. It is possible to review and change all parameters concerning feed filling, feed mixtures, and feed equipment (green square), feed settings for the different destinations (red square) and to activate manual feedings (blue square).



Manual feeding window:

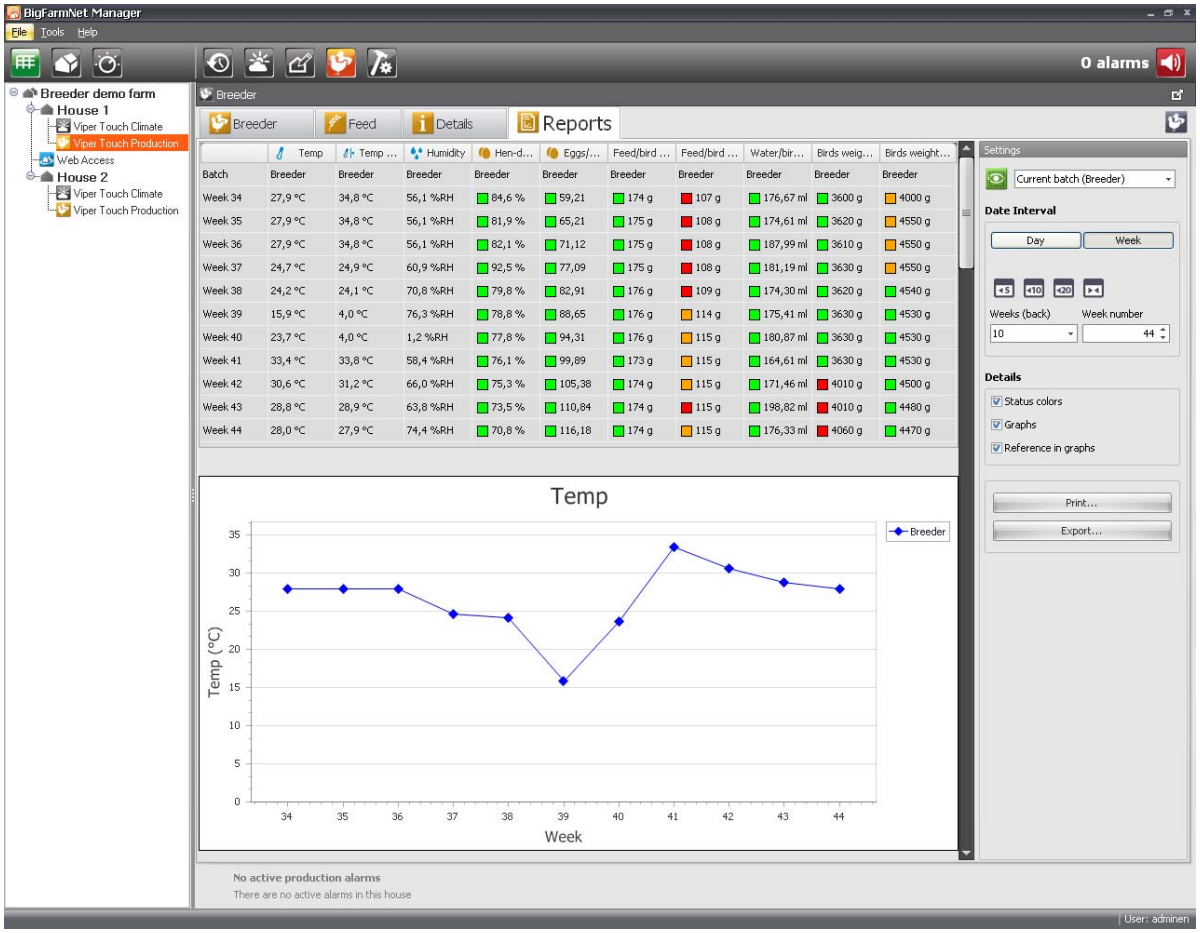


The new "Details" tab allows for access to all information available about production in the same way as the climate module already shows.



The new "Report" tab makes it possible to fully configure the key values presented in the report.

Using the key value selection icon or making right click in the table header it is possible to select any of the key values present in the system.



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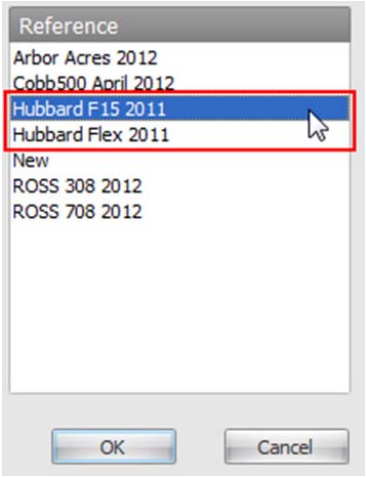
No. 1541 August 13, 2014

Service Access released with BigFarmNet Manager 2.5

The new BigFarmNet Manager version comes with two new reference files, that have been added to the Broiler reference list: Hubbard Flex and Hubbard F15

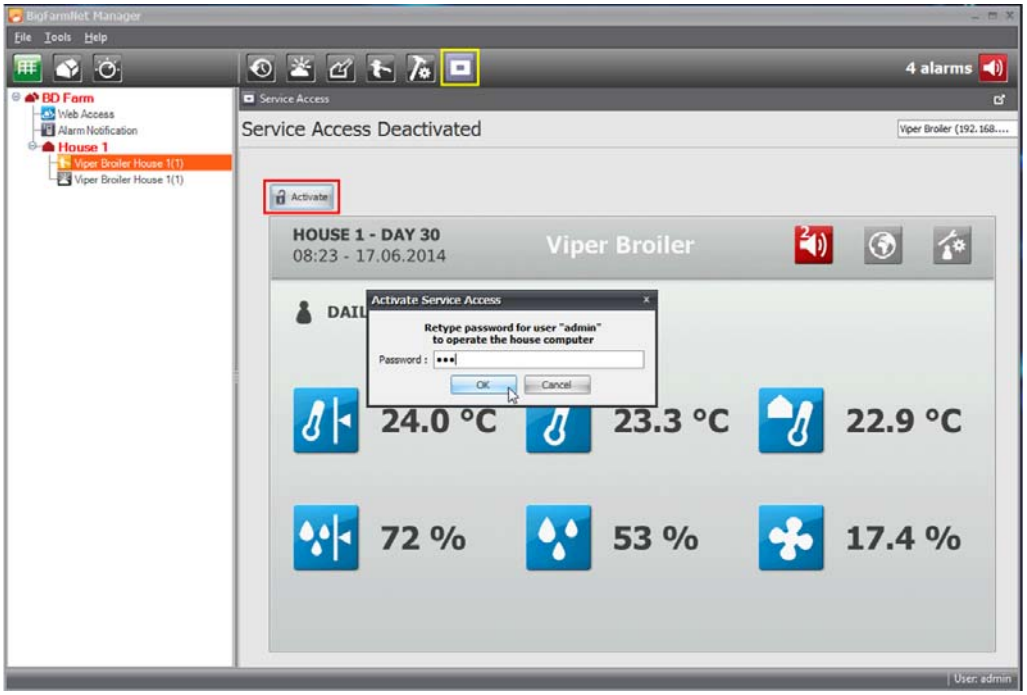


The communications capabilities with the house control and WebLink boxes in combination with older house controls were improved.

But the most important new feature is the Service Access. It allows direct access to the ViperTouch Screens from a local PC.

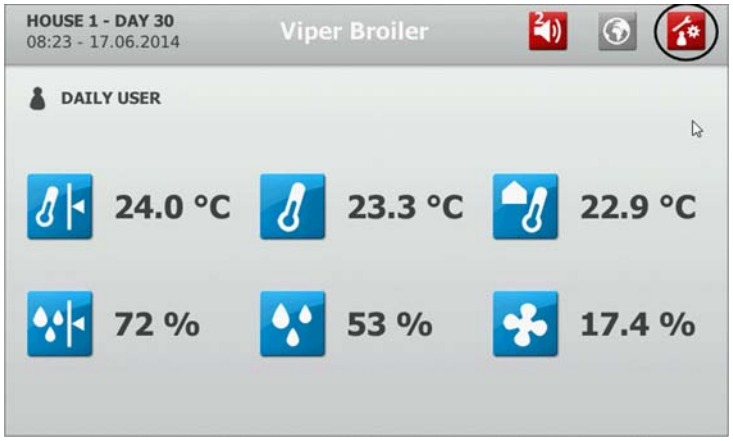
☞	The ViperTouch controls need at least version 2.1 or newer.

Due to the installation of an additionally required per-house-license, a additional icon will be displayed in the menu bar. After clicking the symbol (yellow square), a mirror of the ViperTouch screen appears. For direct access it is possible to activate the remote control with the "Activate" button (red square).

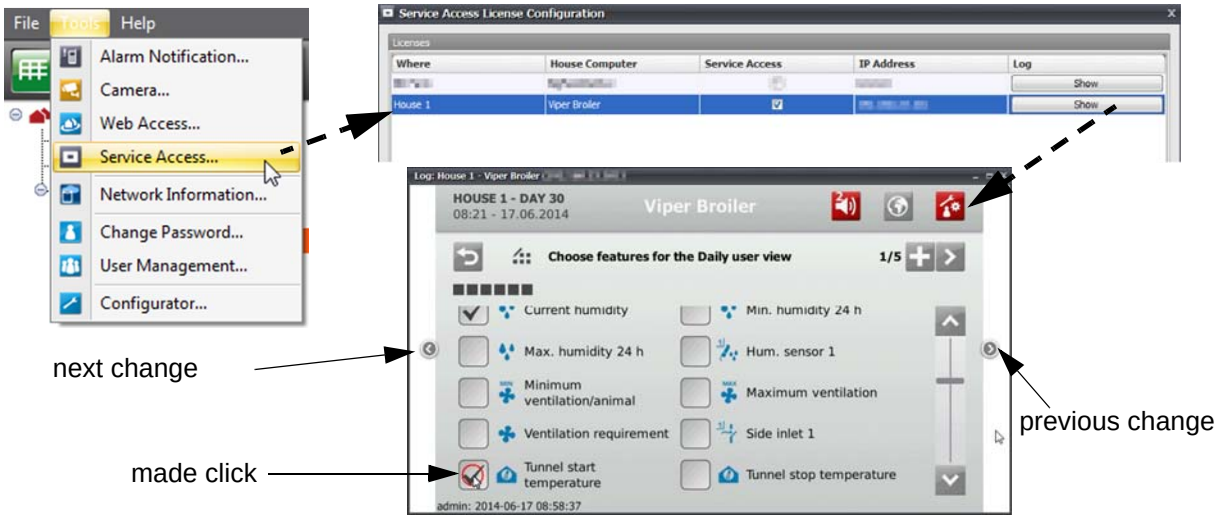


The current BigFarmNet user password is required to prevent unauthorized access. A safe system always requires a password. Some of the Active Service Access dialogues are only available in English.

The person in front of the control can see, that the system is remotely controlled. In this case the main menu button will change its colour to red (black circle).



For safety reasons the system will log all screen clicks, so changes can be shown later via integrated screen capture history.



It is possible to use this feature from a remote PC, smart phone or tablet via TeamViewer or VNC-Software. We recommend to use our VPN industrial router (see product information no. 1455). It supports a secure connection to the farm and provides easy access for the costumer. The BFN-Poultry-App 2.0 does not support Service Access.

⚠	The current BigFarmNet production broiler functionality is only compatible with computers configured for broiler. Breeder computers like the new ViperTouch breeder software 2.1 or the old MC95 Breeder are not supported. The BFN-Manager with Breeder Production Module will be released with Version 3.0 later this year!

For the Service Access the following license is required per house:

Code-no.	Description	Qty.
60-43-0619	Program BFN Manager Service Access, 1-house license	1x per house
Accessory:		
91-04-0132	Industry router w/firewall+VPN (LAN/LAN) w/BigFarmNet remote maintenance setup	1x per farm

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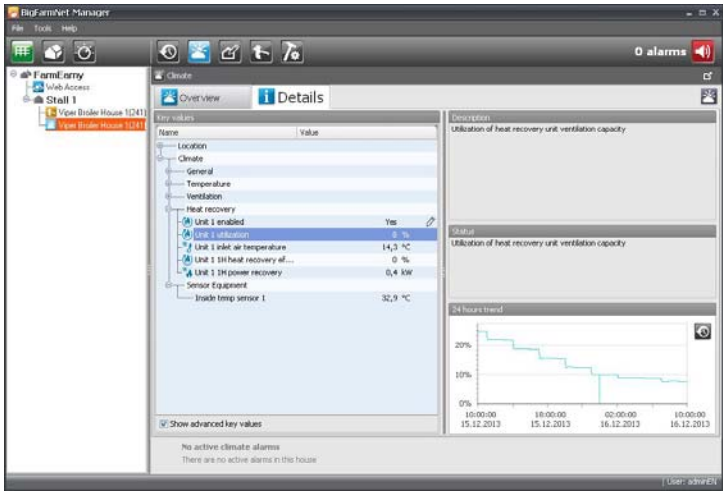
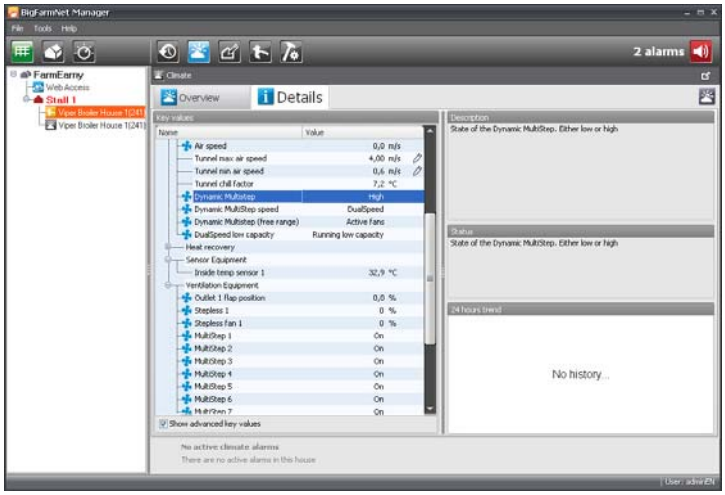
No. 1483 March 5, 2014

BigFarmNet-Manager 2.4

The new version of the BigFarmNet-Manager includes improvements in the climate module supervision and in the area of the Earny control as well as several improvements in the broiler production module like the new reference editor, more water meters and bird scales.

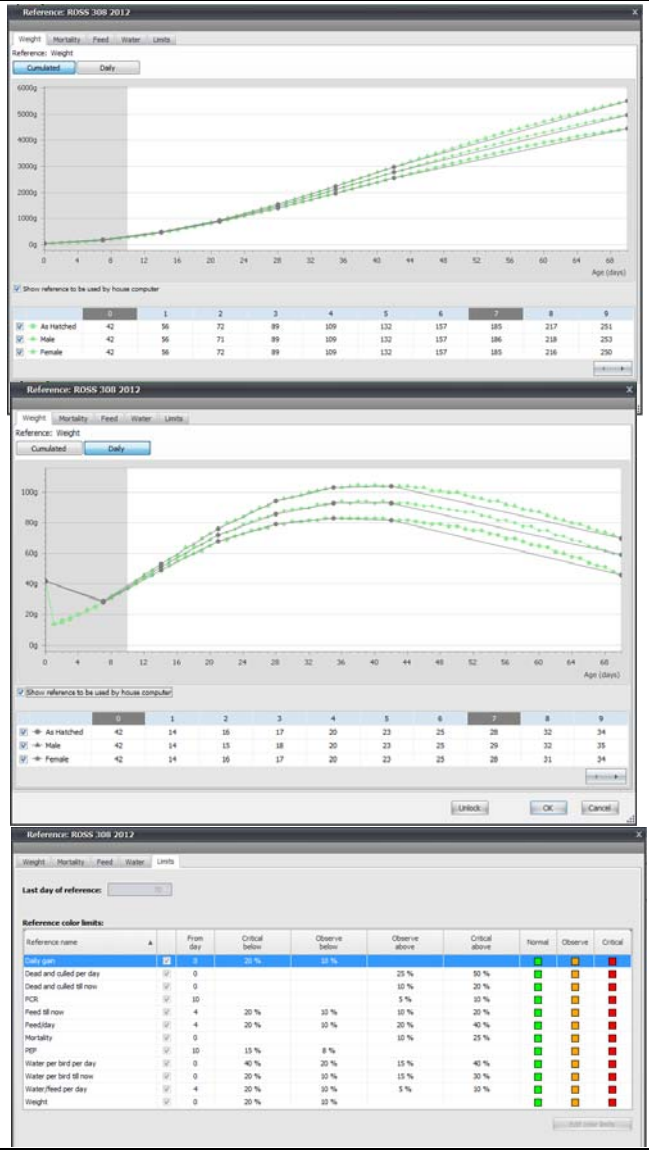
In addition, a new calculation tool for BigFarmNet network is available.

Climate module

Earny unit for heat recovery:	
	This new version enables to control and supervise the Earny, which is connected to a Viper Touch (version 1.6 or newer required).
Dynamic multistep:	
	The support for dynamic multistep was added in this version.

Module for the broiler production

Reference editor:

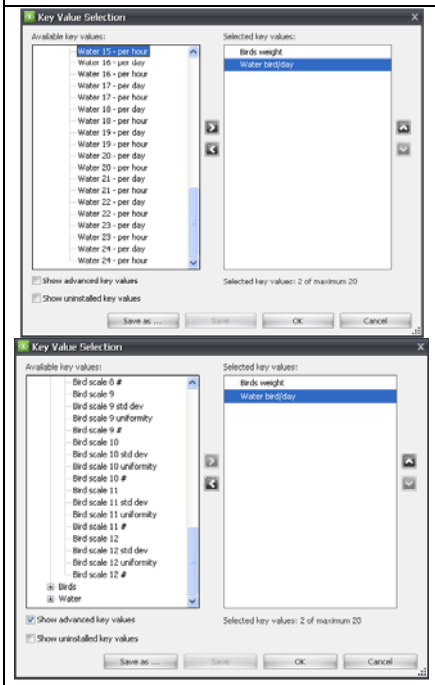


The new reference curves editor makes it easier to create and adjust the curves. It further allows to define the colour comparison limits which were introduced in previous versions.

In this new version we have two curves per value, the cumulated value and the daily value. It is also possible to see male, female and as-hatched references in the same graph.

Window for the definition of the colour:
This new version allows to define in % and the program will show the respective reference value in either red, yellow or green in the broiler view graphics.

Water meters and bird scales:

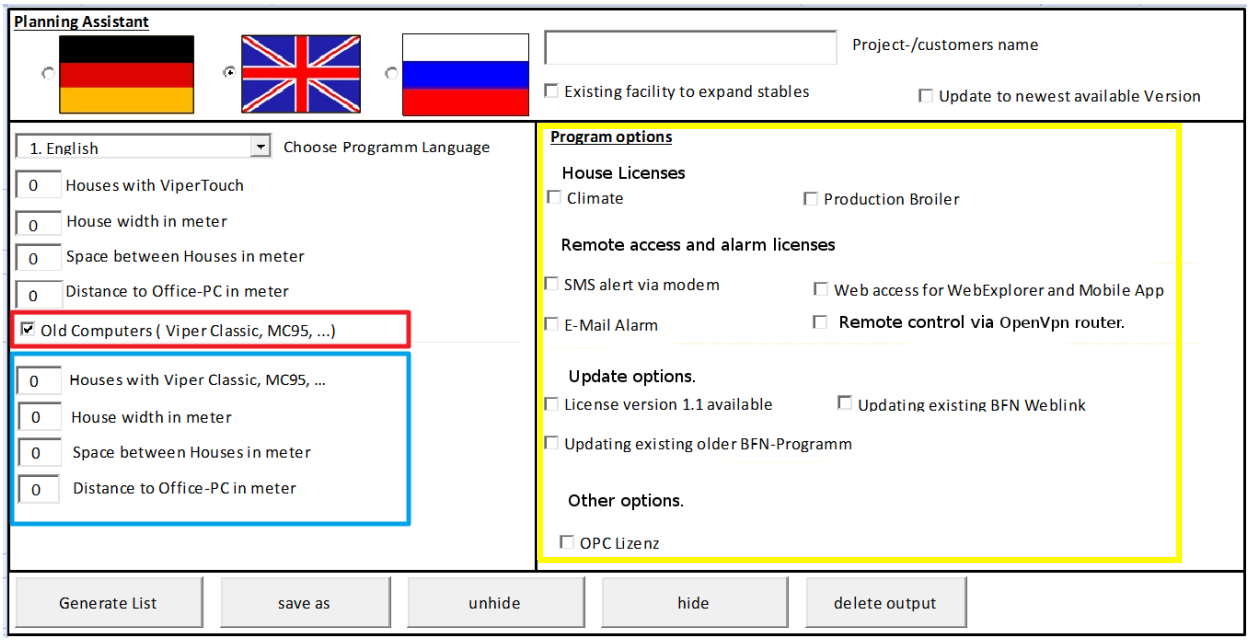


Now, up to 24 water meters and 12 bird scales can be supported (Viper Touch 1.6 or newer required).

New calculation tool - EP II-No. 1.3.1.5.3.

In the new tool it is differentiated between new computers (Viper Touch) and old computers (Viper, MC95). To add an old computer mark the selection box "Old Computers" (red box), then the field in the blue box will appear below, complete this with the required information.

Also more clear options (yellow box) are added.



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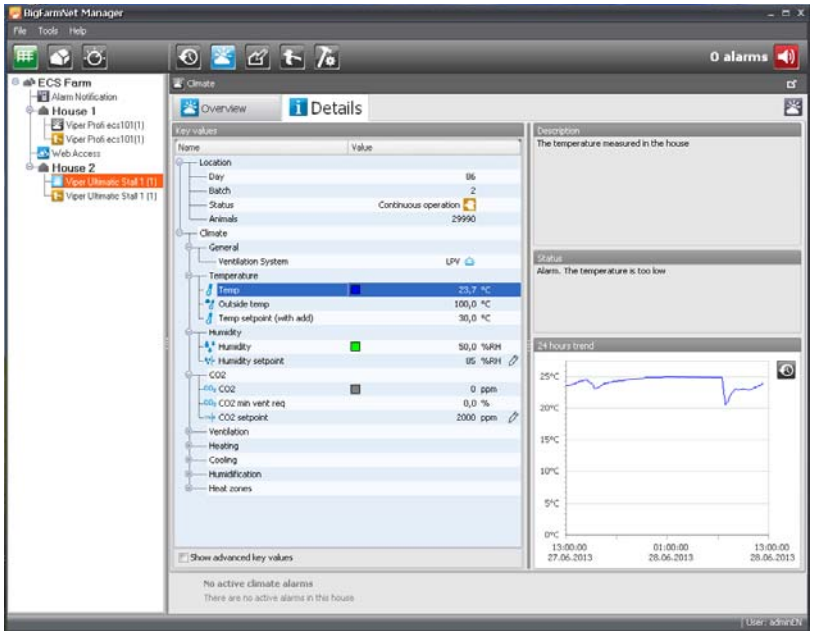
No. 1454 February 3, 2014

BigFarmNet 2.3

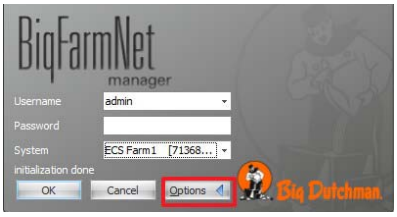


The new BFN version is now available. Several visual changes were made to make the operation more effective.

Additional language support for: Croatian, Finnish, Hungarian, Romanian, Portuguese and Slovakian.

Already supported languages: English, German, Danish, Swedish, Thai, Chinese, French, Czech, Italian, Korean, Polish, Russian, Dutch, Japanese and Indonesian.

If users experience trouble with a slow performance or have asked for the features described above, we recommend an update to the new version. It is not necessary to make a new farm configuration, the old configuration can be selected in the "system" field of the login window.



All the previous data will be present after the update.

	The BFN-Manager can support up to 25 ViperTouch in one configuration. If more computers are needed please contact the EC Support.

Survey change:

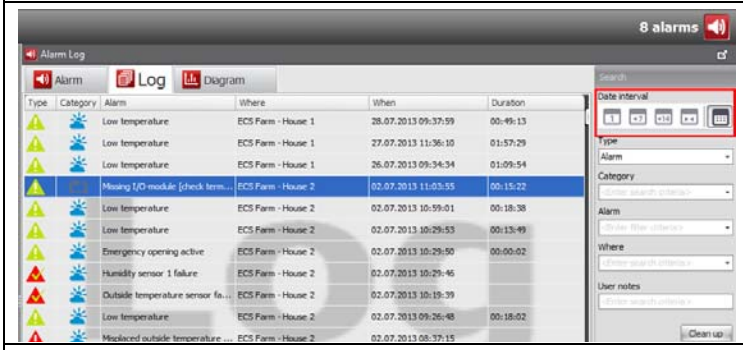
Now it is possible to create multiple tabs in the survey.

Each tab can have different key values.

The locations can be shown in columns or rows.

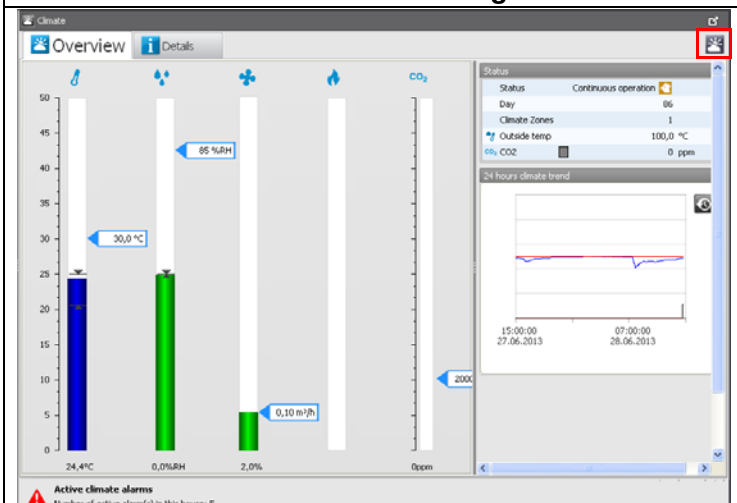
It is also possible now to make a quick report of the survey.

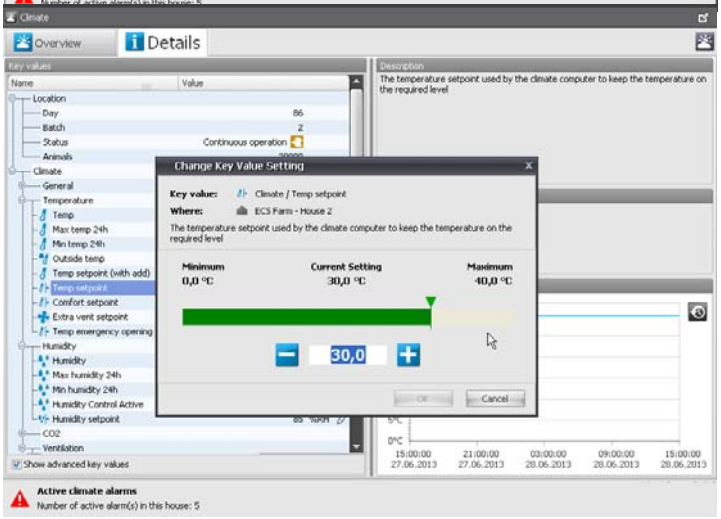
Alarm search by intervals:



With the new date interval filter the alarm log now allows to filter the alarms according to dates.

Climate overview and details change:





The climate view has been completely renewed.

It is possible to change the climate program by clicking on this icon:

The most important change is the new detail view - all parameters can now be accessed from one list.

Also a description of the selected parameter, a status report for the value as well as a 24-hour trend is provided.

A new window pops-up when a parameter is selected for change. The further information about the parameter will help to adjust the right settings.

Additional improvements:

- This new version makes it easier to configure a network with older Viper- or MC-series and Viper Touch.
- For quotation support, please take a look on the renewed BFN calculation sheet under 1.3.1.5.7 in the Enterprise II

Coding

Code no.	Description	Planning aid
60-43-0610	Program BigFarmNet manager starter kit poultry v.2 DK	per farm-PC
60-43-0611	Program BigFarmNet manager starter kit poultry v.2 GB	per farm-PC
60-43-0612	Program BigFarmNet manager starter kit poultry v.2 D	per farm-PC
60-43-0613	Program BFN manager starter kit poultry v.2 CZ	per farm-PC
60-43-0614	Program BFN manager starter kit poultry v.2 RUS	per farm-PC
60-43-0601	Program BigFarmNet Manager Climate Poultry, 1-house license	per climate computer *
60-43-0615	Program BigFarmNet Manager production broiler, 1-house license	per production computer *
60-43-0603	Program BigFarmNet Manager license extension	per license extensions **
60-43-0616	Program Update BigFarmNet manager 1.X to 2.X	per farm-PC
60-43-0617	Program Update Interface BFN Weblink v.2	per farm
60-43-0621	Program BigFarmNet manager web access, 1-farm license v.2.1	per farm-PC
60-43-0620	Program BFN manager OPC server v.2.1	per farm-PC
60-43-0604	Program BigFarmNet manager alarm notification, 1-farm license v.2.1	per farm-PC
60-43-0691	Program Update BFN manager 2.X on latest version	per farm-PC
91-04-0132	Industry router w/firewall+VPN (LAN/LAN) w/BigFarmNet remote maintenance setup	per farm and internet connection

* In case of dual house computers (MC-95-2 for example) two licenses are needed.

** This part is only needed to add new licenses in a working BigFarmNet system.

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1 BigFarmNet Manager OPC Server Documentation

This document describes the OPC server solution that is part of the BigFarmNet Manager system. It is assumed that the reader is familiar with basic OPC concepts as described in [Softing OCP Book, Chapter 1 & 2].

The target audience of this document is system integrators working on integrating the BigFarmNet Manager OPC server into their existing systems by reading data from the BigFarmNet Manager OPC server.

1.1 Terminology

Term	Description
BD	**B**ig **D**utchman
BFN	**B**ig **F**arm **N**etwork
DA	**"D**ata **A**ccess" = OPC specification
MIA	**M**jølner **I**nformatics **A**/S
OPC	**O**LE for **P**rocess **C**ontrol

1.2 References

Reference	Document
[OPC DA]	OPC Data Access Custom Interface Specification Version 3.0
[OPC DCOM]	"Using OPC with DCOM with Microsoft Windows XP SP2", Version 1.10, OPC Foundation, http://www.opcfoundation.org under "Downloads→White Papers"
[Softing OPC Book]	Frank Iwanitz and Jürgen Lange: "OPC Fundamentals, Implementation and Application", 3rd ed, 2005, ISBN 3-7785-2904-8

1.3 Introduction

The data published in the OPC server is a subset of the data published in the BigFarmNet Manager system.

The OPC server supports the OPC Data Access Specification, hereafter referred to as OPC DA or simply DA, see the OPC DA specification [OPC DA] for technical details. The OPC server provides a snapshot of the current values of the BigFarmNet Manager.

The BigFarmNet Manager OPC server runs as a Windows service.

The BigFarmNet Manager OPC server has currently only been tested on Windows XP SP2.

1.4 Getting Started

Big Dutchman recommends using a generic OPC client when first connecting to the BigFarmNet Manager OPC server. This is to ensure that it is possible to connect to the BigFarmNet Manager OPC server before using your custom-developed OPC client. Many of the vendors have free trial versions of generic OPC clients available.

The OPC server has the following URI

```
opcda://<hostname>/BigFarmNet Manager OPC Server/{0D642258-1CD9-4126-AF31-F7F8FA56A5A2}
```

1.5 Structure of Namespace

The OPC items are modeled after the structure of the locations in BigFarmNet Manager. In BigFarmNet Manager a “location” is a farm, a house or a section within a house. Locations are modeled in a hierarchical structure as shown in the figure below.

The rest of this document is based on the Big Dutchman demonstration example from BigFarmNet Manager:

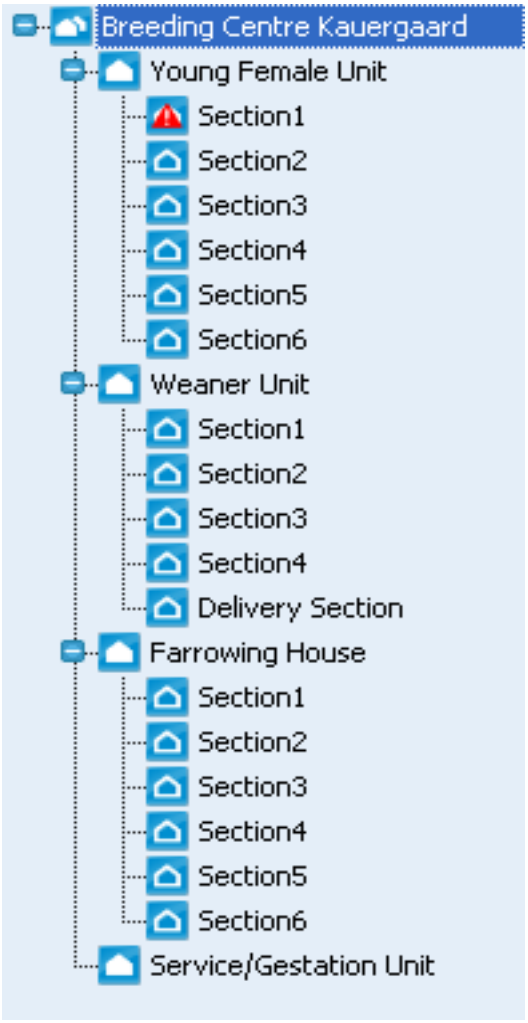

Figure 1 - Big Dutchman demo example “Kauergaard” taken from BigFarmNet Manager

The example has a Farm, “Breeding Centre Kauergaard”, with four houses, “Young Female Unit”, “Weaner Unit”, “Farrowing House” and “Service/Gestation Unit”. Some houses are divided into sections. The types of location are Farm (1), House (4) and Section (17) for a total of 22 locations.

Each location has the following data associated:

- “Alarms” child item where all active alarms are published as XML. An alarm can have type “alarm” or “warning”. An alarm will be visible in OPC as long as it has not ceased or it has not been acknowledged.
- “Data” child item where all measured data from equipment (house computers), e.g. DOL 234. Also published as XML.
- “Location properties” which is data stored in the location item itself. Also published as XML

This is illustrated in the figure below that, for presentation purposes, only shows a subset of the locations:

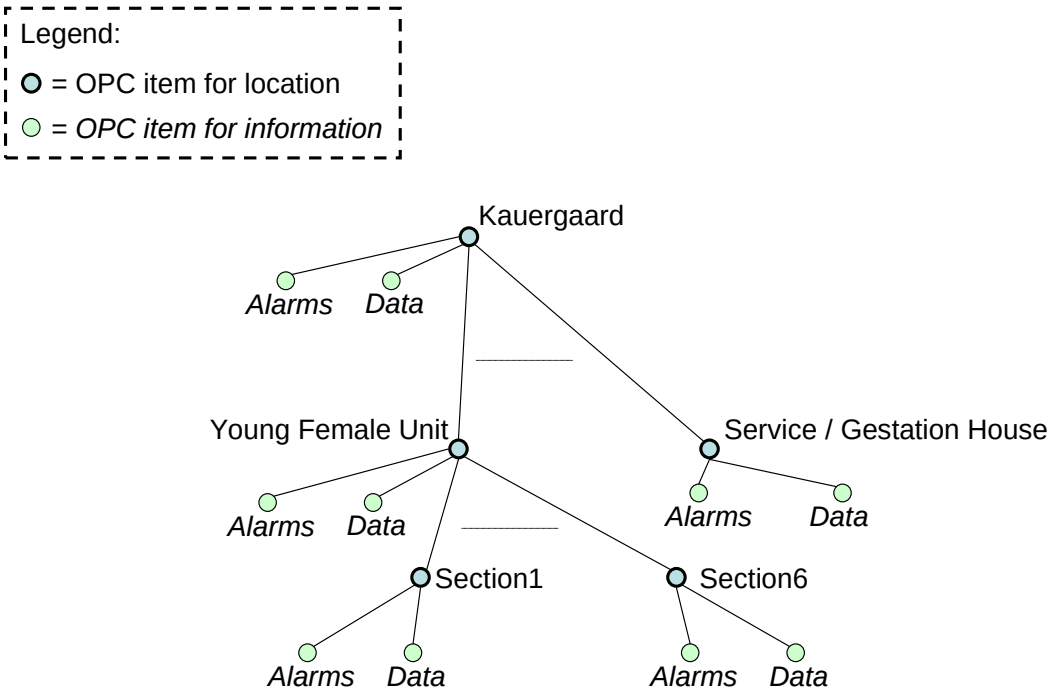

Figure 2 - Location and their data as OPC items

Regardless of whether a location has alarms or house computers, there will be an Alarms and a Data item for the location.

1.6 Configuration from BigFarmNet Manager

The OPC server cannot be started until BigFarmNet Manager has been connected to the farm network with a valid OPC license. When BigFarmNet Manager is first connected, the initial configuration of the OPC server is created.

The OPC server can be monitored via the OPC tool in BigFarmNet Manager.

The OPC server may run on only one farm computer, and this will per default be the first computer that starts up BigFarmNet Manager. If the OPC server should run on another farm computer, this can be configured in BigFarmNet Manager's OPC tool running on that computer.

The OPC tool in BigFarmNet Manager can be used retrieve the following information:

- Whether the OPC server is online
- The name of the computer which is set to run the OPC server
- The connection string for connecting clients to the OPC server

1.7 Alarms

First the generic XML schema for alarms is described. The XML data in each OPC "Alarms" item can be validated against this schema. Secondly the information contained in the XML document is described. The schema is available in appendix A of this document.

1.7.1 Schema for Alarm XML

The XML schema for alarms is generic in order to allow for adding more attributes to the published alarms in future versions of BigFarmNet Manager without breaking existing integrations.

The schema has three basic XML tags. `<alarms>` which is the root tag, the tag `<alarm>` represent an alarm and the tag `<attribute>` represent an attribute of the alarm object.

1.7.2 The Published Alarm Data

For each published alarm the following attributes are published:

Attribute	Meaning
Type	Indicates whether the alarm is of type "alarm" or "warning".
Slogan	The alarm slogan. This is a brief text that describes the alarm.
Help text	This is a longer text that describes the alarm.
Code	This is a numeric identifier for the alarm.
Acknowledged	Indicates whether the alarm has been acknowledged. The value may be: • Acknowledged at 16-01-2009 11:55:37 • Unacknowledged • Warnings cannot be acknowledged
Acknowledged by	The user or house computer that acknowledged the alarm.
Activated	Information about when the alarm was generated. An example of a value is: `16-01-2009 11:55:29`

Restored	Information about when the condition that generated the alarm was ceased. Examples of values are: • Ceased at: 16-01-2009 11:55:42 • Not ceased
Category	This is an overall category for the alarm. An example is “Climate-Temperature”.
Source	A description of the source of the alarm. This may be a user name if the user has generated the alarm in BigFarmNet Manager or it may be the house computer that generated the alarm.
User note - feedback	User notes entered in the “Feedback” field in BigFarmNet Manager.
User note – corrective action	User notes entered in the “Corrective action” field in BigFarmNet Manager.

1.8 Data

First the XML schema for Data is briefly described. The XML data in each OPC Data item can be validated against this schema. The schema can be found in appendix C.

1.8.1 Schema for Data XML

The XML schema for Data is generic in order to allow for new types of equipment or data types in future versions of BigFarmNet Manager without breaking existing integrations.

A location can have zero or more house computers. Each house computer produces one or more data objects.

The schema has three basic XML tags. `<data>` which is the root tag, the tag `<houseComputer>` is the only child tag of the `<data>` tag and represent a house computer. The only child tag of `<houseComputer>` is the tag `<dataObject>` representing one data object. A `<dataObject>` can have two different child tags `<collectionAttribute>` and `<simpleAttribute>`. The `<collectionAttribute>` is used to represent a set of discrete measurement values, e.g. a set of temperature values over time. The `<simpleAttribute>` is used to represent singular values, e.g. a Boolean indicating whether a Heat monitor is installed or not.

For documentation of the data objects from the individual house computers we refer to << Skov documentation supplied by SRN >>.

An example XML document can be found as appendix D.

1.9 Location Properties

First the generic XML schema for location properties is described. The XML data in Location item can be validated against this schema. Secondly the information contained in the XML document is described. The schema is included as appendix E

1.9.1 Schema for Location Properties XML

The XML schema for location properties is specific and only contains information about the type of location (Farm, House or Section) and the locations name in partial ISOAgriNet notation, e.g. 1.2.4 would be Farm 1, House 2, Section 4, which in the example used in this document would be “Section4” of the “Young Female Unit” house.

The schema has three basic XML tags. `<properties>` which is the root tag, the tag `<type>` represent the type of location and the tag `<templateNumber>` represent the ISOAgriNet notation of the location.

An example XML document can be found in appendix F.

1.10 Additional DCOM Information

The reference [OPC DCOM] contains the needed information about setting up the correct security etc. on a Windows XP SP2 machine.

1.11 Limitations

When locations are reconfigured in the BigFarmNet Manager Configurator, this implies changes to the OPC namespace. In order to make sure the name space is updated correctly in all clients, the OPC server will shut down and an alarm is generated. When this happens, all OPC clients should be closed down and restarted.

2 Appendix A: XML Schema for Alarms

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="alarms">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="alarm" type="alarmType"
                    minOccurs="0" maxOccurs="unbounded"  />
      </xs:sequence>
      <xs:attribute name="numberOfAlarms" use="required">
        <xs:simpleType>
          <xs:restriction base="xs:integer">
            <xs:minInclusive value="0"  />
          </xs:restriction>
        </xs:simpleType>
      </xs:attribute>
    </xs:complexType>
  </xs:element>

  <xs:complexType name="alarmType">
    <xs:sequence>
      <xs:element name="attribute" type="attributeType"
                  maxOccurs="unbounded"  />
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="attributeType">
    <xs:sequence>
      <xs:element name="name" type="xs:string" />
      <xs:element name="value" type="valueType" />
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="valueType">
    <xs:simpleContent>
      <xs:extension base="xs:string">
        <xs:attribute name="type" type="xs:string"
                    use="required"  />
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>

  <xs:simpleType name="typeEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="xs:string"  />
    </xs:restriction>
  </xs:simpleType>
</xs:schema>
```

3 Appendix B: Alarm XML Example

This is XML taken from ”Section1” OPC item, which is a child of “Young Female Unit”.

```
<?xml version="1.0" encoding="utf-8"?>
<alarms xmlns:xs="http://www.w3.org/2001/XMLSchema"
        numberOfAlarms="2" >
  <alarm>
    <attribute>
      <name>Type</name><value type="xs:string">Warning</value>
    </attribute>
    <attribute>
      <name>Slogan</name><value type="xs:string">Alarm Test</value>
    </attribute>
    <attribute>
      <name>Help text</name>
      <value type="xs:string">
            Manual test. Check that the alarm lamp is flashing and the
            system is alarming as intended. Test each house in turn
      </value>
    </attribute>
    <attribute>
      <name>Code</name><value type="xs:string">001-0013</value>
    </attribute>
    <attribute>
      <name>Acknowledged</name>
      <value type="xs:string">Warnings cannot be acknowledged.</value>
    </attribute>
    <attribute>
      <name>Acknowledged by</name><value type="xs:string" />
    </attribute>
    <attribute>
      <name>Activated</name>
      <value type="xs:string">04-02-2009 11:37:37</value>
    </attribute>
    <attribute>
      <name>Restored</name><value type="xs:string">Not ceased</value>
    </attribute>
    <attribute>
      <name>Category</name><value type="xs:string">System</value>
    </attribute>
    <name>Source</name>
      <value type="xs:string">DOL234</value>
    </attribute>
    <attribute>
      <name>User note - Feedback</name><value type="xs:string" />
    </attribute>
    <attribute>
      <name>User note - Corrective action</name>
      <value type="xs:string" />
    </attribute>
  </alarm>
  <alarm>
    <attribute>
      <name>Type</name>
      <value type="xs:string">Alarm</value>
    </attribute>
    <attribute>
```

```
      <name>Slogan</name>
      <value type="xs:string">One parameter is set default</value>
    </attribute>
    <attribute>
      <name>Help text</name>
      <value type="xs:string" />
    </attribute>
    <attribute>
      <name>Code</name>
      <value type="xs:string">001-0025</value>
    </attribute>
    <attribute>
      <name>Acknowledged</name>
      <value type="xs:string">Unacknowledged</value>
    </attribute>
    <attribute>
      <name>Acknowledged by</name>
      <value type="xs:string" />
    </attribute>
    <attribute>
      <name>Activated</name>
      <value type="xs:string">04-02-2009 11:37:54</value>
    </attribute>
    <attribute>
      <name>Restored</name>
      <value type="xs:string">Not ceased</value>
    </attribute>
    <attribute>
      <name>Category</name>
      <value type="xs:string">System</value>
    </attribute>
    <attribute>
      <name>Source</name>
      <value type="xs:string">DOL234</value>
    </attribute>
    <attribute>
      <name>User note - Feedback</name>
      <value type="xs:string" />
    </attribute>
    <attribute>
      <name>User note - Corrective action</name>
      <value type="xs:string" />
    </attribute>
  </alarm>
</alarms>
```

4 Appendix C: XML Schema for Data

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema attributeFormDefault="unqualified"
           elementFormDefault="qualified"
           xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="data">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="houseComputer" type="houseComputerType" />
      </xs:sequence>
      <xs:attribute name="numberOfHouseComputers"
                    type="xs:unsignedByte" use="required" />
    </xs:complexType>
  </xs:element>

  <xs:complexType name="houseComputerType">
    <xs:sequence>
      <xs:element maxOccurs="unbounded" name="dataObject"
                  type="dataObjectType" />
    </xs:sequence>
    <xs:attribute name="name" type="xs:string" use="required" />
    <xs:attribute name="numberOfDataObjects" type="xs:unsignedByte"
                  use="required" />
  </xs:complexType>

  <xs:complexType name="dataObjectType">
    <xs:choice minOccurs="1" maxOccurs="unbounded">
       <xs:element name="collectionAttribute"
                   type="collectionAttributeType" />
      <xs:element name="simpleAttribute" type="simpleAttributeType" />
    </xs:choice>
    <xs:attribute name="name" type="xs:string" use="required" />
  </xs:complexType>

  <xs:complexType name="collectionAttributeType">
    <xs:sequence>
      <xs:element maxOccurs="unbounded" name="value">
        <xs:complexType>
          <xs:simpleContent>
            <xs:extension base="xs:decimal">
              <xs:attribute name="type" type="xs:string"
                            use="required" />
            </xs:extension>
          </xs:simpleContent>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
    <xs:attribute name="name" type="xs:string" use="required" />
    <xs:attribute name="unit" type="xs:string" use="required" />
  </xs:complexType>

  <xs:complexType name="simpleAttributeType">
    <xs:sequence>
      <xs:element name="name" type="xs:string" />
      <xs:element name="value">
        <xs:complexType>
          <xs:simpleContent>
```

```
            <xs:extension base="xs:string">
              <xs:attribute name="type" type="xs:string"
                            use="required" />
            </xs:extension>
          </xs:simpleContent>
        </xs:complexType>
      </xs:element>
      <xs:element name="unit" type="xs:string" />
    </xs:sequence>
  </xs:complexType>
</xs:schema>
```

5 Appendix D: Data XML Example

This is XML taken from ”Section1” OPC item, which is a child of “Young Female Unit”.

```
<?xml version="1.0" encoding="utf-8"?>
<data xmlns:xs="http://www.w3.org/2001/XMLSchema"
      numberOfHouseComputers="1">
          <houseComputer name="DOL234-Section1" numberOfDataObjects="3">
            <dataObject name="Humidification [SKOV]">
                        <simpleAttribute>
                                    <name>Demand</name>
                                    <value type="xs:float">0</value>
                                    <unit>Percent</unit>
                        </simpleAttribute>
                        <simpleAttribute>
                                    <name>Installed</name>
                                    <value type="xs:boolean">false</value>
                                    <unit/>
                        </simpleAttribute>
            </dataObject>
            <dataObject name="EmptyHouse [SKOV]">
                        <simpleAttribute>
                                    <name>Ventilation</name>
                                    <value type="xs:float">0</value>
                                    <unit>Percent</unit>
                        </simpleAttribute>
                        <simpleAttribute>
                                    <name>Heat</name>
                                    <value type="xs:float">0</value>
                                    <unit>Percent</unit>
                        </simpleAttribute>
                        <simpleAttribute>
                                    <name>AntiFrostActive</name>
                                    <value type="xs:boolean">false</value>
                                    <unit/>
                        </simpleAttribute>
                        <simpleAttribute>
                                    <name>FrostTemperature</name>
                                    <value type="xs:float">0</value>
                                    <unit>Celsius</unit>
                        </simpleAttribute>
            </dataObject>
            <dataObject name="TempCurve [SKOV]">
                        <simpleAttribute>
                                    <name>OffsetTempVent</name>
                                    <value type="xs:float">0</value>
                                    <unit>Celsius</unit>
                        </simpleAttribute>
                        <collectionAttribute name="Day" unit="">
                                    <value type="xs:short">1</value>
                                    <value type="xs:short">7</value>
                                    <value type="xs:short">14</value>
                                    <value type="xs:short">21</value>
                                    <value type="xs:short">28</value>
                                    <value type="xs:short">35</value>
                                    <value type="xs:short">42</value>
                                    <value type="xs:short">49</value>
                        </collectionAttribute>
```

```
<simpleAttribute>
        <name>SetpTempVent</name>
        <value type="xs:float">1</value>
        <unit>Celsius</unit>
</simpleAttribute>
<simpleAttribute>
        <name>SetpTempHeat</name>
        <value type="xs:float">0</value>
        <unit>Celsius</unit>
</simpleAttribute>
<collectionAttribute name="TempHeat" unit="Celsius">
        <value type="xs:float">33</value>
        <value type="xs:float">31.2</value>
        <value type="xs:float">28</value>
        <value type="xs:float">25</value>
        <value type="xs:float">21.5</value>
        <value type="xs:float">19.3</value>
        <value type="xs:float">17</value>
        <value type="xs:float">17</value>
</collectionAttribute>
<collectionAttribute name="TempVent" unit="Celsius">
        <value type="xs:float">33</value>
        <value type="xs:float">31.5</value>
        <value type="xs:float">28.5</value>
        <value type="xs:float">26</value>
        <value type="xs:float">23</value>
        <value type="xs:float">21</value>
        <value type="xs:float">19</value>
        <value type="xs:float">19</value>
</collectionAttribute>
<simpleAttribute>
        <name>OffsetTempHeat</name>
        <value type="xs:float">0</value>
        <unit>Celsius</unit>
</simpleAttribute>
<simpleAttribute>
        <name>ComfortTemp</name>
        <value type="xs:float">1</value>
        <unit>Celsius</unit>
</simpleAttribute>
<simpleAttribute>
        <name>NightDecrease</name>
        <value type="xs:float">0</value>
        <unit>Celsius</unit>
</simpleAttribute>
<simpleAttribute>
        <name>HumidityDecrease</name>
        <value type="xs:float">0</value>
        <unit>Celsius</unit>
</simpleAttribute>
<simpleAttribute>
        <name>EnvironmentTemp</name>
        <value type="xs:float">0</value>
        <unit>Celsius</unit>
</simpleAttribute>
<simpleAttribute>
        <name>SetpTempVentAdd</name>
        <value type="xs:float">2</value>
        <unit>Celsius</unit>
</simpleAttribute>
```

```
                    <simpleAttribute>
                              <name>SetpTempHeatAdd</name>
                              <value type="xs:float">0</value>
                              <unit>Celsius</unit>
                    </simpleAttribute>
          </dataObject>
        </houseComputer>
</data>
```

6 Appendix E: XML Schema for Location Properties

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema attributeFormDefault="unqualified"
           elementFormDefault="qualified"
           xmlns:xs="http://www.w3.org/2001/XMLSchema">
         <xs:element name="properties">
          <xs:complexType>
                    <xs:sequence>
                              <xs:element name="type" type="xs:string"/>
                              <xs:element name="templateNumber"
type="xs:unsignedByte"/>
                    </xs:sequence>
          </xs:complexType>
         </xs:element>
</xs:schema>
```

7 Appendix F: Location Properties XML Example

This is XML taken from the “Farrowing House” OPC node.

```
<?xml version="1.0" encoding="utf-8"?>
<properties xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <type>House</type>
  <templateNumber>1.3</templateNumber>
</properties>
```

Big Dutchman

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