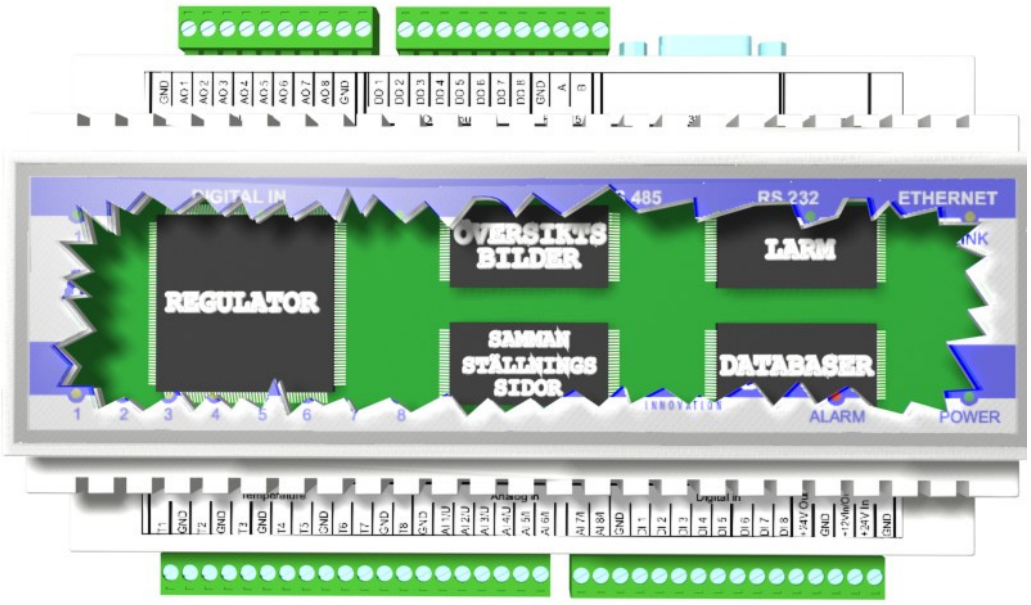
Abelko
INNOVATION

IMSE WebMaster Pro

User Guide



User Guide WMPro ver. 13
Release 3.4 - 3.5

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Contents

1 Introduction

1.1 About this user guide

In this section you will discover how the user guide is structured and how you can get the most out of it.

For a more detailed description of the WMPro, please see the WMPro Reference Manual. To find out about specific controllers, please see the WMPro Controller Reference Manual.

WMPro

Throughout the manual we use the name WMPro, which is short for IMSE WebMaster Pro

Getting started

We have created a Connection Wizard to get you started and discover what the WMPro can do. The wizard is a small program you can download from the Abelko web site: www.abelko.se. It will help you get to know your WMPro

To find out more

For a more detailed description of the WMPro, please see the WMPro Reference Manual. To find out about specific controllers, please see the WMPro Controller Reference Manual.

1.1.1 Document structure

The user guide is structured chronologically. In other words the sections generally appear in the order you will need them.

Each section starts with a general description and a basic example. The rest of the section goes into more detail. Reference tables and other data appear at the end of the section.

1.1.2 Where to start

Section 2 describes the WMPro hardware, with connection instructions and input/output specifications.

Section 3 discusses the communication options in the WMPro. The basic user interface is web based, so you will need to connect to a PC before you can start changing settings.

Section 4 is possibly the most important section of all. It contains a general description of how the WMPro and the user interface work. Once you have understood the system as a whole, it will be easier to understand the details.

The rest of the sections cover how to use the WMPro and various parts of the user interface.

1.1.3 Other documents

Apart from this user guide, there are other documents that are provided to help you. The example applications give you an idea of the many possibilities. The reference manuals contain all the details we could not include in this user guide.

For more information, go to www.wmpro.abelko.se

1.2 Important information

1.2.1 Installation

Electrical installation work may only be carried out by qualified electricians in accordance with the applicable regulations. The equipment must be unplugged from the mains during installation.

1.2.2 Protection

IMSE Webmaster Pro is protected to IP 20, which means it is not water resistant. It must not be installed where it might be exposed to water of any kind.

1.2.3 Electromagnetic radiation

When measurement and control systems are installed, the cables must be laid in a way that minimises magnetic and electric fields. These fields can be influenced by many factors – frequency converters, relays, contactors, earth currents and static discharge. Cable lengths can also affect sensitivity. The installation should be carefully planned to minimise interference.

1.2.4 Operating conditions

IMSE WebMaster Pro is designed for an ambient temperature of between –40 °C and +60 °C and up to 90 % relative humidity (non-condensing).

1.3 Warranty

1. Abelko will repair any design, material and manufacturing defects at its own expense, provided they occur during normal use and the purchaser submits a claim within 60 months of the verified delivery date. The purchaser is responsible for removal and re-installation and for paying transport costs to Abelko, and Abelko will repair the defect and return the equipment free of charge to the purchaser.

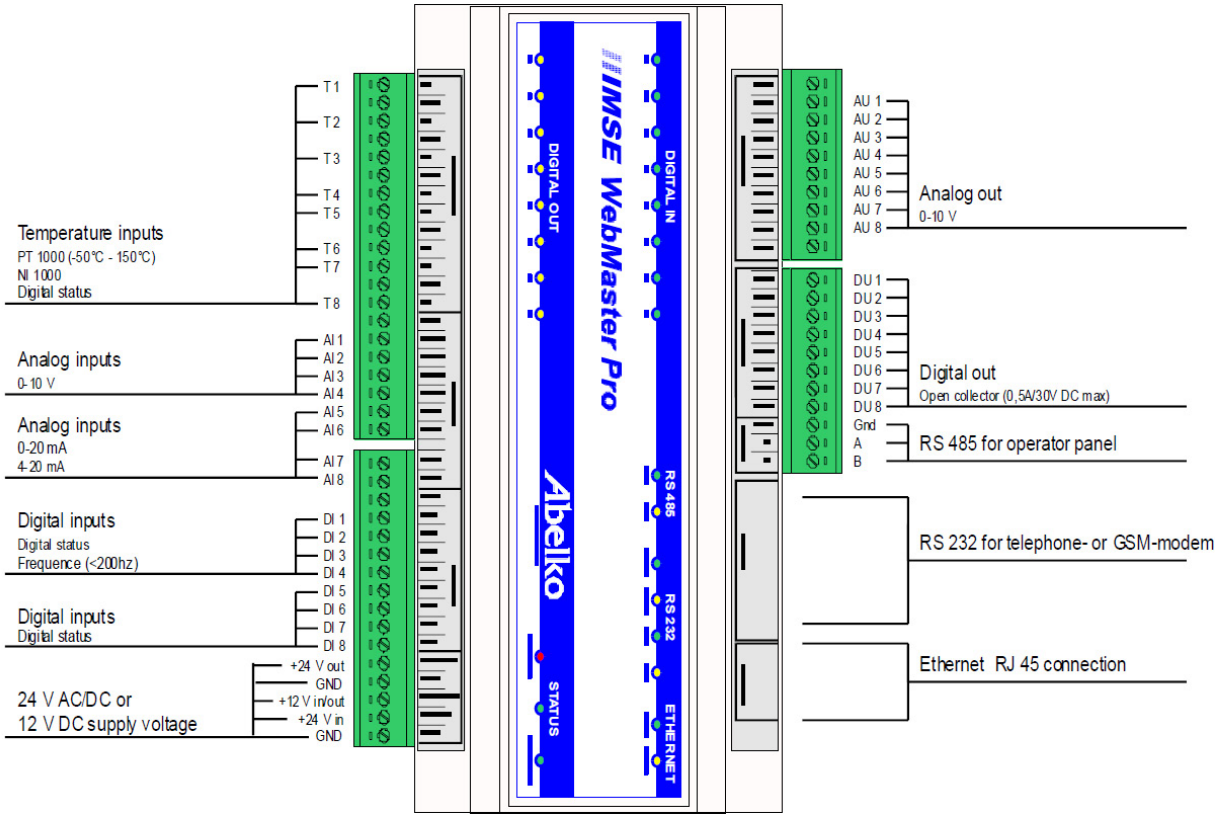
2. The warranty only covers design, material and manufacturing defects. This means that Abelko is not responsible for defects caused by a failure to follow the instructions, or defects resulting from normal wear and tear, poor maintenance, unauthorised work, non-compliant operating conditions, incorrect installation, or repairs not carried out by Abelko or an authorised agent, voltage surges or other electrical faults.

3. Abelko's responsibility for defects is limited to the circumstances described above. Abelko is not responsible for any consequential damage that may occur as a result of design, material and manufacturing defects. The purchaser is therefore not entitled to use defects as grounds for compensation or any other claim, except in the circumstances described above, nor may such claim be made against any third parties responsible for fulfilling this warranty.

4. Abelko is not responsible for restoring any configurations, etc. added by the purchaser. The purchaser should create a backup of configurations and save them to a server.

2 Inputs and outputs

This section explains how to connect sensors and actuators to the WMPro and how to power them. It starts with a description of the available inputs and outputs and a hookup example. The inputs and outputs are then described in detail separately.



2.1 Introduction

The WMPro can use 24 V AC or DC, or 12 V DC as the power supply. Altogether there are 40 inputs and outputs for connecting sensors, actuators or relays.

The WMPro has one RS485 port and one expansion port to communicate with peripheral equipment and external units. To communicate with the outside world there is an RS-232 port for connecting a modem, as well as an Ethernet connection. Section 3 explains how to connect the device and how to use a web browser to communicate with it.

The diagram above and the table on the next page show the locations and the uses of the various input types. Note that some inputs are multifunctional and can be used for more than one sensor type.

When the device is switched off or is starting up, all digital outputs are off and all analog outputs are 0 V.

2

I/O type	Number	Comments
Temperature inputs	8	For 1000 Ω sensors, e.g. Pt1000 or Ni1000. Measuring range 800 Ω to 1580 Ω (= -50 °C to +150 °C for Pt1000). They also act as digital inputs.
Analog inputs for voltage	4	0 to 10 V, approx. 100 kΩ input impedance. 10 bit resolution.
Analog inputs for current	4	0 to 20 mA, or 4 to 20 mA. 10 bit resolution.
Digital inputs	8	Digital status inputs DI1 to 4 also act as frequency inputs or counters up to 200 Hz.
Analog outputs	8	0 to 10 V, max. 2 mA.
Digital outputs	8	Open collector outputs. Max. 36 V and 0.5 A.

If the power supply to the WMPro is 24 V AC or DC, there is one output for 24 V DC and another for 12 V DC. These outputs can be used to operate relays or as a power supply for sensors. Be careful not to overload the outputs.

To make space for all the inputs and outputs, the number of earth terminals (GND) is quite small. Earth terminals are shared between a number of inputs and outputs. If you are planning to use a lot of inputs and outputs, you could add an external earth bar or a row of earth terminals to make it easier to connect everything up.

Connections

The maximum width of the screwdriver you use to connect wires to the terminals should be 2 mm, otherwise you might damage the plastic and dislodge the screws.

The enclosure is designed for DIN rails, and the width is nine modules. The terminal blocks are divisible to simplify installation and replacement. The four plug-in blocks have different widths to minimise the risk of incorrect connections. The maximum width of the screwdriver you use to connect wires to the terminals should be 2 mm, otherwise you might damage the plastic and dislodge the screws.

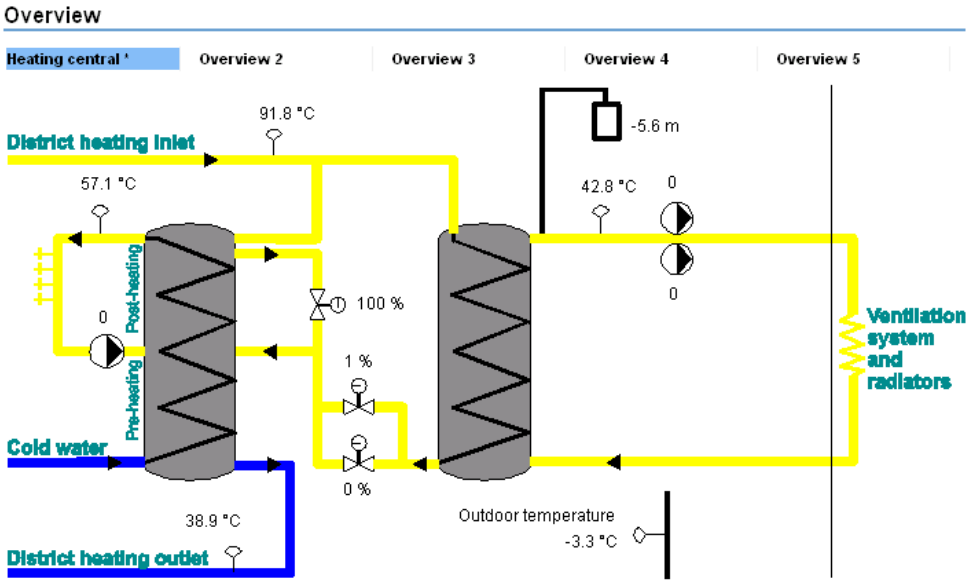
The LEDs on the front indicate the status of the eight digital inputs and the eight digital outputs. There are also LEDs for power supply, operating status and alarm status. Finally, there are LEDs indicating Ethernet, RS485 and RS232 activity.

Status LEDs

The POWER LED lights up when the WMPro is connected to the power supply. The STATUS LED lights up when the device starts measuring and controlling. If there is an error in the device, the STATUS LED start flashing.

2.2 Example

Later on we will configure inputs and outputs, as well as a controller for a heating central as illustrated below.

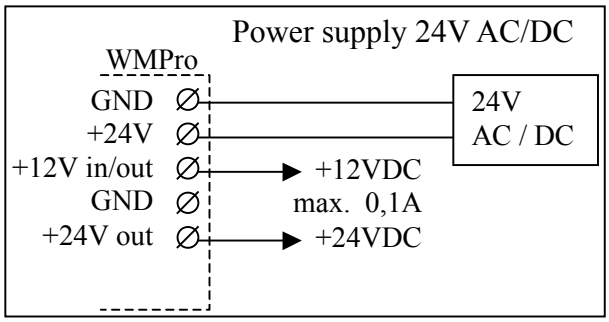


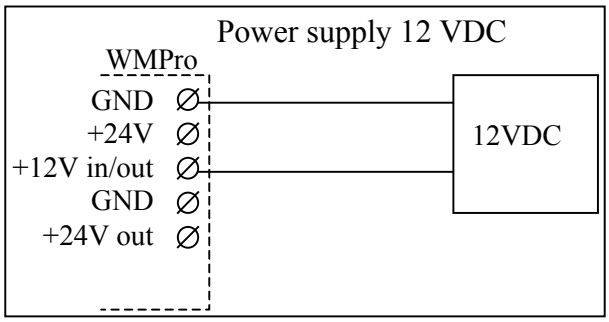
2.3 Electrical connection

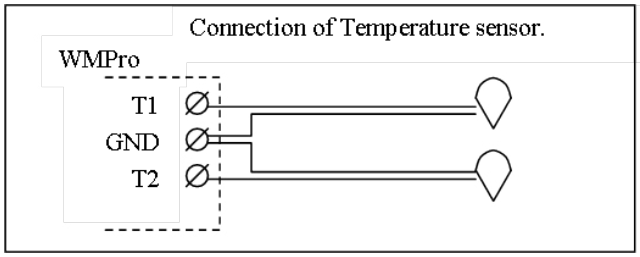
Here are some examples of different electrical connection options.

2.3.1 Power supply

The WMPro can run off a 12 V DC or 24 V AC or DC power supply. If a 24 V power supply is used, the 12 V DC and 24 V DC terminals can be used, each with a 100 mA load. These terminals can be used to operate relays and two-wire sensors with 4-20 mA outputs.







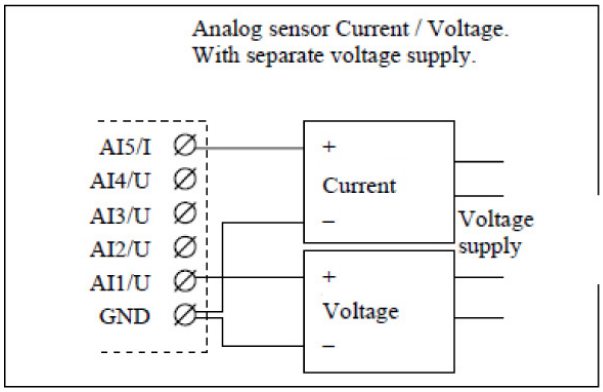
2.3.2 Temperature inputs

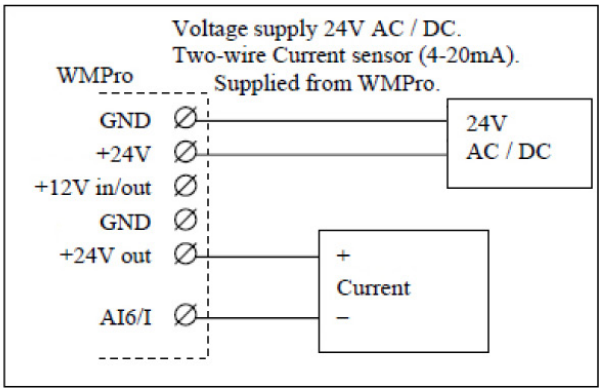
The temperature sensors share just five earth connections (GND). That means that in some places, two wires will use the same terminal. The sensor impedance is about 1000 ohm, and the line impedance is insignificant. 4 ohm corresponds to about 1 degree. Long cables and cables subject to interference must be shielded. The shielding must be connected to protective earth at one end.

The sensors are connected in the same way if you are using the temperature inputs as digital inputs. Important: You must invert these inputs to obtain the same function as the normal digital inputs.

2.3.3 Analog inputs

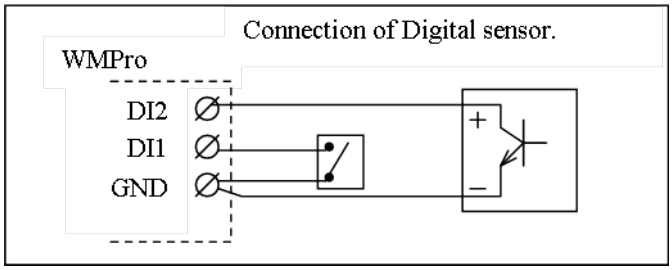
The WMPro has four 0-10 V voltage inputs and four 0(4) - 20 mA current inputs. The voltage is measured to earth (GND).





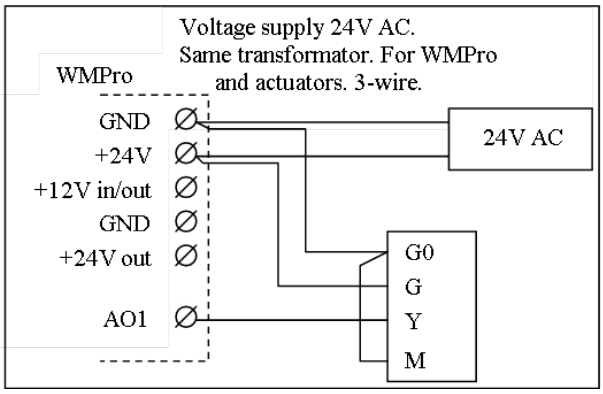
2.3.4 Digital inputs

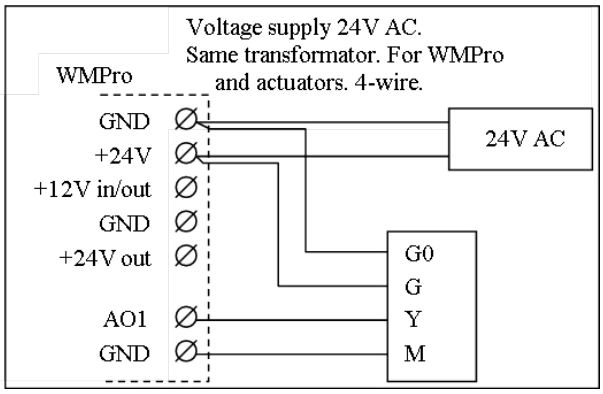
Digital inputs have an internal 12 V supply via a resistor, and the input must be connected to earth (GND) with a dry contact output. Equipment with open collector or open drain outputs can also be used, but remember that the WMPro GND is connected to the equipment ground – which may cause problems in some situations.



2.3.5 Analog outputs

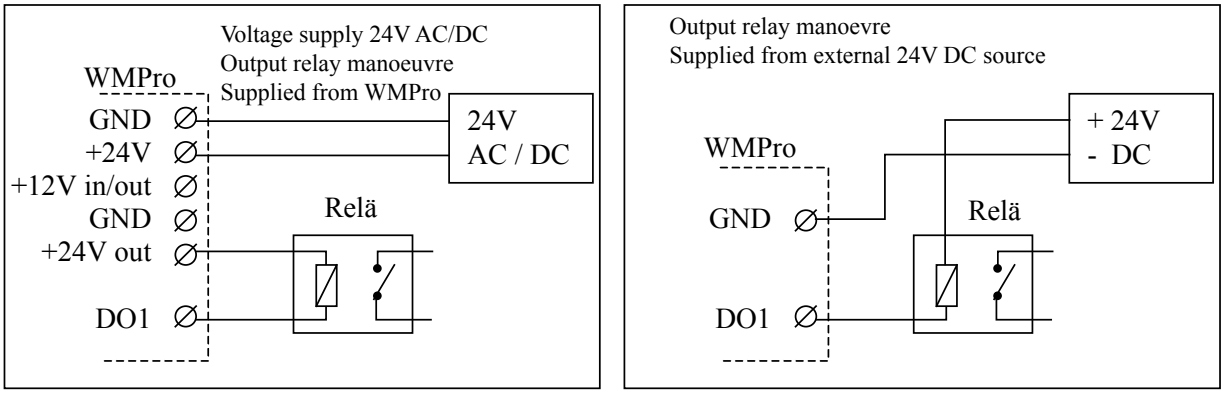
The analog outputs supply voltage to earth (GND). Up to 2 mA load for each output. The outputs are short circuit proof. If the same transformer is used to supply the WMPro and actuators, be careful with phase and neutral throughout the system. For the cable dimension, follow the manufacturer's recommendations .





2.3.6 Digital outputs

Digital outputs sink current to earth (GND). The output transistors can handle 36 V DC and 0.5 A. If the WMPro has a 24 V AC/DC power supply, you can connect a supply voltage to the output relay, either 12 or 24 V. Important: The maximum load is 100 mA.



3 Communication

You will need a computer with a web browser in order to change settings and access the information in a WMPro. This section explains how to connect a WMPro to a computer or network. First, there is an outline of the various options that are available, and you will find out how to get started quickly and easily. If your computer is connected to a LAN, the easiest method is described in 3.2. If there is no network, you can use a direct connection instead, as described in 3.3. 3.4 explains how to browse to a WMPro, and in 3.5 you will learn how to change network settings. More advanced communication options are discussed in 3.6 onwards. Turn to section 18 for details of RS485 communication with external units and WMShare.

3.1 Communication options

The WMPro has two communication ports – one for Ethernet and the other for a modem. You can connect the Ethernet port directly to a computer, a network or a broadband modem. You will always use the Ethernet port to configure a new WMPro for the first time.

The modem port (RS232) is used for remote access via a modem. You can use a standard dialup modem or a GSM/GPRS modem for wireless access. If a WMPro has a modem, you can connect to it.

Ethernet indicators

The Ethernet port has two LEDs – LINK (yellow) lights up when the WMPro is connected to a network, and LAN (green) flashes when there is network traffic.

3.2 Network connection

You can connect a WMPro to a LAN temporarily in order to configure it, or permanently as part of a larger system. To configure a new WMPro you will need to use a computer connected to the same LAN. This user guide assumes the computer is running Windows 95, 98, 2000, XP or NT. Other operating systems are also supported. The procedure is more or less the same, although the details may differ depending on the operating system.

RS232 indicators

The RS232 port has four data traffic and handshake LEDs.

3.2.1 PC connection

The IP address factory setting for a new WMPro is 10.0.48.94. Start by letting your computer know that your WMPro is connected to the same network. Because all WMPro devices come preconfigured with the same address, you will only be able to connect one new WMPro at a time.

3.2.2 Direct connection using the Connection Wizard

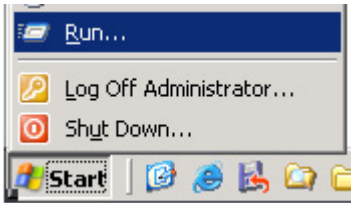
If you use a direct connection as described in 3.3, you can use the Connection Wizard. If everything works you will be able to browse to your WMPro directly, see 3.4. If you connect your WMPro to an existing network instead, you should follow the instructions starting at 3.2.3.

The Connection Wizard is a small program that sets the computer IP address, searches for a connected WMPro and opens a browser.

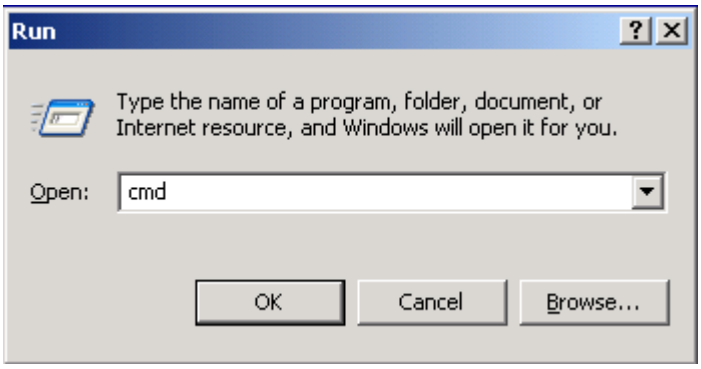
The program is available for download from the Support section of the Abelko web site www.abelko.se. It automatically runs a "route add" command and opens a browser.

The program does not have a special install routine – simply copy it to the desktop or to its own folder. You can even run it directly from a diskette or CD-ROM. **Important: The program only works in Windows 2000 or XP, and you must have administrator rights on your computer.**

3.2.3 Connecting manually using the network



Start by finding out your own network address by opening a DOS window and typing "arp -a" at the command prompt. To open a DOS window, click Run on the Start menu and type "command" in Windows 98 or "cmd" in Windows NT/2000/XP.

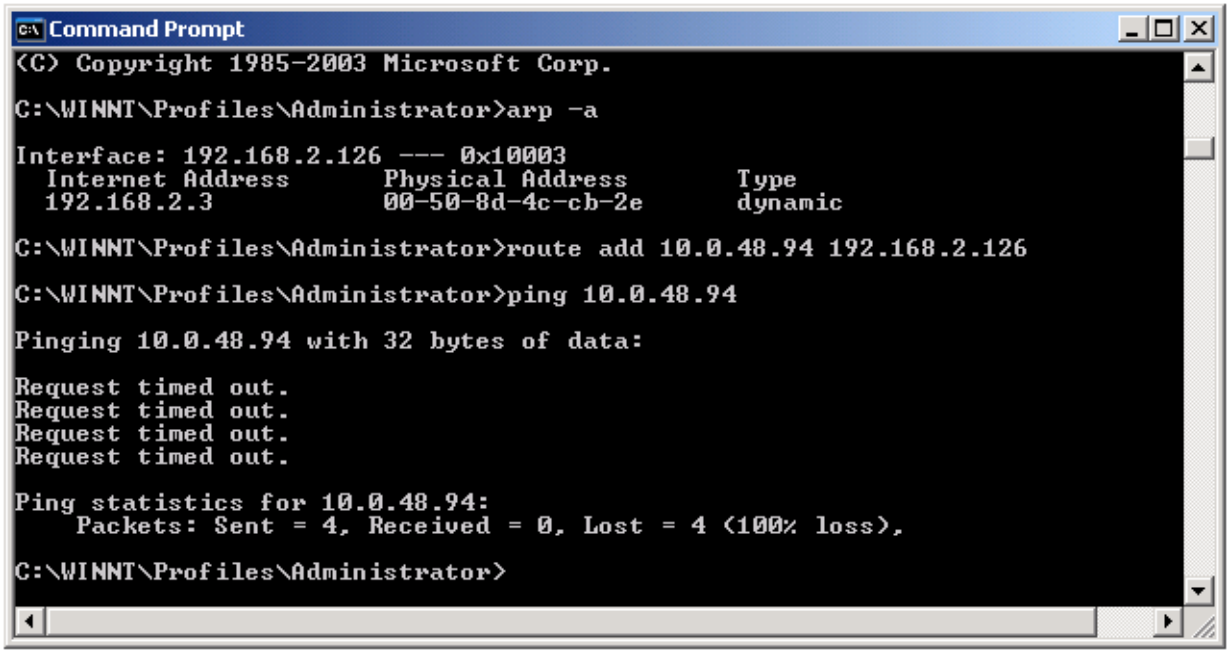


The top line of the results contains the IP address of your network adapter. Example:

C:\>arp -a

Interface: 192.168.2.126 on interface 0x2000003

In this case, 192.168.2.126 is your computer's IP address.



3.2.4 Creating a search path

Still in the DOS window, type this command:

route add –p 10.0.48.94 X.X.X.X

and press Enter. (Replace X.X.X.X with your computer's IP address). Your computer will now act as a gateway for WMPro. The "-p" option means that the setting is permanent.

You can remove it with "route delete". If you miss out the "–p", the setting will disappear when you restart the computer. If you are using Windows XP with a direct connection, you should use "–p", otherwise the setting will disappear when the WMPro restarts.

3.2.5 Check that the address is free

Before connecting the WMPro to the network, make sure the default IP address is free . Check that the address is not in use by typing the following command in the DOS window:

ping 10.0.48.94

If the address is free, you will see **"Request timed out"** in the result. If the result is **"Reply from 10.0.48.94: bytes=32 time<10ms TTL=128"** (or something like it) the default IP address is already in use. In this case you will need to change the basic configuration with a direct connection as described in 3.3.

3.2.6 Connect the WMPro

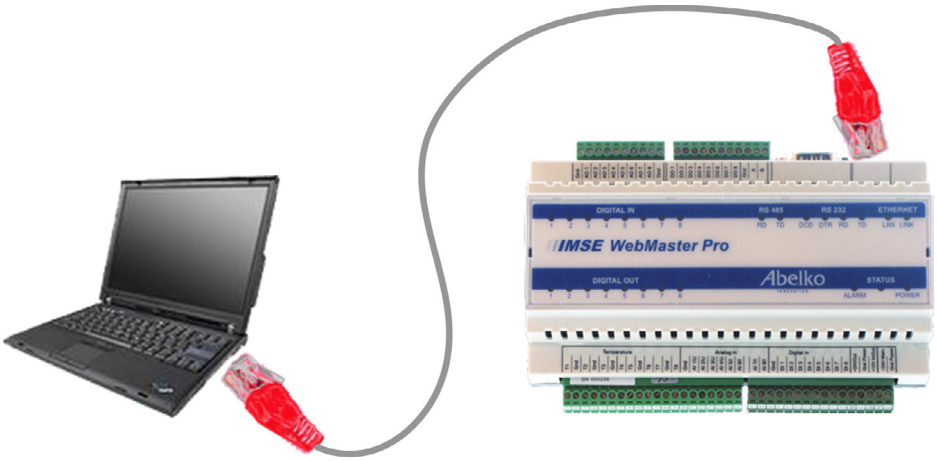
Standalone WMPro

Use a direct connection if you want the WMPro to run as a standalone device without a network. You do not need to change any of the basic settings.

You are now ready to connect the WMPro to the network and switch it on. After a minute or so STATUS LED light up to indicate that the device is up and running.

If the network connection is working properly, the yellow LINK LED also lights up. If it fails to light up, there is a connection error. You might be using the wrong kind of cable. There are two types of network cable – straight-through and cross-over. You must use a straight-through cable to connect to a network socket, a hub or a switch.

You can check the settings using the ping command described in 3.2.5. The WMPro should send a reply. The best way to check that everything is working is to browse to the device. See 3.4 to find out how to do this.



3.3 Direct connection to the WMPro

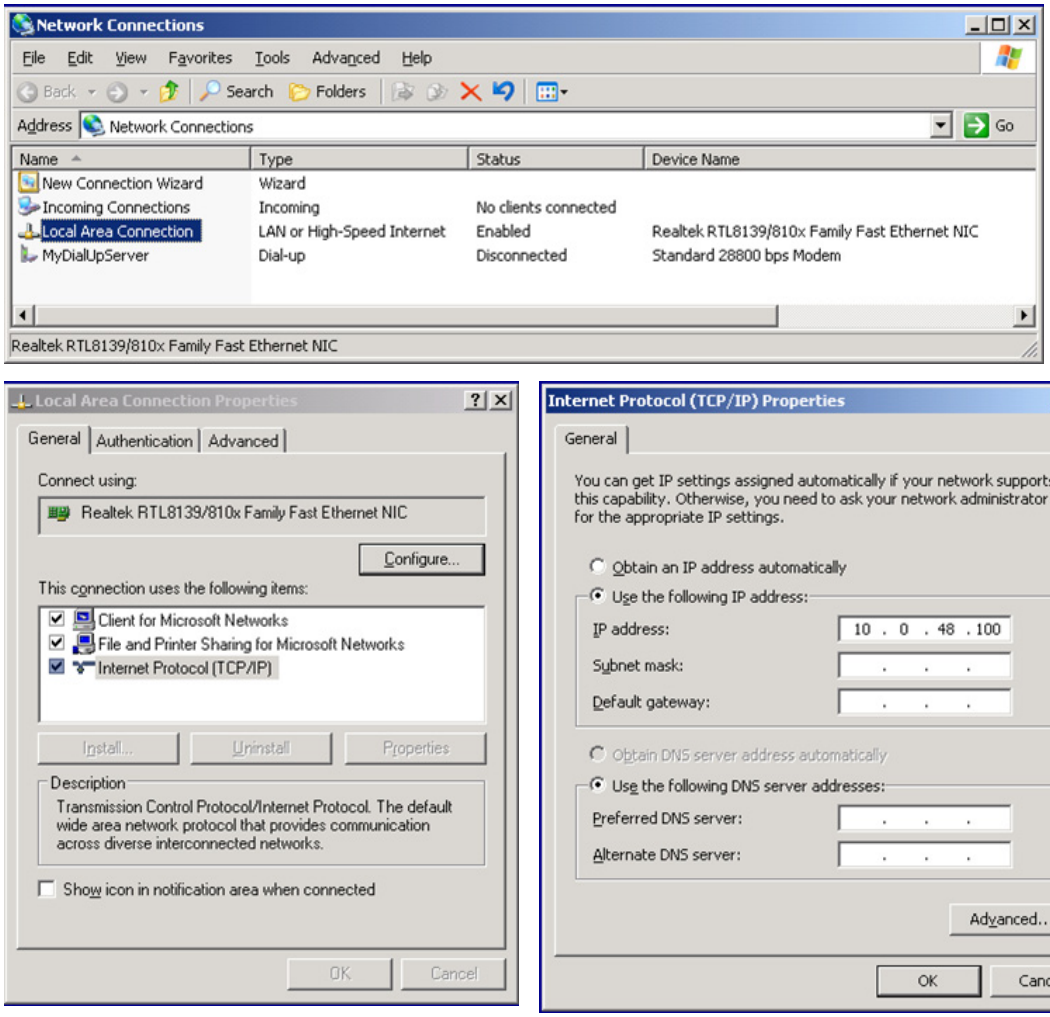
A direct connection involves running a network cable directly between the WMPro and a PC. A cross-over cable must be used for this type of connection.

You can also use the **route add** command described in 3.2 in a direct connection, but only if there is no gateway defined in the WMPro (factory setting).

Important: If the WMPro is configured for connection to a modem via the RS232 port, a gateway will be defined. In this case, you will need to change your computer's IP address so it is in the same network as the WMPro. The procedure depends on your operating system.

There are several ways to change the IP address – here is one of the easiest. You can only change the address if you are logged in with administration rights in Windows XP and Windows 2000.

You might have to restart the computer to apply the changes. If your computer is usually connected to a network, you should make a note of the settings so you can restore them when you have finished configuring the WMPro.



3.3.1 Changing the IP address in Windows 2000 and XP

Right-click the "My Network Places" icon on the desktop and select "Properties".

Right-click "Local Area Connection" and select "Properties".

Highlight "Internet Protocol (TCP/IP)" and click the "Properties" button.

Select "Use the following IP address" and type 10.0.48.100. Click OK.

3.3.2 Changing the IP address in Windows 98

Right-click the "Network" icon on the desktop and select "Properties". Select "TCP/IP" for your network adapter and click the "Properties" button. Select "Specify an IP address" and type 10.0.48.100. Click OK. Restart the computer. To change the IP address in computers with other operating systems, consult the help files for the operating system.

3.4 Browsing to the WMPro

> **Network WMPro**
>
> If you want to connect the WMPro to a network, you will need to change the IP address so it works with other computers in the network.

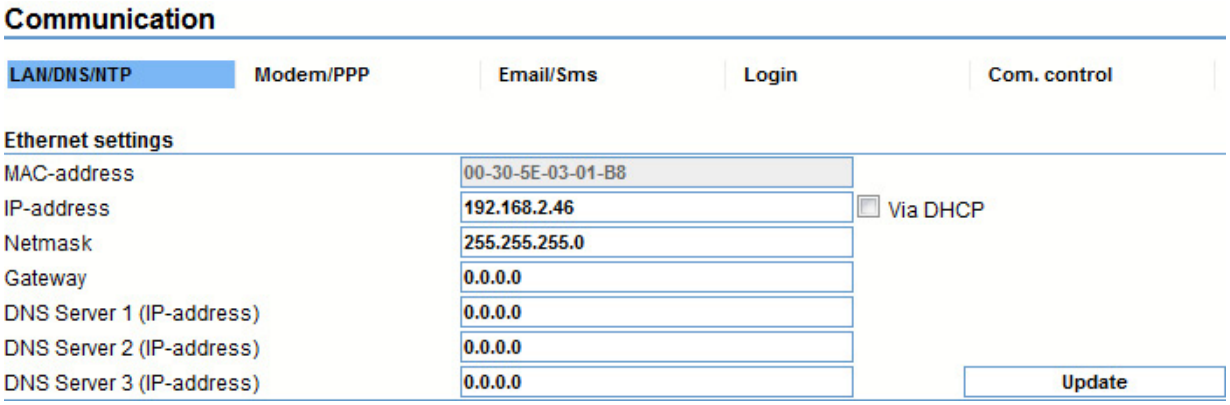
Start a browser, for example Internet Explorer, and type **http://10.0.48.94/** in the address bar. (If you have given the device a different IP address, type this instead.)
The WMPro will respond by displaying its login page. Use "**config**" as the username and "**ef56**" as the password. You are now able to access all the functions in the WMPro.

The web pages use JavaScript as well as Java applets. The applets will only work if Sun Java is installed. If Sun Java is not installed on your computer, the WMPro will display a message with a link to the Sun web site, where you can download the necessary software. Starting from R2.0, Java 1.5 or higher is required.

3.5 Network settings in the WMPro

The settings you changed with "route add" in order to access the WMPro will be lost when you switch off the computer. If you want the WMPro to become a permanent part of the network, you need to change the settings so they are compatible with the rest of the network. The settings will also have to be changed if you want to run more than one WMPro in the same network.

Select "Settings" then "Communication" from the navigation on the left. You will see the "LAN/DNS/NTP" tab, containing settings for IP address, netmask, gateway, DNS and NTP. Ask your network administrator for the correct settings.



To browse to the device you normally need a fixed IP address – the IP address is the address you enter in the browser. If you use a portal service or WDB, you can use DHCP. This means that valid network settings are sent automatically to the device.

Enter the correct settings in the fields and click the "Update" button to send the settings to the device. Then click "Restart". This is necessary because the settings are not applied until the device is restarted. You will lose contact with your WMPro for a few minutes while it restarts.

Type the new address in the browser address bar and log in again. This WMPro can now be accessed from all computers in the network.

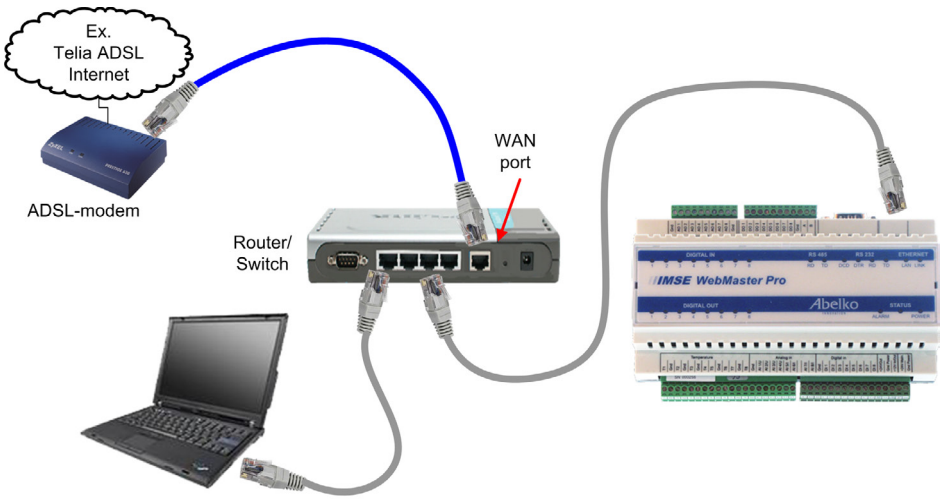
3.6 Broadband or ADSL connection

A WMPro can be connected directly to a broadband socket or an ADSL modem. However, you are always recommended to use a router. That way, you can combine multiple WMPro devices to form a separate network, all sharing the same Internet connection. A building might have several WMPro devices that need to share information with each other. This is much easier to achieve if they are in the same network. You can find out more about WMShare in 18.8.

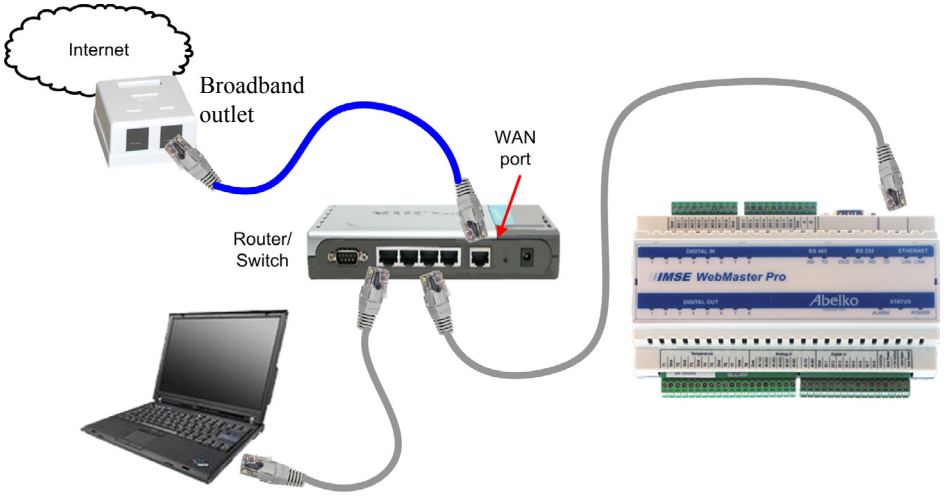
Broadband sockets and ADSL modems normally use DHCP, so there is no way of knowing the IP address allocated to a particular WMPro. That is why you also need to connect the WMPro to something called a portal, which keeps track of the allocated IP address. Otherwise the device will drop out of the network.

If you are using a router to connect WMPro devices, the devices should have fixed IP addresses within the internal network so their location is always known.

In the router settings you can access Internet services like dyndns, which keeps track of the router's IP address and gives it a name, e.g. building.dyndns.com – this means that all WMPro devices connected to the router can be access from the Internet. The router settings depend on the manufacturer and model, so please consult the router manual.



The diagram shows how to connect the router, the WMPro and the computer to an ADSL modem



The diagram shows how to connect the router, the WMPro and the computer to a broadband socket

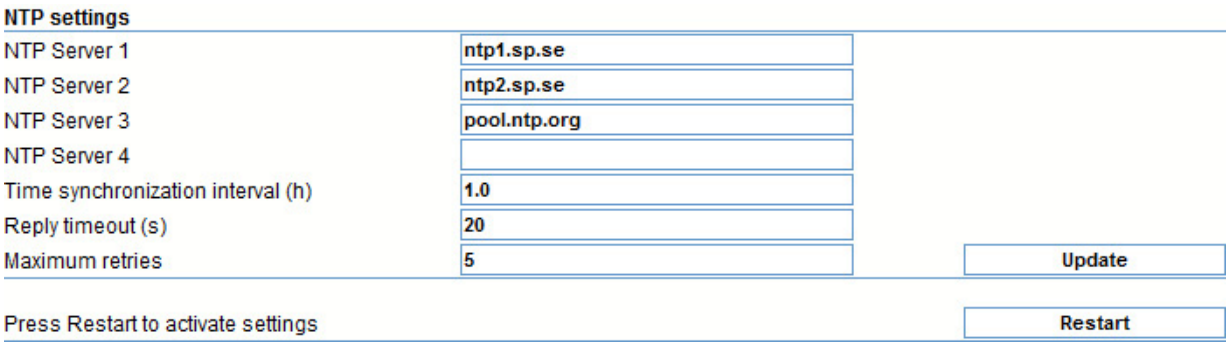
3.7 NTP – Network Time Protocol

In NTP, network devices obtain the current time from an NTP server and use it to synchronise their internal clocks. From release 3.4, WMPro has a built-in NTP client. If the option is enabled, the internal clock is regularly synchronised with a specified NTP server and adjusted if the difference is more than 5 seconds. So you never need to adjust the clock manually if it runs slow.

3.7.1 NTP settings

The NTP settings are with the network settings in the LAN/DNS/NTP tab under Communication. To activate NTP, specify an NTP server. You might be able to use a name to specify the server but only if you have also defined a DNS server and gateway. If DHCP is enabled you do not need to do this manually. To deactivate NTP, simply delete all NTP server addresses.

The polling interval specifies how often the WMPro will obtain the time from the NTP server. The timeout and the number of retries define what happens if polling fails.



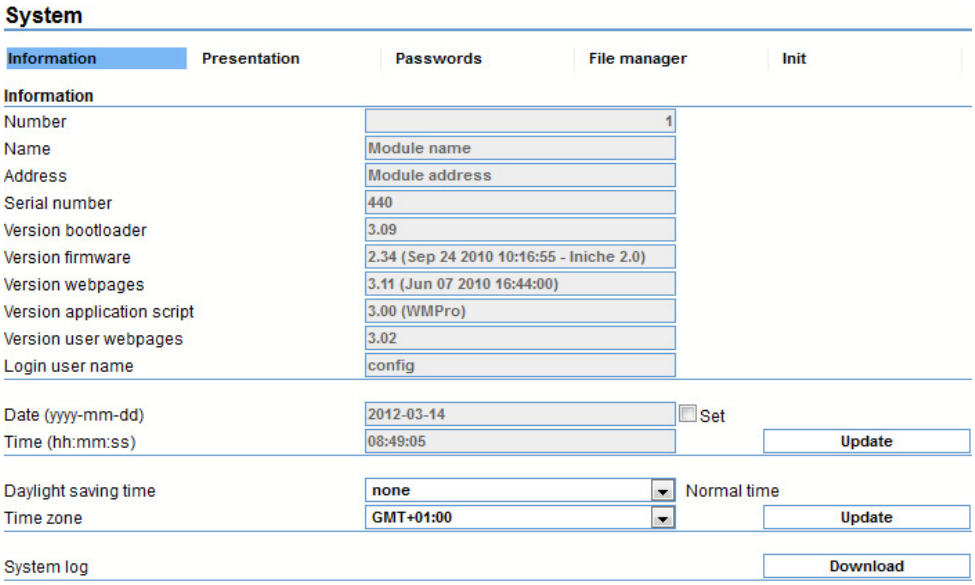
There is no need to restart the device to apply the NTP settings – they are used the next time the server is polled. For example, if you change the interval from 24 to 0.5 hours, the changes will be applied when the first 24 hour period has finished.

A WMPro carries out an initial NTP synchronisation a few minutes after restarting. Synchronisations then take place according to the defined interval.

If synchronisation fails because polling takes too long, the process is cancelled. There is no new attempt until after the next defined interval.

3.7.2 Time zone

It is also important to set the right time zone. The NTP server does not know which time zone the client is in, so the time needs to be adjusted to create the local time. To set the time zone go to Settings/System/Information. You can also specify whether daylight saving time is used.



3.7.3 Clock adjustments

If the WMPro internal clock is out by more than five seconds, it is reset. The message "Clock adjusted" is added to the alarm and event log.

If the clock is adjusted backwards, a database may contain two values with the same timestamp If the jump is large in relation to the time granularity of the database, you may find that the time actually reverses in the plot.

If you are using weekly schedules or some other way of generating a short pulse at a certain time to trigger an event, time adjustments might mean that the specified time never occurs. This is not the usual way to implement time control – for example, controllers never do it this way. Other events in WMPro that are set to occur at certain times are designed to cope if the clock is adjusted or if the device happens to be switched off at that particular time. The system will ensure that these events are carried out regardless. In a small number of applications, however, it may be better not to use NTP.

pool.ntp.org

If you do not have access to an NTP server to obtain the correct time, you can use the NTP POOL PROJECT. If you define pool.ntp.org as the NTP server, the time will be obtained from the thousands of NTP servers in the pool. For more information, go to www.pool.ntp.org.

3.8 Modem connection

Modem WMPro

To use a modem to connect the WMPro, you need to change the settings so the device uses the modem port rather than the Ethernet port for normal communication.

A WMPro can also be connected to a standard dialup modem or a GSM/GPRS modem. The modem connects directly to the RS232 port in the WMPro. You can configure the WMPro to call an ISP or RAS and send an email if there is an alarm, and you can create a remote connection from your computer if you want to access a WMPro. You can also connect a router to create a network of WMPro devices all sharing the same phone line or GSM connection for incoming access or to send alarm emails. Two modems are normally needed for this arrangement – one for sending emails and one for incoming calls. The two modems can share the same phone line. GSM/GPRS routers are available that can handle bi-directional communication.

The maximum transmission speed is 38,400 bit/s (9600 bit/s for GSM).

If a WMPro is connected by modem, it cannot be accessed over the Internet.

Modem connections are used quite rarely, most people preferring to use ADSL connections. If you are considering using a dialup modem or a GSM modem, see the Abelko support page at www.abelko.se for a description of modem settings.

3.9 Email settings

If you want the WMPro to send an email if there is an alarm, you will need to specify the SMTP server and the recipient addresses. Log in as "config" and select Settings/Communication/Email.

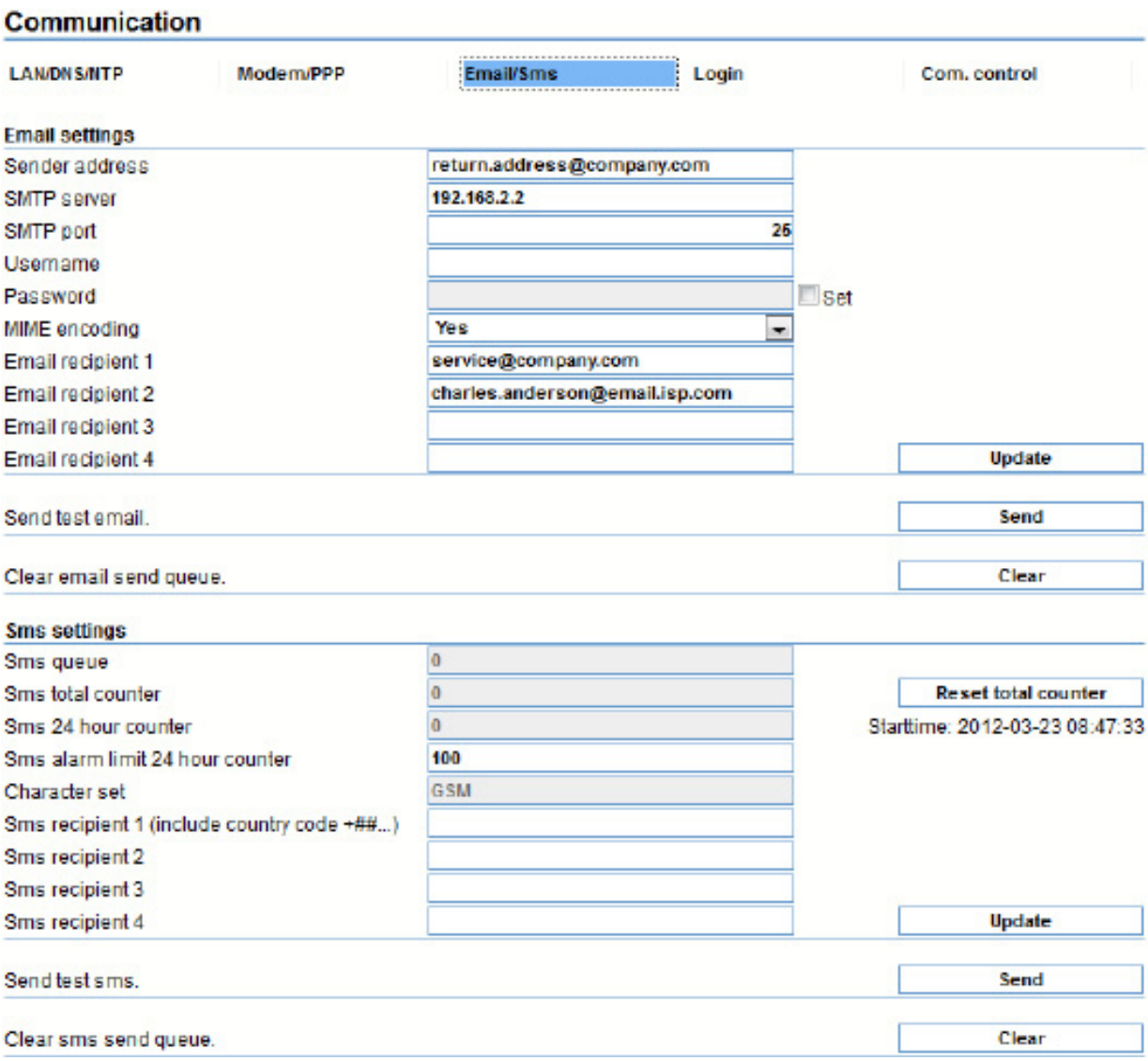
Enter a valid sender address. (return.adress@-abelko.se is only an example).

Enter the IP address of the SMTP server. If you have specified a DNS server in the previous section, you can type the name instead of the IP address.

(For example mail1.telia.com if Telia is your ISP). Ask your ISP or network administrator for the details.

Select whether to use MIME encoding.

Add one or more email recipients, then click Save. Check that everything works by clicking Send. This sends a test email to all the recipients. You may need to specify login details as described in 3.10.



3.10 SMS settings

Starting from release 2.1, you can send alarm text messages via SMS if a GSM or GPRS modem is connected to the WMPro. The modem must be working properly, and must have a SIM card that can be used to send SMS text messages.

If these conditions are met, you can specify up to four mobile phone numbers in the SMS settings. These numbers will receive the alarm text messages. Include the country code with the phone numbers.

If at least one telephone number is defined, and an alarm defined for SMS notification occurs, the alarm text message is added to an SMS queue. You can check the web page to see how many text messages are in the queue.

The WMPro will usually attempt to send the first text message straight away. If this attempt fails for some reason, the WMPro initially waits five minutes before trying again. If it still does not work, the system waits for 10 minutes this time, followed by 15 minutes between attempts.

The phone bill can quickly mount up if you set the alarm thresholds too low or if the system triggers lots of alarms for some other reason. That is why there is a function to limit costs. In the "SMS alarm limit 24 hours" field, enter the maximum number of text messages the WMPro can send over a 24-hour period. A text message is sent indicating that the limit has been reached, but no further text messages are sent until the alarm is acknowledged.

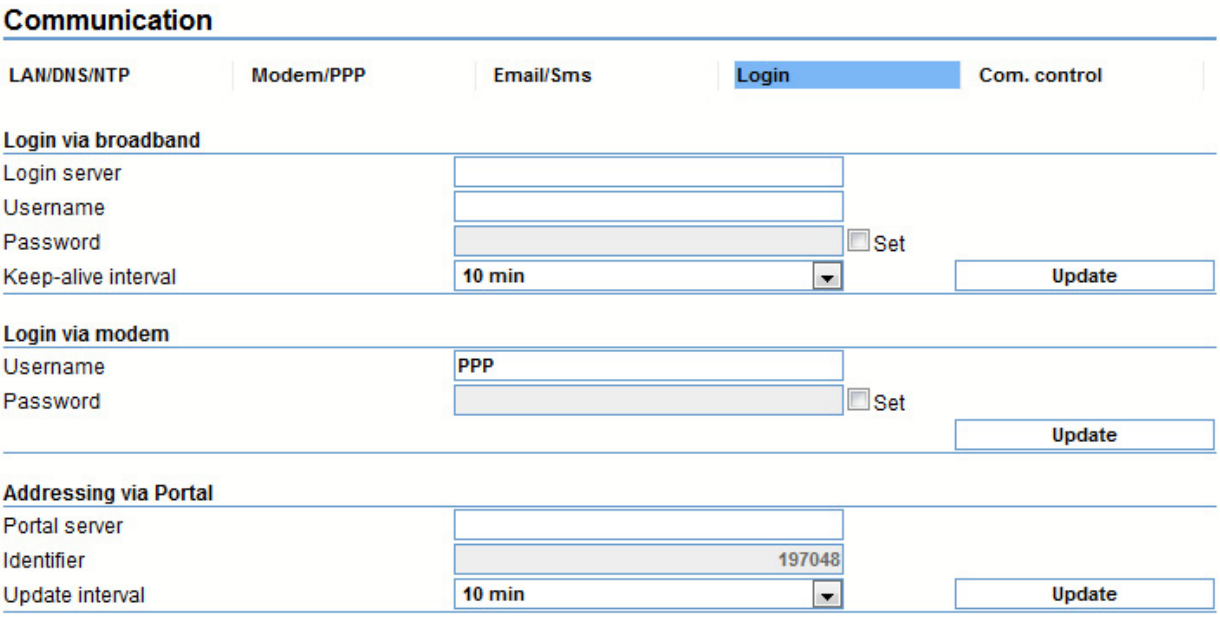
You should set this limit high enough not to block alarms that you would expect to occur in normal operation. Remember, too, that adding recipients multiplies the number of text messages sent. The web interface shows how many text messages have been sent in the current 24-hour period, and when the period started.

To help you keep track of costs, there is also a counter for the total number of text messages. You can reset the counter manually. As with email, there is a test function you can use to send a test message.

There is a button to delete all emails or text messages in the queue. You should do this before you activate the function. Otherwise a large backlog of messages will be sent.

3.11 Login settings

Before a WMPro can log into an ISP you will need to specify the username and password. To do this, go to Settings/Communication/Login.



3.11.1 Broadband login

Enter the IP address of the login server and the username, select "Set", and enter the password. Choose a "Keep-alive interval" (how often you want the WMPro to log in) and click "Update". If you have specified a DNS server in 3.5, you can type the name instead of the IP address. (For example mail1.telia.com if Telia is your ISP). Ask your ISP or network administrator for the details.

3.11.2 Modem login

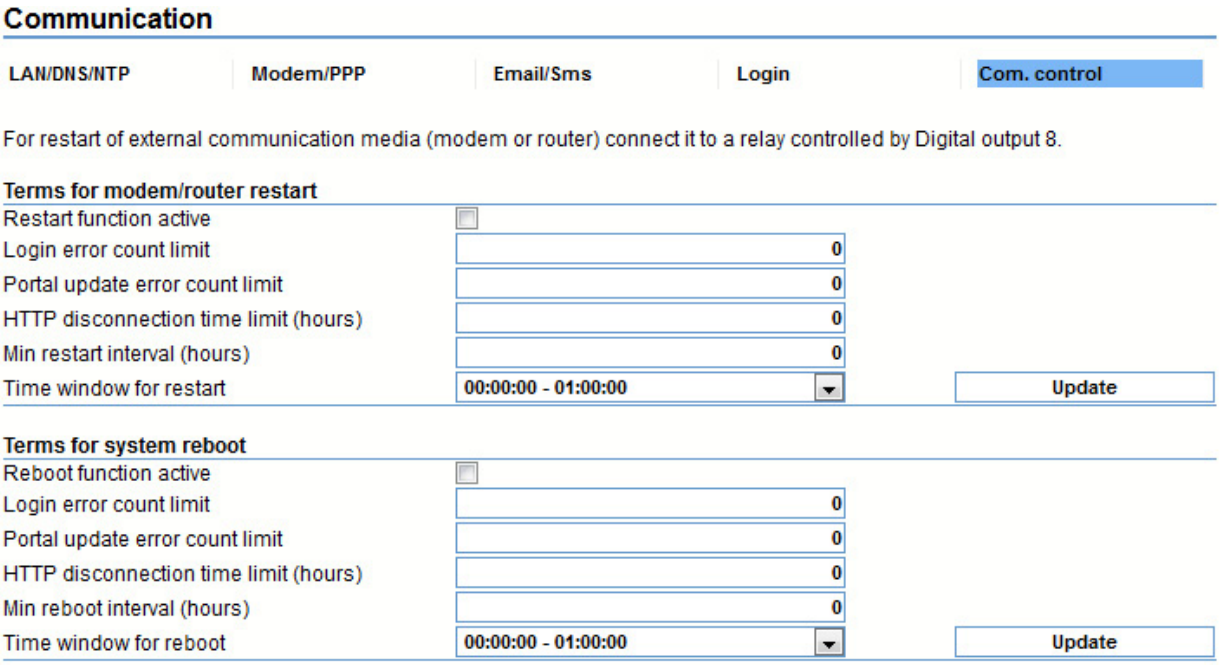
Enter the username, select "Set", and enter the password. (Ask your ISP or network administrator for the details.) Click Save.

3.11.3 Address from the portal

Enter the IP address of the portal server, choose an update interval and click Update. If you have specified a DNS server in 3.5, you can type the name instead of the IP address. If the portal server is in a different network, you will probably need to activate one of the logins above.

Portal

A portal is a place where information from various different sources is collected. For example, it is the interface between the internal system and the Internet. The portal also makes sure information is distributed to the right people. The information can often be accessed from mobile phones, standard browsers, emails, etc. The information received can usually be presented in different ways, depending on the user's equipment and software.



3.12 Monitoring communication

If you are using a modem to connect a WMPro, the modem can sometimes hang. Contact with the installation is lost, and someone has to physically go to the modem and switch it off and on again. If you connect the power supply to the modem via a digital output (DU8), the WMPro can restart the modem by itself if contact is lost. You can change the settings in Settings/ Communication/Com.control.

Communication

The WMPro is able to restart a modem if it hangs.

You can restart the modem, reboot the entire system, or both. Certain conditions must be met before each restart/ reboot.

Active restart/reboot function: Check the box to activate.

Login fail count limit: The number of failed logins before a restart/reboot.

Portal update fail count limit: The number of failed portal updates before a restart/reboot. (Important: The WMPro must be logged into the portal. It is not enough simply to be in contact.)

HTTP disconnection time limit: The number of hours since someone browsed to the device before a restart.

Min restart/reboot interval: Minimum number of hours between two restarts.

Time window for restart/reboot: Select an hour during the 24-hour period when you want any restart/reboot to take place.

If you leave 0 in any field, that condition will be ignored. Save the settings when you make any changes. Important: The restarts/reboots are each saved separately.

3.13 If all else fails

If you forget the IP number you configured for a WMPro, you will no longer be able to browse to it. If an operator panel is connected, you will be able to view and change the IP number from there. Otherwise, there is an emergency solution. You can restore the device to its factory settings (user scripts and images are left intact).

Factory settings

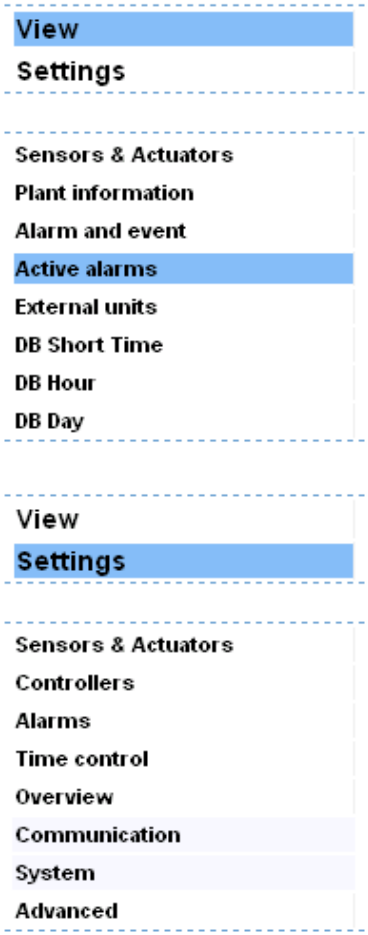
The WMPro can easily be reset to the original factory settings.

To do this, remove the cover and connect a jumper between pins 2 and 3 in the 4-pin or 5-pin jumper block on the PCB, and switch on the device. Remove the jumper once all I/O LEDs have started flashing. Important: All the settings will be overwritten, including the configuration parameters. Wait 2-3 minutes for the WMPro to restart. The IP number is restored to the factory setting (10.0.48.94) and you will have to repeat all the configuration steps from the beginning.

4 Functions

This section is a general description of how the WMPro works. There are several ways of approaching the subject, and the best description for you depends on what you are interested in. Most users do not need to worry about the details. That is why 4.2 describes how the WMPro works when it is used for standard tasks.

Section 4.3 goes under the hood to describe how the WMPro works in detail. Users wanting to delve a little deeper will need to know this information. It may also be worth reading this section even if you are a basic user, because you will come across the concepts elsewhere in this user guide and in the user interface. Please consult the reference manual if you want to find out about more advanced operations.



4.1 View menu and Settings menu

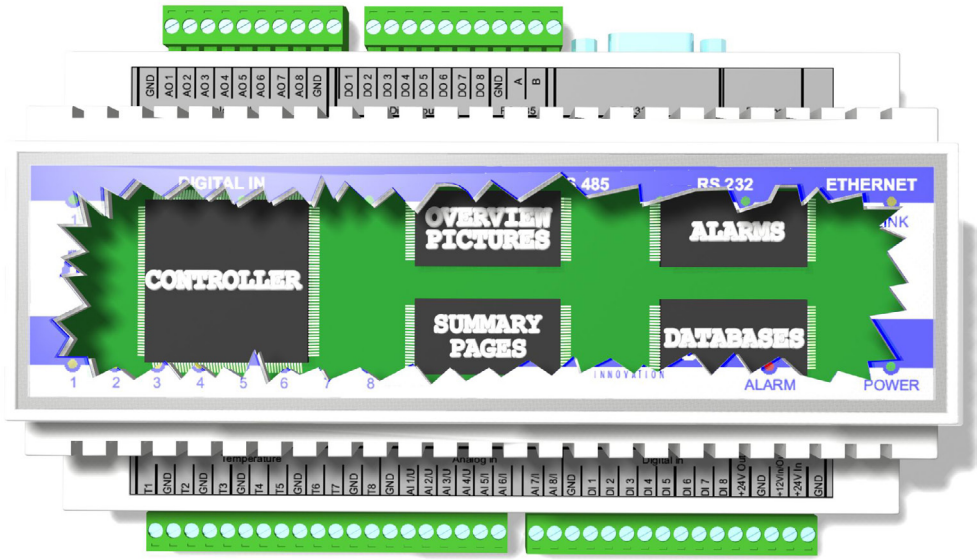
There are basically two types of WMPro user. There are the technicians who configure and install the system, making sure the connected WMPro works as it should. And there are the operators who run and monitor the system on a day-to-day basis. These two user groups want different things from the user interface. That is why there are two menus – View and Settings.

On the other hand there are not two but three login levels: view, operator and config. The view level allows you to view settings and data and to download data. The operator level lets you do everything you can do at view level, and you can also change adjustable parameters and acknowledge alarms. At config level, you can do everything. Each of the levels has its own password. See 16.3.

The View menu is for someone wanting to see what is happening in the installation, check alarms, read sensor values, consult databases and make occasional adjustments to a controller. This means that the View menu is partly dynamic – the overviews and summaries are adapted to the particular installation. An overview shows up-to-date values in their correct places in the installation. A summary gathers information and configuration options for a component like a controller, for example.

The Settings menu is provided for people who need to configure the device. You can define what the device does, which sensors are connected, alarms and much more.

The Advanced section appears at the bottom of the menu. This section expands the Settings menu, where you can change the settings for parameters, channels, curves, databases and programming options. The Communication and System sections contain settings for the device itself rather than the wider installation. Here you can do things like change network settings, add email addresses and perform software updates.



4.2 Standard controllers

Before you can control something, you need to tell the WMPro what you want it to control. Using the controller tool, you can specify what kind of installation you are running. Before starting the controller tool you should configure all the inputs and outputs you will be using, and give them names. This makes the configuration process easier. The inputs and outputs appear as a list of names in the controller tool, where you can simply select the ones you want to use.

When you configure a controller, the WMPro also generates a user interface for it. You then define the configurable parameters and any necessary alarms, and a summary is created for the controller.

If the controller tool is unable to configure your controller, you will need to use a script.

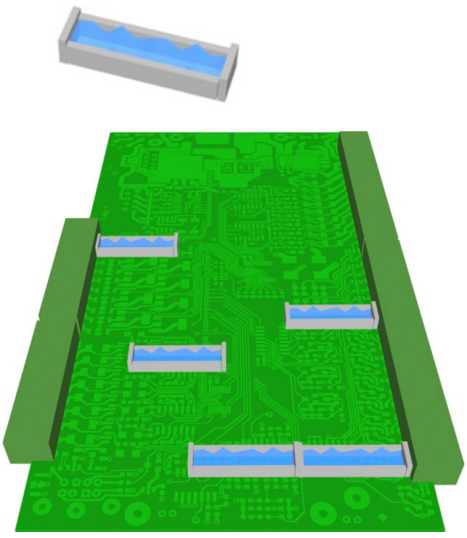
4.3 Under the hood

If we take a closer look at how the WMPro works, we see that the system depends on channels, scripts and parameters.

All variable data in the WMPro is handled by channels. You can think of channels as containers of data. One end of a channel can be connected to a source, such as an input. New data can then flow into the channel second by second from an external sensor.

A channel can also be connected to an output, so that the data in the channel can update an actuator. A channel can be connected to another channel, or it can even have no

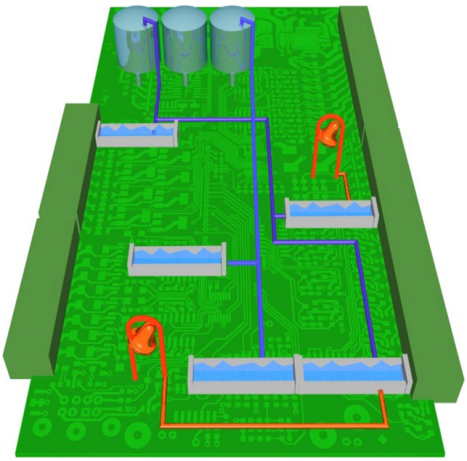
Channels



Databases

Alarms

input and output at all.



A channel is not just a passive container for data – it can also modify the information flowing through it. It can be used to scale the information and carry out conversions, for example volts to kPa for a pressure sensor. There are more advanced conversion functions, allowing the value from a temperature sensor input to be scaled to temperatures in degrees Celsius or Fahrenheit. Channels can also be used to calculate mean values, filter the data, calculate runtimes, etc.

Other functions in the WMPro use information from the channels. Examples include databases and alarms, which connect to channels to obtain information. Databases store historical data so it can be analysed later on. Alarms are functions that monitor a channel, and they are triggered when specified conditions are met.

Some functions connect to channels in order to add information to channels, for example alarms with an output channel. The only way channels connected to outputs alone – or not connected at all – can receive information is from an alarm or from a script. Find out more about channels in section 11.

The whole system is controlled by scripts, which can add and remove data without restriction. A script is a small program specifying what you want the device to do. All controllers are implemented as scripts, and graphical programs, too, are in fact scripts.

```
USER SCRIPT 1 BEGIN
  ROUTINE P_Controller
  ALIAS
    ControllerActive    = PARAMETER[1];
    PFactor             = PARAMETER[2];
    SetValue            = PARAMETER[3];

    InSignal            = CHANNEL[1];
    ControlSignal       = CHANNEL[2];
    ControlError        = CHANNEL[3];

  BEGIN
    IF ControllerActive > 0 THEN

      ControlError <- InSignal - SetValue;
      ControlSignal <- ControlError * PFactor;

    ENDIF
  END;
END;
```

The scripts are stored in text form in the device, so there is no need for a compiler or other tools. If you use the controller tool, it creates the script and uploads it to the device, so the device knows what you want it to do.

Parameters are another kind of container for data, but unlike channels they can only be changed by a user. They are used in scripts to specify configuration options and to influence the script while it is running.

4.4 Definitions

Term	Definition
Channels	Channels handle variable information in the WMPro. They may modify information by applying scale factors and other mathematical functions.
Parameters	Parameters are used to store values that can be changed by a user.
Databases	Databases store values from selected channels at regular intervals. The WMPro has three databases that normally store information every second, every hour and every day.
Alarms	Alarms monitor a channel and compare values with defined alarm thresholds. Alarms are recorded in the alarm log. Emails can be sent if email notification is enabled, and a specified output channel can be activated.
Calendar control	Calendar control can be set to 1 at specified times or on specified dates or days of the week, and 0 the rest of the time.
Curves	An interpolation table presented as an configurable curve. Used by controllers to do things like converting an outdoor temperature into a flow temperature.
Summaries	A summary is a page containing the channels, parameters, databases and curves belonging, say, to a controller.
Overviews	An overview displays the current measurements on an image.

5 Sensors and actuators

This section explains how to change the settings for various types of sensor and actuator. The settings relate to the sensor type and to the information you want to store in the databases. You can also go to the channel page to change some of the settings directly.

5.1 Configuring sensors and actuators

When you connect a sensor or actuator to a WMPro, you need to tell the device what you are connecting. A WMPro measures V, mA, Ω or Hz, depending on the signal supplied by the sensor. A scale factor or a conversion function is applied to convert the reading into the quantity being measured, e.g. °C, kPa, kWh or m^3/h. The same applies to actuators, only the other way around.

Sensors and actuators

Sensors and actuators can also be configured directly on the channel page. For more details, see section 11.

5.1.1 Databases

The WMPro has three databases, which are used to store selected information at regular intervals. You can use the sensor and actuator settings to specify the information you want to store. The size of the database history depends on how many values are saved at each interval. If you only save values from a small number of sensors, this leaves space for a longer history. This is why you have the option of selecting the values you are interested in.

Databases

Go to section 10 to find out how to use databases and view the information they contain.

The short time database normally stores information every second, so it contains momentary values. The other two databases stored values every hour and once a day respectively. In these longer-term databases, statistical information is usually more interesting than a snapshot of values at the beginning of the hour/24-hour period. So you can choose from statistics like mean values, highest and lowest values over the period, how much the signal varied over the period, etc.

5.1.2 Names and display options

The sensor settings include the name and other options governing how the sensor/actuator will be displayed on web pages and overviews.

View menu

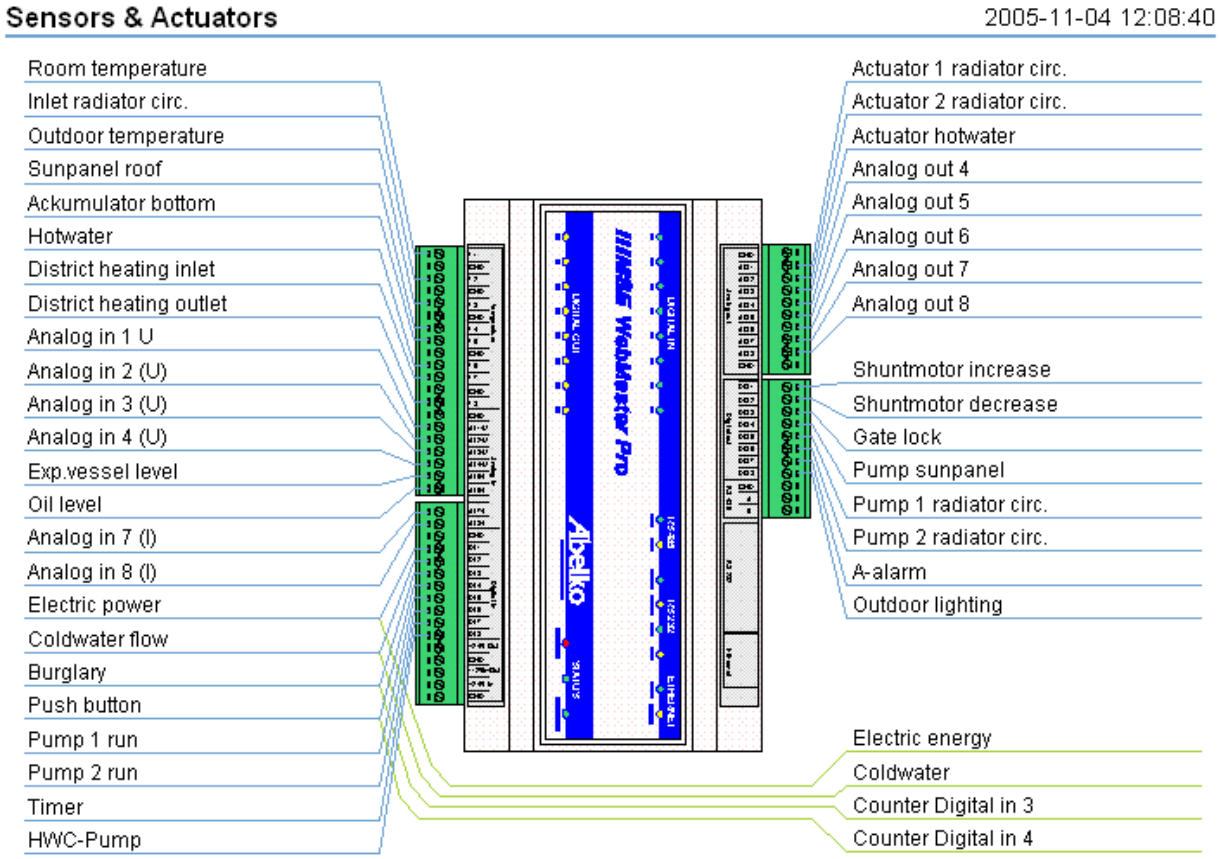
There is also a Sensors & Actuators option in the View menu. The page is the same as the Settings menu, except you can view and update current values. What you cannot do is change any settings.

5.2 Example

In this example, we have connected a Landis & Gyr Ni1000 room sensor to temperature input 1. To configure the sensor you need to be logged in as "config".

Select Settings/Sensors & Actuators to see how the system as a whole is configured.

The sensor is connected to T1, so there is already a temperature reading for this input. The WMPro initially assumes that temperature sensors are Pt1000 sensors, so the temperature displayed is slightly higher than the real temperature.

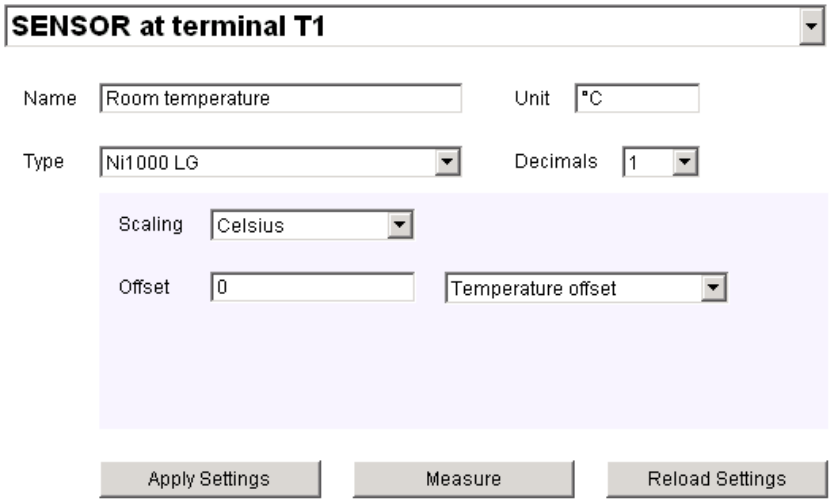


Click on the name to start the configuration tool. Java must be installed on your computer. If you see a message similar to "Do you want to install and run signed applet distributed by Abelko", answer Yes.

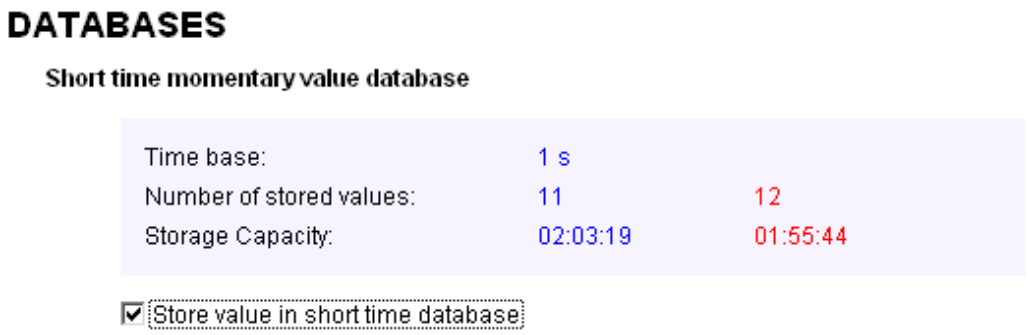
The top part of the applet is where you change the sensor settings. Give it a name – Room temperature – and select the correct type from the drop-down list box. Also select a scaling value, the number of decimal places you want to display, and an offset if you want to apply one. Find out more about the scaling and offset functions in 5.3.

Scaling

For scaling you can choose from °Celsius, °Fahrenheit, Kelvin.



Click Apply Settings to upload the new settings to the device. Click Measure to obtain a new reading to check plausibility. Click Reload Settings to import the settings that were saved last. Important: Make sure you save the sensor settings before starting database configuration. You can use the drop-down list box at the top to quickly switch to another sensor or actuator.

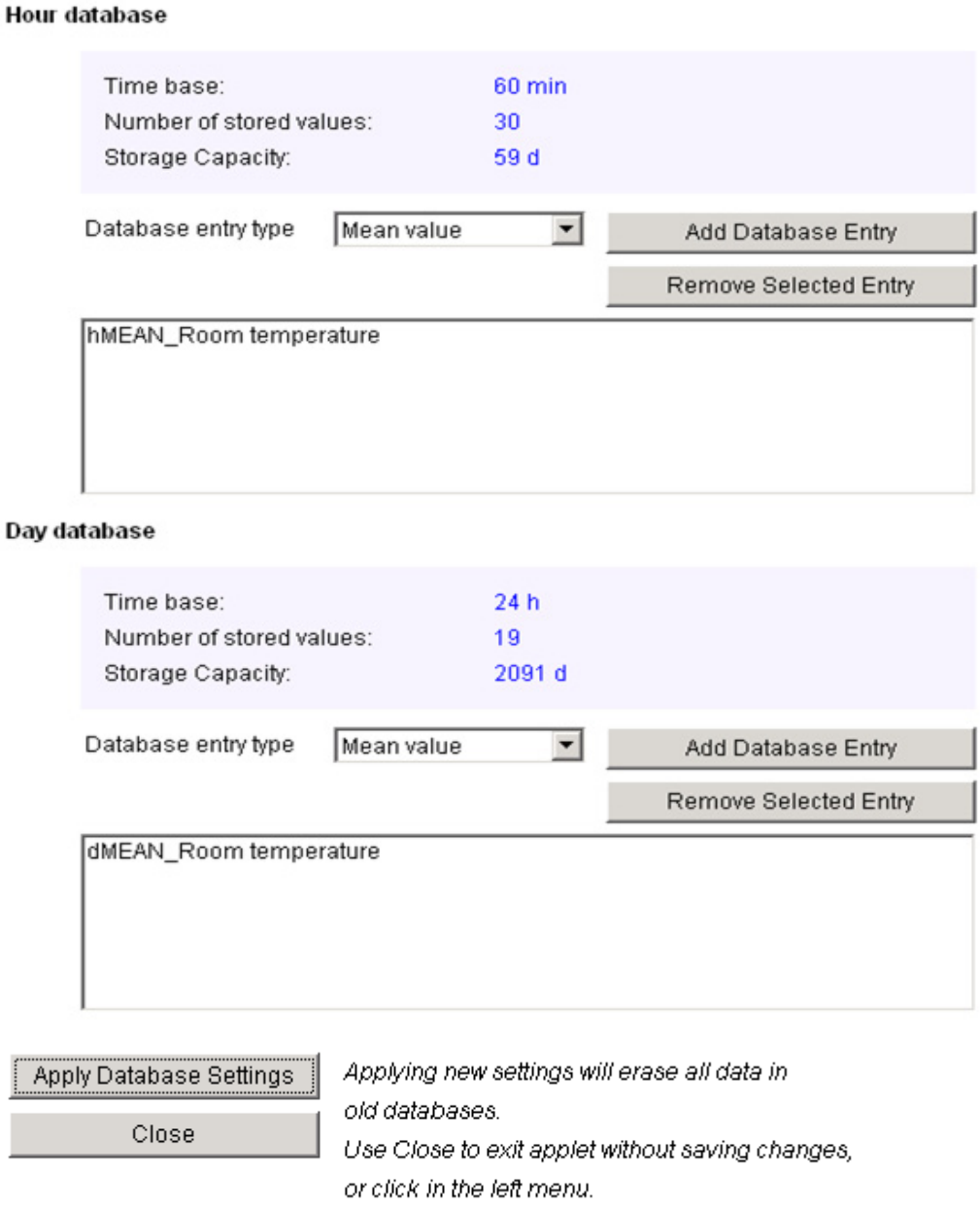


Further down the page you can change the database settings. Select the Store value in short time database option to add the room temperature to the short time database. The blue numbers describe the situation before the settings are changed, and the red numbers indicate what will happen when you update. The number of stored values indicates how many values are saved in each database row. This number increases by 1 when you add the room sensor.

The storage capacity indicates how far back in time the database can store information. The format is hours:minutes:seconds. This value decreases as more channels are added.

The storage capacity of the other two databases can exceed 24 hours. In this case, the number of whole days is stated.

The hour and day databases have more options for you to choose from. Choose mean value as the database entry type, then click Add Database Entry to include it in the database. A new line appears in the field underneath, showing the entry for that particular sensor. Details of the highest and lowest room temperatures may also be interesting, so let's include them too. The day database works in the same way. To distinguish between the channels containing the hour and day values, the letter h or d is prefixed to the channel name.



When you have finished changing the database settings, upload them to the WMPro by clicking Apply Database Settings.

If you want to change the name of a sensor, you will need to delete the old database settings and then create new ones. When you add or remove values to/from a database, the WMPro will be unable to correctly interpret the remaining data. To prevent errors, the databases are erased when you change the definition, and the entire history is lost. Turn to section 10 to find out more about databases, including how to create backups.

5.3 Temperature sensors

When you connect a temperature sensor you can choose from a number of standard types in the drop-down list box. There is a table on the next page, explaining the various types.

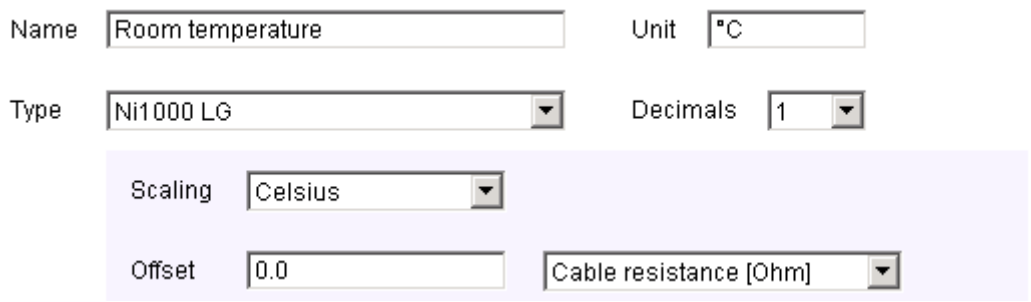
You can scale the temperature sensor readings to degrees Celsius, kelvin or Fahrenheit. The unit (ºC, ºF or K) changes automatically when you select the scaling.

If the sensor cables are so long that the resistance produces a measurement error, you can specify an offset in ohms. Select Cable resistance (Ohm) from the drop-down list box. Enter the cable resistance you have measured. If you have not measured the cable resistance or if you need to compensate for intrinsic heating or some other systematic error, you can specify an offset in degrees. Select *Temperature offset* from the drop-down list box and specify the number of degrees to **deduct** in order to arrive at the correct value.

Resistance measurement

The temperature inputs are actually measuring resistance. It may be possible to connect other types of resistive sensor. Go to section 2 to confirm that the resistance range is compatible. The reference manual explains how to configure a channel to carry out the measurement.

The temperature inputs can also be used as digital inputs. **In order to obtain the same function as a standard digital input, the signal must be inverted.**

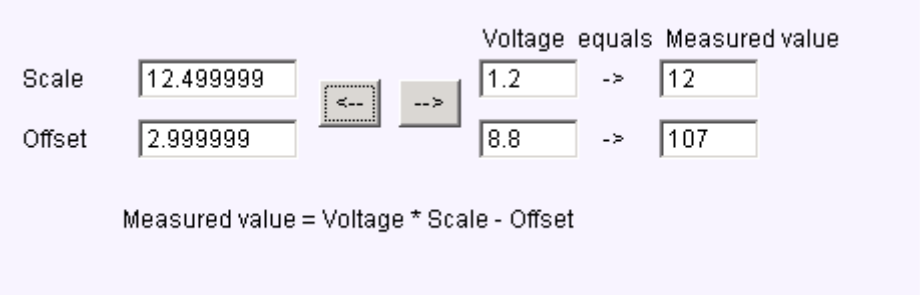


Sensor type	a	Comments
Pt1000 IEC751	0.00385	IEC751 is an international standard governing Pt1000 sensor calibration. It is based on a DIN standard and is used throughout Europe.
Pt1000 JIS C1604	0.003916	JIS C1604 is a Japanese industrial standard. There is also a corresponding US standard. Used in Japan and some US companies.
Ni1000 DIN	0.00672	Ni1000 calibrated according to German industrial standards.
Ni1000 LG	0.00672	Landis & Gyr have their own sensor type, which is basically an Ni700 in series with 300 ohm.
Ni-Fe 1000	0.00518	Nickel-iron sensors usually have this alpha value.
Mo1000	0.00300	Molybdenum sensor.
Cu1000	0.00427	Copper wire sensor element.

5.4 Analog sensors

Analog sensors supply an output signal either as a voltage or as a current. The WMPro has four inputs for each type. The configuration process is the same for both types – you will need to enter a scale factor and an offset that converts volts or mA into the relevant unit.

You can usually find these details printed in the sensor documentation, but if not, you can easily work them out. This is what the fields on the right are for.



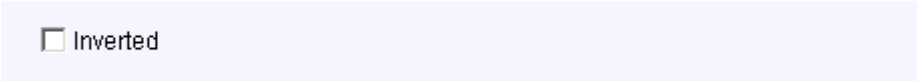
Assume you want to measure a water level with a pressure sensor that outputs a signal between 0 and 10 volts. You can use a ruler to measure the water level, then click Measure button to tell the WMPro to obtain a voltage reading. You need to take readings at two levels, for example 12 and 107 cm. Enter these levels and the voltage values, 1.2 V and 8.8 V, then click the left arrow. The scale factor and the offset are calculated automatically. You can also enter values in the scale factor and offset fields, then click the right arrow to see the values for particular voltages.

Do not forget to save the settings.

5.5 Digital sensors

5.5.1 Digital status

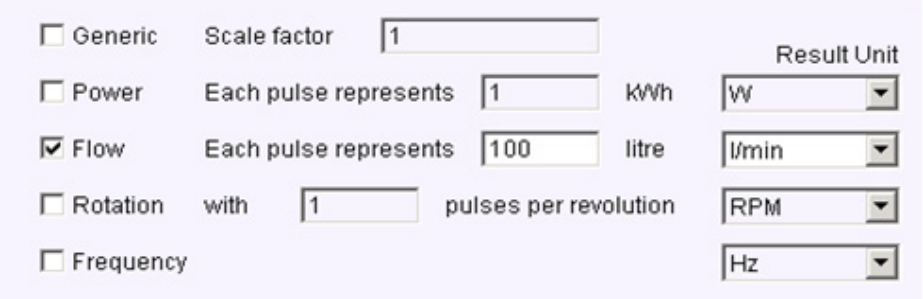
A digital status input does not provide so many options. All you can do is invert the signal. An input normally has the value 1 = **On** if it is connected to earth or if the input voltage is low (< 6 V). If it is open (not connected) or if the input voltage is high (> 6 V) it has the value 0 = **Off.**



If you select the Inverted option, On and Off are swapped around. This is usually done if an active sensor is connected. You can use all eight digital inputs on the WMPro as digital status inputs.

5.5.2 Frequency

Some sensors supply pulses to represent a measured quantity such as a flow. The WMPro measures the frequency in Hz, which then has to be converted into the relevant unit. Digital inputs 1– 4 can measure frequency.



The WMPro can help you calculate a scale factor for most situations. Start by selecting the box next to the quantity you are measuring. We are measuring a flow of water in this example, so select *Flow*. You need to complete two fields on the same line – these fields are white and the other fields are the same colour as the background.

Consult the sensor documentation to find the value for the "Each pulse represents" field. (If the documentation states the value as pulses per litre, you will need to convert it to litres per pulse.) Use the drop-down list box on the right to select the unit for the flow. The changes will take effect when you click the *Apply Settings* button.

Power works in the same way as flow, and this option is used for energy meters with a pulse output.

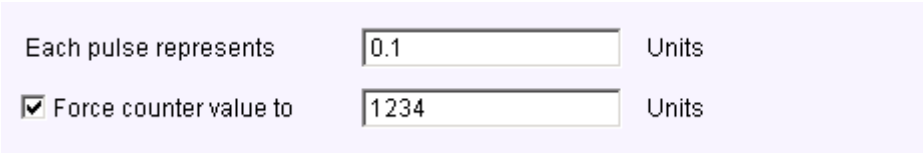
Select *Rotation* if the sensor measures the speed of rotation. Enter the number of pulses per revolution and select the display unit.

For *Frequency*, select the unit, Hz, and pulses per minute or pulses per hour.

If none of the options applies to the quantity you are measuring, select *General* and calculate your own conversion factor, the frequency in Hz and the unit.

5.5.3 Counters

If you are using a pulse generator to measure a flow, the same sensor can be used to measure consumption. Alongside the four digital inputs that can be used as frequency inputs, there are four counter inputs. These inputs do not receive data from other sensors – instead they count pulses from the same sensor.



To measure water consumption using the flow sensor we set up in the example in 5.2, simply specify a volume for each pulse. The cubic metre is a more suitable unit for measuring consumption, so enter 0.1 m3 instead of 100 litres.

If there is an external mechanical meter and you want to force the WMPro counter to take the same value, you can enter the value here. In this example it is 1234 m3.

The principle would be the same if you were measuring energy consumption, the number of visitors to a zoo, or whatever.

5.6 Analog outputs

The analog outputs supply a signal between 0 and 10 V. The configuration options are the same as for the analog voltage inputs, and the tool for calculating the scale factor is exactly the same.

The scale factor and the offset are used according to this formula:

Output signal = (Channel value + Offset) / Scale factor

This may seem strange, but what it means is that the scale factor and offset are calculated in exactly the same way for actuators and for sensors. The channel value is the value that will be output by a controller or similar device, scaled using the specified unit.

5.7 Digital outputs

WMPro only has digital status outputs. The only configuration option is inversion.

If the value for the output is 0, the output is **off**, i.e. it does not conduct current. Otherwise it is **on** and conducts current to earth. If you select the Inverted option, On and Off are swapped around.

5.8 Database settings

Each database has a definition detailing what will be saved for each update. This definition is modified when you change database settings for sensors.

The databases can accommodate up to 50 values per row. The number of rows, and therefore the stored history, is limited by the available memory. Because the available memory is constant, more values per row mean less space for rows. In other words you need to make choices about what you want to store, so that the databases cover the period you are interested in.

To save space, the database contains nothing but the values – the only way of knowing what these values are is by consulting the definition. In other words, if the definition is changed, there is no way of interpreting the existing information in the database. For this reason the databases are deleted automatically when changes are made to the definition.

5.8.1 Statistical functions

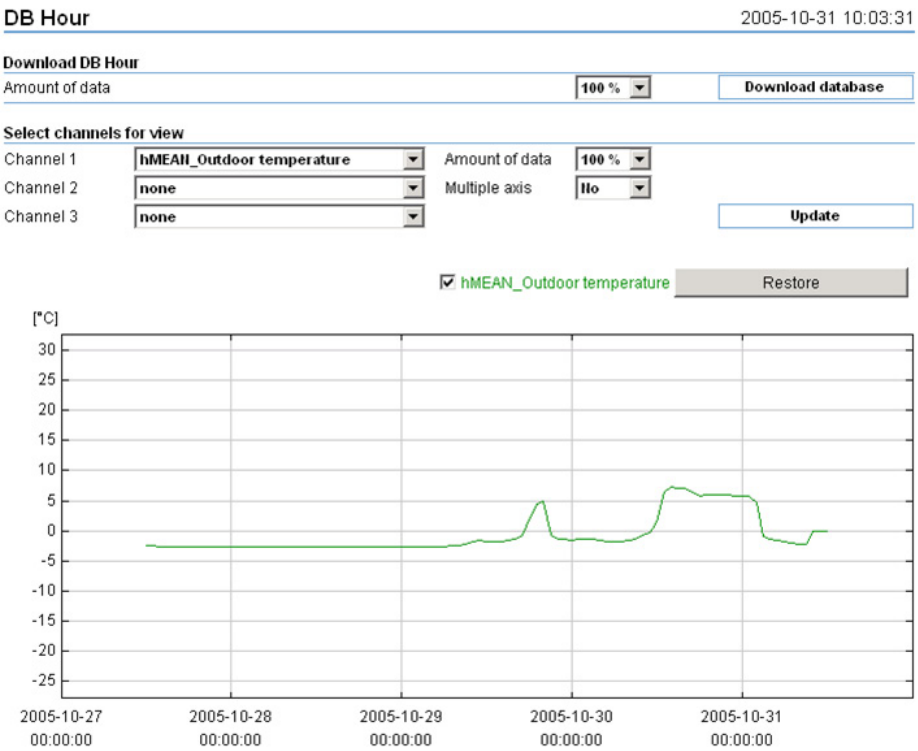
The short time database can only contain momentary values. In the hour and day databases, we are usually more interested in statistical values that tell us something about the period since the last update. The table shows the various options.

Name	Comments
Momentary value	An instantaneous value.
Mean value	The mean value over the period.
Max value	The highest value during the period.
Min value	The lowest value during the period.
Variance	A statistical measure of how much the value has varied over the period.
Standard deviation	Square root of the variance. The standard deviation is better than the variance when comparing two sets of data.

5.8.2 Names

When you add statistical values to a database, they are automatically named by adding a prefix to the sensor name. If you click the Database tab in the View menu to open a database, you can choose the values you are interested in by name. You can use the channel list to change the name of a sensor, even if the databases already contain statistical information for that sensor. The channel names belonging to the sensor are automatically renamed.

The actual sensor name is limited to 32 characters.



5.9 Manual control

All outputs – analog and digital – can be controlled manually. You can use the channel list to change the relevant settings. This function is time limited in case you forget that it is activated.

You can find out more about manual control in 11.1.4.

6 Controllers

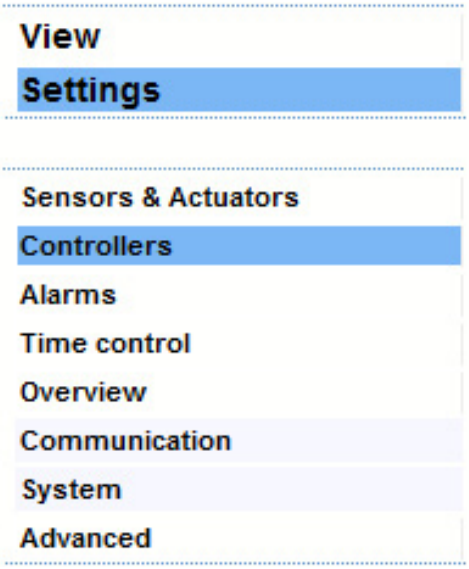
This section explains how to configure various types of controller. The settings determine which inputs and outputs are used and how they influence each other.

6.1 Configuring controllers

Controllers

The WMPro is supplied with a tool for configuring controllers. There are three types of controller: heating controllers, ventilation controllers and general PID controllers. The controller tool can also configure three-state actuators.

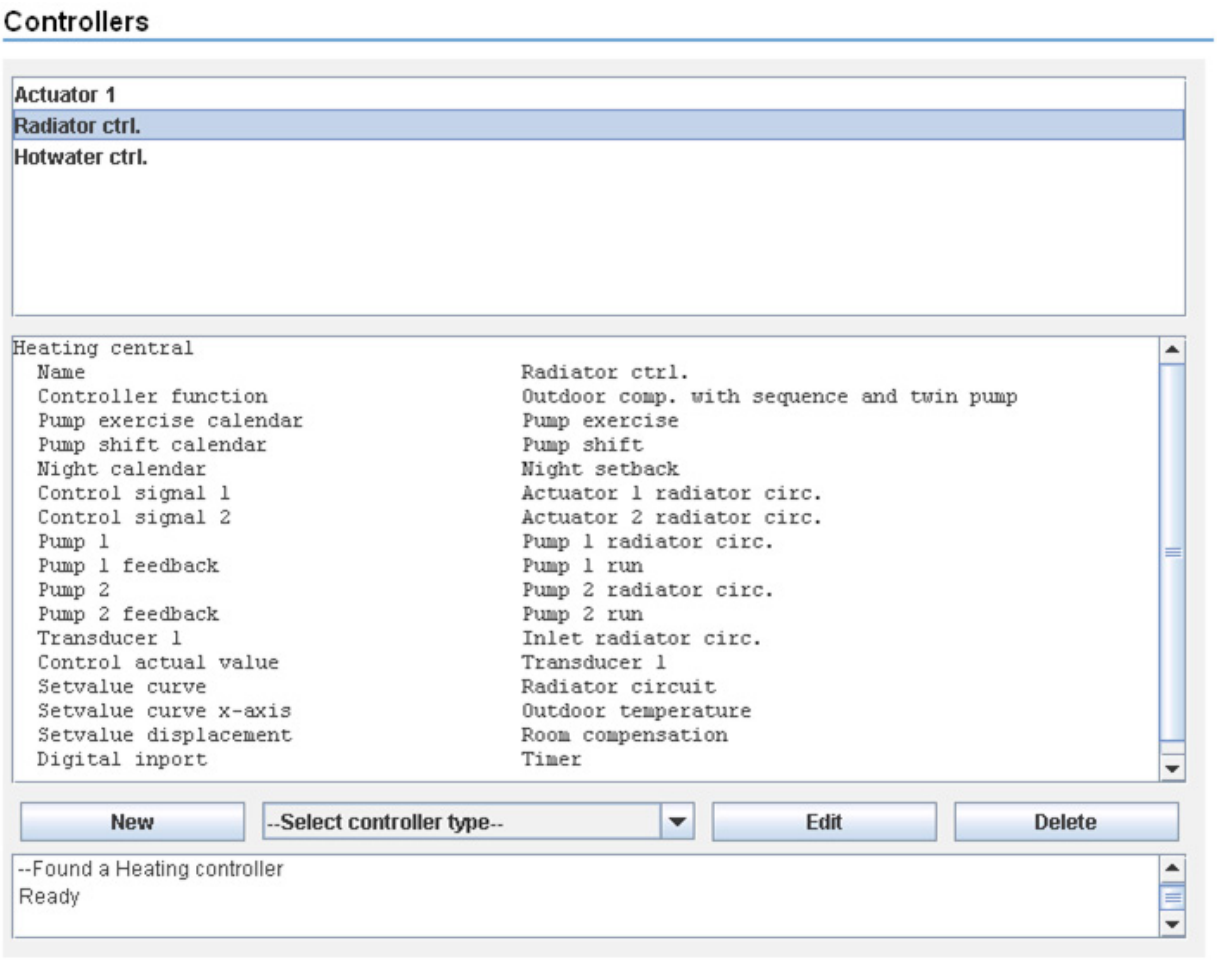
To configure a controller, you need to tell the WMPro which sensors and other inputs and outputs to use, and how you want them to influence each other. The WMPro has a controller tool which you can use to directly configure three main types of controller. The main types are conheating controllers, ventilation system controllers and general PID controllers. The controller tool can also be used to configure "three-state actuators". The tool generates a script and settings that are automatically imported into the WMPro. To configure the controllers you need to be logged in as "config". You can make the process easier by configuring and naming all the sensors and actuators as described in section 5. If the controller tool does not provide enough configuration options you will need to write your own script.



You can change many controller settings, including the controller function, the name and other information about the sensors/actuators and other inputs to use, and how you want them all to work together.

You can also select curves and weekly night and day programmes, pump exercise calendars and pump shift calendars for twin pumps. Start by selecting Settings/ Controllers. This opens the first page of the controller tool. If you have already configured any controllers, they are listed here. You can highlight a controller to show the main parameters. You can also delete or edit the highlighted controller.

When you come to select sensors for a controller, you will also see channels connected to external units. That is why it is important to assign names to these channels before you start configuring the controller. If a pump has a control output as well as an indicator, make sure the names specify which is the input and which is the output. Otherwise it is easy to get them mixed up.



Control functions: A heating central controller has the following control functions: constant or compensated, with or without pump(s) and one or two actuators in sequence.

6.1.1 Controller for heating centrals

Control functions

A heating controller has the following control functions: constant or compensated, with or without pump(s) and one or two actuators in sequence.

To illustrate, we are going to define a new controller for a heating central. Highlight Heating central and click New. This section describes in detail how to configure a controller in a heating central – for a radiator circuit with twin pumps and two actuators in sequence, with a weekly day/night programme, a pump exercise calendar and a pump shift calendar. This configuration gives us the opportunity to work our way through virtually all the settings. Name the controller and select the controller function – "Outdoor comp. with sequence and twin pump" in our example.

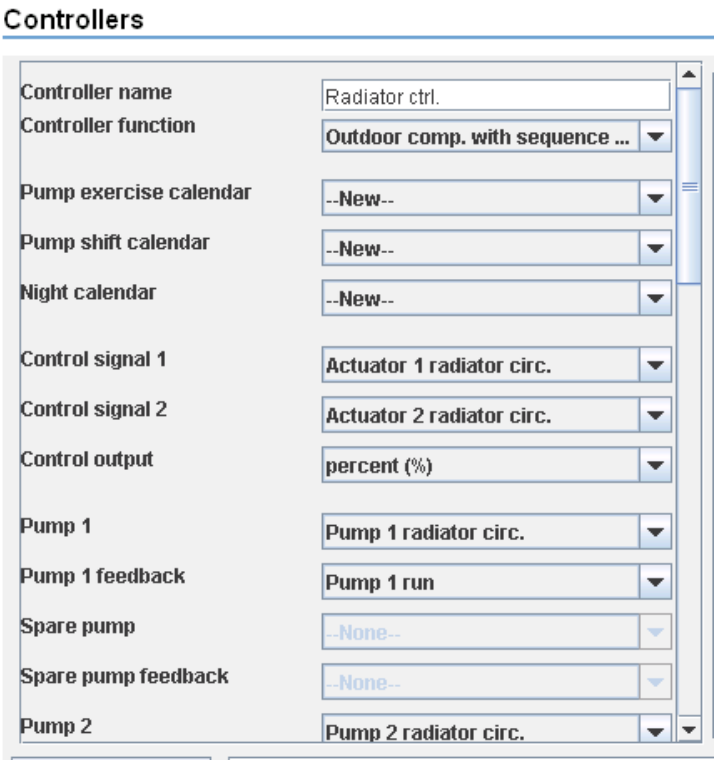
Select a pump exercise calendar, pump shift calendar and night calendar. You can either choose from existing calendars or select New. Find out more about calendars in section 9.

Select the control outputs you want to use and how you want to display the control signal (V or %).

Important: The display setting must be the same as the output configuration.

If you have assigned names to all inputs and outputs, they will appear by name in the lists. There is a New option in the list of control outputs. You should choose this option if you are using a "three-state actuator". The outputs are actually configured later in a special dialog. See 6.4 and 11.1.

Select control and operation signals for both pumps. Twin pump automation will only work if each pump provides a feedback signal. A feedback signal is an input signal with the same state as the output signal. For example, if the motor circuit breaker is tripped, the input signal changes to 0 while the output signal remains 1. This causes the second pump to start and triggers an alarm.



Select transducer 1.

Choose how you want to generate the actual value for the controller. If two sensors are connected, you can use the highest or lowest temperature at either of the sensors, or the mean value. One of the sensors can also be used for the minimum limit. In this example there is only one sensor.

Pump operation

A heating controller has the following pump options:

No pump.
Single pump.
Single pump with spare pump.
Twin pump.

All pumps can be used with feedback alarms. In other words, a digital input to indicate operation must have the same status as the output controlling the pump.

Transducer

A controller can have two transducers, which can work in four different ways:

Mean value control.

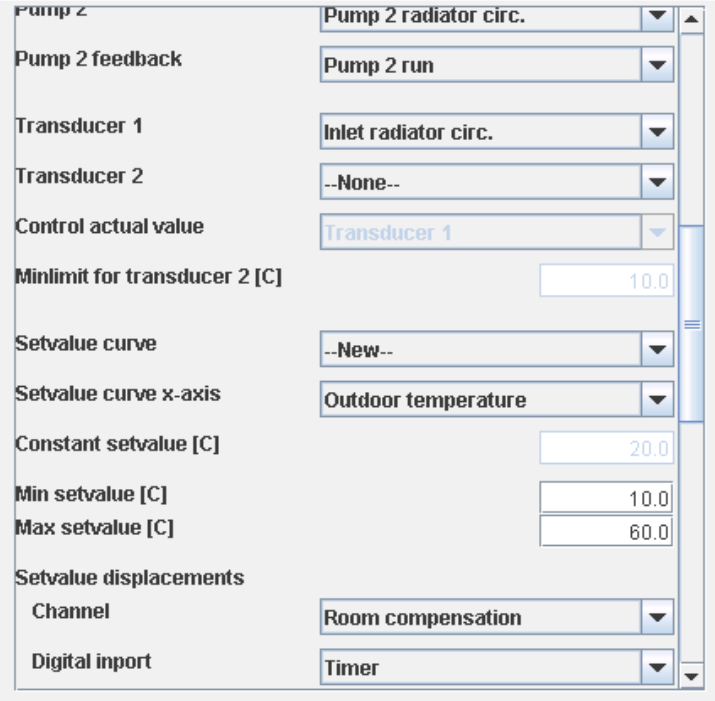
Control by sensor with the lowest temperature.

Control by sensor with the highest temperature.

Sensor 2 can be used for the minimum threshold.

Control curves

The curves have up to ten breakpoints, which you can drag in either the X direction or the Y direction. The value of the active point appears below the chart. You can use the curve tool if you want to reduce the number of breakpoints, import values in table form or change the scaling of the axes. See section 8.



Set value displacement

There are two types of set value displacement: simple digital displacement, in which the size of the displacement is specified in the controller tool; and a displacement channel for more advance displacements. Examples include room compensation.

Select the controller curve. If there is no suitable curve, select New. The controller tool will generate a standard curve – you will probably need to edit this later. Turn to section 8 to find out more about curves.

Select the sensor that will provide the input signal for the curve. This is usually the outdoor temperature.

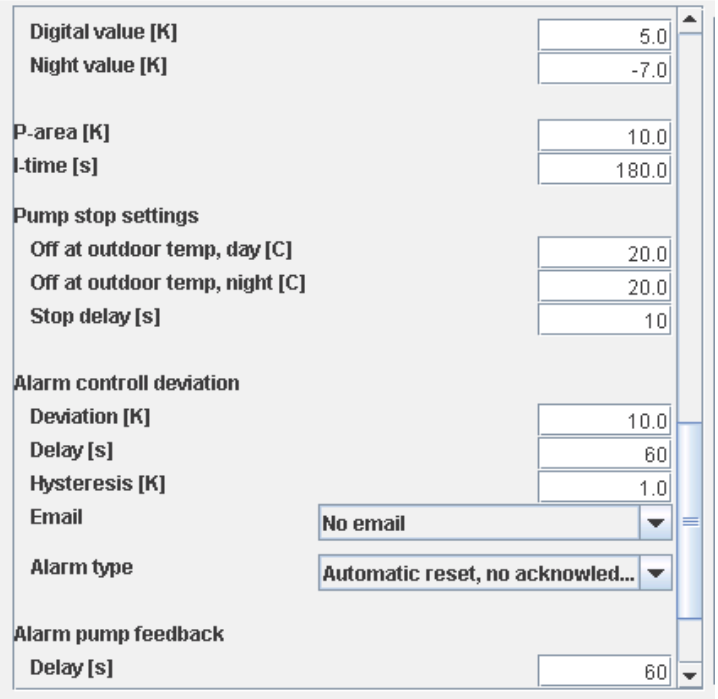
Specify the minimum and maximum set values. In theory, a compensated controller can receive unrealistic set values Specify plausible values, e.g. 10 °C and 60 °C.

Specify whether to use a channel for set value displacement. In this example we are not using a channel for set value displacement. Find out more about set value displacement in section 6.3.

Specify whether to use a digital input for set value displacement. In this example we will use an external timer for set value displacement.

Specify the digital displacement and the night displacement. In this example, the digital displacement (timer) is 5 K and the night displacement is –7 K.

Specify the P-area and the I-time. 50 K and 180 s are good starting points in a controller for radiator circuits. (You can adjust the settings later.)



Set the desired day and night off temperatures for pumps, and a time delay for restarts. The restart delay prevents the pumps starting and stopping in response to slight variations in the outdoor temperature. **Important:** The delay is used every time the controller starts for any reason, for example after a power cut.

P-area

The P-area defines the deviation necessary in order to obtain a 100% output signal from the controller. The P-area is centred on the set value, so if the P-area = 10 K and the set value is 20 °C, the output signal is 50% when the actual value is 20 °C. When the actual value is 15 °C the output signal is 100% and when it is 25 °C the output signal is 0%.

I-time

The I-time is the time taken to halve or double the control signal for a specified constant deviation. For example, assume that a deviation produces a 20% output signal. After one I-time the output signal is 40%. After two I-times the output signal is 60%. And so on. The deviation must remain constant throughout.

Specify the deviation, delay, hysteresis and alarm details for set value deviation. The deviation is the maximum permitted difference between the actual value and the set value before the alarm is triggered. The delay is the number of seconds the deviation is tolerated before the alarm is triggered. Hysteresis is the number of degrees by which the deviation must fall below the alarm threshold before the alarm is deactivated.

Choose an email option and select the alarm type. The alarm type determines how the WMPro will handle an alarm. There are three options.

Automatic reset, no acknowledge. There is no need to acknowledge this alarm type. The alarm is recorded in the alarm log and emails are sent (if email notification is enabled). Otherwise everything continues as normal.

Automatic reset, with acknowledge. As above, except that the alarm remains active until it is acknowledged.

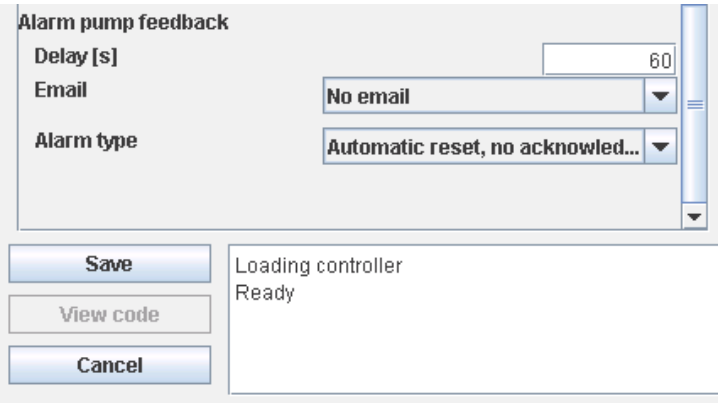
Reset when acknowledged. Choose this option if the alarm performs an action in WMPro, for example frost protection in a ventilation system. If there is a risk of freezing, the system is stopped and cannot restart until someone acknowledges the alarm.

Alarm types

You can choose from three different types: automatic reset without acknowledgement; automatic reset with acknowledgement; and restart when acknowledged. You can find out more in section 7.

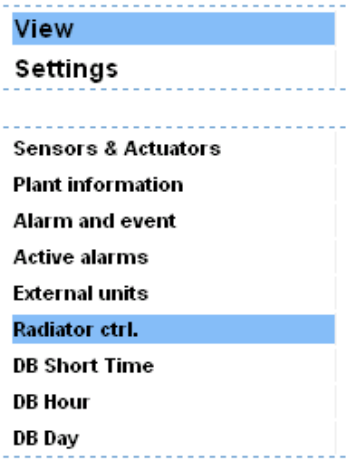
Specify the delay, the email option and the alarm type for pump feedback. The delay is time between the moment the feedback loop is interrupted to the moment the alarm is triggered. This value also specifies the delay before starting the spare pump or twin pump if they are installed.

You can add information to the alarm email that is sent. To do this, go to Settings/Alarms. See section 7.



You have now finished configuring the controller, and all you need to do is save it. Click Save and wait for the controller tool to generate a script and restart WMPro – this takes about three or four minutes. If you want to configure a new controller, you can get going as soon as the WMPro has restarted.

After configuring all your controllers and waiting for the WMPro to restart for the last time, you will need to update your browser.



You will see a new tab under the "View" menu. The tab name is the name you assigned the controller earlier. If there is more than one controller, each has its own tab. You can use the tabs to view controller data and modify all adjustable parameters and curves.

6.1.2 Changing or removing a controller

When you open the controller configuration page, you will see a list of all existing controllers that were configured using the controller tool. Select the controller you want to change or remove, then click the relevant button. If you have bypassed the controller tool and configured a controller with a script, you will have to use the script to edit or delete the controller.

6.2 Viewing controller data

The "View" menu now contains separate tabs for each controller.

Open a controller

The controller data appears at the top of the page. You are not able to modify this data. If there is a curve, it appears in the middle of the page. You can use drag-and-drop to alter the breakpoints. For more advanced curve settings, see section 8.

Other adjustable parameters appear at the bottom of the page. **Important: Each row must be updated separately.**

The next page shows the data page for the controller we configured earlier.

6.3 Definitions

6.3.1 Set value displacement

The set value can be shifted up or down by a channel, a digital input or a weekly programme. If there are multiple active displacements, the values are added together. The effect of a channel depends on the content of the channel. If the channel is an analog input with a displacement, say, of 0—10 V = 0—10 degrees, a 5 V signal at the input creates a 5 degree displacement. The channel could also create a set value displacement on the basis of the room temperature. This requires a control curve and some graphical programming. The digital input and the weekly programme each have a fixed level, which you specify when you configure the controller. You can change the settings at any time in the controller's "View" page.

6.3.2 Control functions

Most controllers operate according to one of two principles – constant or compensated. The constant principle means that the controller set value is kept constant, for example when controlling a hot water circuit. The compensated principle means that the set value is modified dynamically by another input signal on the basis of a curve.

6.3.3 Pump operation

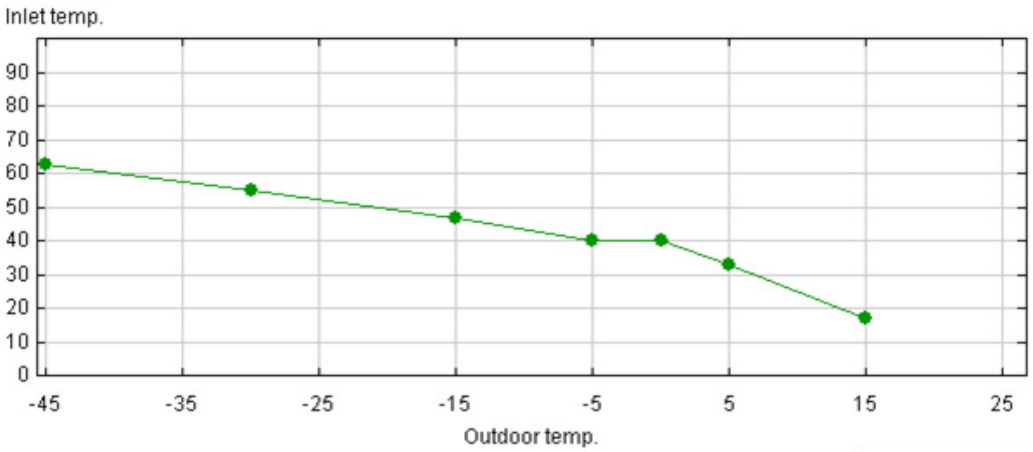
As well as managing various types of actuator, the controller can also start, stop and switch pumps, fans, etc.

6.3.4 Feedback alarm

An alarm is triggered by the combination of a digital output and a digital input. As long as they have the same status, there is no alarm. However, an alarm is triggered as soon as their statuses diverge. Suppose the digital output is controlling a contactor for the circulation pump. An auxiliary contact on the contactor is connected to the digital input. If the motor circuit breaker is tripped, the connection to the input is interrupted, triggering an alarm. The alarm could also be used to start a spare pump or a twin pump.

Radiator ctrl.

Value Radiator ctrl.	43.0 °C
Setvalue Radiator ctrl.	39.2 °C
Ctrl error Radiator ctrl.	3.8 K
Actuator 1 radiator circ.	0 %
Actuator 2 radiator circ.	0 %



Update

P-area Radiator ctrl.	K	10.0	Update
I-time Radiator ctrl.	s	180.0	Update
Min setvalue Radiator ctrl.	°C	10.0	Update
Max setvalue Radiator ctrl.	°C	60.0	Update
Man displacement Radiator ctrl.	K	0.0	Update
Night displacement Radiator ctrl	K	-7.0	Update
Di displacement Radiator ctrl.	K	5.0	Update
Off day Radiator ctrl.	°C	20.0	Update
Off night Radiator ctrl.	°C	20.0	Update
Pump delay Radiator ctrl.	s	10	Update

6.3.5 Transducer

A transducer supplies the actual value to the controller. Two transducers can be connected to the WMPro, and they can generate the actual value in three different ways: the sensor with the lowest temperature, the highest temperature or the mean value of the two sensors. One of the transducers can also be used for the minimum threshold. In a ground heating system, for example, the risk of frost means you want to maintain a minimum temperature in the return. You can set the threshold temperature using a parameter in the controller's "View" page.

6.4 Controlling three-state actuators

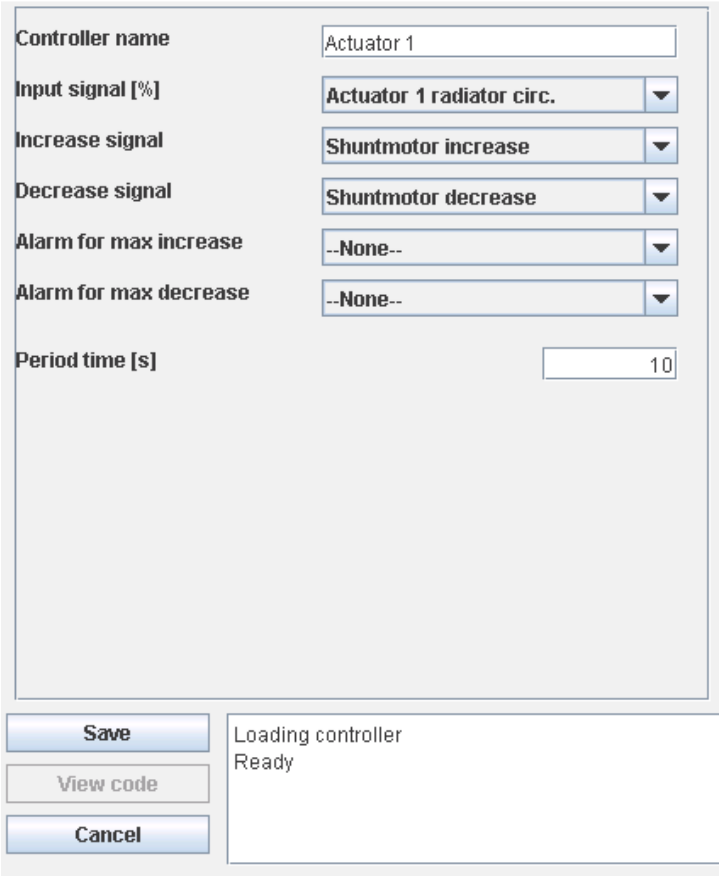
In this section we will configure a three-state actuator (increase, stop, decrease). You can use the controller tool to do this.

Open Settings/Controllers

Select the *Three-state actuator* controller type and click *New*.

This opens the configuration page.

One of the actuators in the controller we configured earlier has a three-state actuator. Start by assigning a name. Choose the channel you want to use as the control signal. When we configured the controller earlier, we specified an analog output for actuator 1. You can use this, in which case the controller will have outputs for both actuator types. If you select New instead, there will be a channel called Control signal 1 Radiator circuit. Select any of these as the input signal. Also select the digital outputs you want to use for the Increase and Decrease signals. You have the option of selecting an alarm channel that sets the Increase or Decrease channel to On. This could be useful if the actuator is controlling a valve with frost protection. When the frost protection is tripped, the Increase output will be permanently On.



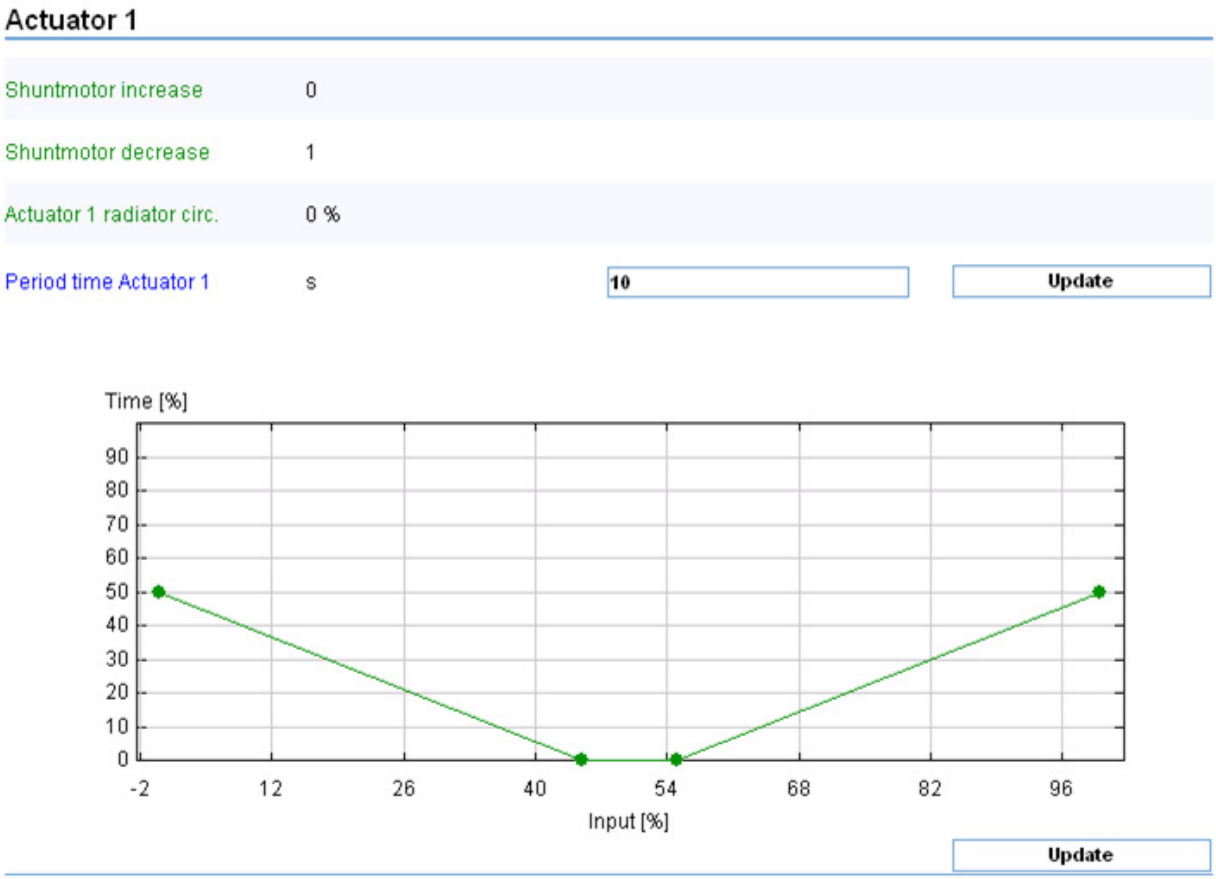
In this case, select the frost protection alarm as the input signal for constant Increase. If you select two alarms and they are triggered simultaneously, the alarm generating the Increase signal has priority. The actuator in this example has no special alarm function. The outputs are pulse-width modulated, and you can specify the period time.

When setting the period time, remember that the minimum running time is 1 second. When you have finished changing the settings, click Save. The WMPro now generates a script and restarts. The program also creates a configuration page under the View menu, called Actuator 1. You will not be able to see the menu until you reload the page.

6.5 Viewing actuator data

Open View/Actuator 1. You will see the period time setting and a curve in which you can specify the pulse proportions. You can use drag-and-drop to move the breakpoints, but you can also edit the curve in Settings/Advanced/Curves. Here you can add breakpoints, change labels, scaling, etc. See section 8.

The settings for three-state actuators do not usually need to be changed after the initial phase. For this reason you may think there is no need for the page to appear under View. You can hide it or remove it completely in Settings/Advanced/Summary Pages.



6.6 Ventilation and PID controllers

Ventilation and PID controllers are configured in the same way. Please consult the controller manual for more detail.

7 Alarms

Alarms are central to the way the WMPro works. This section explains how you can view alarms and the alarm history, and how to acknowledge alarms. You will also find out about the various types of alarm and how you can send email notifications when an alarm is triggered. You will also learn how to change alarm settings.

7.1 Alarm pages

The purpose of alarms is to alert users when something goes wrong in the system. If there is an active alarm, the red LED on the WMPro lights up, and the alarm frame at the top of the web page turns red if the number of alarms is greater than zero. If alarms occur while a system is running, they need to attract our attention. That is why the first page in the View menu is the Active alarms page.

The View menu also contains a page called Alarm and event log, where you can see a history of alarms showing when they occurred, when they were acknowledged and when they were cleared.

The log also contains errors, events and messages. An error is a kind of internal alarm affecting the WMPro itself rather than the wider installation. Events are entries indicating that something (not an alarm) has happened in the device. Examples of entries include device restarts, software updates, etc. Messages can be script-generated.

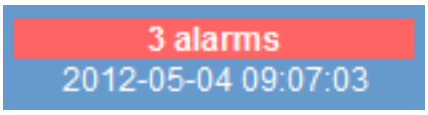
In the Settings menu, the Alarms section lists all the alarms in the device (the maximum number of alarms is 50). In this section, you can change alarm settings or create new alarms. Some alarms are created automatically when you set up a controller, but you will usually need to create your own alarms.

Alarm LEDs

There is a red ALARM LED on the front of the WMPro. It lights up if at least one alarm is active. If it is flashing, there are alarms waiting to be acknowledged.

Alarm frame

There is an alarm frame in the middle of the top line of the WMPro web page, showing the number of active alarms in the device and the system time. You can change the update frequency of the frame in the Presentation tab of the System menu. If there are no active alarms, the frame appears in green.



7.2 Alarm types

Alarms can work in three different ways in the WMPro.

7.2.1 Automatic reset, no acknowledge

Automatic reset, no acknowledge means there is no need for a user or operator to acknowledge the alarm. The alarm is cleared when the error is no longer active as defined in the alarm conditions. You can specify delay and hysteresis values in the conditions.

You can also add "A-alarm" or "B-alarm" to the email that is sent when the alarm is triggered. This allows recipients to sort the alarms.

7.2.2 Reset when acknowledged

The "Reset when acknowledged" setting means that the alarm remains active until a user or operator acknowledges it. If the error persists after the alarm is acknowledged, it will remain active until the error is cleared, including the delay and hysteresis. The alarm LED flashes if an alarm is waiting to be acknowledged. If the alarm persists after it is acknowledged, the alarm LED stops flashing but stays lit until the alarm is reset.

A-alarms and B-alarms

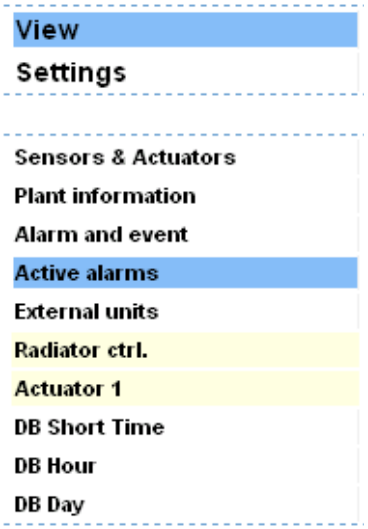
The WMPro does not classify alarms as A-alarms and B-alarms – the possibilities are in fact much wider than this. To use summary alarm outputs, select an action channel in the alarm settings. These outputs can be digital outputs, and you can name them A-alarm or B-alarm.

7.2.3 Automatic reset, with acknowledge

The third option – automatic reset, with acknowledge – is a hybrid. The alarm resets itself when the error is cleared, but it still has to be acknowledged. In this case, the acknowledgement is a kind of confirmation that someone has noticed the alarm. Details of the reset and the acknowledgement are both recorded in the alarm log.

The alarm appears in the list of active alarms until it is acknowledged, but after it is reset the status column will contain "Not acknowledged" instead of "Active". It is possible to acknowledge this type of alarm while it is still active.

7.3 Alarms and events

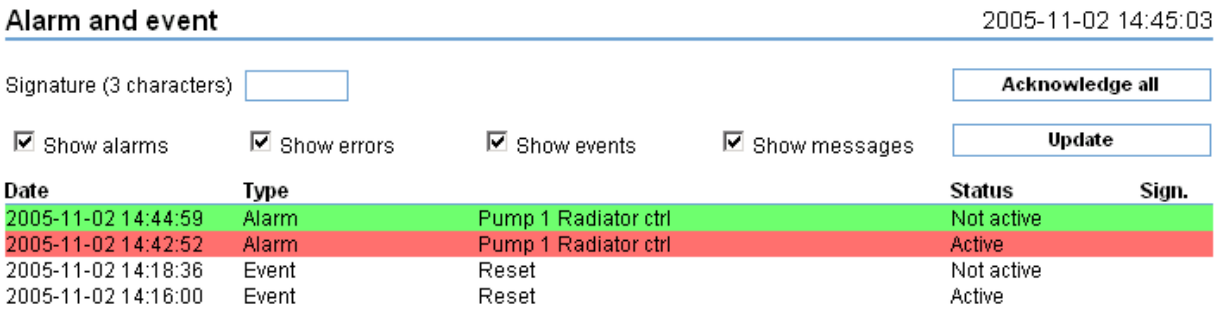


The alarm and event log is a list of things that have occurred, affecting the device and the installation. The log shows when alarms were triggered, when they were cleared and when they were acknowledged.

Events, errors and messages are also included in the log. See section 7.5.7 for precise details of the possible entries and what they mean.

You can use the checkboxes and the Update button to choose what you want to include on the list. If you are interested in something in particular, this is a way of stripping away irrelevant information.

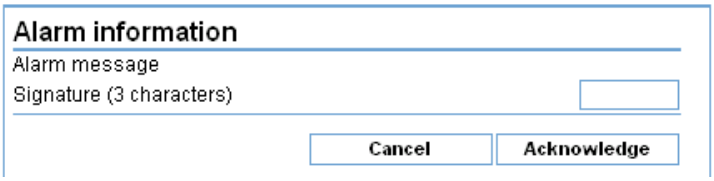
The list is colour-coded. An active alarm appears in red. Rows appear in green if they contain alarms that are inactive or have been acknowledged. Events have a white background. If an internal error is detected, it appears on the list with a yellow background while it is active, then with a white background once it has been cleared. Messages have a pale blue background.



Date	Type		Status	Sign.
2005-11-02 14:44:59	Alarm	Pump 1 Radiator ctrl	Not active	
2005-11-02 14:42:52	Alarm	Pump 1 Radiator ctrl	Active	
2005-11-02 14:18:36	Event	Reset	Not active	
2005-11-02 14:16:00	Event	Reset	Active	

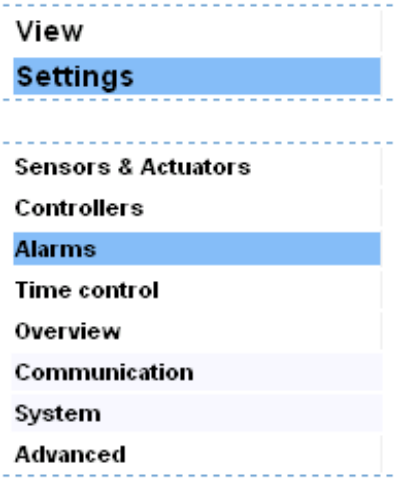
7.4 Acknowledging alarms

If you select a row in the alarm and event log or in the list of active alarms, the following dialog appears.



Apart from the alarm name, the dialog contains an alarm message if one has been defined. There is also a signature field. To acknowledge the alarm, enter your initials or other identifier up to three characters long. The identifier appears alongside the acknowledgement in the alarm log so there is a record of who acknowledged the alarm.

If there are too many alarms to acknowledge one by one, you can click the "Acknowledge all" button. You will need to enter a signature here, too. All outstanding alarms are acknowledged, and an entry is added to the alarm log stating that the "Acknowledge all" button was used. Use of this button is recorded as an event. You can acknowledge alarms if you are logged in as operator or config, but not as view.

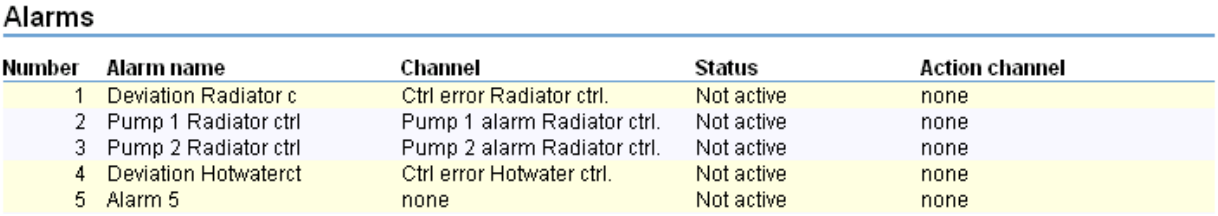


7.5 Alarm settings

You must be logged in as config to change any of the alarm settings. If you have configured any controllers, some alarms will already be installed. You can edit them here.

Open Settings/Alarms You will see a list of all alarms, including alarms that have not been configured yet. The device has space for up to 50 alarms. Configured alarms usually have a name like "Controller error", while unused alarms are simply called Alarm 1, 2, etc.

Each alarm monitors a channel. This could be an input, or a channel used in a controller, a graphics program or a script. The list also shows which channel the alarm is associated with.



7.5.1 Alarm conditions

You can click on a row to show the alarm definition. You will see the name and the channel, as well as the conditions that trigger the alarm. The channel list only contains activated channels.

Start by selecting the type of condition. OVER and UNDER are self-explanatory. BIGGER and SMALLER are slightly less obvious. These conditions work with the absolute value of the channel, without regard to its sign. It ought to be clear what EQUALS means, although you will probably not use it much.

Alarm list

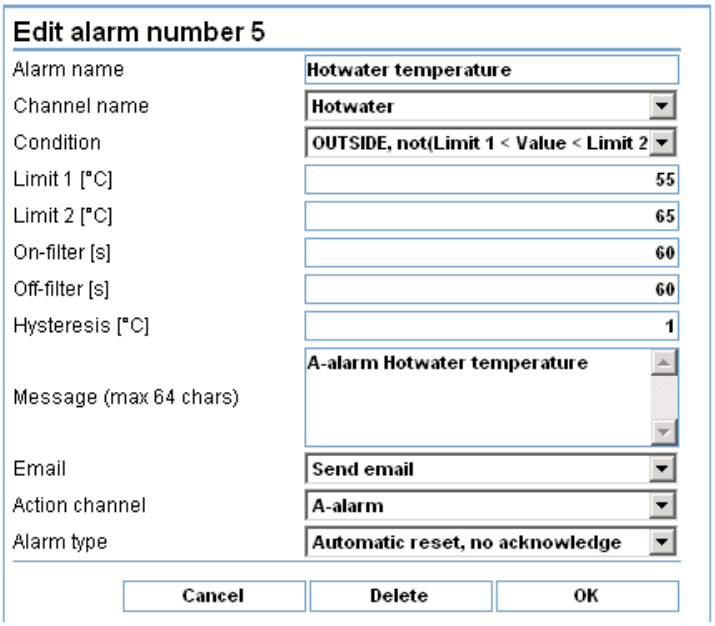
Alarms that are used by a script have a pale blue background, and user-defined alarms have a pale yellow background. Unconfigured alarms have a white background.

All these conditions are compared to the value you enter in the Limit 1 field. The BETWEEN and OUTSIDE conditions use the values in Limit 1 and Limit 2. BETWEEN triggers an alarm if the channel value is somewhere between the two limits. OUTSIDE triggers an alarm if the channel value is outside the limits. Limit 1 is the lower limit and Limit 2 is the upper limit.

7.5.2 Filters and hysteresis

The on-filter specifies the number of consecutive seconds the alarm condition must be true before the alarm is triggered. The off-filter specifies the number of consecutive seconds the alarm condition must be false before the alarm is cleared.

The hysteresis setting is a way of preventing the alarm repeatedly switching between active and inactive when the value is equal to the limit. It specifies the number of degrees by which the value must fall back below the limit or limits before the alarm can be cleared.



7.5.3 Example

In this example we are going to add an alarm that is triggered when the hot water temperature goes above 65 ºC or below 55 ºC. The alarm will activate an alarm relay called A-alarm, which is connected to digital output 7, and it will send an email. Start by configuring a temperature input and a digital input unless you have already done this. See section 5. Open Settings/Alarms Click on the first unconfigured alarm. (Alarm 5 in the list above.) Give the alarm a name, for example Hotwater temperature.

Choose the channel you want to use as the alarm value. In this example, use the "Hotwater" channel. Specify the alarm conditions. In this example, use outside limit 1 and limit 2. (OUTSIDE, not (Limit 1 < Value > Limit 2)). Enter values for Limit 1 = 55 °C and Limit 2 = 65 °C. Enter times for On-filter and Off-filter. The time specifies the number of seconds the alarm conditions must be true or false before the alarm changes to active or inactive respectively. In this example, type 60 seconds in both fields. Enter a hysteresis. In this example, use 1 °C.

Write out the alarm message, for example A-alarm Hotwater temperature. This message will also be sent as an email if you select the Send email option. You should make sure the message accurately describes the problem. Choose the digital output you want to use for the A-alarm. Alarm outputs are explained in more detail in 7.5.5.

Select the alarm type. For example Automatic restart, no acknowledge. Click OK to save. You are returned to the alarm page, where the new alarm now appears in the list.

Alarms

Number	Alarm name	Channel	Status	Action channel
1	Deviation Radiator c	Ctrl error Radiator ctrl.	Not active	none
2	Pump 1 Radiator ctrl	Pump 1 alarm Radiator ctrl.	Not active	none
3	Pump 2 Radiator ctrl	Pump 2 alarm Radiator ctrl.	Active	none
4	Deviation Hotwaterct	Ctrl error Hotwater ctrl.	Not active	none
5	Hotwater temperature	Hotwater	Not active	A-alarm
6	Alarm 6	none	Not active	none

7.5.4 Service alarm

Service alarm

A machine may need a service after running for a certain number of hours. The WMPro can send an email when it is time for a service.

Assume there is a pump that needs to be serviced every three years, in other words after about 26,000 hours of usage. We can instruct the WMPro to send an email when the pump is due for a service.

You can find out more about runtimes in section 11.

Open Settings/Alarms Click on the first unconfigured alarm. Unconfigured alarms appear in white and are numbered, for example Alarm 7.

Give the alarm a name, for example Service Pump 1.

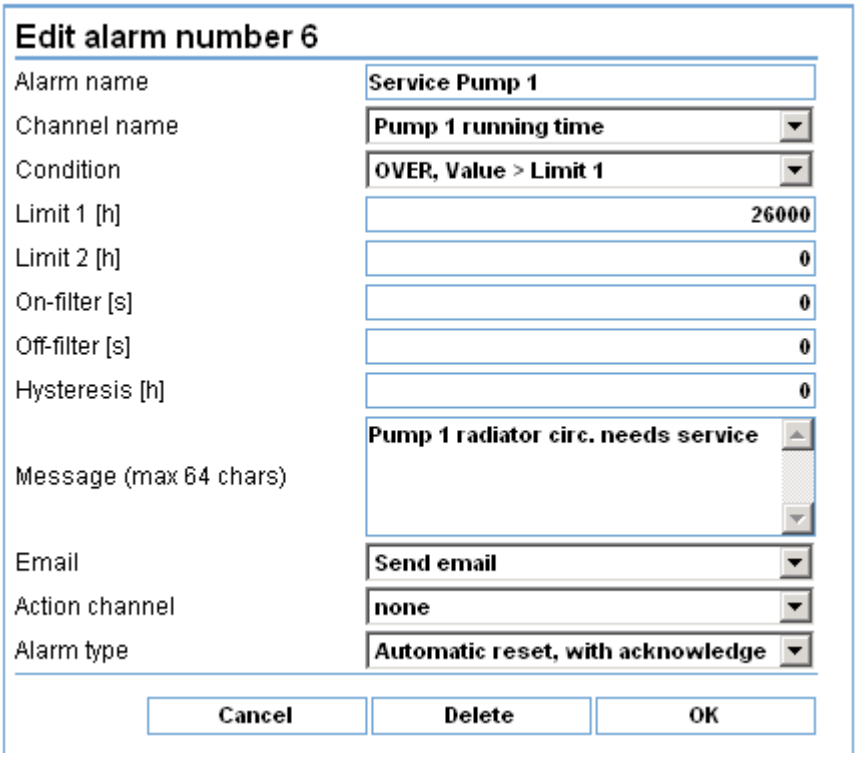
Choose the channel you want to trigger the alarm. = Pump 1 running time.

Select the condition. = OVER, Value > Limit 1. Set Limit 1 = 26000. On-filter, Off-filter and Hysteresis can all be left at 0. Type a descriptive message. Select Send email Select an action channel if you want to use one. For the alarm type, select Automatic reset, with acknowledge.

When the pump reaches the specified running time, an email is sent. The engineer has to acknowledge the alarm and either reset the timer or increase Limit 1 to 52,000 hours in order to clear the alarm.

7.5.5 Deleting alarms

To delete an alarm, select it then click the "Delete" button in the edit dialog. You cannot delete alarms that are being used by scripts.



7.5.6 Action channels

If you select a channel as an action channel (this is optional) it will change according to the alarm status. It will have the value 0 if the alarm is inactive, and 1 if the alarm is active.

You can assign multiple alarms to the same channel, in which case the channel will contain the number of active channels. If you select a digital output as the action channel, it will be active if any of the assigned alarms are active – providing summary alarm functionality.

7.5.7 Email and SMS notification

All alarms have the option of email and/or SMS notification. You can decide whether to send a message when the alarm changes to active and inactive, or just when it changes to active. Email/SMS notifications only work if you have changed the relevant settings in the Communication menu, as described in 3.7 and 3.8.

An email uses the alarm name as its subject line, and contains the time, the alarm message and the ID of the device sending the email. Some lines are also included for automated processing. Text messages contains the same information

7.5.8 Events and errors

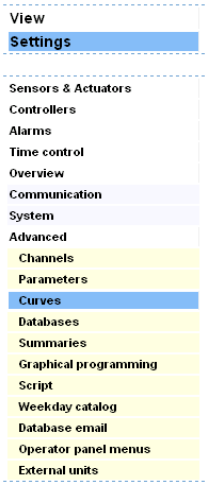
On the next page there is a list of events and errors in WMPro.

Name	Description
*** ALL ***	Someone has clicked the "Acknowledge all" button.
Reset	The device has restarted, either after a power cut or after a restart command. For example, a file download always triggers a reset.
Watchdog reset	The device has restarted because of an internal error. Acknowledgement required.
Database error	There are several possible causes. The most common problem is that the database content does not match the definition. The error may also be caused by an overload. Acknowledgement required.
FLASH param error	The device has detected an error in some of the settings stored in flash memory. These settings may have been changed to the default settings. Acknowledgement required.
EEPROM param error	The device has detected an error in some of the settings stored in EEPROM. These settings may have been changed to the default settings. Acknowledgement required.
FLASH param init	The settings in flash memory have been changed to the default settings, either in response to a command or after a software update. Acknowledgement required.
EEPROM param init	The settings in EEPROM have been changed to the default settings, either in response to a command or after a software update. Acknowledgement required.
RAM corrupt	Error detected in RAM. The device has restarted, No action is necessary unless the error keeps occurring. Acknowledgement required.
Ethernet error	Error in Ethernet communication. If the error keeps occurring, you will need to replace the device. Acknowledgement required.
Program error	The device has restarted because of a software error. Make a note of the circumstances around the time the error occurred, and send the system log file to Abelko. If the error occurred some time ago, the information about the error is likely to have disappeared from the system log.
Clock error	Error reading from or writing to the real time clock. The error may occur if the WMPro has been switched off for a long time. Check the clock settings. If the error keeps occurring there is probably a hardware error. Acknowledgement required.
File upload error	A fault occurred during a file upload to the device. Either the upload was interrupted, there was a file error, or the file type was wrong. Acknowledgement required.
New program	New software has been uploaded to the device, and it is working. Acknowledgement required.
Email error	An error occurred while trying to send an email. Possible causes include incorrect settings or a communication problem. If the device later succeeds in sending the message, the error is reset. Acknowledgement required.
Email test	A test email has been sent.
SMS error	An SMS text message could not be sent because of an error.
SMS test	A test SMS has been sent.
SMS max limit error	SMS text messages were not send because of the function intended to limit costs. See section 3.8.

8 Curves

This section explains how to create and change new and existing curves for compensated controllers, sequences, etc.

8.1 Control curves



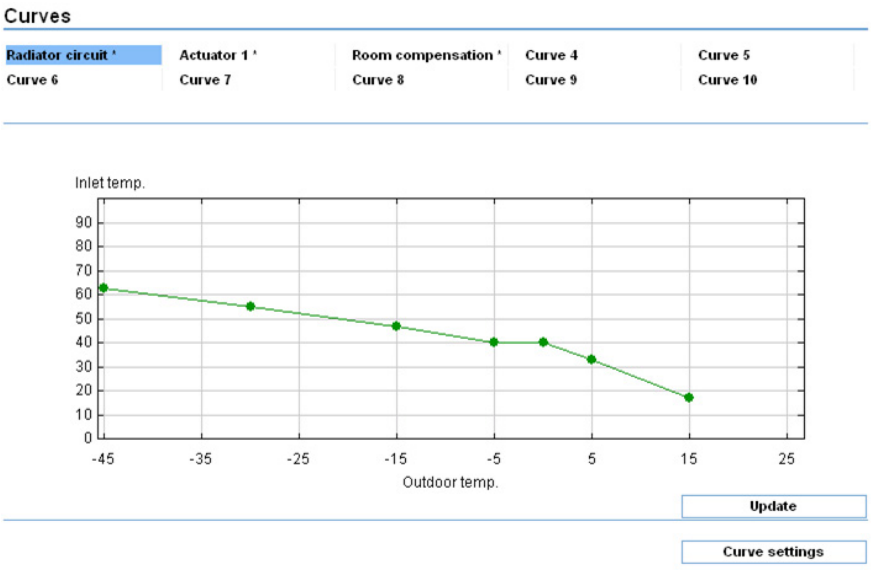
Control curves are used in order to influence the set value in the controller. You can use up to ten different curves in the WMPro. A curve tool is provided to help you create new curves and edit existing ones. You can also add a new curve directly in the controller tool when you configure a compensated controller. However you will not have access to all the settings there and you will still need to edit the curve later.

8.1.1 Edit options

You can change the name, x and y axis labels and scaling, the number and position of breakpoints and the number of decimal places to show for the breakpoints.

8.1.2 Curve settings

To open the curve tool you need to be logged in as "config". Expand the Settings menu by clicking Advanced, then select Curves.



You will now see the first curve in chart form. At this stage you can select any of the nine other curves to edit them. Some of the curves will have names, while the others are simply called Curve 4, Curve 5, etc. Click on a name to open the curve to edit it. All configured curves have an asterisk * after the name.

You can use drag-and-drop to move the breakpoints around in the chart. Click Save when you have finished.

To change more advanced settings, click the Curve settings button. Here, you can change the name, the axis labels and scaling and the number of breakpoints, and you can also enter the breakpoints in table form.

8.1.3 Example configuration

In this example we will view and modify the curve we created when we configured the controller in section 6. The curve was named Radiator circuit.

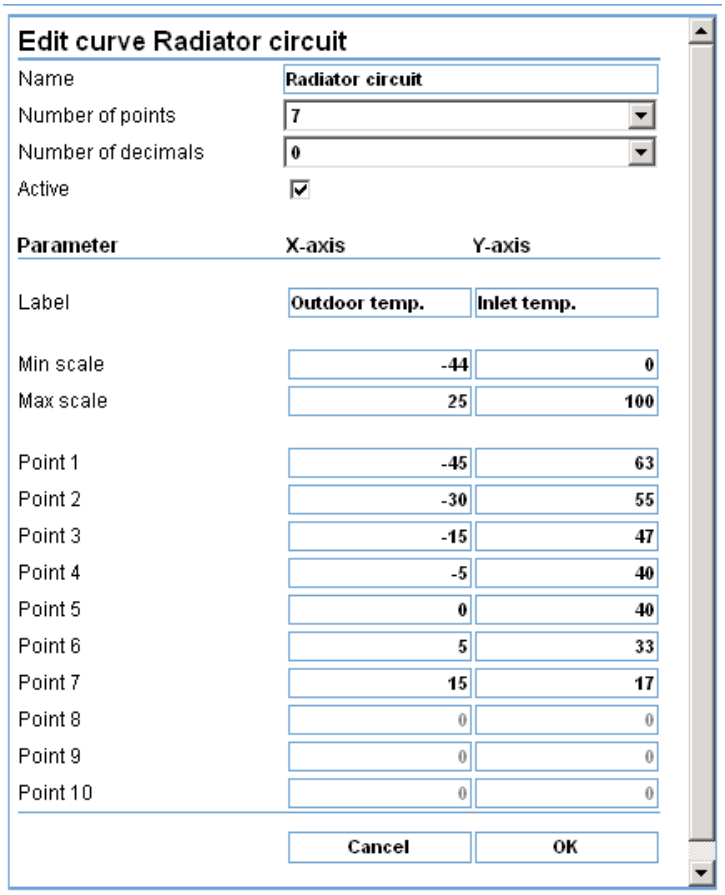
Start by clicking "Radiator circuit" and then Curve settings.

We are going to change the name, add new labels and change the axis scaling. We will also set the number of breakpoints to 7, specify no decimal places and enter the breakpoints into a table. It should be obvious how to do this. See the screenshot on the previous page.

Click OK to save. You are returned to the chart page, where you can check the changes you have made.

Curve tool

You can find the curve tool in the advanced settings. Expand the Settings menu by clicking Advanced. Then select Curves.

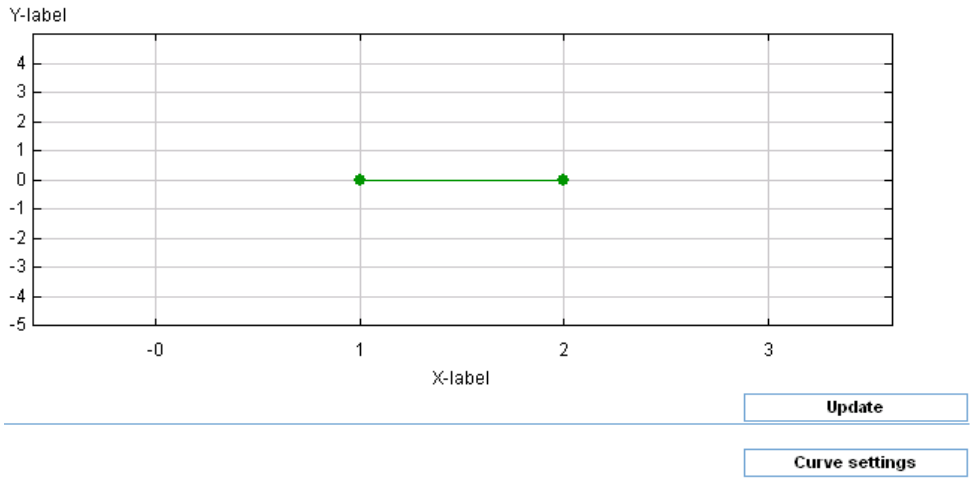


New curve

If you select a curve that has not been edited before, it only has two breakpoints. If you want more, click the Curve settings button and specify how many you need.

8.1.4 Editing a new curve

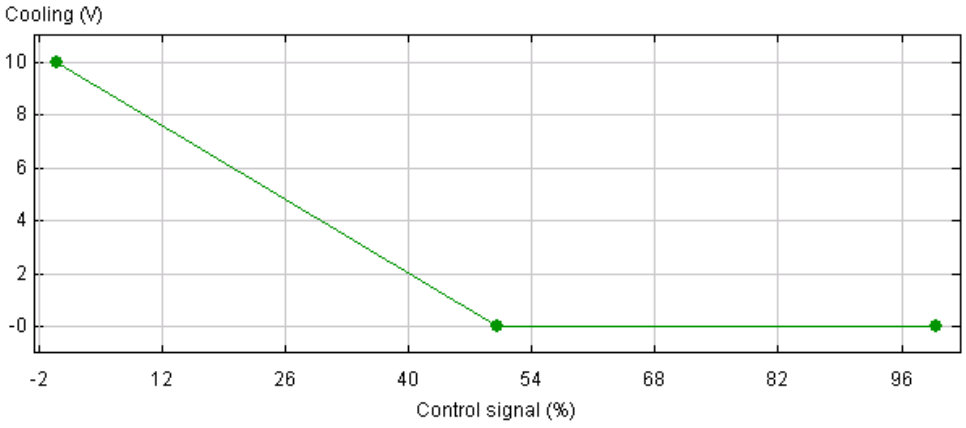
Select a curve that has not been edited before, for example Curve 4. On the chart page, you can see there are only two breakpoints. In most scenarios, this will not be enough. To add more breakpoints, click Curve settings and enter the number you need. Rename the curve, type the labels and the breakpoint values, and finally check the Active box before clicking Save.



8.2 Sequence curves

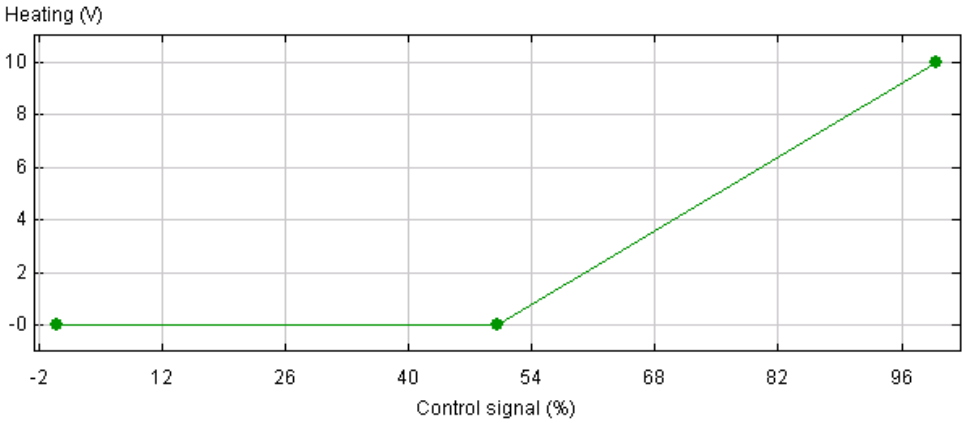
If a ventilation controller has actuators in a number of sequences, a curve is created for each sequence. A sequence curve has at least three breakpoints, and describes how the output signal from the controller is apportioned for the particular actuator. You can specify whether the sequence is a cooling sequence or a heating sequence, whether to create dead zones, etc. You can include up to 10 breakpoints, allowing you to construct a non-linear curve if necessary.

A controller with two actuators in sequence will have two sequence curves. Assume we want the first half of the control signal to produce 10—0 V for actuator 1 (Cooling) and the second half 0—10 V for actuator 2 (Heating). Open the curve for sequence 1. Drag the breakpoints to the correct positions. The chart shows that sequence 1 is 10 V when the control signal is 0, and 0 V when the control signal is 50%, where it remains until the control signal reached 100%.



If you need more breakpoints you can open the curve in the edit window by clicking Curve settings.

Click Save if you have made any changes, then open the curve for sequence 2.



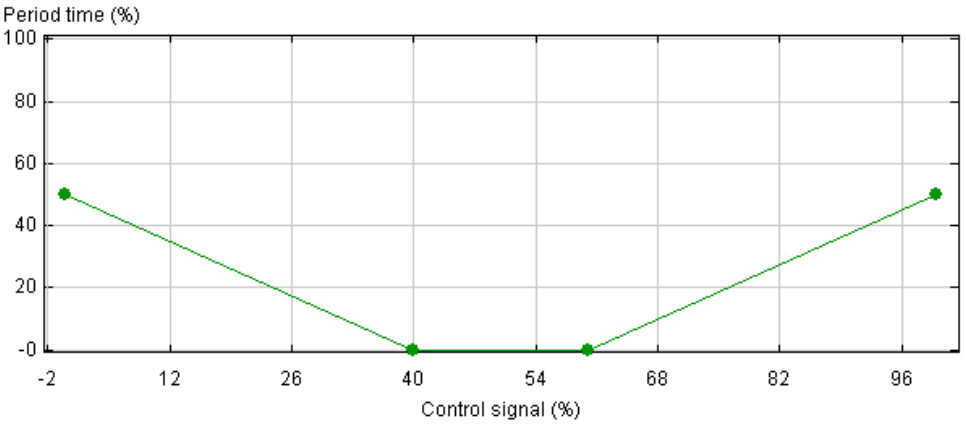
In sequence 2, the output voltage stays at 0 V until the output signal reaches 50%, climbing to 10 V when the output signal is 100%.

You can easily move the breakpoints around to make the sequences overlap or to create a dead zone. Always remember to click Save if you have made any changes.

If you chose to display the output signal to the actuator as a percentage instead of volts (V), the Y axis on the relevant curves will also appear as a percentage.

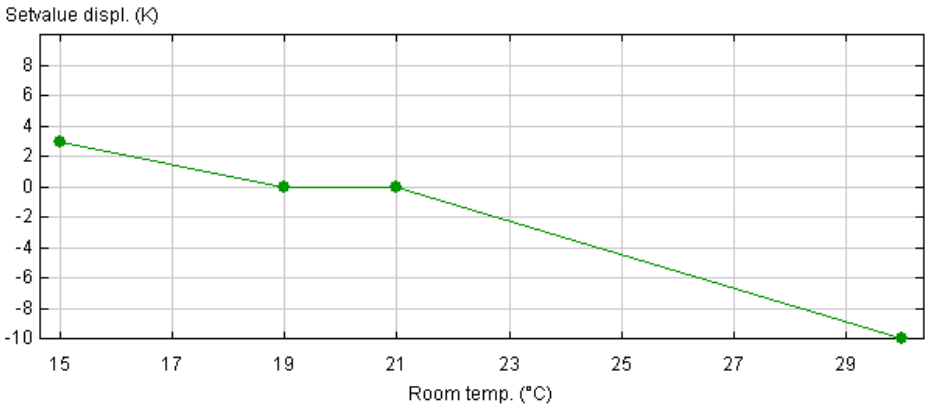
8.3 Curves for three-state actuators

Curves can also be used to specify the operating parameters for three-state actuators. These actuators are controlled using pulse-width modulation. The period time for PWM is defined in a parameter on a special configuration page. The default number of breakpoints is four. Start by defining the dead zone, then decide the percentage of the period time you want to use for the end positions of the controller. You can add more breakpoints by clicking Curve settings. This curve has a dead zone between 40% and 60% of the control signal and 50% modulation at the end positions.



8.4 Curves for room compensation

A control curve is an easy way of setting the displacement if you want the controller to use compensation based on the room temperature. The chart below shows a curve with +3 K compensation at 15 °C, no compensation between 19 and 21 °C and –10 K at 30 °C.



Graphical programming is used to link the curve to a room sensor and a controller.

9 Time control

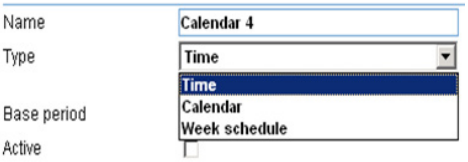
Time control is central to the way the WMPro works. This section explains how to view time controls and edit them.

9.1 Calendars

You can use time control to do certain things at certain times. Time control in the WMPro is based on integrated calendars. A calendar is set so that at any moment in time, it has a value of either 1 or 0 (true or false). There are three different configuration options: Time, Calendar and Week schedule. You can edit calendars in Settings/Time control.

9.1.1 Selecting the calendar type

The calendar edit dialog contains a drop-down list box with three options: Time, Calendar and Week schedule.



Calendars

The WMPro has ten different calendars. For example a day and night calendar could be used by all controllers, graphics programs and scripts that need to know when it is day or night.

Use **Time** to define actions that occur periodically. You first specify a base period – anything from a few seconds to different days. Then you specify up to ten periods during which the time control value will be 1. These periods are defined with a start time and a duration.

Use **Calendar** to define non-periodic actions. You can specify up to ten pairs of start and end times between which the time control value will be 1. The date/time format is yyyy-mm-dd dd:mm:ss.

Use **Week schedule** to define actions on the basis of days of the week. In the week schedule, too, you can specify up to ten conditions under which the time control value will be 1. Specify a start and end time during a 24-hour period, and select the relevant days of the week. You can use the weekday catalog to tell the system to interpret holidays falling on a working day as a Sunday (or other day of the week).

9.1.2 Automatically generated calendars

When you set up a controller with pump control and night setback, one calendar is generated for pump exercise and another for night setback. If the system uses twin pumps, a pump shift calendar is also created. These calendars use predefined start times that you will probably need to edit.

9.1.3 Manually generated calendars

If you need time control for a graphical program, you can set up one of the unconfigured calendars yourself.

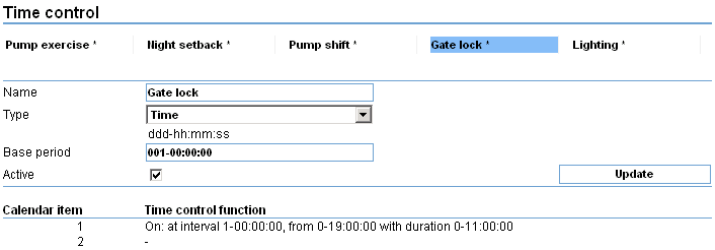
9.2 Example

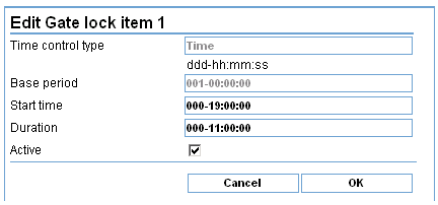
You can only edit or create a new calendar if you are logged in as "config". Go to Settings/Time control. A window appears containing all the calendars. If you have set up a controller with a pump and night setback, there will already be at least two named calendars. Unconfigured calendars are called Calendar 3, 4, etc. The process is more or less the same whether you are creating a new calendar or editing an existing one.

The following section describes in detail how to create a calendar to control when a gate is locked. You will then find out how to edit the existing calendars.

9.2.1 Gate lock

Gates are usually locked at the same time every day. We are going to create a calendar that locks the gates at 19:00 every evening and opens them at 06:00 every morning. Click on the first unconfigured calendar. All configured calendars have an asterisk * after the name.





Give this calendar the name Gate lock. Select the type **Time.** Specify the base period, in other words when the calendar will be repeated. In the case, the base period is every day. Check the Active box and click Update. The page is redrawn to reveal the settings.

Click on calendar item 1. The item appears in an edit window. Enter the start time 19:00:00 and the duration 11:00:00 (from 19:00 to 06:00). Check the Active box and save by clicking OK.

9.2.2 Editing the pump exercise calendar

Open the calendar by clicking on the name. The existing name is too long, so change it to "Pump exercise" and click *Update*.

Click on calendar item 1.
This opens the edit dialog.

We only want to exercise the pump on weekdays during working hours.

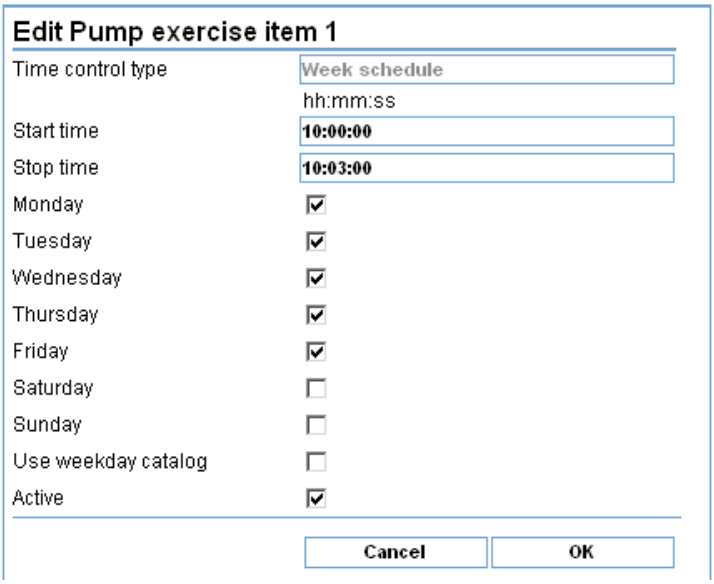
Name	**Pump exercise**	
Type	**Week schedule**	
	ddd-hh:mm:ss	
Base period	**001-00:00:00**	
Active	☑	**Update**

Calendar item	Time control function
1	On: at Mon Tue Wed Thu Fri Sat Sun and holidays, from 10:00:00 to 10:05:00
2	-
3	-
4	-
5	-
6	-
7	-
8	-
9	-
10	-

Uncheck *Saturday, Sunday and Use weekday catalog*. The reason for the changes is to avoid calling out the engineers at the weekend or on a public holiday if a fault occurs while the pump is being exercised.

Change the *Stop time* so that the pump is only exercised for three minutes.

Make sure *Active* is checked and click *OK* to save.



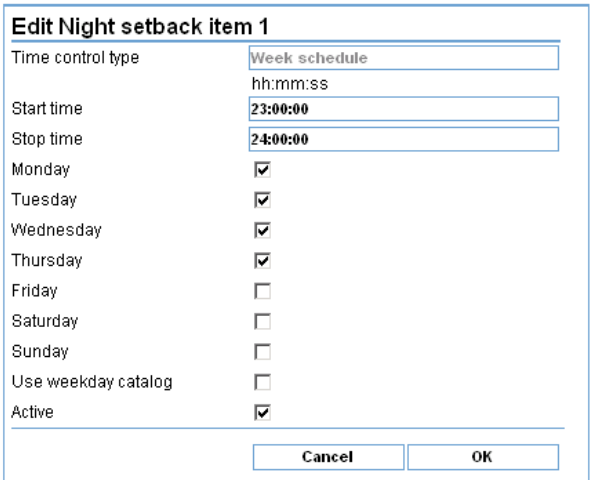
9.2.3 Editing the night setback calendar

Click on the name. Change the name to Night setback and click *Update*.

We are going to build up a week schedule day by day. Some days will be the same. In principle, a day begins at 00:00:00 and ends at 24:00:00. This means that a night setback that starts at 23:00:00 on one day and ends at 05:00:00 on the next day has to be divided between two calendar items.

For example, you will need to create three calendar items to reduce the temperature from 23:00 Mondays to Thursdays and from 01:00 Saturdays to Mondays and public holidays, and to increase the temperature at 05:00 every day. One item reduces the temperature from 23:00 to 24:00 Mondays to Thursdays. Another item reduces the temperature from 00:00 to 05:00 Tuesdays to Fridays. A third item reduces the temperature from 01:00 to 05:00 Saturdays to Mondays and public holidays.

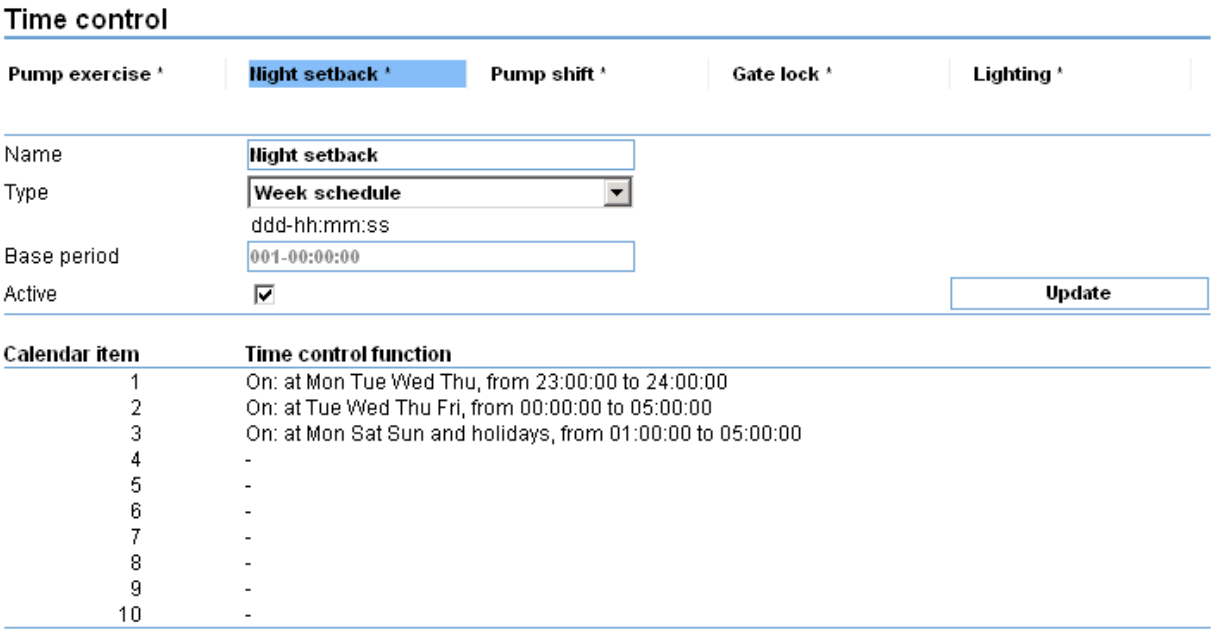
Click on the first calendar item. Enter the start time 23:00:00 and stop time 24:00:00. Check the boxes from Monday to Thursday. Check the Active box and save by clicking OK.



Click on the next calendar object and enter the start time 00:00:00 and stop time 05:00:00. Continue as for the first item.

Click on the third calendar object and enter the start time 01:00:00 and stop time 05:00:00. Check the boxes from Friday to Sunday. Check the Active and Use weekday catalog boxes. Confirm by clicking OK.

After creating all three calendar items, the page looks like this.



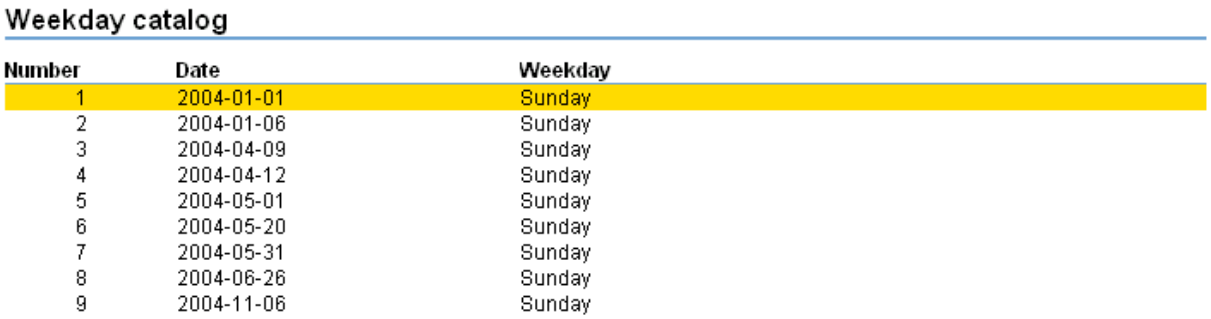
9.3 Weekday catalog

The WMPro includes a calendar where you can define public holidays and other days, for example periods of leave, that you want to treat differently. If Christmas Eve falls on a Tuesday, for example, you may want to treat it as a Sunday.

The weekday catalog has space for 100 programmable days. The days do not need to be in chronological order, and when a day has passed you can use its entry to program another day instead.

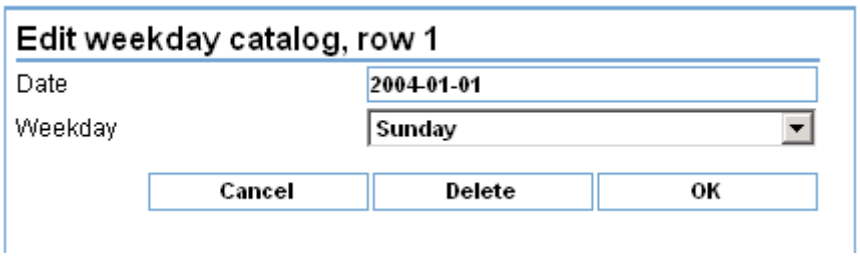
To add or edit a day, go to Settings/Advanced/Weekday catalog.

Click on the date you want to change or an "empty" day. (Empty days have the date 2000-01-01.) This opens an edit dialog.

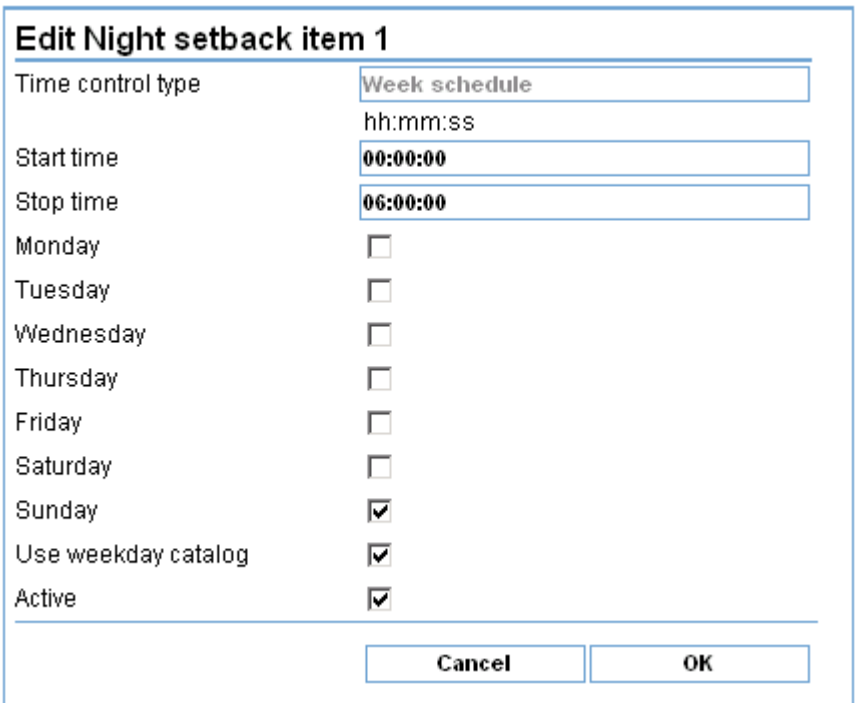


Enter a date for your holiday. Choose the day of the week you want to treat it as. You can choose any day of the week, but Sunday is the most common.

If you want a calendar item to consult the weekday catalog, check the "Use weekday catalog" box in the edit dialog. **Important: You must choose the day of the week you want the holiday to be treated as.**



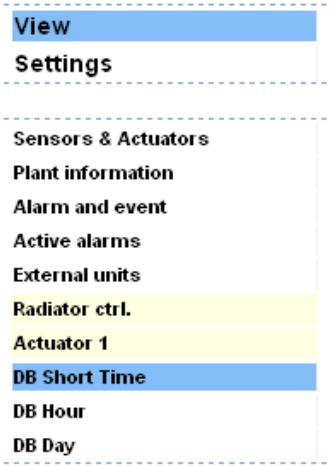
The calendar item below is set to run every Sunday and every day in the weekday catalog that is treated as a Sunday.



10 Databases

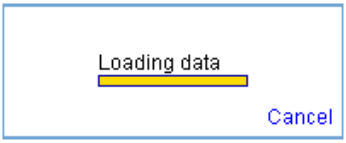
The databases contain a history of the data in the system, and they can be used to generate statistics. This section explains how you can choose the information displayed.

10.1 Databases



The WMPro has three standard databases. There is a short time database that saves a value every second. And there is an hour database and a day database, which save a value every hour and every day respectively. When you configure inputs and outputs, you can choose whether to save the value to a database. The hour and day databases provide a range of options such as mean values over a period, minimum and maximum values, etc. You can also save other information to the database, but this involves more advanced functions which are described in the reference manual.

You can either view the databases directly in the browser in the form of charts, or you can download them for further processing in programs like Excel.



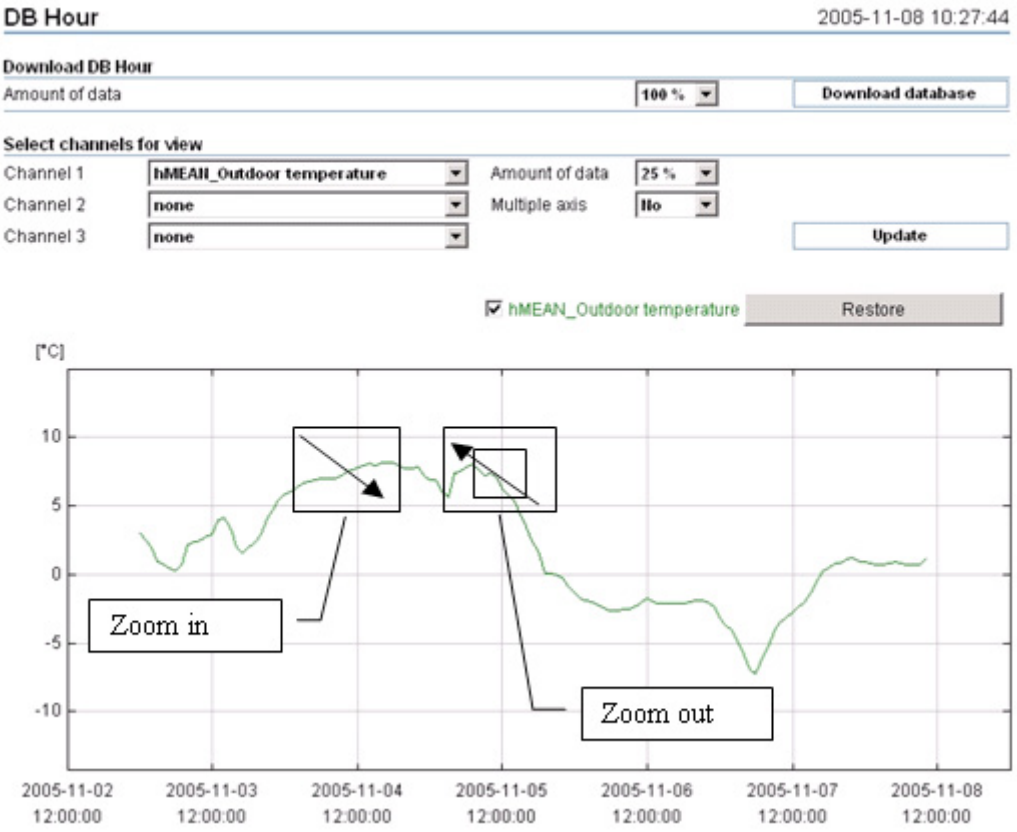
10.1.1 Viewing in the browser

Open one of the databases. For example the short time database. The most recently viewed channels are loaded. It might take a while to import all the data to the browser. If you want to view a different channel, you can stop the download by clicking Cancel in the small progress indicator.

You can display up to three channels simultaneously in the browser. Select the channels you want to view. Specify how much of the database you want to view. The higher the percentage, the longer it will take to import the file. Choose whether you want to use multiple Y-axes. For example to display the control signal to an actuator – about 5 V – as well as the return temperature in the district heating network – about 100 degrees – it will not be possible to show the variations in the control signal using the same scale on the Y-axis. In this situation you would use multiple axes, giving each channel its own Y-axis with different scaling. When you have finished changing the settings, click *Update*. The curves will appear after a few moments.

10.1.2 Zooming into the chart

To zoom in, click and drag down and right. The chart is redrawn with new X and Y-axes. To zoom out, click and drag in the opposite direction – up and left. The chart is scaled down according to the difference in the size between the two rectangles. Click the Reset button to restore the chart to its original scale.



10.1.3 Downloading databases

If you want to download the database as a file instead, start by specifying how much of the database you want to download. Now click Download database. Next, specify a location for the file on your computer. The default name of the file is Database.dta. You should rename the file before you save it, to make it easier to find later on. The downloaded file contains all the channels in the selected database. You can also open the file directly in Notepad or Wordpad. After saving the database file you can open it in Excel and carry out calculations, apply formulas, etc.

10.2 Sending databases by email

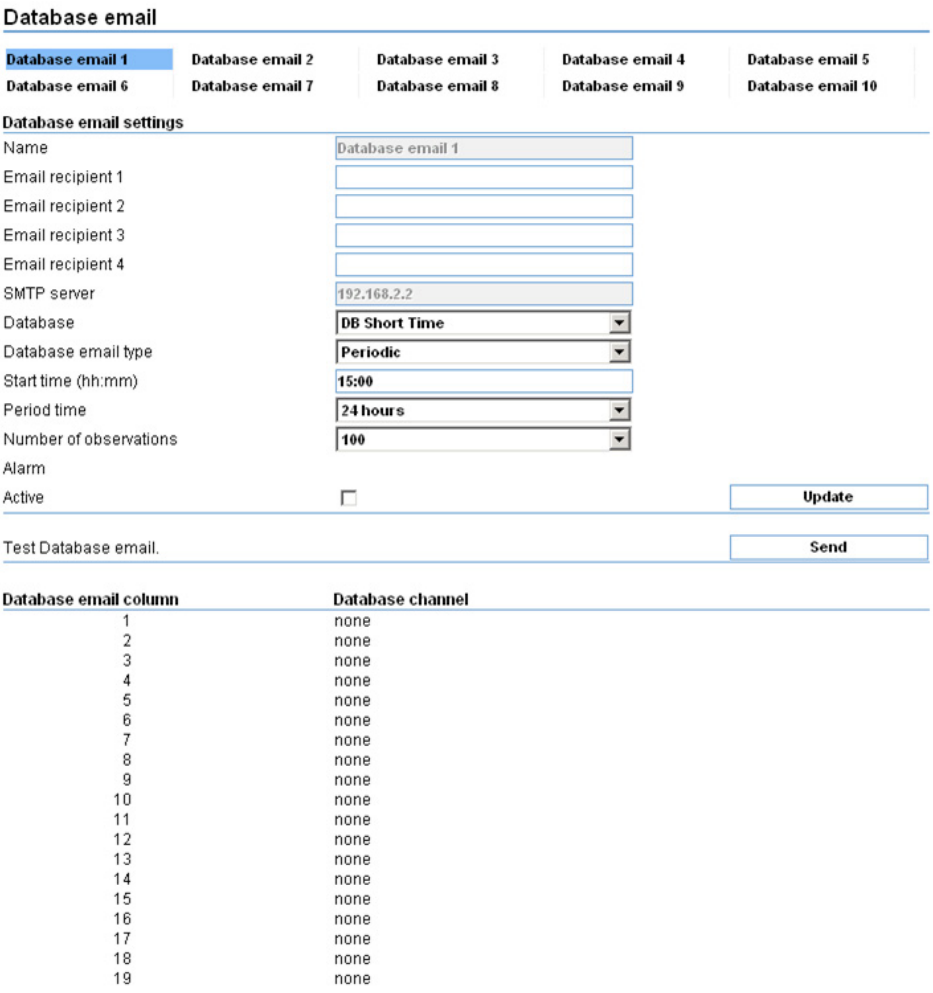
A WMPro can send logged data by email. It is up to you to decide which database and channels you want to send, how much of the database to include, and who to send the email to. You can define 10 different email transfers with up to 20 channels in each. Each transfer contains values from one of the three databases. To configure a transfer you need to be logged in as "config". Open Settings/ Advanced/Database email.

Select an unconfigured transfer. All configured transfers have an asterisk * after the name.

Choose the *Email recipients* for this transfer. Each transfer can be sent to different recipients.

Enter an *SMTP server* address if you have not already done so. See 3.7 for the communication settings.

Select the *Database* you want to use.



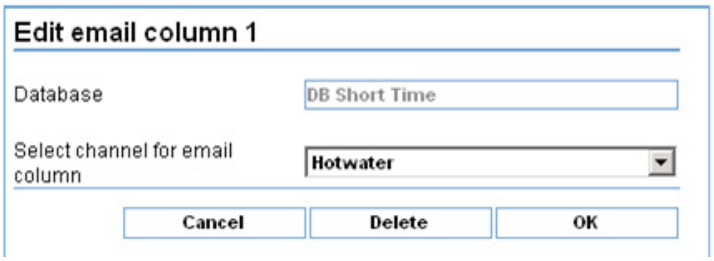
Select the *Database email type*. There are two options – Periodic and On alarm. If you select the periodic type, the transfer will use the *Period time* and *Start time* you specify. If you plan to transfer large amounts of data from more than one WMPro, you should stagger the start times. On *alarm* means that the transfer will start when a particular alarm is triggered.

You can limit the *Number of observations* if necessary.

Check the *Active* box and click *Update.*

Click on the first Database email column.

This opens an edit dialog.



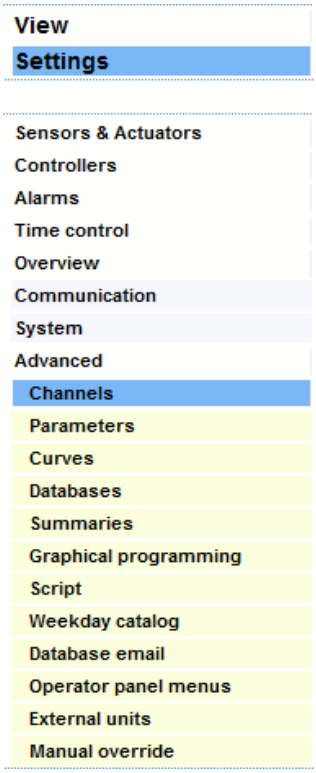
Select the channel you want to appear in the first column, then click OK.

Continue in the same way for the next column until you have included all the database channels you are interested in. If there are not enough columns you will need to set up a new transfer.

When you have defined all the columns you want to include, you can test the transfer and *Send* a test email. **Important: The test email will only work if the database channels contain data.**

11 Channels and parameters

All variable data in the WMPro is handled by channels. There are 200 channels, of which the first 44 are reserved for the I/Os. Parameters store data that can only be changed by the user.



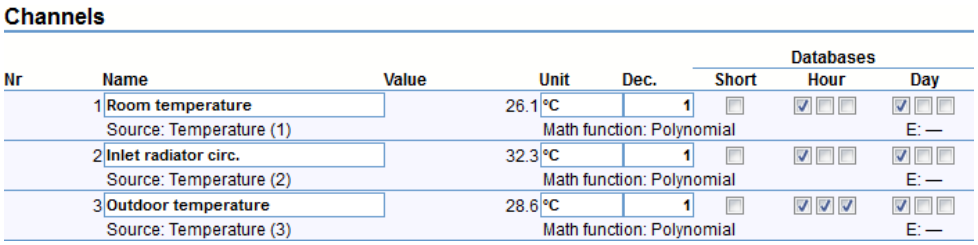
11.1 Channels

All the variable data in the WMPro is handled by channels. There are 200 channels – 44 of them are used for the inputs and outputs, and one is used for the status indicator. The other 155 channels are unoccupied, so they can be used by scripts, databases, etc. Unoccupied channels have the name Channel followed by a number. Channels usually have the value 0 after a restart, so even though it is possible to write to channels, you will probably not need to do so.

11.1.1 Configuring channels

The first 44 channels are linked to the physical inputs and outputs of the WMPro. When you configure inputs and outputs as described in section 5, the name, settings, databases, etc. are copied to the channel list. You can speed up the process by working directly in the channel list. To make changes to the channel list, you need to be logged in as "config". Open the channel list by clicking Settings/Advanced/Channels.

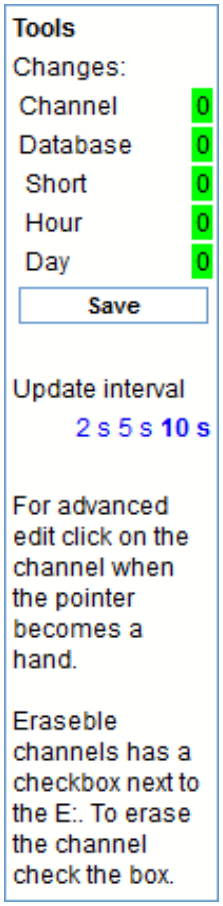
You can now specify the name, unit, the number of decimal places and whether you want to save the channel in a database. The hour and day databases have three extra options: mean, minimum and maximum value during the period. If you move the mouse pointer over the field, you will see an explanation. When you add a channel to an hour or day database, a new channel is created specifically for the database. This new channel is automatically linked to the channel being measured.



Digital inputs 1-4

44 channels are reserved for I/Os even though there are only 40 physical I/Os. Digital inputs 1-4 can measure frequency as well as counting pulses. That is why these channels need to be configured twice.

When you check one of the boxes for the hour and day databases, the first unoccupied channel is reserved for this purpose. That means that the database channels will not be in any particular order. This does not really matter, but you may prefer things slightly more organised. In that case, simply wait until you have finished configuring everything else before adding the databases. This means all the databases will occupy a single block at the end of the list of configured channels. If a channel is linked to a database, a database icon appears to the left of the channel field.



11.1.2 Saving settings

When you have finished changing settings, you need to save them. To the right of the channel list there is a floating toolbar showing the number of changes you have made. You can click the button there to save all the settings. **Important: You can make changes to other channels without having to save them every time, but you must remember to save the settings before leaving the page or all your changes will be lost**. The toolbar also lets you choose how often you want to update the page with new values. The default update interval is 10 seconds. There is also a short help text in the toolbar.

11.1.3 Advanced channel settings

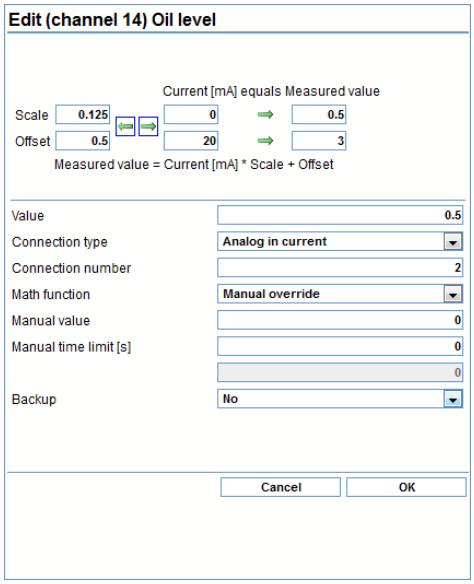
Move the mouse pointer over the channel field, which turns yellow. When the mouse pointer turns into a hand, click to open a dialog for advanced settings. The appearance of the dialog differs depending on whether the channel is linked to an I/O or is unoccupied. For analog and digital inputs and outputs, the dialog is as described in section 5. There is a slight difference for temperature inputs. You will need to go to Settings/ Sensors & Actuators if you want make any changes to a temperature input apart from selecting the sensor type. See section 5. Please see the reference manual for other advanced channel settings.

Channel list

This list shows all channels with their values. You can specify how often the list is updated. You can choose from 2, 5 or 10 second update intervals.

Scale and offset

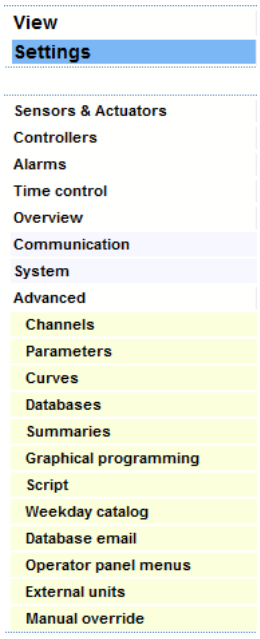
The scale and offset fields alter the signal before it is counted. If you enter a scale value = -1, the signal is inverted.



11.1.4 Manual control

You might need to set an analog input, say, to a particular value during setup or service. All analog and digital outputs can do this automatically, but you can also set other channels manually. This function is time limited in case you forget that it is activated. To set the time limit, go to Advanced channel settings, and to activate the function go to Settings/Advanced/Manual control. We will use a radiator valve as an example.

To set a channel manually, select Manual control in the Mathematical function field, and specify a time limit. There is no need to set the manual value at this stage. The default setting for all output channels is that they can be set manually, and the time limit is set to 1800 seconds (half an hour). If you want to change the time, do it here. The Factor and Offset fields alter the signal before it takes effect. If you enter a factor of -1, the signal is inverted.



To activate the function, go to Settings/Advanced/Manual control. You will now see a page showing all the channels that can be set manually. Enter the value you want the channel to have, check the box and click Save. In this example, the control value will open to 50% for 1800 seconds, regardless of the controller output.

To reset the channel before the end of the time limit, simply uncheck the box and click Save. **Important: You must save each row separately.**

When you return to automatic control, the controller is likely to have set itself to an end position. This means that the actuator will close or open fully for a while before returning to normal.

11.1.5 Channels for running times

Running times can be measured in all channels. The most common application is to measure how long a digital input or output is in the ON state. This shows, for example, how long a pump has been running. It may also be useful to know how long a temperature or other analog input, or other channel, has been higher than a particular value. This virtual meter could then be included on a summary page for running times or on an existing controller page. Running times are calculated in a separate channel. This section explains how to calculate the running time for Pump 1 (from the controller example). Start by looking in the channel list in Settings/Advanced/Channels to find out which channels are linked to the pump.

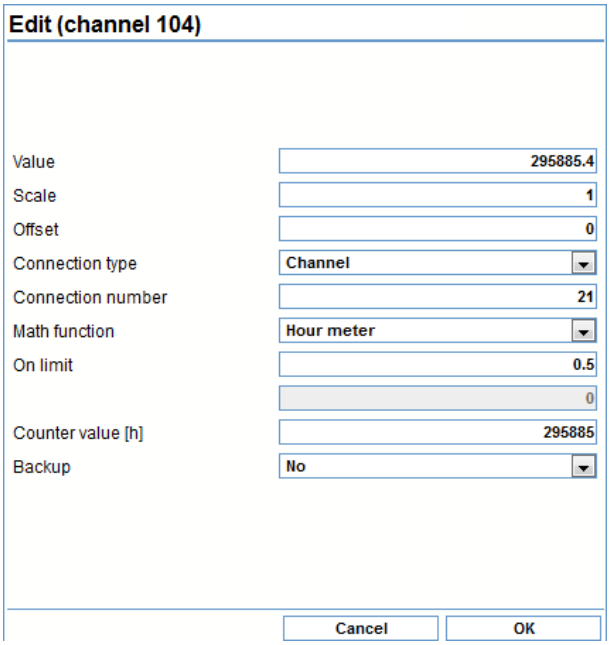
Running time

As well as measuring the running time, the WMPro can record how long an analog signal, e.g. the temperature, has been above a specified level.

Alarms

A pump may need a service after running for a certain number of hours. The WMPro can send an email when it is time for a service.

Pump 1 has two usable channels because we specified pumps with feedback in the controller. One of the channels is channel 21 – a digital input – and the other is channel 37 – a digital output. Select the digital input. Make a note of the channel number (21). Change the name of one of the unoccupied channels to Running time circ. pump. Unoccupied channels have the name Channel followed by a number. For example use Channel 104. *Set the channel unit* = h (hours). Set a suitable *number of decimals*.



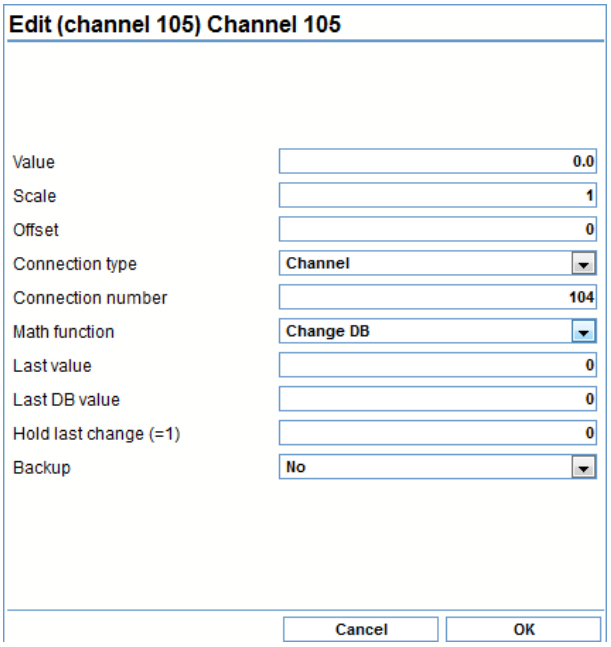
Open Advanced settings for the channel. Set the *scale* = 1 and *offset* = 0. Set the *connection type* = Channel. Set the *connection number* = 21 (pump 1 operation). Set the *math function* = Running time. Set the *on limit* = 0.5. Because we are measuring the running time using a digital input, the value is either 0 or 1. That is why we use 0.5 here. If we were measuring temperature or an analog signal instead, we would specify the level above which the time would be measured.

If a mechanical meter is installed, set the *counter value* to the meter value. Click *OK* to save the settings.

If you are planning to include the meter in a configuration page, you can choose to display the *channel value*. Alternatively if you want to be able to edit the channel value (meter), select *Edit channel math parameters*. Find out more about configuration pages in section 14.

The pump in our example needs to be serviced every three years, in other words after about 26,000 hours of usage. We can instruct the WMPro to send an email when the pump is due for a service. Find out how to do this in 7.5.4.

11.1.6 Running times in databases



You might be interested in finding out how long the pump runs every day. To do this you will need another channel that obtains today's counter setting, subtracts yesterday's value and stores the difference in the database. There is no automatic way of doing this – you have to change the settings manually.

Start by selecting an unoccupied channel. Give it the name d_Running time circ. pump. *Set the channel unit* = h (hours). Set a suitable *number of decimals*.

Open Advanced settings for the channel. Set the *scale* = 1 and *offset* = 0. Set the *connection type* = Channel. Set *connection number* = 104 (pump running time).

Select the *math function* DB change. Click OK.

You now need to add this channel to the database manually.

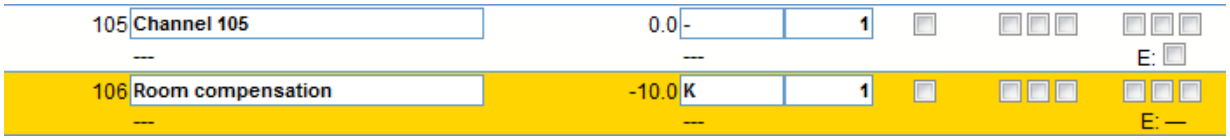
Open Settings/Advanced/Databases.

Select the day database.

Click on the first unconfigured database object and choose "d_Running time circ.pump" and click OK. A prompt appears warning you that all the data in the day database will be erased. If this is not OK, you should click Cancel and export the day database before continuing. Find out how to do this in 10.1.3. **Important: You will not be able to re-import the database to the device if you have changed the database settings.**

11.1.7 Deleting channels

Channels cannot be deleted if they are device I/O channels or if they are used by a script. There is a delete field on the right of each channel field, containing a checkbox or a line. To delete the channel, check the box and click Save. Take care when deleting channels. When you delete a channel it reverts to its original name, e.g. Channel 105. In the example below, the channel on top can be deleted but not the one on the bottom.



11.2 Parameters

A parameter stores values that can only be changed by the user. The WMPro has 100 parameters, which you can use without restriction. When you configure a controller, some parameters are created automatically, e.g. Setvalue, I-time, etc. Parameters can be added to a configuration page and/or an overview image where settings can be changed. The parameter list is more or less the same as the channel list, except that you only need to enter the name, value, unit and the number of decimal places.

To make changes to the parameter list, you need to be logged in as "config". Open the parameter list by clicking Settings/Advanced/Parameters.

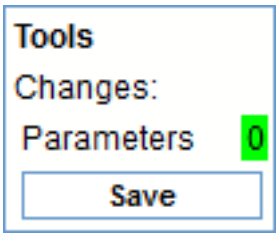
The next page is a list of all the parameters. An unoccupied parameter has the name Data followed by a number, e.g. Data 9.

Parametrar

Nr	Name	Value	Unit	Dec.	Erase
1	Radiator ctrl.	0		0	Erase: ☐
2	P-area Radiator ctrl.	10.0	K	1	
3	I-time Radiator ctrl.	180.0	s	1	
4	Min setvalue Radiator ctrl.	10.0	°C	1	
5	Max setvalue Radiator ctrl.	60.0	°C	1	
6	Man displacement Radiator ctrl.	0.0	K	1	
7	Ctrl v.off Radiator ctrl.	0	%	0	
8	Di displacement Radiator ctrl.	5.0	K	1	
9	Night displacement Radiator ctrl	-7.0	K	1	

Enter the name, value, unit and the number of decimal places you want your parameters to use.

11.2.1 Saving parameters



As with the channel list, there is a floating toolbar in the top right. The toolbar indicates how many parameters have been changed, and there is a Save button.

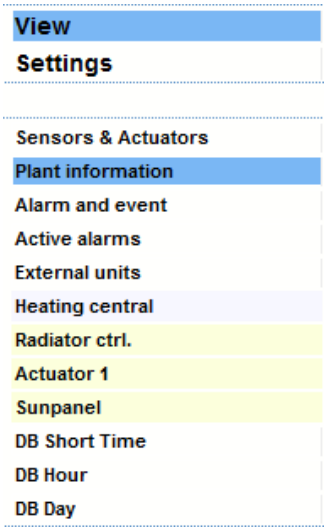
Important: You can make changes to other parameters without having to save them every time, but you must remember to save the settings before leaving the page or all your changes will be lost.

11.2.2 Deleting parameters

You cannot delete parameters if they are used in scripts. If the parameter can be deleted, you will see a delete field containing a checkbox on the right of the parameter field. To delete the parameter, check the box and click Save. Take care when deleting channels. When you delete a parameter it reverts to its original name, e.g. Data 9.

12 Plant information

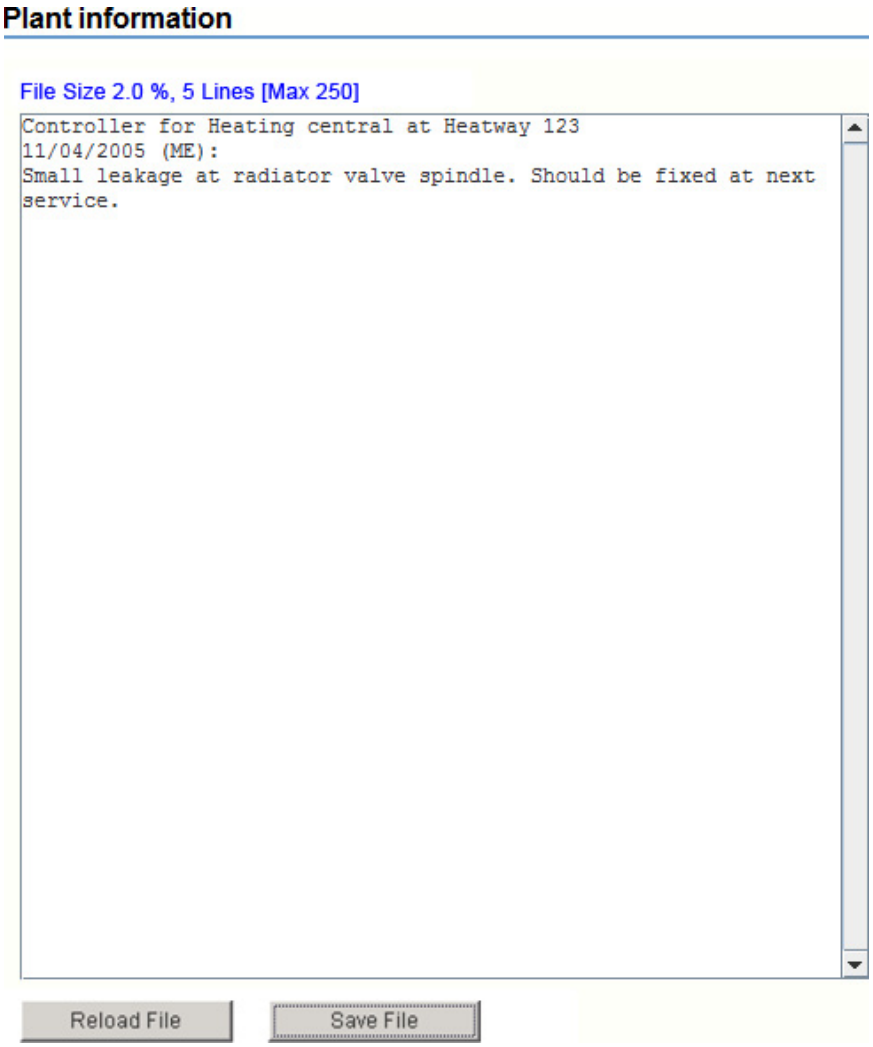
You can use the plant information page to save important information about the equipment. It is also useful as a service log, etc.



12.1 Plant information

Plant information is stored in the WMPro as a text file with space for 250 rows. You can read and edit it if you are logged in as "operator" or "config", but "view" provides read-only access.

Select View/Plant information View the information and add new information if necessary. Remember to click Save File if you make any changes. You can click the Reload File button to revert to the last saved version.



13 Overviews

Overviews are a good way of seeing your installation as a whole. The images can display live measurements, alarms, etc. This section explains how to create an overview and how to add measurements to the image.

13.1 Overviews

Overviews containing measurements and readings, are a great way to find out the current status of a system. There is space for five overviews in the WMPro. For example you could have one general system image with the most important measurements, and four other images showing more detailed information. Each image can display up to 50 measuring points. You should finish configuring inputs and outputs, controllers, etc. before you start working on overviews. A special tool is built into the WMPro to help you add the measuring points.

Overviews

You can create your own overviews in the WMPro by uploading an image file and then adding values and texts to the image.

There are five overviews, which means you can show five different functions in this way. A special tool is built into the WMPro to help you add the measuring points.

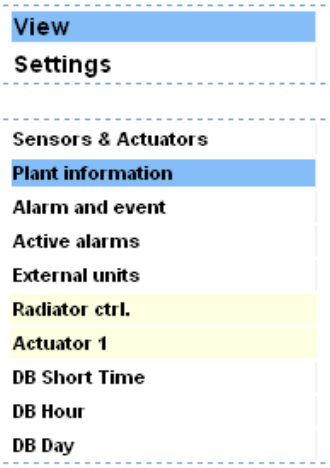
This is how you create an overview.

Start by loading an image. This could be a drawing, a photograph, a map or anything else in machine-readable form.

Save the image in one of the formats that the browser can read, for example GIF or JPG. The size should not exceed the screen size – 700*400 pixels is probably a good size. The file size may not exceed 64 kB.

Upload the file to the WMPro. You can create your own overviews in the WMPro by uploading an image file and then adding values and texts to the image.

Add the measuring points to the image, then save the settings.

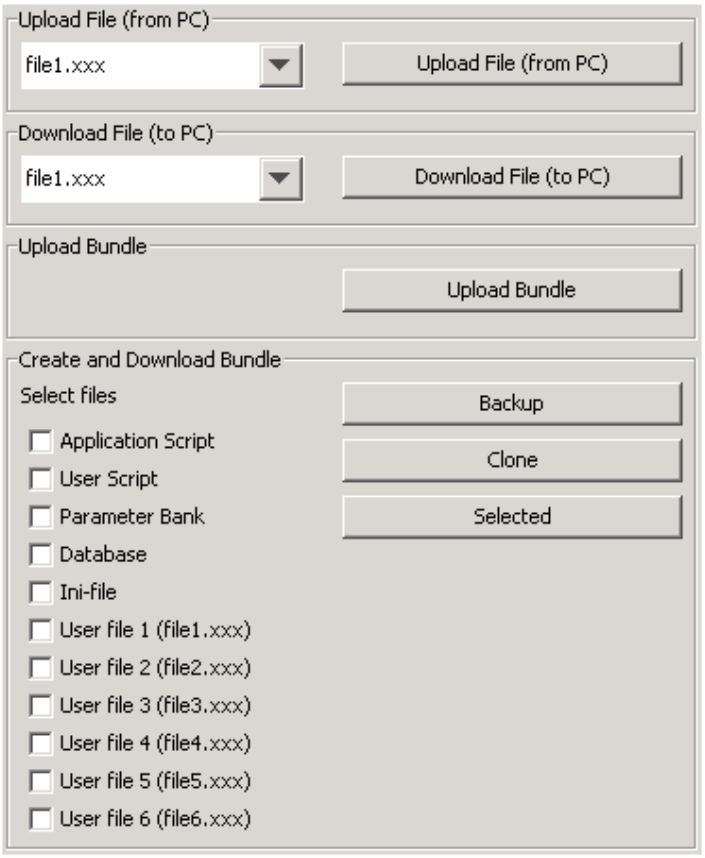


13.2 Example

In this example you will create an overview of a heating central in which WMPro is used to control a radiator circuit and a hot water circuit. There is a controller for the hot water as well as the controller we configured in section 6. The image will be based on a drawing saved as UC.GIF.

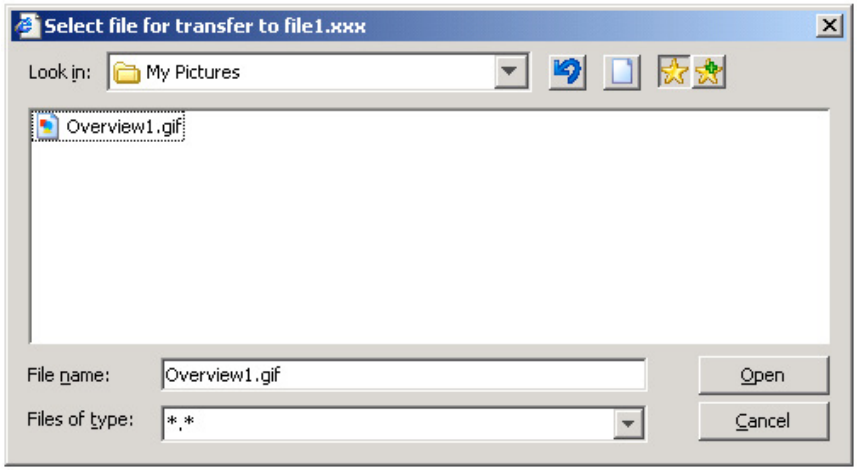
13.2.1 Upload the image

Open *Settings/System and click File manager*



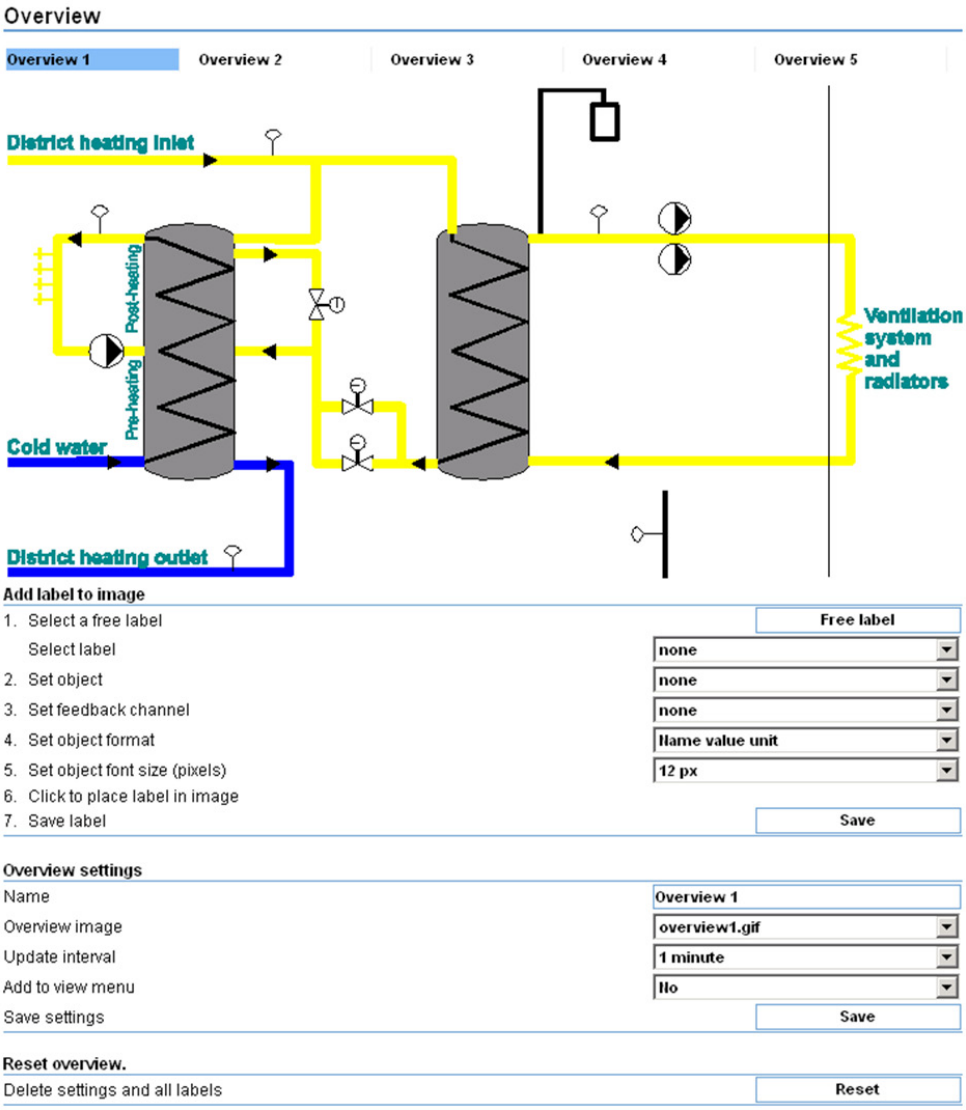
Select any of the files file1.xxx –file5.xxx and click *Upload file*. **Important: Make sure you keep track of which files are in use in the WMPro**. Otherwise you might overwrite an important file. Find out more about the file manager in section 15.

A dialog box opens, where you enter the path to your file. Click *Open*.



The WMPro imports the file and restarts.

The image has now been imported into the WMPro and is ready for editing.

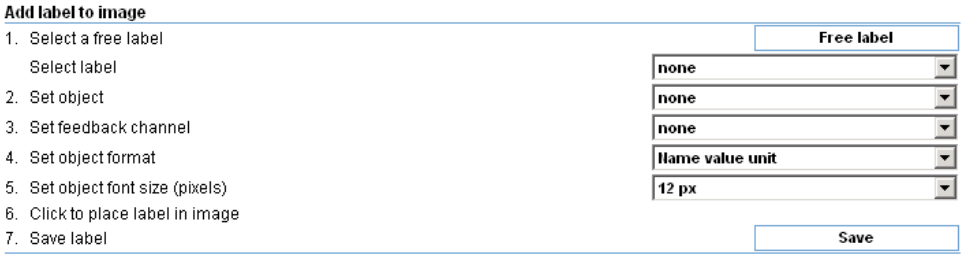


13.2.2 Add measuring points

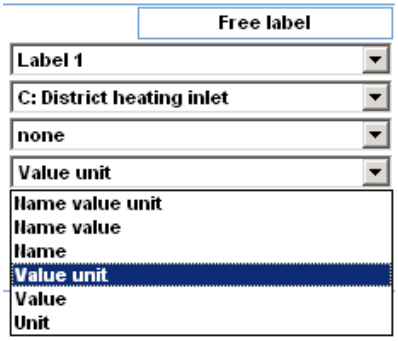
Now you can add measuring points to the image. Open Settings/Overview This opens an edit window for the first image. All occupied overviews have an asterisk * after the name.

Start with the "Overview settings" towards the bottom of the page – enter a new name and select an image if the correct image is not already selected.

Choose an update interval and specify whether you want to add the page to the "View" menu. Click Save when you have finished.



When the image appears again, you are ready to add labels and measuring points.



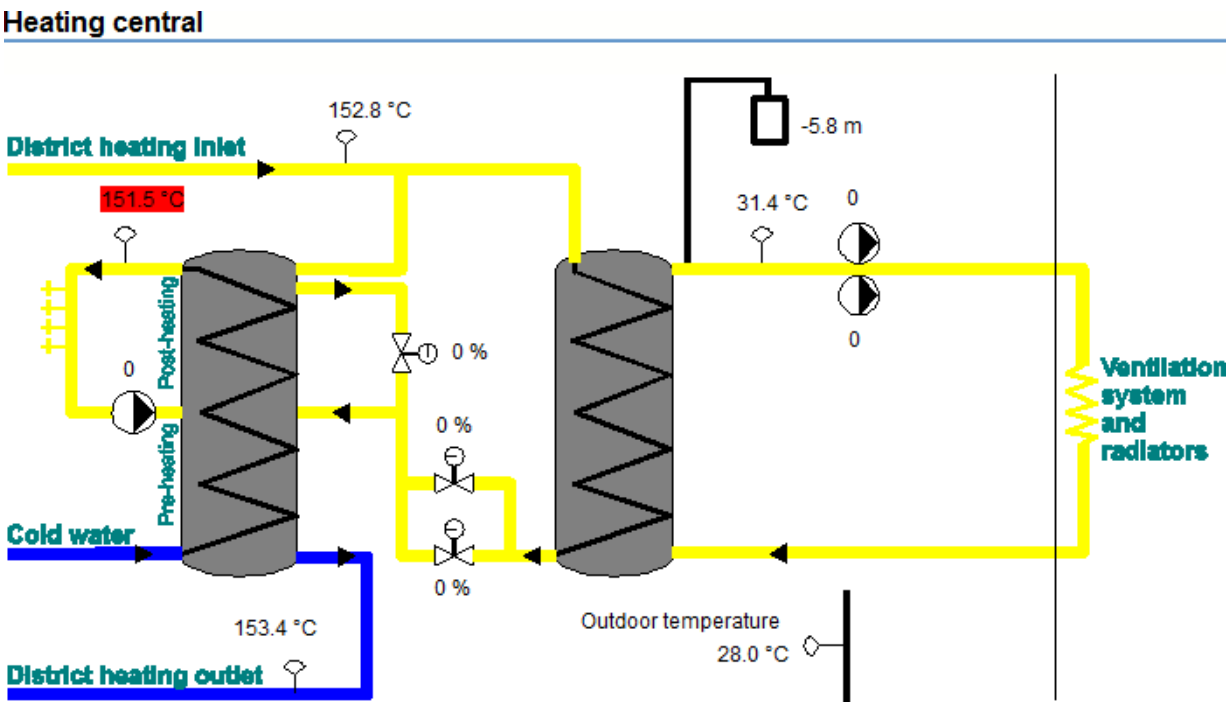
Start by selecting the first unused label by clicking "Free label".

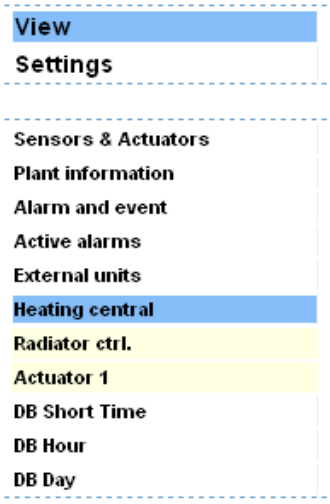
Select the object you want to link to the label. You can choose any channel, alarm or parameter. For our first label, choose *District heating inlet*.

Select *none* for the feedback channel. (Feedback is explained later in this user guide.)

Choose a format for the object. The options are *name*, *value* and *unit* in various combinations. If you choose all three, the label will be quite long. If space is limited, it may be better to split the label into several labels and place them in two rows – like the Outdoor temperature label in the next image.

Click inside the image where you want the label to appear. If you change your mind, simply click again somewhere else. You can also change the view-settings or the font size, and you can see the result of the changes immediately. When you are happy with the appearance and position of the label, click Save. Continue like this until you have added all the labels you want.





When you have finished, you need to update the browser. There is now a new section under "View" named after the overview. Open the overview and see how it looks.

If the overview includes a parameter or an alarm, you can click on it to change or reset it.

If you want to make changes to the image, open Settings/Overview and click on the image you want to edit. To edit an existing label, click on it, make your changes, then save. You can add more labels at any time.

13.3 Feedback

If you want the image to show a digital output in green when its value is 1, but the output does not have its own feedback channel, you should select the same output as the feedback channel.

To display a digital output with a feedback connection to a digital input (e.g. a pump with feedback in a controller), select the input as the object and the output as the feedback channel. In this case, the label will be green when the input and output are both 1 and white when they are both 0. If the digital input (the object) has an alarm (an alarm is added automatically during controller configuration), the label will turn red if the alarm is triggered.

You will need to write a script if there is a digital output with a feedback connection to a digital input and you want an alarm to be triggered when the output and input have different values. Controllers with feedback generate code that is similar to the code for pump feedback.

The script could look like this:

```
ROUTINE FeedBack
ALIAS
  DO1          = CHANNEL[37]; %Digital out 5
  DO1F         = CHANNEL[21]; %Digital in 5
  DO1FStatus   = CHANNEL[52]; %Channel 52
BEGIN
  IF (NOT (DO1 XOR DO1F)) = 1 THEN
    IF DO1 = 0 THEN
      DO1FStatus <- 2;
    ELSE
      DO1FStatus <- 1;
    ENDIF;
  ELSE
    DO1FStatus <- 0;
  ENDIF;
END;
```

If you want the label to be green for normal operation (both 1), white when switched off (both 0) and red when there is an alarm (one is 1 and the other is 0), add the channel DO1FStatus to the image and create a feedback connection to itself. You also need to create an alarm, connect it to this channel and set it to trigger when the channel value is 0.

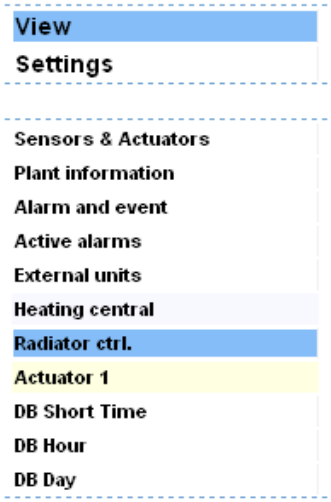
Important: Adding a feedback connection to a channel in an image does not generate an alarm or create an event in the device – it is only for display.

13.4 Deleting a label

Click on a label. Set the object and the feedback signal to "none" and click Save. To delete all the measuring points, simply click Reset at the bottom of the page.

14 Summaries

A summary is a page containing the channels, parameters, databases and curves belonging, say, to a controller. This section explains how to use and create a summary.



14.1 Summary

When you configure a controller, the controller tool automatically creates a summary for the controller. The summary contains all variable parameters and curves. The page is named after the controller, and appears under "View". If you are logged in as "view" you will only be able to view the page. You cannot change any settings. To change the settings you need to be logged in as "operator" or "config".

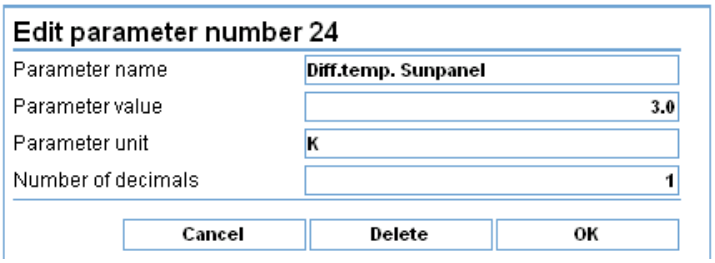
14.1.1 Controller page

Turn to page 48 of this user guide to see the summary for the controller we defined earlier. A controller page has two or three parts. The controller data appears at the top of the page. You are not able to modify this data. If there is a curve, it appears in the middle of the page. You can use drag-and-drop to alter the breakpoints. For more advanced curve settings, see section 8. Other adjustable parameters appear at the bottom of the page. Every parameter has a field where you can enter a new value, and an Update button. **Important: Each row must be updated separately.**

If you create another function requiring parameters to be changed, you can generate a new summary for it. Alternatively, you can add it to an existing page.

14.1.2 New summary

In this example, we will create a simple summary. There is a solar collector on the roof, and we want to automatically start a pump when the temperature on the roof is three degrees higher than the bottom of the storage tank, and stop it when the difference has decreased by one degree. We also want an easy way of changing the differential temperature and the hysteresis. We will need two parameters. Parameters are explained in detail in the reference manual, so here, we are only going to show you the steps involved.



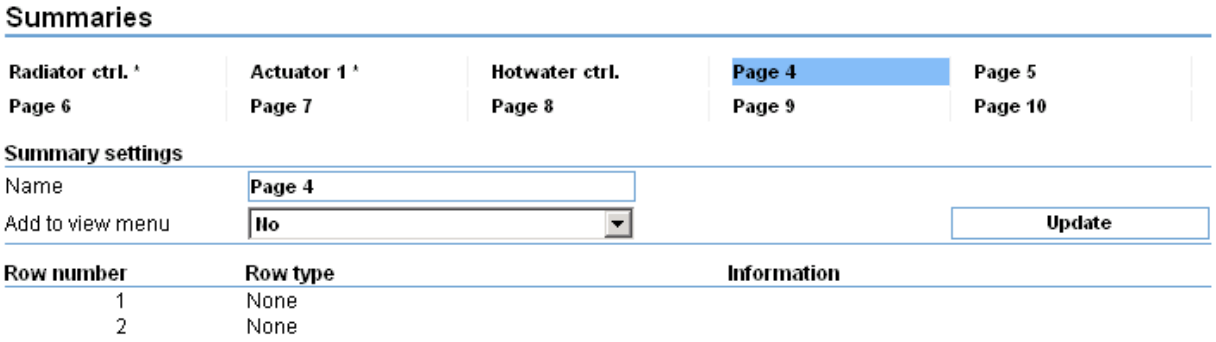
Log in as "config" and select Settings/ Advanced and Parameters. A list appears showing all configured parameters – script parameters have a pale blue background and user parameters have a pale yellow background. Unconfigured parameters have a white background. Unconfigured parameters are called Data 15, 16, etc. Select the first free parameter by giving it a name (Diff.temp Sunpanel), enter a value (3), a unit (K) and the number of decimal places (1). Repeat these steps for another parameter, calling it Hysteresis Sunpanel, giving it a value of 1 and using the same unit and decimal places. Now you have two new parameters to use in our new summary. Remember to click the Save button before you leave the page.

Open Settings/Advanced and Summaries.

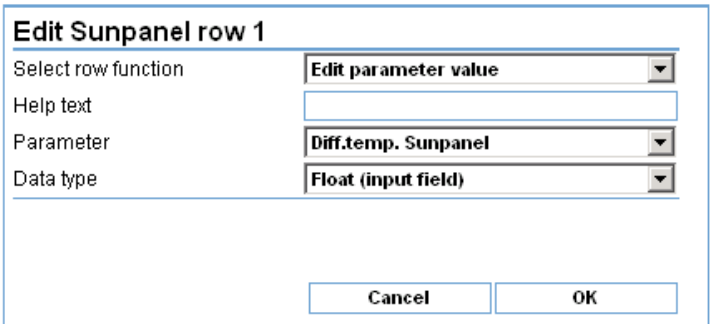
The first generated page appears. In this case it is the controller page. You can choose from 10 different pages. All configured pages have an asterisk * after the name. First select a free page.

Give the page a name (for this example Sunpanel) set "Add to view menu" = Yes – which means that the page will appear as a heading under "View" – and finally click *Update*.

When the page appears again, click on row number 1. This opens an edit dialog, where you select what you want to appear on the first row.

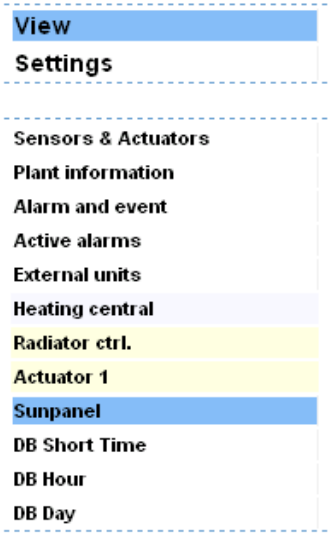


Select row function. In this example, we want to *Edit parameter value*. Select the parameter you want to edit, which in this case is "Diff.temp Sunpanel" We can also enter a help text if necessary. The parameter name is self-explanatory here so this field can be left blank. In the Data type field we can choose from Boolean (check box) or Float (input field). Select float. Click *OK* to save the row.



Click on row 2 and follow the same steps, but select the second parameter called Hysteresis Sunpanel.

After saving the second parameter you need to update your browser. There is now a new section under "View", called Sunpanel. Open it.



The page now includes two rows where you can change your parameters. You could also go directly to the parameter to change the value, but the good thing about the summary is that it gathers together all the parameters belonging to a function. This also reduced the risk of errors. If you do not want to use up a whole summary just for these two rows, you could add them to an existing page instead, for example the controller page.

In 15.9 we explain how to create a function to start and stop the pump for the solar collector.

15 Graphical programming

This section is about graphical programming and a few other functions in the Advanced menu. The idea is to help you learn how to use the graphical programming tool, which opens up the powerful capabilities of the WMPro that are not available in the standard controllers. We cannot cover the rest of the Advanced menu as this would take too much space. Please see the reference manual for more detailed information.

15.1 Introduction

If you click Advanced at the bottom of the Settings menu, the menu expands to reveal more options. These options control the internal workings of the WMPro. We described channel, parameters, scripts, etc. in general terms in section 4. Here, you will learn how to change the settings.

We will concentrate mainly on the graphical programming tool, as well as some other menus controlling new WMPro functionality.

A graphical program is a kind of circuit diagram that is converted into a script and stored in the device. You can connect an output to an input, or to an alarm or a calendar function. You can also issue instructions to the device using logical operators, calculations, switches, etc. The output does not need to be a physical output – it could be a standalone channel that you connect to an alarm or save to a database.

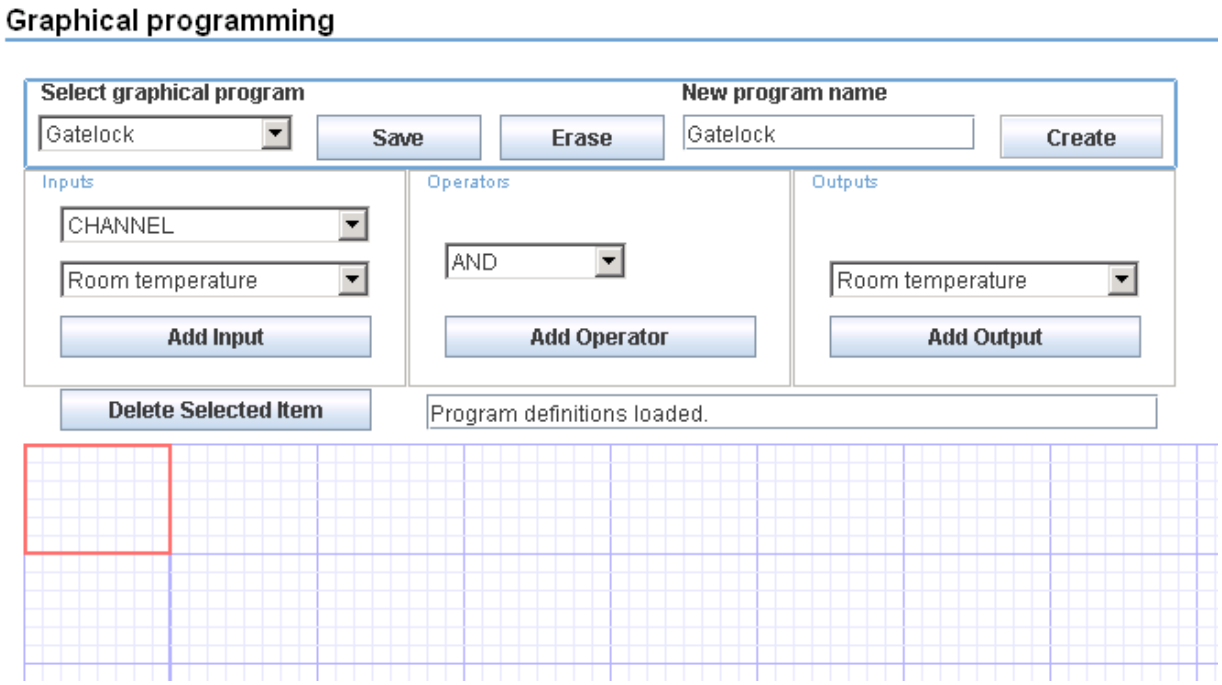
15.2 Example based on gate locking

Let's start with a very straightforward example. We want to control the lock for a gate in a building, using a digital output in a WMPro. The gate will be kept locked at night (so people can only enter with a code) but it will be open during the day. This function will need a calendar function and a digital output. We have already explained how to configure these objects, so we will assume they have been created and named.

Click Graphical programming to start the tool. Type Gatelock in the New program name field and click Create. You now have a new empty program.

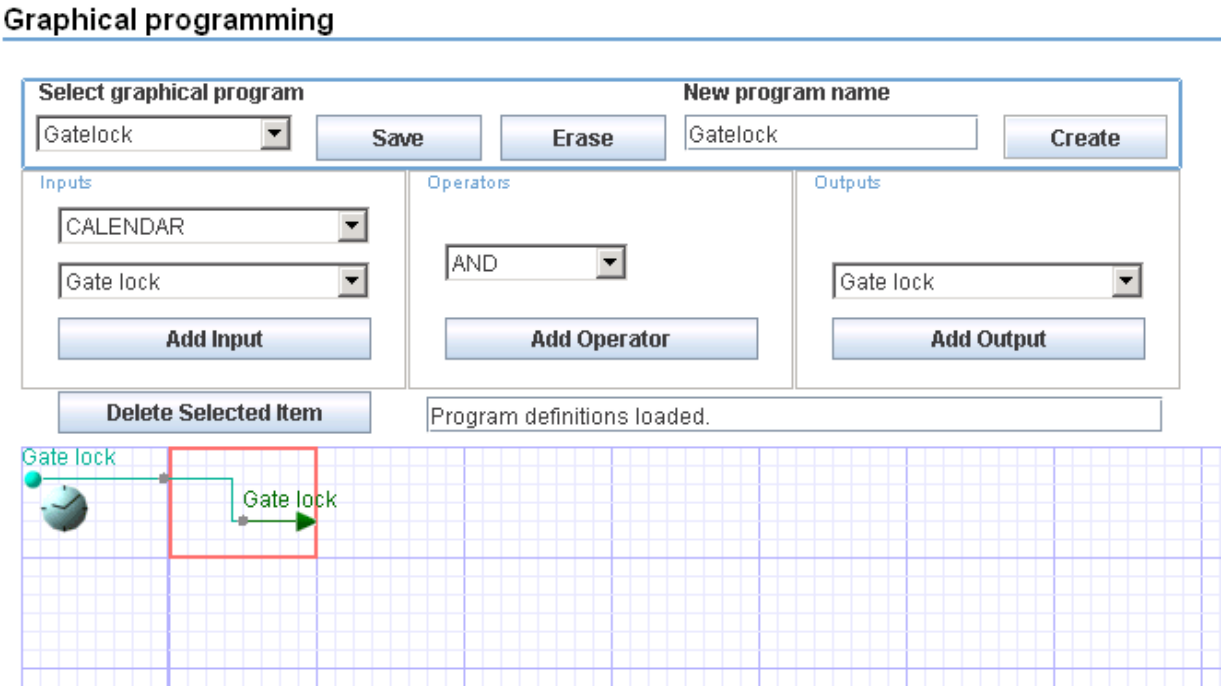
Click inside the square at the top left of the workspace – its border changes to red.

Above the workspace there are two drop-down list boxes under Inputs. Change the input from CHANNEL to CALENDAR. In the list box underneath, choose the calendar function you want to use. Click Add Input. The red square in the workspace now contains an icon for the calendar function (a stylised clock).



Click inside the next square to the right – its border now changes to red. Under Outputs, select the output that controls the gate lock and click Add Output. (As well as outputs, the list of outputs contains all channels even if they are actually inputs.) The workspace now shows the output icon.

Now you need to connect the calendar function to the output. Both the icons have a grey dot. Move the mouse pointer to the dot for the calendar function. Click and hold down the mouse button. Keep the button pressed and a blue line follows the mouse pointer as you drag. Drag the line to the grey dot for the output icon, then release the mouse button. If you accurately specified the start and end points, the blue line is replaced with a rectilinear connection.



The program is now finished, and all you need to do is click Save. Since the tool creates and uploads a user script file, the WMPro has to restart. You will be unable to use the device for a few minutes.

15.3 Inputs

An input is a data source that provides information to the graphical program. The input options are channel, parameter, alarm, calendar and constant. Depending on the input, the list box underneath contains the type of the object you selected. The exception is CONSTANT. If you choose this input, a field appears instead of the list box, where you can enter a constant value.

You can only position inputs in the first column of squares at the left of the workspace. This column is bordered by a thicker blue line, creating a margin.

15.4 Outputs

Outputs are always channels. The tool is unable to detect what the channels are used for. That is why all channels appear in the list, even if they are inputs, calculation channels for databases, or not used at all. You can position outputs anywhere on the workspace apart from the column on the left, and there is nothing to stop you including more than one. You could use the same output several times in the same program, or in different programs in the same device. This might not be such a good idea, however, because the value of the outputs would not be clearly defined.

15.5 Operators

15

Operators are icons that you add to the workspace between the inputs and the outputs to increase the range of things the program can do. The operators are classified by the number of inputs they have and by the type of signals they use. All operators have one output, to the right. They can have one, two or three inputs. Things are relatively straightforward if there is just one input, but if there is more than one, it is important to keep track of which is which. If there are two inputs, the one on top is called a and the one on the bottom is called b. If there is a third in the middle, it is called c.

Although there is really only one type of signal in the graphical program and in the script language, signals are used and interpreted in two different ways. Normal analog signals can take any value – theoretically from minus infinity to plus infinity. Digital signals have two values – true and false. If a signal is 0, it is interpreted as logical false by operators using digital signals. Anything other than 0 is interpreted as true. If the signal from a digital output is 0 or negative, the output is interpreted as off, and any positive value means it is interpreted as on. If you send 42 to a digital output, it will change to on – in other words true. The output signal from a digital operator is either 1 or 0 and nothing else.

Operators using digital signals for the input as well as the output are shown with black border. These include NOT, AND, OR and XOR.

Operators using analog signals with a digital output signal have a blue border. The comparison operators = , >, <, >=, <= and <> all fall into this category. For some operators, for example >, it matters how the comparison is structured. Usually, the a is placed in front of the operator and the b after. This will work as follows:

If a > b the output is 1, otherwise the output is 0.

To make the program more readable and to tell the signals apart, connections from a digital output are drawn in a shade of blue-green, whereas analog signals are yellow-green. Lines connected to an input have the same colour as the input. These colours are green for channels, blue for parameters, red for alarms, cyan for calendar functions and black for constants.

All operators using analog signals have a solid background. The background for simple mathematical relationships is yellow-green. The plus, minus, times and divide symbols are shown using round icons. The others with just one input are shown as squares. Turn to the end of this section for a full list of all the operators and what they can do.

Other, more complex, operators have a pink icon. The most important of these is probably the SWITCH operator. It has three inputs – the a input is a control input. You can think of the operator as a relay. If the control input is 0, the b input (the one on the bottom) is connected to the output. If the control input is true (not 0), the relay is activated and the c input (in the middle) is connected to the output.

15.6 Connecting operators

There are certain rules you need to follow when you connect the operators in the workspace. An input can only be connected to an output. The connection is made from left to right, in other words the input must be one column to the right of the output. An input can only be connected to one output, but a single output can be connected to multiple inputs.

You cannot erase a connection – instead you create a new connection to replace the old one. You will not be able to save your graphical program until you have connected up all inputs and outputs for all operators, inputs and outputs. Otherwise you will see an error message and the operator that is not connected is highlighted.

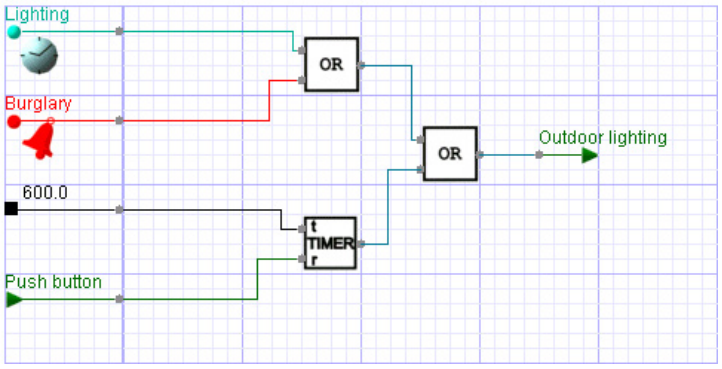
15.7 Editing the program

You can remove a square with an operator by selecting it and clicking Delete Selected Item. You can also move operators. To move an operator, hold down the Shift key on the keyboard, click on the operator and drag it where you want it to go. If the destination square has a green border, you can move the operator there. Otherwise the square has a blue border. If you release the mouse button when a square has a green border, the operator is dropped there, bringing all its connections with it. If the square has a blue border when you release the mouse button, nothing happens. You can only move an operator to a square if the square is empty, if the operator is allowed on the square and if none of the connection rules are broken.

Next to the Save button at the top of the screen there is a button called Erase. This deletes the entire program. There is also a list of all graphical programs in the device. Select the program you want to edit, but remember to save any changes before switching.

To create a new program, type a name in the New program name field and click the Create button. You cannot rename an existing program, and you must be careful not to use the same name twice. The name cannot include special characters or numbers.

15.8 Example – outdoor lighting



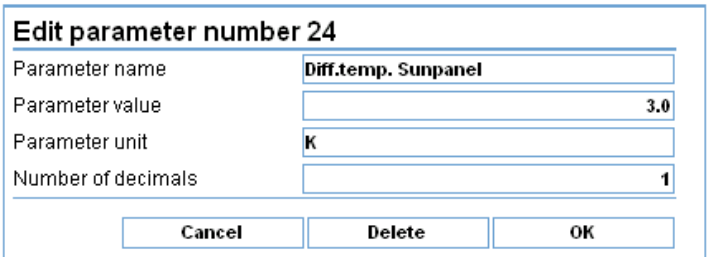
This graphical program will control outdoor lighting. There will be a time function to determine the times of day you want the lights to switch on. The system also includes a burglar alarm. If the alarm detects a break-in, the lights will be switched on regardless of the time of day. If someone arrives at the building when the lights are off, they can be switched on using a pushbutton. They will stay on for ten minutes (600 seconds) before switching off again.

15.9 Example - solar collector

In the next example, we will program the control system for a solar collector pump. It will work like this: If the temperature in the solar collector is three degrees higher than the temperature at the bottom of the storage tank, the pump will start running and continue until the difference drops to two degrees. The pump will also be exercised on the basis of a calendar. We will need two variable parameters. One for the differential temperature and one for the hysteresis. These parameters already exist if you followed the steps in the configuration pages. In the example they are called Diff. temp Sunpanel and Hysteresis Sunpanel.

Configuring a parameter is easy – open Settings/Advanced and Parameters. A list appears showing all configured parameters – script parameters have a pale blue background and user parameters have a pale yellow background. Free parameters have a white background. They are named Data 15, 16, etc.

Select the first free parameter by giving it a name (Diff.temp Sunpanel), enter a value (3), a unit (K) and the number of decimal places (1). Repeat these steps for another parameter, calling it Hysteresis Sunpanel, giving it a value of 1 and using the same unit and decimal places. Remember to click the Save button before you leave the page.

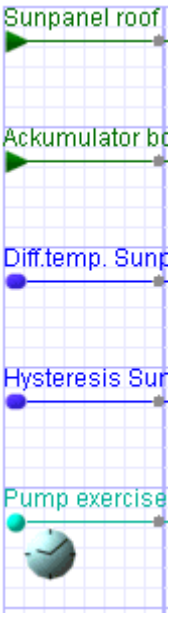


To change a parameter value simply enter a new value and click Save. You can also add the parameter to a configuration page as described in the previous section. You can make changes directly in the configuration page.

As well as these two parameters, we will need two temperature sensors. One is in the solar collector on the roof and the other is at the bottom of the storage tank. And we also need a digital output and an pump exercise calendar. Set this all up before you continue.

Open graphical programming. Type Sunpanel under *New program name* and click *Create*.

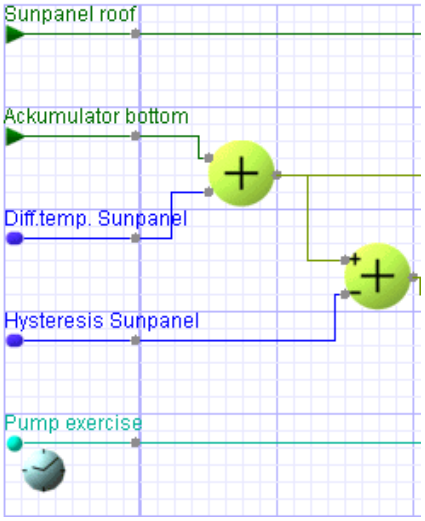
Next, create five inputs – two channels, two parameters and one calendar. Start by clicking on the square in the top left, select the input called "Sunpanel roof" and click *Add Input*. Click on the square underneath and insert "Accumulator bottom". Click on the next square down. Change the upper list box to PARAMETER, select "Diff.temp.Sunpanel" and add it. Move to the next square down and insert "Hysteresis Sunpanel". Finally, change the upper list box to CALENDAR and add "Pump exercise" to the fifth square.



We start by **adding** the storage tank temperature and the differential temperature. We then **subtract** the hysteresis from the total. We now have two temperatures. One is the storage tank temperature + the differential temperature. The other is the storage tank temperature + the differential temperature - the hysteresis. Follow these steps: Click on the square to the right of "Accumulator bottom". Select the + (plus) operator and add it.

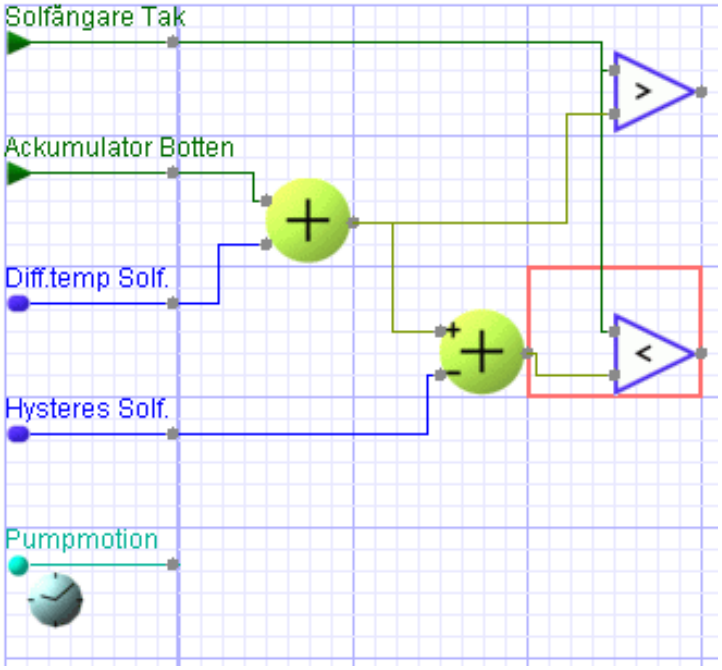
Select the square to the right on the next row down and *add* the - (minus) operator. Connect "Accumulator bottom" and "Diff.temp" to their respective inputs in the *add* operator, and connect the output from this operator to the + input of the **subtract** operator. Connect "Hysteresis" to the – input of the **subtract** operator.

Now we need to compare these two temperatures with the solar collector temperature. Remember we want to start the pump when the solar collector temperature is higher than the storage tank temperature + the differential temperature, and to stop it when the solar collector temperature is lower than the storage tank temperature + the differential temperature - the hysteresis. We need two operators to implement this condition. Click on the fourth square in the top row and add the > (greater than) operator, and add the < (less than) to the square to the right of the subtract operator. Connect the solar collector temperature to the upper input of these two operators. (You will need to draw two connections, from output to input.) Now connect the output from the add operator to the lower input of the operator on top, and connect the output from the subtract operator to the lower input of the operator underneath.



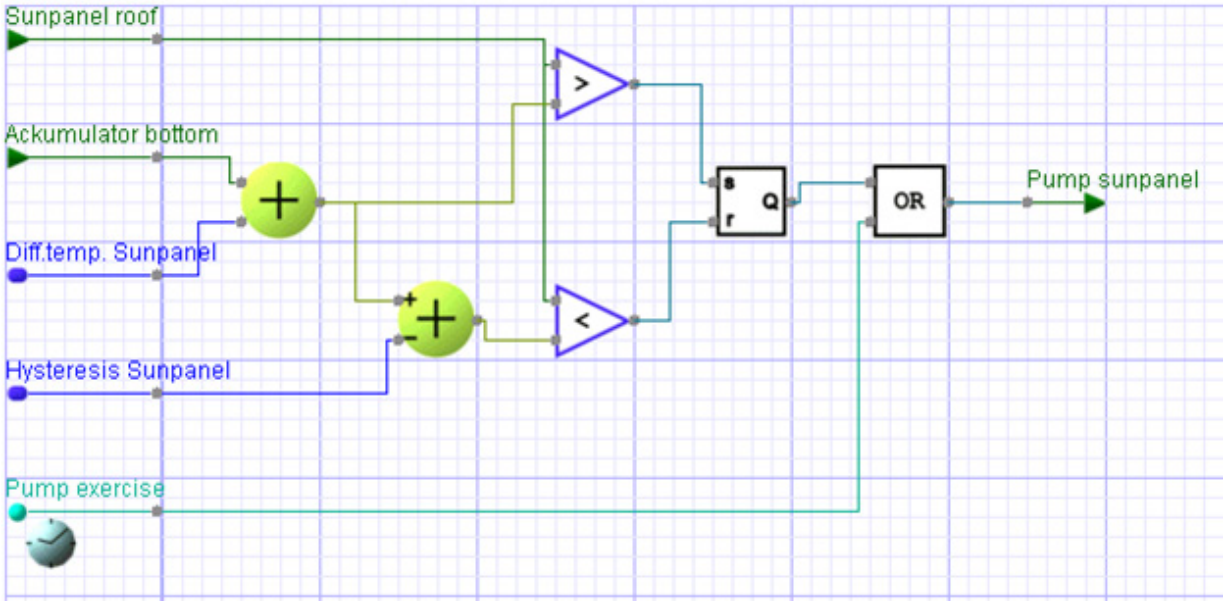
You now have two outputs implementing the condition above. The upper output is on when the solar collector temperature is higher than the accumulator tank temperature + the differential temperature. The other output is on when the solar collector temperature is lower than the accumulator tank temperature + the differential temperature - the hysteresis.

Next, we need an operator that switches to on when the upper output is on, and off when the lower output is on. We will use an RS toggle switch. Click on the square in the fifth column of the second row, and add the RS operator. The output from this toggle switch can now directly control the digital output for the pump, but we still need to add the pump exercise calendar. Select the square to the right of the RS toggle switch and add the OR operator, and finally add the output directly to the right of the OR operator.



Connect the output from the > operator to the S input of the RS toggle switch, and the output from the < operator to the R input. Connect the RS output to one of the inputs of the OR operator, and the pump exercise calendar to the other input.

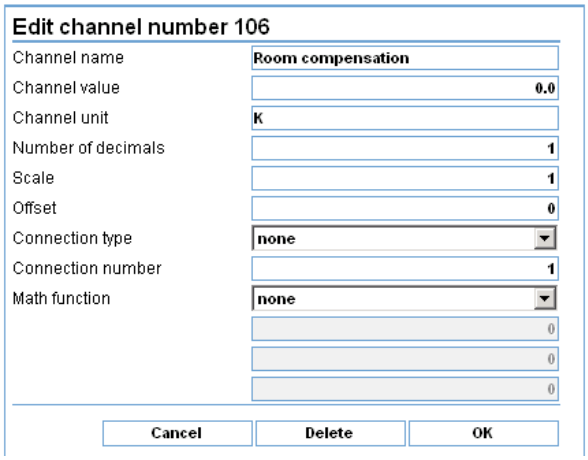
Finally, connect the output from the OR operator to the digital output. You can now save the program. This is the result.



15.10 Example – room compensation in controller

We will now use the programming tool to add room compensation to the controller we configured earlier. We will need a room sensor, a control curve and a channel for set value displacement. Configure the room sensor as described in 5.3. The curve is defined in 8.3. We will define the channel for set value displacement here. Open Settings/Advanced/Channels.

Type the name of the first unconfigured channel. (Unconfigured channels have the name Channel followed by a number.)



Name the channel Room compensation, set the channel unit to K and the decimal places to 1. Also choose whether you want to the save the channel to a database. In this example, the value will be saved to the short time database and the hour database Click *Save*. The room compensation channel is ready to be used.

You now need to add the channel to the controller. If the controller already exists, you can edit it. Otherwise you need to create the controller from scratch. Place the channel in *Setvalue displacements/Channel*. See section 6.1.1.

If you want to view the channel value on the controller summary page, you can add a row to the existing page. See section 13.

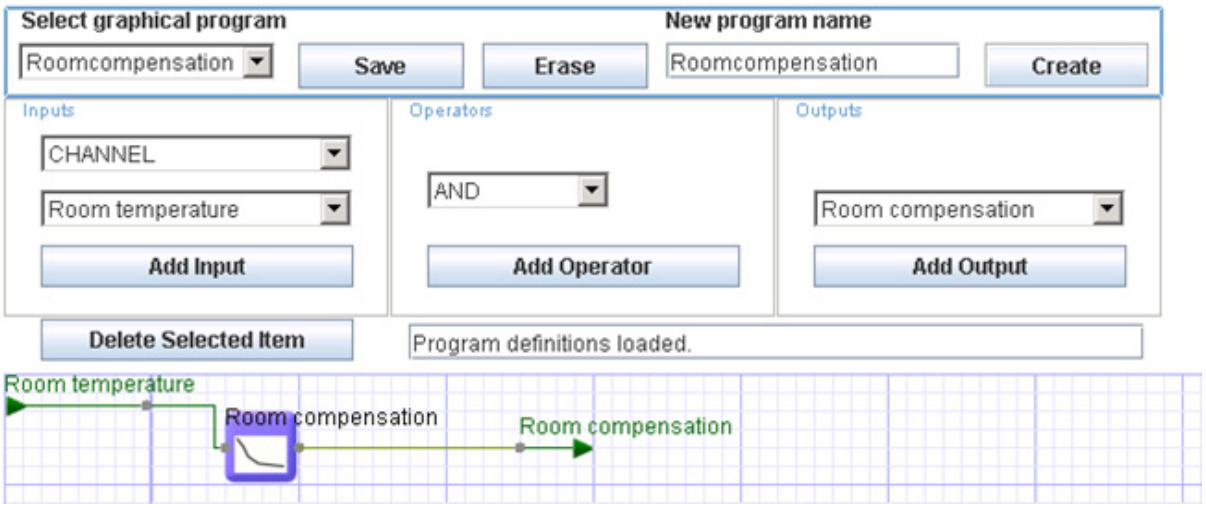
We also need to create a graphical program.

Open Settings/Advanced/Graphical programming.

Create a new program called Roomcompensation and click *Create*.

Select input = room temperature, operator = Room compensation curve and output = room compensation. (The channel we just created.)

Graphical programming

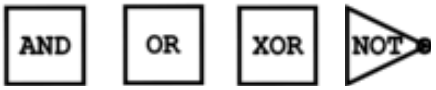


Connect the items as shown and save the program.

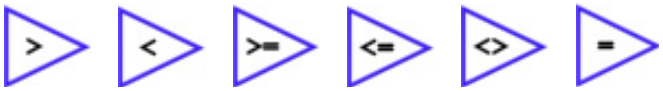
Example applications

Please go to the Abelko web site for more example applications using graphical programming.

15.11 List of operators



Logical operators: and, or, exclusive or (a or b, but not both) and not (inversion).



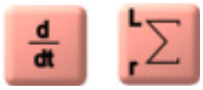
Comparison operators: a compared to b. If the condition is met, the output signal is 1, otherwise it is 0.

The four mathematical operators: a + b, a – b, a * b and a / b.

Mathematical functions: sine, cosine, absolute value and square root.

SIGN checks the sign of the input signal. If the input signal is less than 0, the output signal is -1. If it is greater than 0, the output signal is 1. If the input signal is precisely 0, the output signal is also 0. ROUND rounds the signal to the nearest integer.

The MAX operator uses the greater of the two input signals as the output signal, whereas MIN uses the lesser of the two.



d/dt is a differentiating operator. The output signal indicates how much the input signal has changed since the previous second. The second operator is a summation operator (discrete-time integration). Every second, the input signal is added to the total, which is also the output signal. If the absolute amount of the total is greater than the L input, summation ends. If the input signal r (reset) is anything other than 0, the total is reset to 0.

The LIM operator sets a limit on a signal. The a-input sets the upper limit and the b-input sets the lower limit. If the input signal remains between the limits, it is used as the output signal, but if it exceeds the limit, the limit is used as the output signal.

This is a switch. If the a input is 0, the output signal is equal to the b input. If the a input is true (anything other than 0), the output signal is equal to the middle input.

The output signal from this operator is equal to the input signal one second earlier. The output signal is always 0 when the system starts.

If the b input (enable) is true (anything other than 0), the output signal is equal to the a input. If the b input is 0, the operator keeps using the old value as the output signal. In other words the signal is frozen.

The RS toggle switch sets the output to 1 if the set input (a) is true. The output signal stays the same until the reset input (b) changes to true, when the output signal becomes 0. The output signal is 0 when the system starts.

The TIMER operator works in the same way as an oven timer. The output is 1 for the number of seconds specified by the t input (a). The output then changes to 0. If the reset input (b) changes to true, the output signal becomes 1. If the reset input changes to 0, the timer is restarted and the output is set to 1 for t seconds. The timer is active when the system starts, and the output signal is 1.

This operator stands for one of the ten curves in the WMPro. The output signal is the value along the y-axis that corresponds to the position of the input signal on the x-axis.

16 System

This section explains how to change system settings. The System section contains settings relating to device management, and is not really concerned with the normal operation of the device. The section includes backups, software upgrades, passwords, etc.

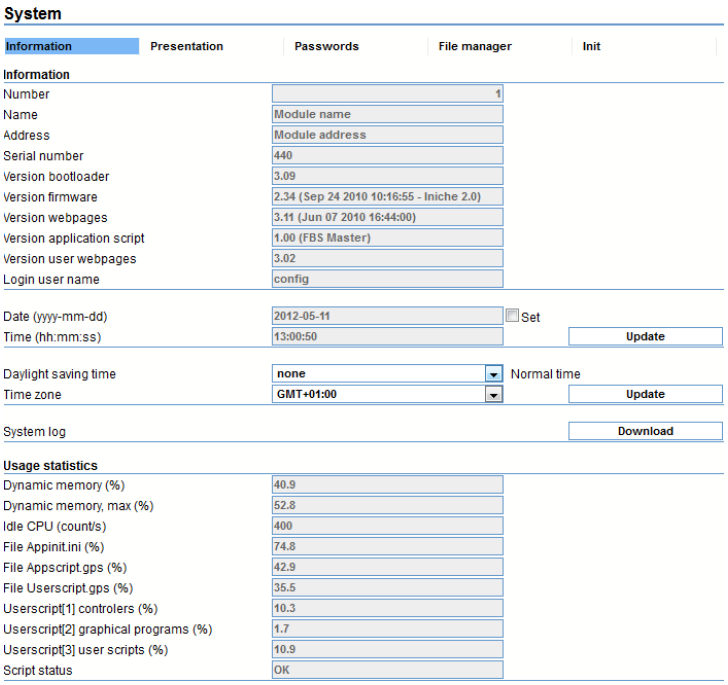
To change system settings you need to be logged in as “config”. You can use system settings to set the clock, change the password, make backups, etc.

16.1 Information

Open Settings/System

The Information page appears. This page shows the module number, name and address, the software versions, the clock, the time zone, daylight saving and a button to download a system log.

The log contains important information if something goes wrong and you need to contact Abelko. The only settings you can change here are the date and time, the time zone and the daylight saving setting. To set the clock, select the "Set" box, enter the date and time, and click "Update". If you change the time zone or the daylight saving setting, you will need to click Update to save the settings separately. This page also contains usage statistics.



Clock

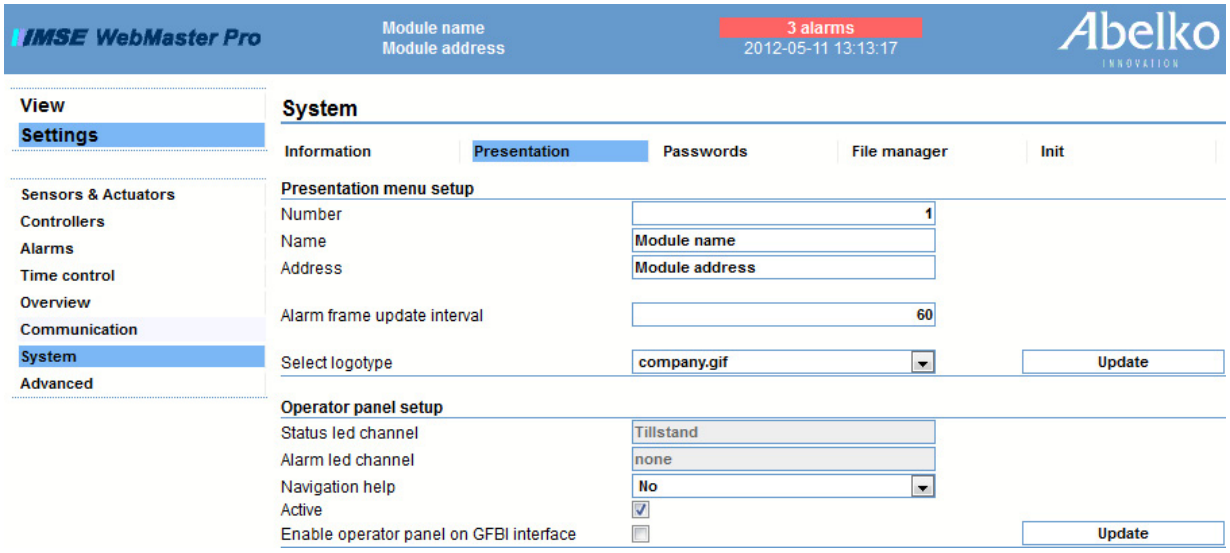
The WMPro has a built-in clock with enough backup power to keep it running for several days without power.

16.2 Presentation

You can use this page to enter details of the number, name and address of the module. The information is included in emails sent by the module and also appears at the top of the web pages.

You can also set the update interval for the alarm frame and the time appearing at the top of the pages. If your connection is slow, for example if you are using a modem, you should specify a long update interval. Otherwise you may not be able to use the device because it will be spending all its time updating.

You can add your own logo to the right of the alarm frame. (You will need to upload a suitable file as a "Userfile".) Click Update when you have finished changing the settings. Further down the page you will see some information about the operator panel, with options to enable the navigation help and activate the panel. Turn to section 17 to find out more about the operator panel.



16.3 Passwords

You can change the default passwords on this page.

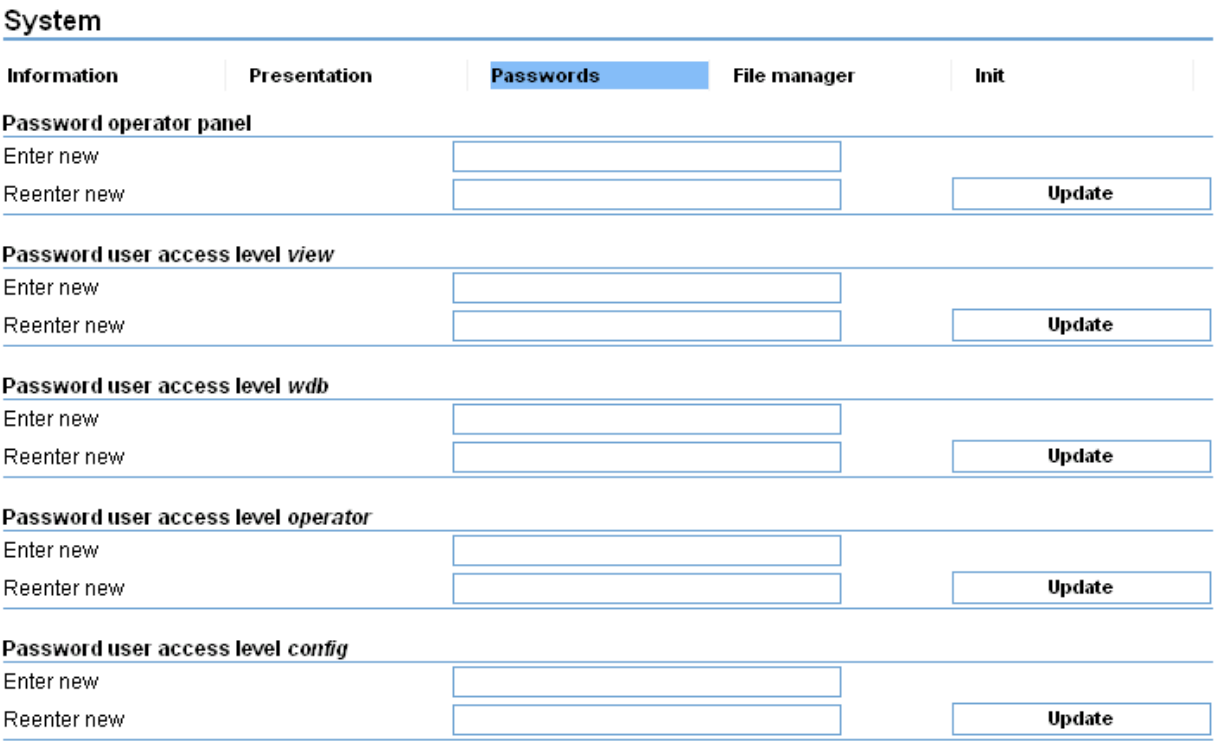
You must enter a password before you can make changes from the operator panel. The password can only contain digits (four digits). The default password is **1234**.

The "view" level allows you to view settings and data and to download data. The default password is **ab12**. A WDB (web database) needs a password in order to download data from a WMPro. The default password is **wdb**.

The "operator" level lets you do everything you can do at "view" level, and you can also change variable parameters in the controller and acknowledge alarms. Default password: **cd34**. At "config" level, you can do everything. The factory setting for the password is **ef56**.

All passwords except the operator panel password can be between four and 20 characters long and can contain most characters: A-Z, a-z, 0-9, !?-_. Do not use ' and " or spaces in passwords.

To change a password, enter the new password in the upper field and confirm it in the lower field. Then click Update. Important: You must save each password separately.



16.4 File manager

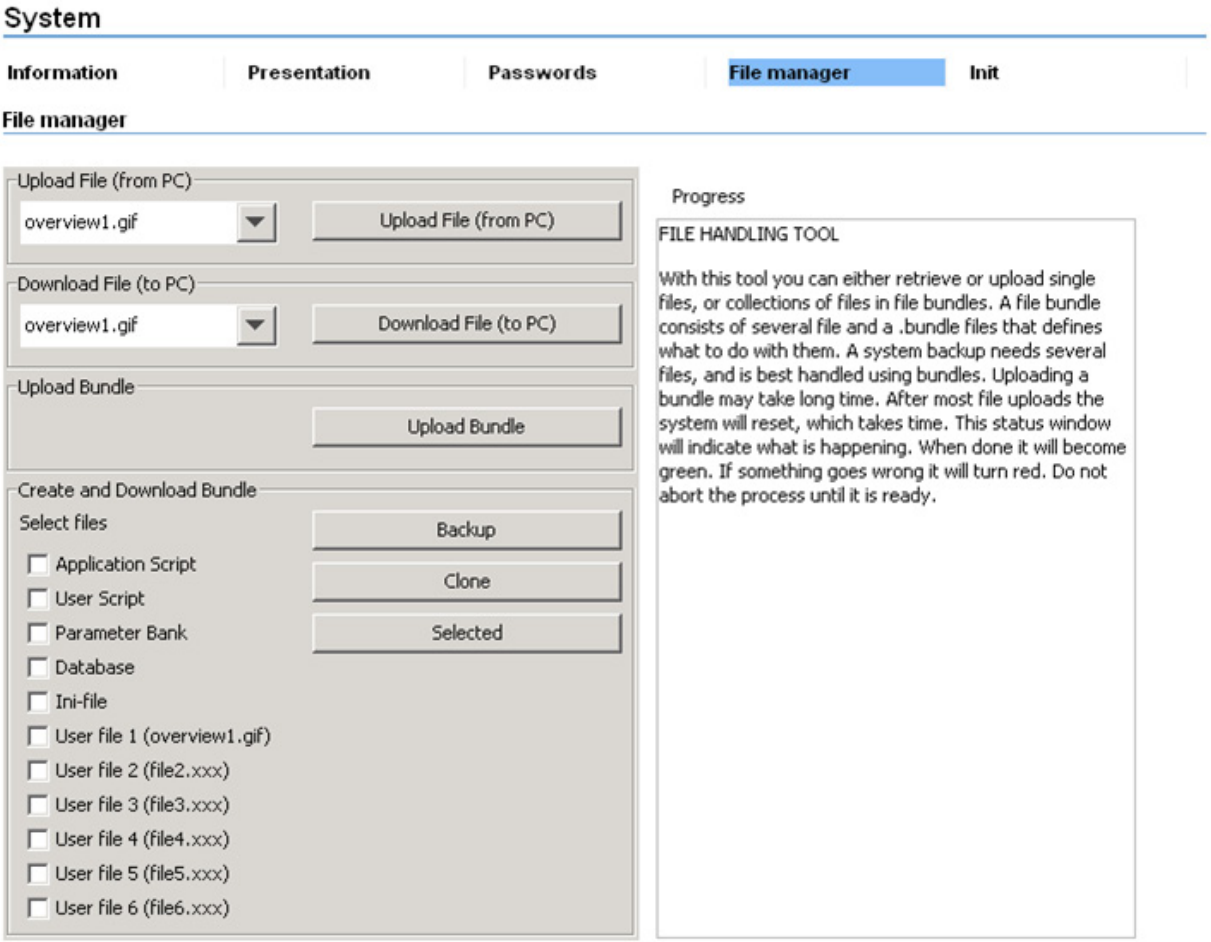
File manager

The WMPro has a file manager allowing you to upload or download software, scripts, images, etc.

You can use this page to upload and download programs, scripts, images, parameters, databases, etc.

Click *File manager*.

We have divided the page into two parts for practical reasons. The first part covers uploads and downloads, and the second part deals with more advance options.



16.4.1 Uploads and downloads

All software is uploaded from here. You can also download certain software. "Uploading" is defined as importing software from the PC **to** the WMPro, so "downloading" means exporting software to the PC **from** the WMPro.

Choose the file you want to upload or download and click the corresponding button. A dialog appears in which you can select the source or destination of the file, depending on whether you are uploading or downloading. You can follow the progress in the status field on the right. Do not close the applet until the status field indicates that the process is finished.

The following files can be uploaded.

Bootloader. Software handling file uploads, reprogramming memory areas, etc.

Application firmware. Software handling all outputs and input, performing calculations, etc. Usually just called "firmware".

Application script. A script that turns the hardware into a WMPro.

Application web. The web pages in the WMPro.

User web. Web pages that are specific to a particular user.

These files can be downloaded as well as uploaded:

Application init. A settings file that can be generated in the WMPro. The file can also be imported from another device to make a copy. There are more details in "Advanced functions" further down.

Parameter bank. The parameter bank. You should not import the parameter file from another device.

User script. Script file determining how the device works. The file can also be imported from another device to make a copy.

Database. The whole database in binary format. **Important:** This file can only be uploaded to a WMPro with **exactly the same** database settings.

User file 1—6. Images for overviews, logos, etc.

16.4.2 Bundles

Bundles

The file manager can create and bundle all the files necessary for cloning a WMPro with a single click. And it is just as easy to import bundle.

You can also use the file manager to create, download or upload bundles. There are three ways to create a bundle. If you click Backup or Clone, the necessary files are created automatically. You can also select the files you want to include in the bundle by clicking the boxes next to the files then clicking the "Selected" button. After clicking any of these file you will see a dialog in which you can give the bundle a name and specify where you want to save it. **Important: You will need to create an application init file before you can generate a backup or a clone**. See the next section.

It is just as easy to reset a bundle. Simply click the Upload Bundle button. Select the bundle you want to upload.

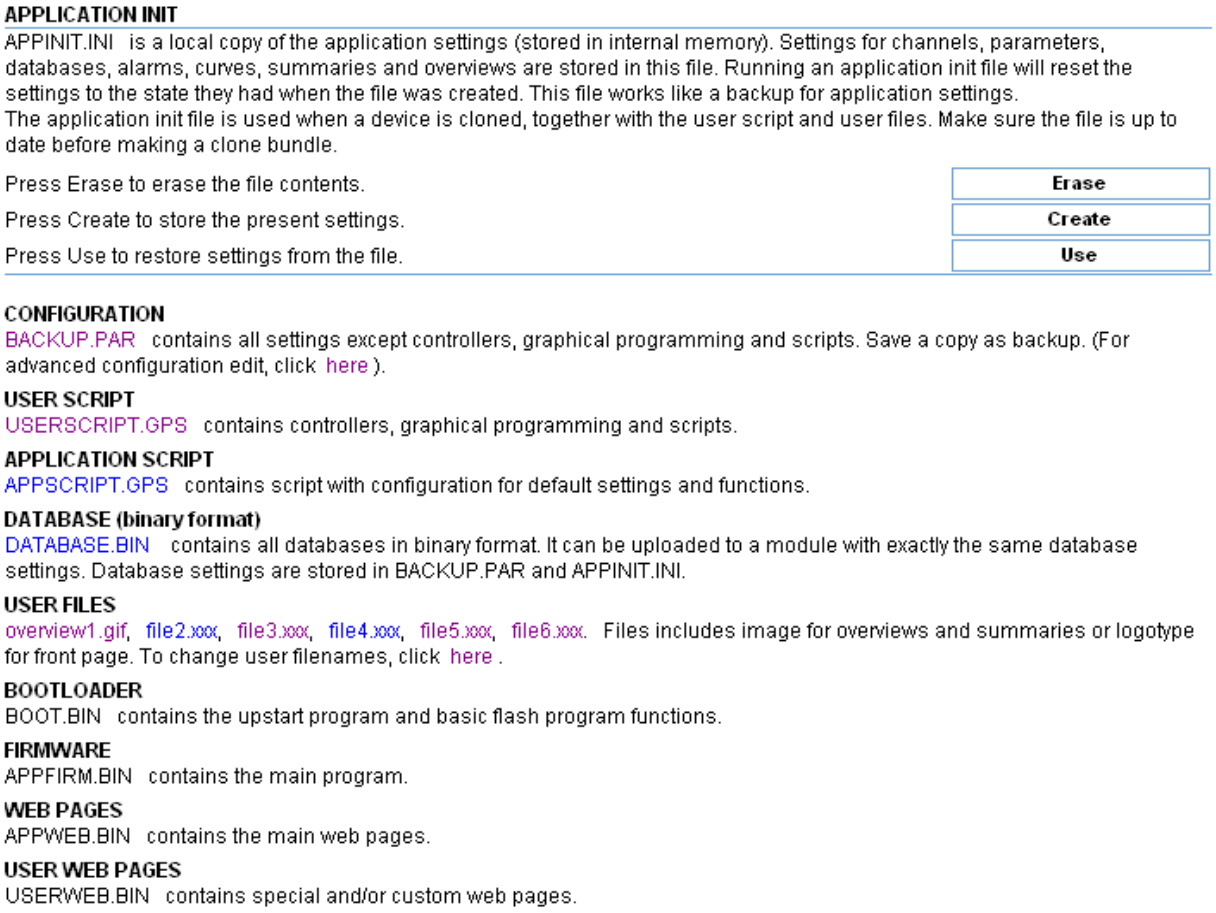
When using the file manager, remember not to close the page or switch to another page until the status field indicates than the current process has finished.

16.4.3 Advanced functions

Application init is a local copy of the application parameters. The file contains the settings for channels, parameters, databases, alarms, curves, summaries and overviews. You can copy the file to another module if you want to use the same settings there. To fully clone the device, you should also copy the user script and user files. All these files are imported automatically if you use bundling (above). **Important: You must save the file before you can download it.**

There are three buttons for the ini file: *Create*, Erase and Use. When you have finished changing the settings, click Create. The file is saved locally in the device, and you can load it at any time by clicking *Use*.

Use *Delete* to remove the file from the device. If you want to save the file to your computer, you need to *download* it as described in 16.6.1. If you **up**load a cloned bundle, it will contain the application init file. In this case, the application will be initialised automatically. If the application init file is uploaded in some other way, you will need to click the *Use* button yourself.



The *parameter bank* creates a file containing all parameters, including IP addresses, etc. This file can only be used to back up your own device. There is also a link to a page for advanced editing of parameters. See the next page.

The *user script* creates a file containing controllers, programs and scripts. It is a backup file for your own device, but it can also be used to make copies of devices.

The *application script* creates a file containing a basic configuration script for the WMPro.

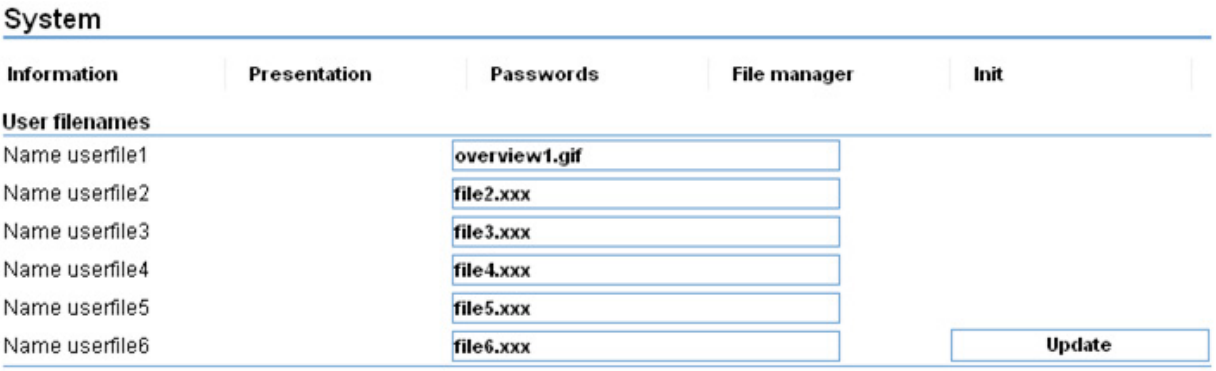
Database (binary format) contains all databases in binary format. The file can be used to move the database to a different device, provided it has **exactly the same** database settings.

User files are used to save the images used in overviews, logos, etc. The files are used to back your own device and also to make copies. There is also a link to a page where you can change the file name.

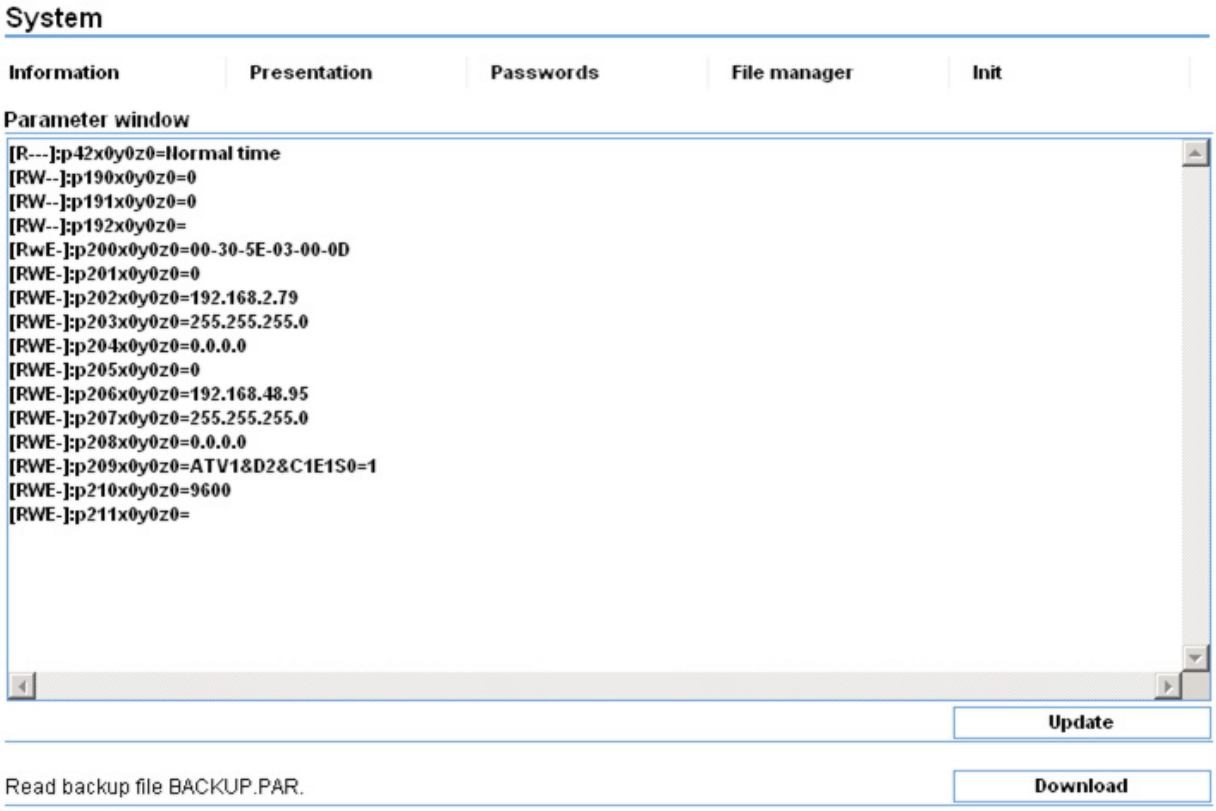
Simply enter the new name and click *Save*.

16.4.4 Advanced editing of parameters

The parameter file is a text file, and you can use programs like WordPad to edit it. You can also paste or type in parameters in the internal text editor. And you can edit and save all or parts of the parameter bank.



Important: Changes to the parameter bank may cause the WMPro to stop working. Do not change anything unless you are sure you know what you are doing.



16.4.5 Upgrades

Software updates are supplied in a program that automatically upgrades the WMPro to the latest version. Updates are available from a support page on the Abelko web site www.abelko.se.

The file name will be something like this: ”WMPro_ SWE_Release_2_xx.exe”

Download the file to a location, for example the desktop. Click on the icon to start the program. All you need is the IP address of the WebMaster and the "config" password. You must also be able to communicate with your WMPro as described in section 3. Instructions are provided when the program starts.

Upgrade

The upgrade program is available from the Abelko web site www.abelko.se.

The program keeps track of the current software version and performs upgrades if necessary.

NOTE. You can only run the program if you have a direct connection to the WebMaster. You will not be able to use the program if the WebMaster is connected by modem.

A .zip file is also available on the web site, containing the individual program files. You can use this file to upgrade as described above.

16.5 Init

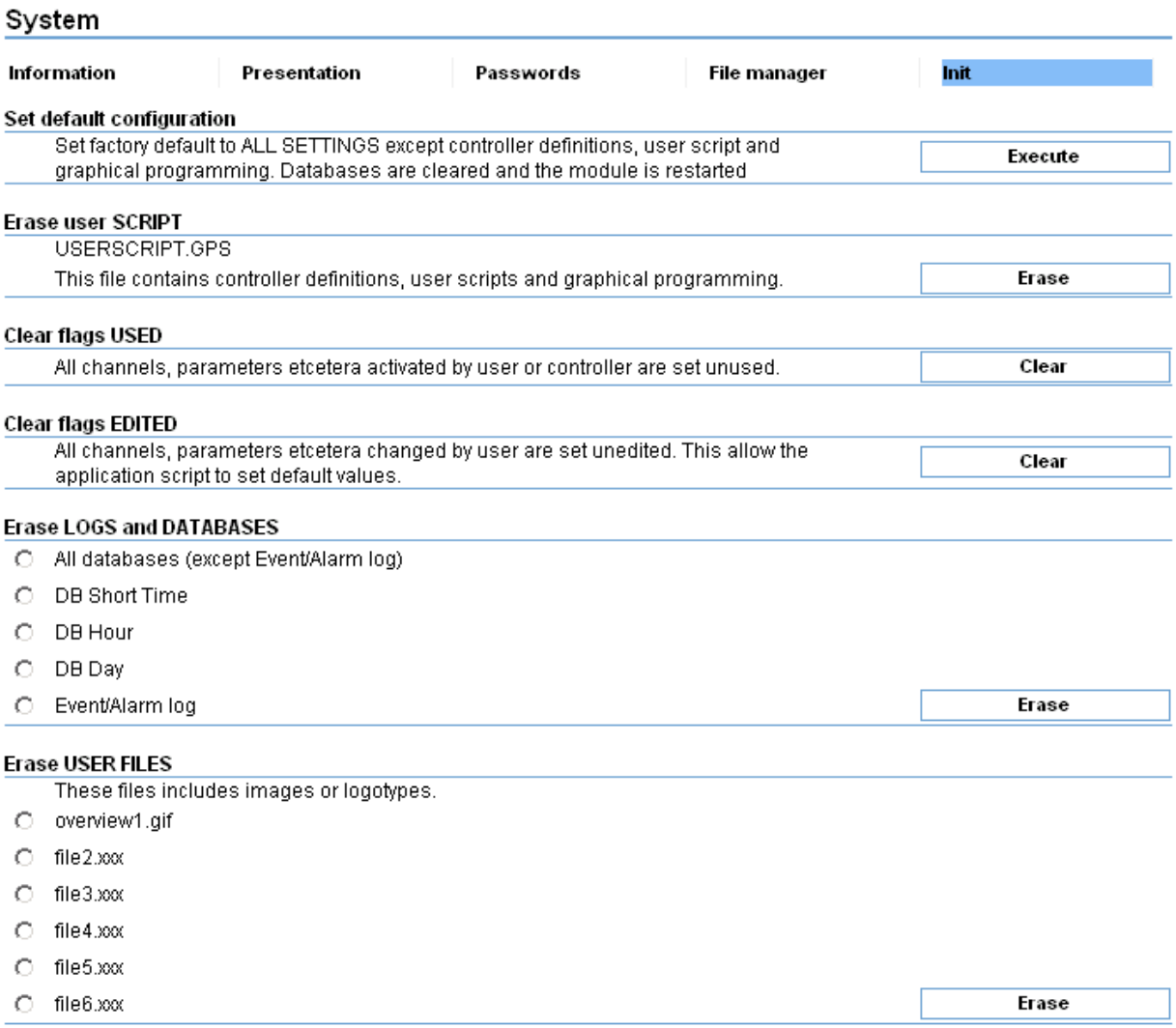
In this section, you can erase user scripts, user files, databases and logs. You can also reset everything to factory settings, except controller definitions, user scripts and graphical programs.

The function of *Clear flags EDITED* and *Clear flags USED* may not be immediately obvious.

The device keeps track of the channels, parameters, etc. that are in use. When the controller tool or the sensor tool needs a new channel, it selects one that is unconfigured. If someone makes changes to a channel manually, it is flagged as "used". One way to remove the flag is by deleting the channel. If there are a lot of flags to remove, you can use Clear flags USED. This removes the flags, leaving the name and other settings intact.

As well as the used flag, there is an edit flag. Channels that have been initialised by the application scripts are used, but they are not edited until someone changes them from the web pages. You can reset this flag for all functions using it. If you remove both the EDITED and USED flags, the application script will overwrite all channel settings in the channels with a default setting.

It is usually safer to use the more powerful Set default configuration to delete old settings from a device.



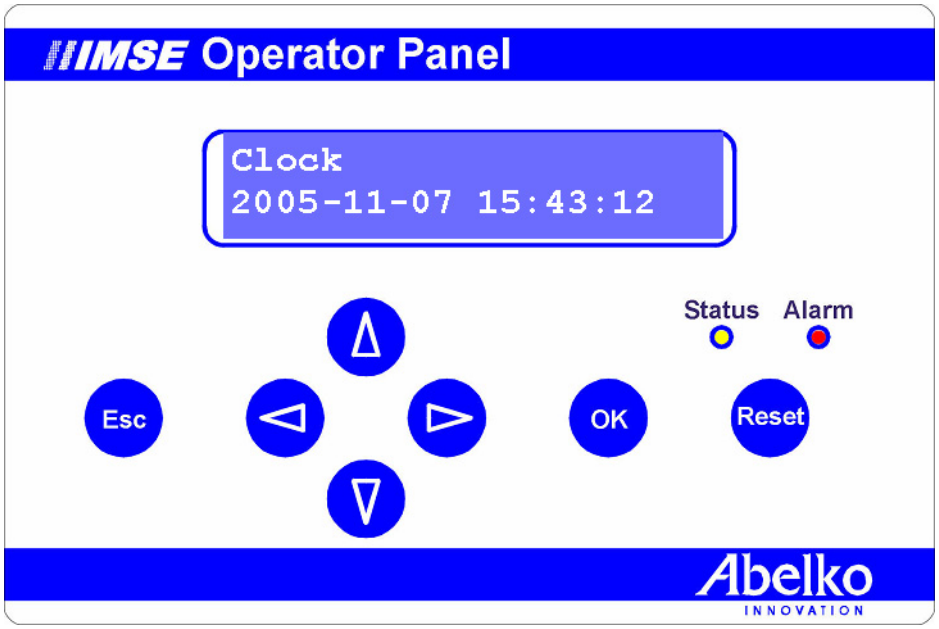
17 Operator panel

An operator panel is available as an accessory for the WMPro. You can use it to view and acknowledge alarms and to change some system settings. When you configure a controller in the WMPro, the system adds new menus to the operator panel, where you can view the channel values and set certain controller parameters. You can also use the operator panel tool to create your own user-defined menus.

This section explains how to connect and use an operator panel, and also how to create your own menus.

17.1 Description

The operator panel has a LCD display with two lines of 20 characters each. The back-lit display is blue with white text.



The panel has seven keys, an alarm LED and a status LED. It uses a 12 V power supply, which can be taken from the WMPro, and is connected to the RS485 A and B terminals.

The operator panel is available with a plastic case or without, for installation in a larger console.

17.2 Connections

If the WMPro has an expansion port and is running software version R2.0 or later, and if the operator panel rating plate is labeled Operator Panel-AeA, you can connect the panel to the expansion port in the WMPro. The WMPro expansion port is an RJ12 contact.

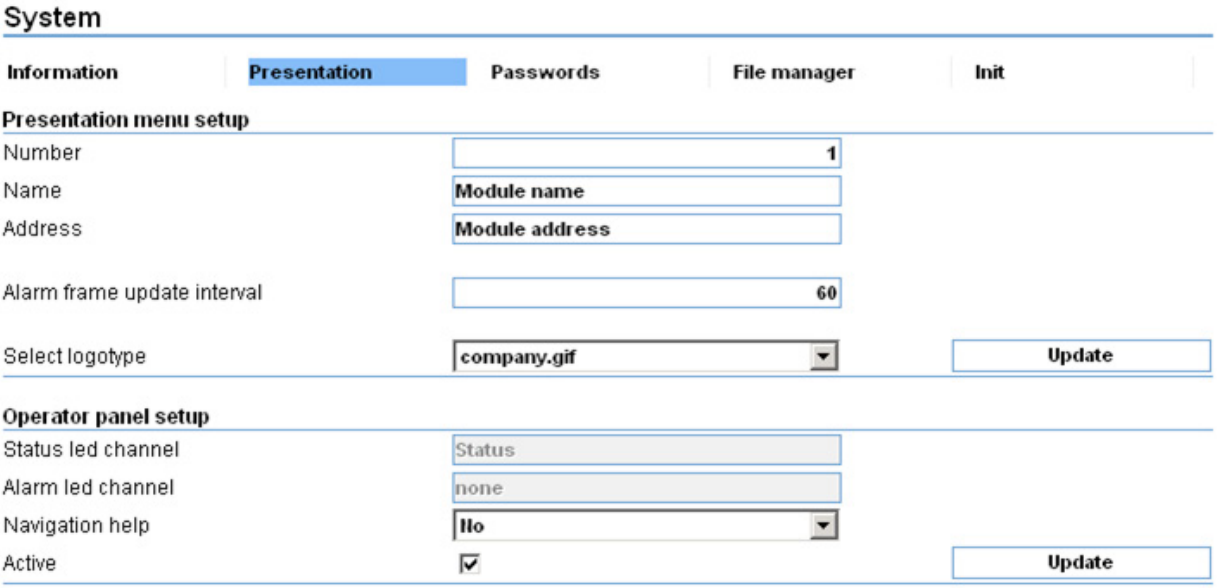
Otherwise, four wires are used to connect the operator panel. The operator panel terminals are labelled +, -, A and B. Connect the plus terminal to the WMPro terminal labelled "+12V in/out". Connect the minus terminal to any of the GND terminals in the WMPro. Connect A and B to the terminals labelled A and B in the WMPro.

If communication is lost while the device is running, the operator panel hangs. None of the buttons will have any effect in this situation.

RS485

The WMPro has two LEDs for the RS485 port. The yellow LED flashes when the WMPro is sending data, and the green LED flashes when it is receiving data. With the operator panel connected and working, every yellow flash should be followed by a green flash.

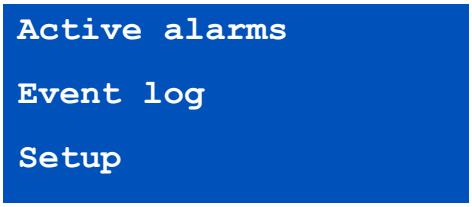
The operator panel has a red status LED. This LED lights up if there is an error. The green status LED works the other way around. You can deactivate the operator panel in the WMPro using a setting in Presentation in the System menu. If the Active checkbox in the Operator panel setup section is unchecked, the WMPro does not attempt to communicate with the operator panel. If the operator panel is connected to the RS485 port, you must check the box labelled "Enable operator panel on GFBI interface". This results in slower communication with GFBI units.



17.3 Using the operator panel

The menus are listed vertically, so you use the up and down arrows to change menu.

If you do not use the panel for 15 minutes, the display shows the current time. To display the menu again, press the Esc key. You can also press the key to exit a submenu or cancel a setting.



To select a menu, press OK. All devices have three menu that always appear at the top of the menu list. "Active alarms", as its name suggests, lists alarms that are currently active. "Event log" lists the last 100 alarms and events as on the Alarms and events page. "Setup" allows you to view and change certain system settings.

17.3.1 Login

Before you can acknowledge alarms and change settings, you will need to enter the operator panel password. You can set this four-digit password using the password page – click Passwords on the System page.

When you attempt to access a password-protected function, the operator panel prompts you to enter the password. Asterisks are used to represent the four digits. One of the asterisks will be flashing. Use the up and down arrows to change the star to the correct digit. Use the right and left arrows to move to another asterisk. Change all the asterisks to the correct digit. Press OK when you have finished.

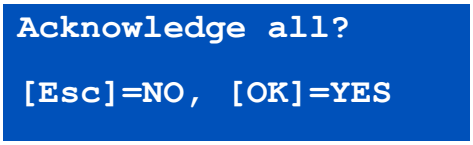
If you enter the wrong password, you will see the four asterisks again. After three failed attempts, the display changes to an error message and the operator panel is blocked for one minute. You can then try again. If you enter the wrong password again you will have to wait two minutes, then four minutes, the eight minutes, etc.

You can cancel a login attempt by pressing Esc.

Once you are successfully logged in, you are not logged out again until the operator panel is inactive for 15 minutes or you log out manually. To log out manually, press Esc until you are back at the main menu, then press Esc again. You are asked if you really want to log out.

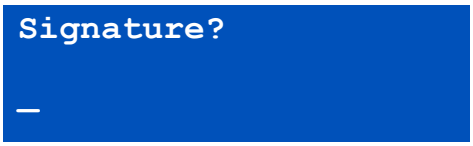
Press OK to log out.

17.3.2 Acknowledging alarms



The operator panel has an alarm LED that corresponds to the alarm LED on the WMPro. It flashes if there are any alarms waiting to be acknowledged, and stays constantly lit if there are active alarms that are not waiting to be acknowledged.

You can acknowledge all alarms by pressing Reset. This does the same thing as "Acknowledge all" in the web interface. You will need to press OK to confirm. You are then prompted to enter the password unless you have already done so.



Just like the web interface you are prompted to enter a signature. The signature is up to three characters long. Press the up and down arrows to change the character. Press the right and left arrows to select the character you want to change. Press OK when you have entered the correct signature.

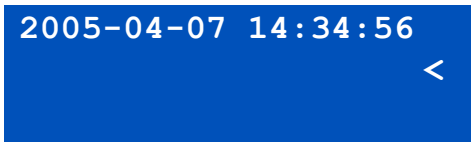
17.3.3 Active alarms

You should obviously not acknowledge an alarm unless you know what the problem is, you can use the Active alarms menu to find out. Use the up and down arrows to move to the menu, then press OK.

You can press the up and down arrows to browse through all active alarms (if there are any). The top line in the display shows the alarm status, with the name underneath. The arrow in the bottom right indicates that you can press the right arrow for more information. This display shows the time and date when the alarm was triggered.

If the selected alarm is active, you can press Reset to acknowledge this particular alarm.

If the alarm does not require acknowledgement or if it has already been acknowledged, you will see a message. Otherwise the process is the same as "Acknowledge all".



Alarms

When an alarm occurs, the operator panel immediately displays the active alarm. Press Esc to exit this mode, or Reset to acknowledge.

17.3.4 Event log

The event log is a list of alarms and events in reverse chronological order. The most recent events appear at the top of the list. The content of the event log is the same as the alarm and event log in the web interface. The event log lists the time when alarms became active/inactive, and shows other information such as restarts, software updates, use of the "acknowledge all" function.

You can press the right arrow to move to the next display to see when the event occurred and a signature if there is one. You can also acknowledge individual alarms from the event log.

Active alarms
- Alarm1
- Alarm2
- …

Event log
- Event1
- Event2
- …

Setup
- Language
- Menu navigation
- Clock
- Change password
- LAN/DNS
  - Ethernet DHCP
  - Ethernet IP address
  - Ethernet netmask
  - Ethernet gateway
  - Ethernet DNS serv 1
  - Ethernet DNS serv 2
  - Ethernet DNS serv 3
- SMS
  - Alarm max limit 24h
  - Recipient 1 (+46…)
  - Recipient 2 (+46…)
  - Recipient 3 (+46…)
  - Recipient 4 (+46…)
  - Testing
- Restart

17.4 Setup menu

Setup is the third and last of the permanent menus. The menu map on the left shows the menus and submenus in the operator panel. The Setup menu contains various settings that you can view and change.

17.4.1 Language

The second line shows the current language. You can change the language by pressing OK (and logging in). Press the up and down arrows to scroll through the available languages. The language setting only affects the language used by the firmware. Web pages and user-defined names are not affected. The language of the permanent menus in the operator panel will change, as well as the firmware messages that appear in the web interface. You should make sure that the language setting is the same as the web interface.

17.4.2 Menu navigation

Menu navigation can be either active or inactive. If it is active, a number appears briefly in the bottom left whenever you move around in the menu structure. The number indicates where you are in the menu structure. For menu navigation, for example, the number 3.2 will appear because the Setup menu is menu 3 and Menu navigation is submenu 2.

17.4.3 Clock

The clock command shows the current system time. You can set the clock by pressing OK (and logging in).

To set the clock, change one digit at a time. The digit you are changing will be flashing. Press the left and right arrows to move to another digit. Press the up and down arrows to increase and decrease the value of digit. When you have finished setting all the digits, press OK. You will see the usual confirmation prompt.

17.4.4 Change password

You can use this command to change the password for the panel. The process for changing the password is exactly the same as logging in. Press OK to save.

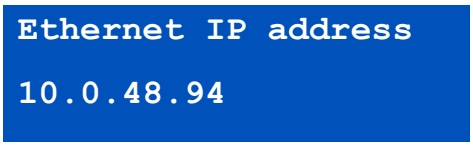
17.4.5 LAN/DNS

The LAN/DNS menu contains network settings.

Ethernet DHCP can either be active or inactive. If it is active, the device automatically obtains an IP address and other network settings from a DHCP server. If you are using a static IP address (so the device address is always the same), set Ethernet DHCP to inactive.

Network problems

If you are unable to connect to the WMPro from a web browser, you can use an operator to verify the network settings. You can show the IP address, netmask and gateway. If any of these settings are wrong, you can change them.



The Ethernet IP address menu shows the address currently being used by the device. If DHCP is inactive, you can set the address here. An IP address consists of numbers and full stops. Press the left and right arrows to move to the number you want to change, and press the up and down arrows to change the number. When you have finished setting the IP address, press OK to save. The new setting will not be applied until the device is restarted.

The process is the same for changing the other settings, which are all related to network communication. See section 3 for information about them.

17.4.6 SMS

The SMS menu contains SMS alarm notification settings. You can only send SMS text messages if there is a GSM/GPRS modem connected.

The first setting – Alarm max limit 24h – limits the number of text messages the WMPro can send over a 24-hour period. The function is described in more detail in 3.8.

Next, there are four user-defined phone numbers. The numbers must include the country code. The code for Sweden +46 appears in brackets as a reminder. To remove a number you do not need to delete every digit – instead you can simply change the first digit to a space.

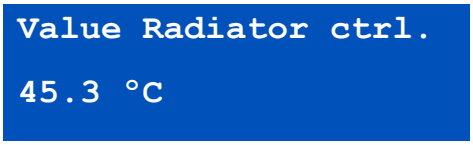
The last command is called Test. This sends a test SMS text message to all recipients.

Turn to 3.8 for details of the requirements for SMS alarm notifications. You can use the operator panel to enter the recipients' phone numbers.

17.4.7 Restart

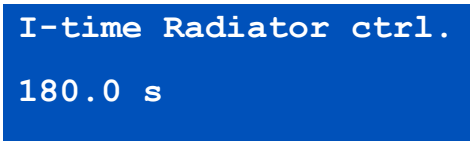
You can use this menu to restart the WMPro.

17.5 Controller menus



When you use the controller tool to create a controller, the tool also add new options to the operator panel. A menu with the same name as the controller is placed after the permanent menus in the menu list. The menu contains the channels and parameters that are important for controller operation.

The channels usually appear first in the controller menu, showing the current values of sensors and actuators and the internal status of the controller.

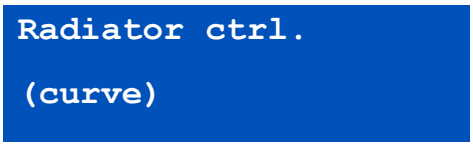


In the case of parameters, you can not only view the values but change them as well. To do this, press OK (and log in). Use the arrow keys to change one digit at a time in the usual way, then press OK again when you have finished.

Some parameters are subject to upper or lower limits. If you attempt to save a value outside these limits, an error message appears "ERROR: Write param!". This means that the value has not been saved. The operator panel returns to edit mode, where you can try again.

17.6 Curves

Starting from WMPro release 1.3, you can use the operator panel to edit curves. Curve menus are identified by the word curve in brackets below the name.



Press OK to access the curve edit functions. The first setting is the Y-label, in other words what the Y-axis is called, and the unit for the Y-axis value. If you press the down arrow you will see the X-label. You cannot change these labels from the operator panel.

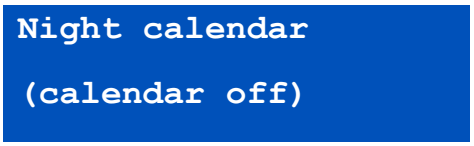
Keep pressing the down arrow to scroll through pairs of X and Y values defining all the breakpoints in the curve. You can change these values by pressing OK.

The X and Y values start flashing as you are editing a breakpoint. Press the arrow buttons to change the values. The up and down arrows change the Y value. The right and left button increase and reduce the X value. The last digit is always the first to change. If you keep the arrow key pressed, the speed of increase/decrease gradually increases. Either press OK to save a change, or cancel by pressing Esc.

Remember that all X values must be in ascending order. Otherwise the system displays an error message when you attempt to save the values.

You have to use the web interface to change the number of breakpoints and the number of decimal places.

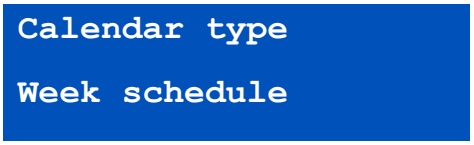
17.7 Time control and calendars



Starting from release 2.1 it became possible to use the operator panel to edit calendar functions. The time function name appears in the top line, and the second line contains either calendar off or calendar on in brackets.

Calendar on means that the time function has the value 1 at this particular moment. Calendar off means that the value is 0. The display on the left means that the WMPro does not think it is night time right now.

Press OK to access the time control functions. You will see details of the type of calendar function first. Turn to section 9 for an explanation of three types: Time, Calendar and Week schedule. The week schedule is the most frequently used type, and the one with the most functions, as you can see in the example below. The submenus for the three types are different.



Press OK to enter edit mode, where you can select a type using the arrow keys. Press OK to save or Esc to cancel.

Press the down arrow to scroll through the 10 different

items that can be used to define a time control. The second line indicates whether the item is active or not. To edit the definition, press enter.

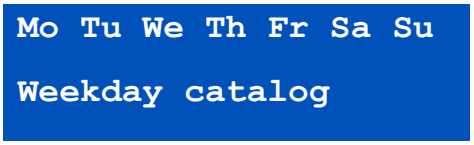
Each object has a number of submenus, which are slightly different depending on the particular calendar type.

In a week schedule, for example, the first item is a start time. This is also true for the calendar and time types, but the calendar type takes an absolute date and the time type takes the start time in days, hours, minutes and seconds. This is the same as the web interface.

The next menu item down is the stop time for the week schedule. The stop time is also the next item for the calendar type, but not for the time type – here, it is the duration.

To edit the start and stop times, press OK.

For the week schedule, the next menu shows the days of the week defined for this item. Use the right and left arrows to move to the day of the week you want to change. Press the up arrow to activate the day and the down arrow to deactivate it. A line appears, replacing the day of the week when you deactivate it. You can also specify whether to use the weekday catalog or not. The weekday catalog option appears on the second line, but it is actually to the right of Sunday in the menu.



For all calendar types, the last menu allows you to activate or deactivate the current definition item. In edit mode, the up and down arrows toggle between Active and Inactive.

The time type has an extra menu just below the calendar type menu, showing the base period for the time function.

17.8 User-defined menus

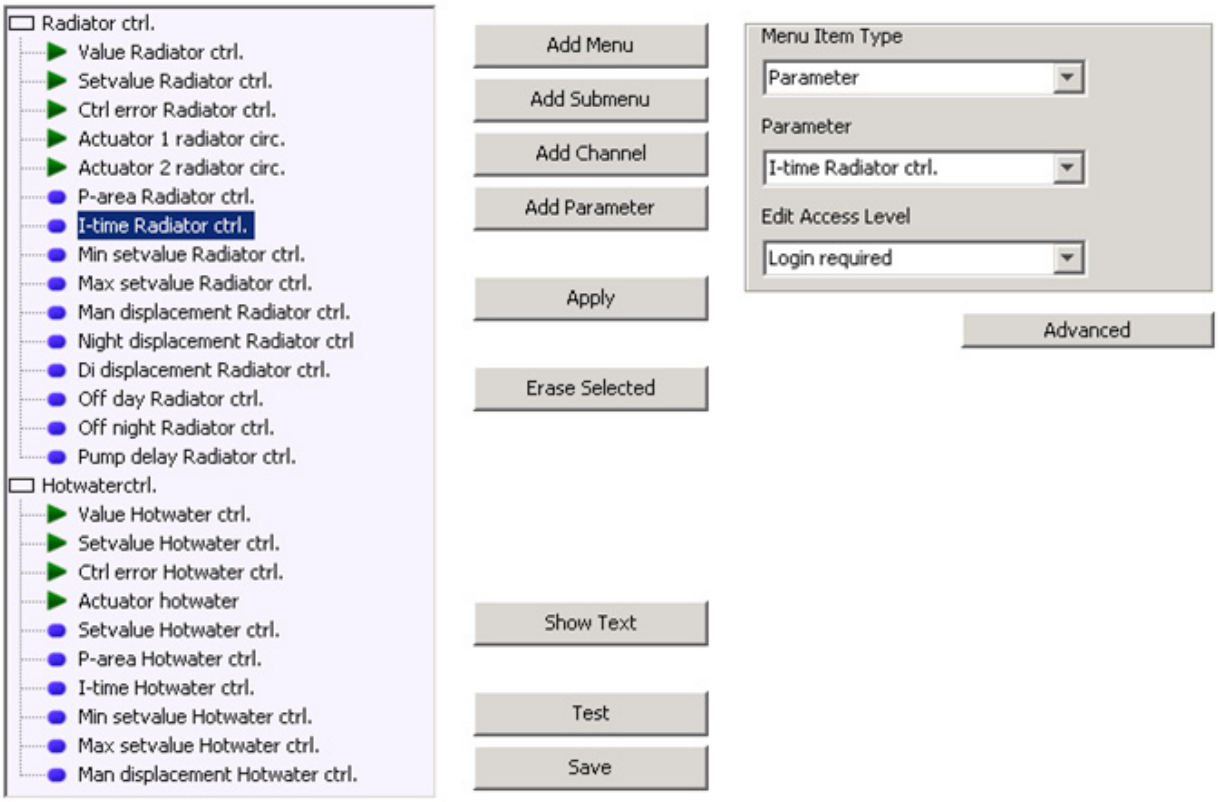
There is a tool to help you define your own menus for displaying channel values or setting parameters. To open the tool, go to Operator panel menu in Settings/Advanced.

The field on the left shows the user-defined menus and the menus created by the controller tool in graphical form. The permanent menus are not shown.

The screenshot below was taken from a device with two controllers. This means that the tree already contains menus. The field if empty is the device has not been configured yet.

Icons are used to identify different menu types. A square symbolises a menu heading. A menu heading can have submenus. A green triangle symbolises a channel, and a blue dot means a parameter.

You can double-click on a menu heading to hide or show all submenus.



17.8.1 Adding and erasing items

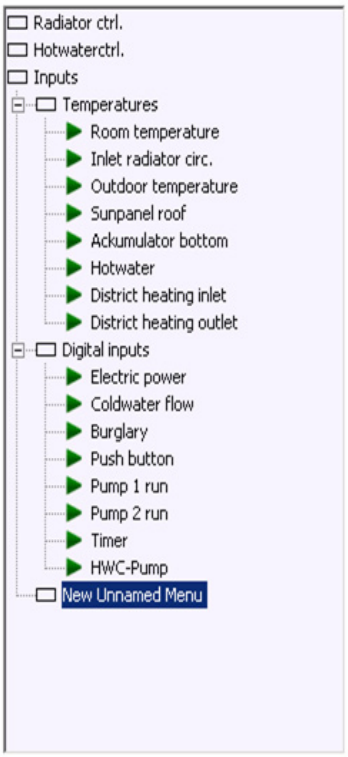
If you click on a menu to highlight it (in blue), you will see the relevant settings on the right. You can change the settings, and they are copied to the menu tree when you click Apply.

The menu item type setting can have one of three values: Submenu, Channel or Parameter. If a submenu (menu heading) already contains other items, you will not be able to change the element type.

Controller menus

You are free to change the menus generated by the controller tool, but remember that if you make changes to the controller and save it, you will overwrite all your manual changes.

The second field determines what the menu will display. For a submenu, type the name. For channels and parameters, select one of the channels or parameters from the drop-down list box.



The third field defines whether channels and parameters are editable, and whether the user has to be logged in to make changes. You can make channels editable, but there is not much point if they are connected to an input or other data source or controlled by a script, controller or graphical program.

Remember to click Apply to make the changes permanent.

There are four buttons for creating new menus. Add Menu creates a new menu heading at the same level as the highlighted item. Add Submenu creates a submenu in the highlighted menu.

The Add Channel, Add Parameter, Add Curve and Add Calendar buttons create new menu items in the highlighted menu, just below the highlighted item. The new menu item is created using default settings. You must always change these settings, then click Apply.

The Erase Selected button deletes the highlighted menu, including all submenus if there are any.

17.8.2 Testing and saving

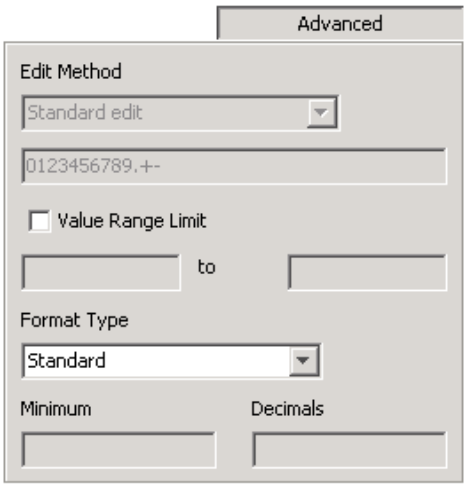
The operator panel settings are saved in the user script. When you click the Save button, a script file is created and stored in the device. This means the device has to be restarted, taking a few minutes. You can use the Test button to transfer the settings to the device without a restart. You can test the way the menus work in the operator panel, but the settings will be lost the next time the device restarts unless you remember to click Save before quitting the tool. The tool always loads the configuration from the user script.

17.8.3 Limitations

As always, there are some restrictions on what you can do. WMPro cannot handle more than 250 menu items. Overall storage space is also limited, so you may run out of memory even before you reach the 250 menu items. If so, an error will occur when you attempt to save or test.

17.8.4 Advanced settings

If you click the Advanced button, some more settings appear. You can specify exactly how the values are displayed and edited, and what values are accepted.



The Edit Method field defines how a value will be changed when it is edited. Normal edit is the usual method, and it is the method used for controller menus.

If you choose Digital ON/OFF, the value will appear as OFF if it is 0, and ON if it is 1. The value can only be changed to one of these values.

The Step edit method means you can use the arrow keys to change the value in steps. You can specify the step size in the field underneath.

The Select and Named Select methods mean you use the up and down arrows to move between the values or names specified in a comma-separate list in the field below. If you use this method, make sure you use the correct formatting.

Check the Value Range Limit box if you want to specify upper and lower limits for the entered value. If you use step as the edit method, you will not be able to go beyond these limits. The upper limit is the value on the right.

The Format Type defines how a value will be displayed, with the number of digits and decimal places. Standard means the number of decimal places displayed will depend on the channel or parameter settings. With this format type, the number is left-padded.

The three options are Left padded, Right padded and Zero left padded. For these three options you must complete the minimum field, which is the minimum number of digits in the number including the decimal places and the point. If fewer digits are needed to display the number, the number is padded either with spaces or with zeros. These are added to the left unless you select Right padded, in which case spaces are added after the number. Use the Decimals field to specify the number of decimal places to show.

If you select Normal as the edit method, it may be important to specify a minimum number of digits. This is because the Normal method only allows you to change digits that already exist – you cannot add new digits. If a parameter contains the digit 1, it cannot be changed to 10 unless you have entered 2 as the minimum number of digits.

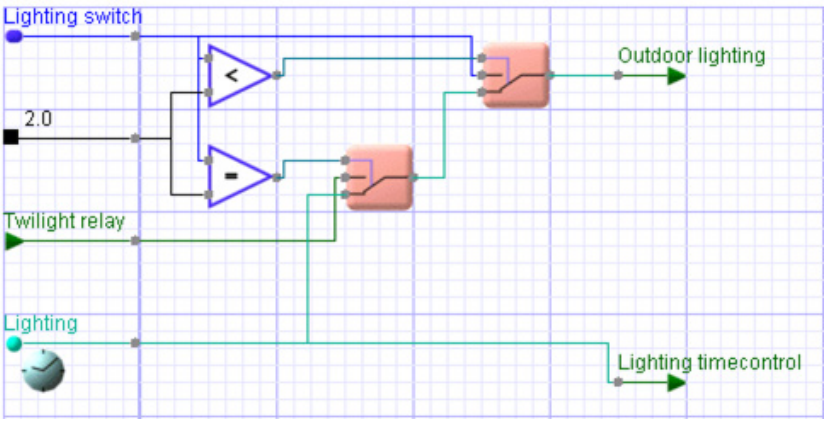
If you use the Select or Named Select edit methods, the numbers you include in the list must match the specified number of decimals.

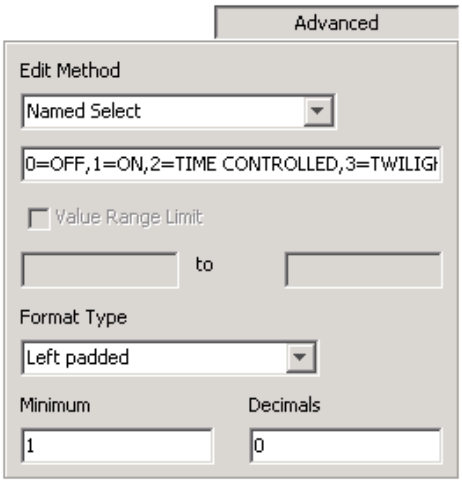
17.9 Example using advanced settings

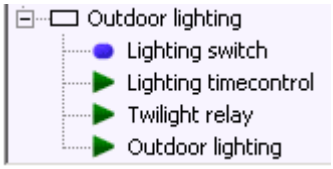
Assume we want to control an outdoor lighting system. We want to be able to control the system using a twilight relay, a calendar function and manual on/off. We will use an operator panel to choose between these options.

A small graphical program defines the system, using a parameter to control how it works. If the parameter is 0, the lighting is off. If the parameter is 1, the lighting is on. The parameter value 2 means the system is controlled by a calendar function, and 4 means controlled by the twilight relay.

An extra channel has been added to the graphical program to mirror the status of the calendar function. Now we can start the operator panel tool to help us create the menus in the operator panel. Click Add Menu, change the name to Lighting, and click Apply.







Click Add Parameter and select the Lighting control parameter from the list. Now click Advanced to show the advanced settings.

Choose the Named Select edit method. In the field underneath, enter

"0=OFF,1=ON,2=TIME CONTROLLED, 3=TWILIGHT RELAY".

Leave the format type as the default – left padded – and the other default settings 1 and 0 can also be left unchanged. This means that you will be able to choose from OFF, ON, TIME CONTROLLED and TWILIGHT RELAY in the operator panel.

You could go on to add the lighting channel to the menu, so you can check if the light is supposed to be on if it is faulty.

You could also add the time control and twilight relay channels so you can check their status too. Remember to click Save.

17.10 Show Text

A new window appears when you click the Show Text button, containing the menu structure of the operator panel in text form. You can use it for documentation purposes or in the user instructions for the operator panel in a particular installation.

If you select (Ctrl-A) and cut the text (Ctrl-C), you can then paste it (Ctrl-V) to a word processor.

18 External units

External units are units of various kinds that a WMPro is able to share information with as the master. Examples include expansion units to increase the number of available inputs and outputs, a PLC or other subsystem, meters, etc. The WMPro uses RS485 to communicate with external units.

An external unit could also be another WMPro, supplying measurements over the network. This section explains how to connect different types of external unit and how to change the settings.

18.1 Introduction

An external unit is a unit that is able to communicate with a WMPro. The WMPro is always the master in a master/slave setup. A WMPro can communicate with an external unit in one of three ways: GFBI, WMShare and AeACom.

External units

Support for external units was introduced with firmware release 2.0. Older devices must be upgraded before the functionality described in this section is available.

18.1.1 GFBI

A WMPro can use this interface to communicate with units connected to the RS485 port. A script language definition tells the WMPro how to interact with the unit. Type definitions must be based on a master/slave protocol, with the WMPro taking the role of master and exercising unidirectional control. The response times must also be known in advance.

GFBI

GFBI is short for General Field Bus Interface. It is a script language used to describe how to communicate with many different types of units with different protocols.

Protocols meeting all these requirements include Modbus and a number of proprietary protocols like GENIbus (Grundfoss), FCbus (Danfoss), etc. You can use GFBI to connect expansion modules for more I/O options, frequency converters, pump control systems and other PLCs.

There are other protocols that do not use RS485 even though they meet the above requirements. M-Bus (Meter Bus) falls into this category. If you use a level converter to change RS485 signal to M-Bus levels, you can use GFBI to connect devices such as electricity, water and other meters to a WMPro.

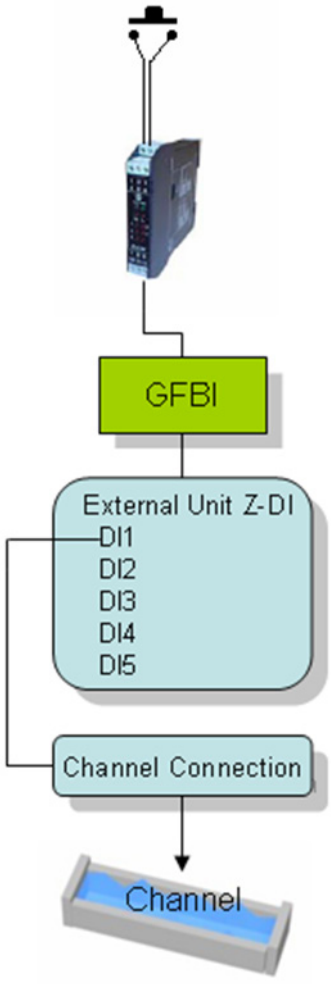
To use a WMPro in a system running LonWorks or Profibus, or another protocol that is not supported in GFBI, there is a workaround involving Anybus modules from HMS.

18.1.2 WMShare

WMShare allows a WMPro to share channel values with other WMPros over the Ethernet or Internet. Communication is based on Ethernet or Internet. For example you could connect an outdoor sensor to a WMPro and allow other WMPros to access the same temperature reading from there. To improve cooperation between systems you could also increase the number of signals shared.

In the WMPro that will share the values, you need to define keys, i.e. the name of the value and the channel containing the value. They can then be accessed without a password by external units using the WMShare interface in other devices.

The rate at which values can be accessed depends in part on the number of units involved. However, the system is not intended for frequent updates. There is no need to access an outdoor temperature more than once a minute. You can try to update values as often as once per second, but there is no guarantee that the actual rate will be this fast, and there would be a high processor workload.



18.1.3 AeACom

AeACom (Abelko embedded Architecture Communication) is the plug-and-play protocol used for units connected to the WMPro expansion port.

AeACom

AeACom is a protocol supporting plug-and-play functionality for connected units.

It is a proprietary protocol for Abelko units only.

AeACom differs from the protocols supported by GFBI in that there is no need to configure the address, and the update times are highly predictable. The protocol is used for plug-and-play units requiring no configuration.

18.1.4 Channel connections, emails and group scripts

You can connect up to 100 external units to a WMPro. But this is not much use unless you can do something with the all that information.

Channel connections are an easy way of linking values from an external unit to channels and vice versa. You can define up to 50 channel connections.

Imagine you have an M-Bus system with lots of meters for internal billing – you could create an email containing values for all meters of a certain type, and send it to a supervisory system.

Alternatively you might be interested in statistical values rather than all the individual values. The script language includes a routine for handling groups of external units of the same type. You can use the routine to calculate the mean value, the highest and lowest value and other statistics from a group of sensors. This means there is no need to link a channel to each sensor – the function works regardless of the number of sensors. The script language and the GROUP routine can also be used for more advanced functions as described in the reference manual.

18.2 Type definitions

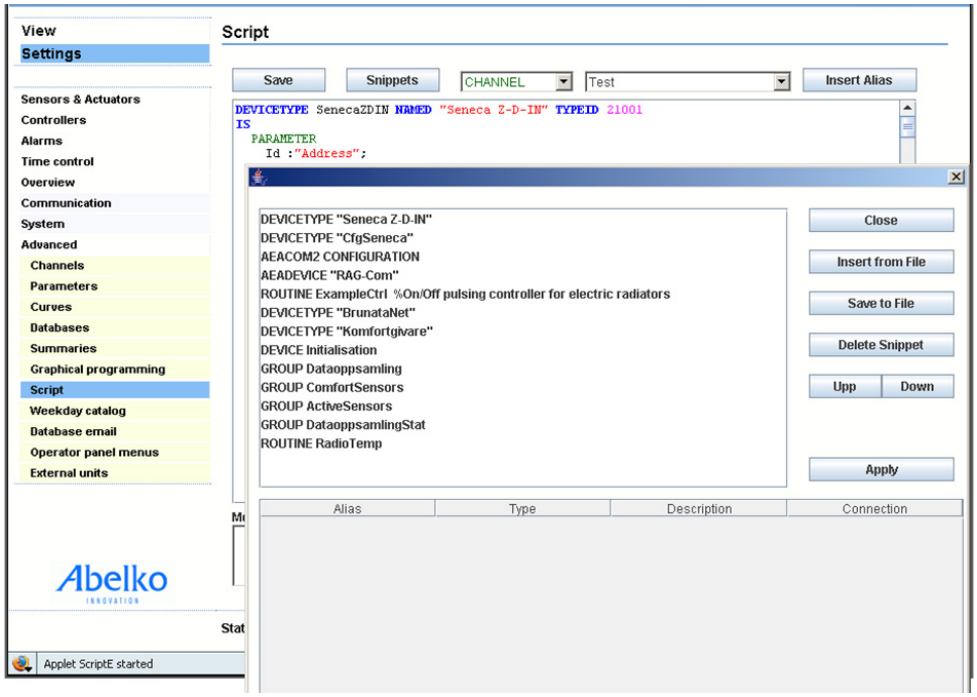
Before a device can be connected via GFBI or AeACom, a snippet must be created to define communication with that particular type of unit. In programming, a snippet is a small script. Snippets containing a type definition (or anything else) are distributed in files with the extension .gpss (Goliath Platform Script Snippet).

To import a type definition, go to Settings/Advanced/Script. A script editor opens, where you can view and edit the script code in the user script area.

Click the Snippets button to see a list of all available snippets.

We will not go into any more detail here, except to mention that you can click the Insert from File button to add snippets from a .gpss file. Click Apply to close the window. (The Close button closes the window without applying the changes you made.) Finally, click the Save button in the script editor to save the script to the device. The device will restart if everything is OK.

If there is a script error, the script will not be saved. Instead, an error message appears in the Message window at the bottom. To find out more about scripts, please see the reference manual.



18.3 Setup

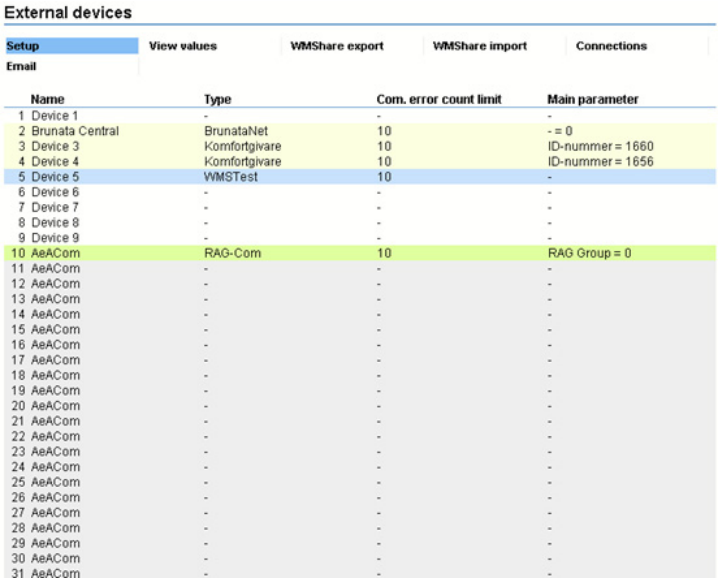
The "External units" section appears at the bottom of Settings/Advanced. This is where you can change the settings of particular external units. The units (all 100 of them) are listed in the Setup tab.

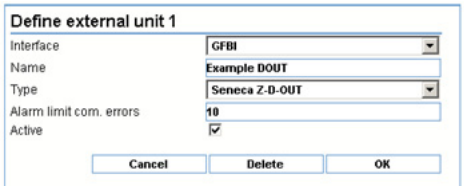
They are colour-coded – unused units are white, GFBI unit are yellow and WMShare units are sky blue.

Three colours are used for AeACom units. Grey means that the unit is not in use and is reserved for plug-and-play AeACom units. When a new AeACom unit is connected, one of the reserved units is taken over and changes colour from grey to blue-green. This all happens automatically, and the colour changes back to grey if the unit is disconnected. If the unit is made permanent, the colour changes to yellow-green. This means it is locked to a particular AeACom unit.

To change the settings, click on an external unit. If you click on an unused unit, you will need to choose the interface, name the unit, select the unit type for the selected interface, and check the Active box. Then click OK.

When the page is reloaded, click on the unit again. Notice that the menu has be updated. Continue with the other settings that are specific to the selected unit. You will not be able to change the interface or unit type at this stage. The unit has to be deactivated before you can make these changes.



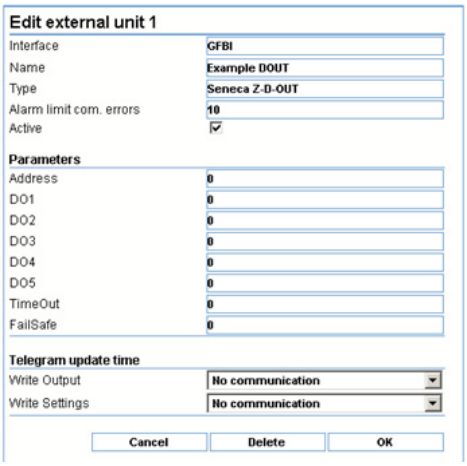


The fields under Parameters contain communication and other settings. The external unit on the right is an expansion module with five digital outputs. Here, the Address field contains the Modbus address used by the device and the other fields are settings that are sent to the device. You can link parameters to channels, and if you have done so, it is the channel that determines which settings are sent to the device. In this case the values entered here are not the values that are actually sent to the device.

The fields under Telegram update time specify how frequently various types of message are sent to the external unit. A telegram is defined as a query/response sequence. More than one telegram can be defined for an external unit. The DO module in the example has one telegram to set the digital outputs and another to write the timeout and failsafe settings. This is where you specify how often you want to send each telegram type.

A WMPro running GFBI cannot send more than one telegram per second to each external unit. You will probably want to set the digital outputs for the DO module to update every second. If you also set the Write Settings telegram to update every second, the WMPro will make the best of the situation and send the telegram every other second. This means that the outputs will be updated every other second. In practice, the values sent using Write Settings hardly ever change, so you can set the update frequency to a minute or longer, or even stop updating altogether once the settings have been changed.

The value in the "Alarm limit com. errors" field is the maximum number of failed communication attempts before the unit is defined as faulty.



Telegram

In GFBI, a telegram is the combination of a query sent from a WMPro and a response from an external unit.

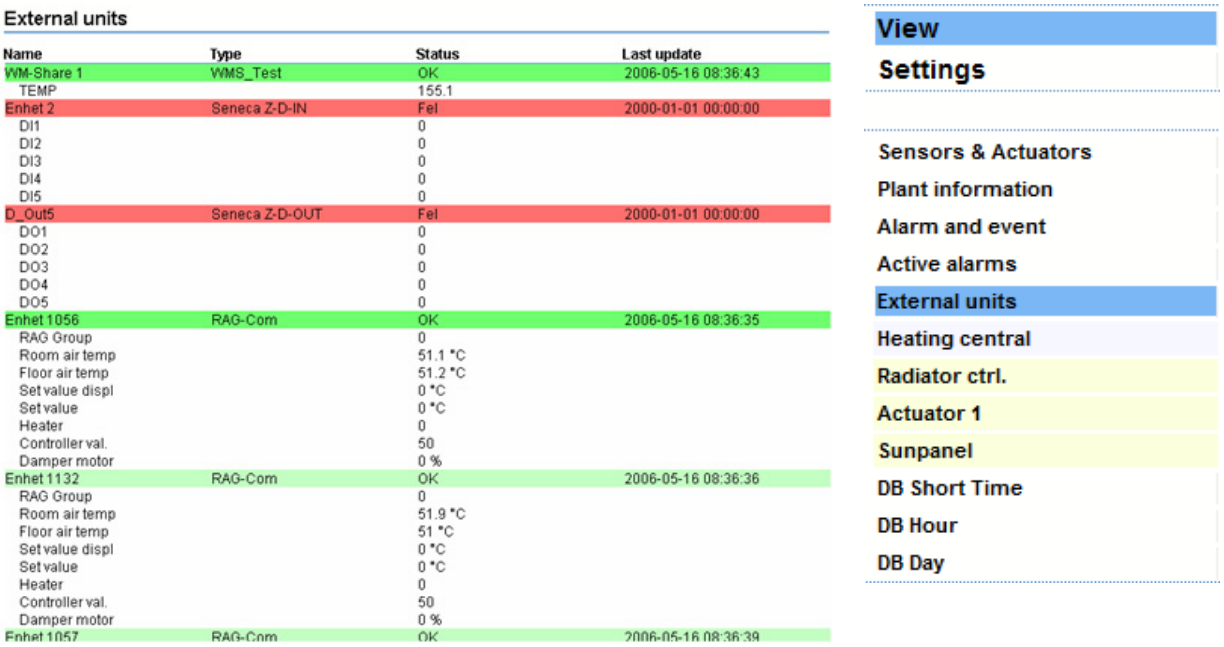
Update time

You can indicate a telegram frequency for an external unit, but this cannot be guaranteed. Communication may slow down if other units stop working, for example, because the WMPro wastes time waiting for responses that do not arrive.

18.4 Viewing external units

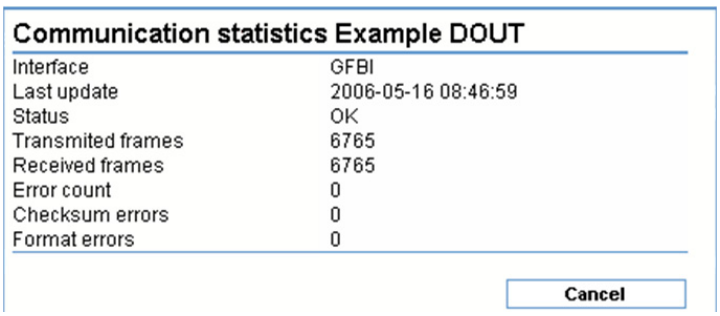
There is also an External units command in the View menu. Click the command to display a list of all activated units. Each unit has a header row followed by all the values handled by that unit. The maximum number of values is ten.

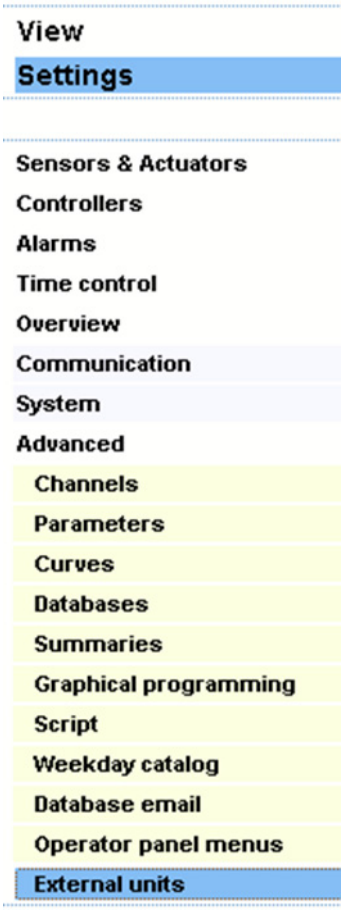
The header row is green if the WMPro is in contact with the unit (OK). If the row is red, communication with the unit has been lost (error). Pale blue means either that one or more recent telegrams have failed (but less than the number specified in the alarm limit), or that the system is attempting to establish communication (trying). It may also mean that no update time is defined (disabled). Pale green indicates that this is an automatic unit.



If you click on a header row you will see some statistical information about the communication link. If everything is working OK, the number of telegrams sent and received should be the same. Checksum errors mean that the data was corrupted by transfer problems. Format errors mean that the WMPro received a response but it was not as expected.

Note that the list of external units is not updated until you click on External units again in the menu. The statistics, on the other hand, are updated every time you click on a header row. If you have not defined any external units, this page is empty. There is also a View values tab on the external units page in the Settings menu. This tab lists the active units with the same colour coding but without the values. You can see the values by clicking on a row.





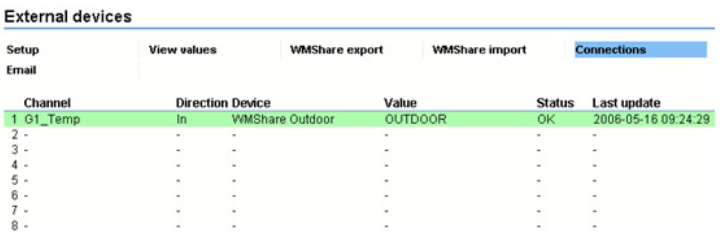
You can indicate a telegram frequency for an external unit, but this cannot be guaranteed. Communication may slow down if other units stop working, for example, because the WMPro wastes time waiting for responses that do not arrive.

18.5 Channel connections

There is a special tab for channel connections in Settings/External units. You can use the tab to link a channel to an external unit. You can either link an output to a parameter in the external unit or an input to a value in the unit.

Click on any of the other 50 rows to display the Edit connection dialog. Start by selecting the channel you want to connect and the direction (input or output). A WMShare can only be connected as an input. Next, select the unit you want to link to the channel, and then choose the unit value or parameter.

If you are connecting the channel as an input, make sure you specify what happens if contact is lost with the unit.

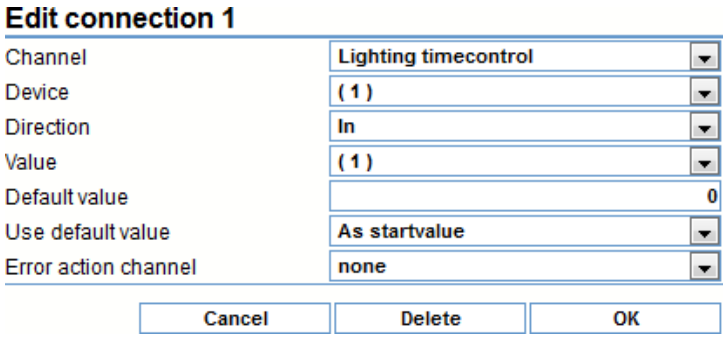


The default value will be the channel value before the WMPro has established contact with the unit on startup. The Use default value field can be toggled between "As startvalue" and "As startvalue & on error". Choose the second option to also use the default value if there is an error in the external unit, in other words if the WMPro loses contact with it and it appears in red on the View page.

"As startvalue" means that the channel will retain the previous value even if there is an error.

Use the "Error action channel" field if you want to trigger an alarm or do something else if there is an external unit error. If there is an external unit error, the error action channel has the value 1.

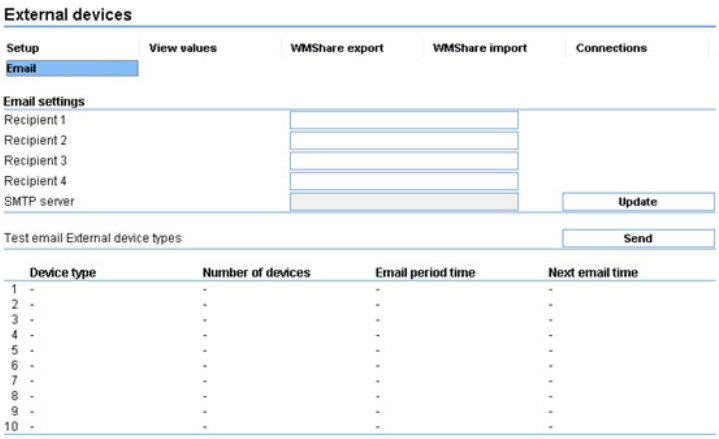
The error action channel works like the output channel for alarms: If you connect multiple external units to the same error action channel, the error action channel will contain the number of faulty connections.



To trigger an alarm, connect the alarm to the channel you selected as the error action channel. If there is more than one channel connection to the same unit you only need to link an error action channel to one of the connections.

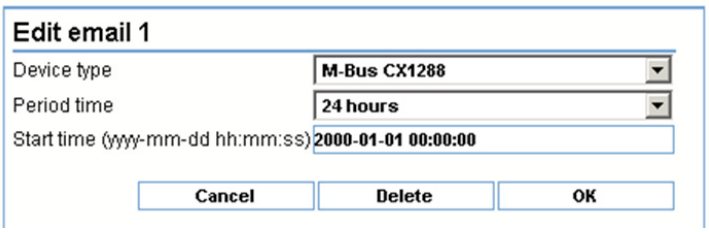
18.6 Emails from external units

If you are collecting information from a large number of meters, in an M-Bus system for example, it might be difficult to connect all the values to channels, which are then saved to databases. In any case, there will not be enough channels and databases for so many meters, especially if you want the WMPro to act as a normal controller too. That is why there is an option to send values from external units in emails.



These emails contain all the values from all sensors of a particular type, in table form. The emails, like database emails, are sent periodically. The data in the email is the latest information received from all sensors.

You can define up to four recipients and configure emails for up to ten different sensor types. The recipients are the same for all external unit emails.



Click on an email row to display the Edit email dialog. Select the device type and the frequency.

You can specify a start time, a day of the week or a date in the month.

The example below shows an email containing a single Z-D-OUT module (like the one in the example in 18.3).

```
Module name, Module address
00-30-5E-03-00-FC
10, Seneca Z-D-OUT 21002
000 Name Last update Status DO1 (-) DO2 (-) DO3 (-) DO4 (-) DO5 (-)
002 Dout 2006-03-21 18:00:13 (OK) 0 1 1 0 0
```

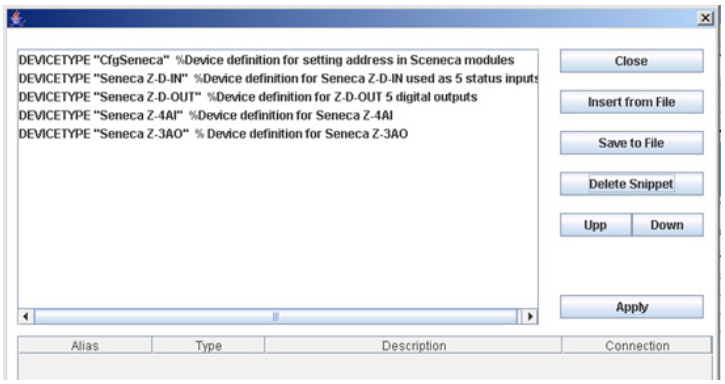
There is a header containing the module name and module address. The second row contains the last twelve characters of the MAC address, which uniquely identifies the device. The third row contains the number 10, the name of the sensor type and the ID number of the type definition.

The row beginning 000 contains the table headings separated by tabs. Units appear in brackets. The next row contains values for each unit of the specified type. There is only one row in this example. It starts with 002 because the external unit is number 2. The values are also tab-separated, making it easier to import the email into database applications or Excel.

18.7 Example – external units

18.7.1 Seneca expansion modules

Seneca is an Italian company that produces a range of modules with inputs and outputs, using Modbus to communicate. If you go to the Abelko web site you can download .gpss type definitions for four Seneca modules. One of the modules has five relay outputs, one has five digital inputs, one has four analogue inputs and one has three analogue outputs. The type definitions can be imported into a WMPro as described in 18.2.



Each module must be set to a unique address, and this can only be done remotely (from the WMPro). To help you do this, a type definition called CfgSeneca is provided. CfgSeneca is used to set the address of a Seneca module. You can use a DIP switch on the module to set the module address to 1 and the baud rate to 9600. This allows the WMPro to communicate with the module as a CfgSeneca unit, but there must not be any other modules running with the same settings in the system. To use a Seneca module, follow these steps:

1. Download and import the type definitions into the WMPro as described in 18.2.

2. Create an external unit with the type CfgSeneca. Set the update time for both telegram types to 2 seconds.

3. Use the module DIP switch to set the address to 1 and the baud rate to 9600.

4. Connect the module to the WMPro and switch it on.

5. Check that the WMPro has established contact with the module. If so, the CfgSeneca external unit will appear in green.

6. Open the unit settings and set the New Address parameter to a suitable address, for example 2. Wait a few seconds while the WMPro sends the settings to the device.

LEDs

The WMPro has two LEDs for the RS485 port. The yellow LED flashes when the WMPro is sending data, and the green LED flashes when it is receiving data. If an external unit is working properly, every yellow flash should be followed by a green flash.

7. Switch off the Seneca module and reset the DIP switch so that the module obtains the address and baud rate from the EEPROM. Switch the module on again.

8. Create a new external unit with the correct type for the particular module. Set the correct address and a suitable telegram update interval. The new unit should start working immediately.

9. Repeat from step 3 if you want to add more modules, otherwise you can deactivate the CfgSeneca external unit.

18.8 M-Bus units

M-Bus (Meter Bus) is a protocol that was designed primarily for various kinds of meter, such as water meters, electricity meters and heat meters. The power supply and the communication signals are carried on two wires. You will need a level converter in order to connect M-Bus meters to a WMPro. Level converters are designed for a maximum number of units. The level converter on the left is designed for 10 M-Bus slaves.

You can generate type definitions for M-Bus using a small program that is available for download from the Abelko web site. The program is called M-Bus Device Creator. It has its own user guide, but we will describe the process in general terms here.

There is a query that you can send to all M-Bus units, requesting them to return all their information. The response includes details of the kind of information being returned. The data is divided into records. You can use M-Bus Device Creator to send one of these queries to a meter, and then select the information you want the WMPro to handle. After you have done this you can generate a type definition in the form of a script.

M-Bus

To find out more about M-Bus, go to www.m-bus.com or consult the standards EN 13757-2 and EN 13757-3.

Each M-Bus meter has an address. If you do not know the address, there is a broadcast address which obtains responses from all connected units. If you use the broadcast address, you can only have one meter running in the system, otherwise the units will all transmit at the same time.

M-Bus Device Creator runs on a PC, and the level converter is attached to the RS232 port.

When you have finished creating your type definitions, install them in the WMPro. You can then start to define an external unit for each connected meter.

18.8.1 Other units and system integration

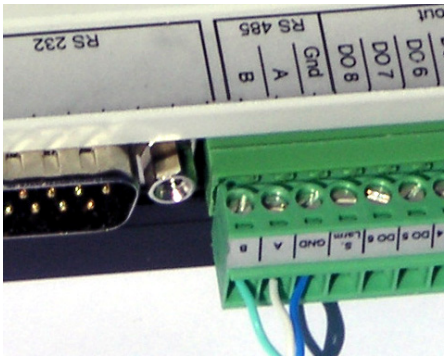
Abelko will add more type definitions for units as they are created and after they have been tested. You can also write your own type definitions, or you can ask Abelko to add support for a particular type of unit. There are more Seneca I/O modules that communicate via Modbus, not to mention the other manufacturers. PLCs can often communicate via Modbus, and you may want to integrate separate systems in order to handle shared signals and alarms or simply to display information on a web site.

It is relatively easy to write type definitions for Modbus, and the reference manual contains some examples.

Communicating with a frequency converter means you use one less analogue output, but there are many other benefits. The capabilities depend on the particular make and model, but for example you could manage detailed alarms from the frequency converter and monitor the temperature. You might also want to change settings from a WMPro instead of using the display on the frequency converter.

It may be possible to communicate with the control system of a pump, for example, in order to obtain information from its sensors. This means there is no need to install external sensors.

18.8.2 Combining units



The WMPro and GFBI are both able to switch easily between different protocols and speeds. But certain units may be confused by communication they do not understand. Most protocols include protective mechanisms making it highly unlikely that they will misinterpret or become confused by extraneous traffic, but a lot depends on the particular implementation in different units. Each case should be considered individually.

The update time is another important factor in systems using external units. Some types of unit need to exchange information frequently, for example expansion units with inputs and outputs used in a control system. There is nothing to stop you including several units in the same system if all the units use high communication speeds, short messages and short response times. But it is not a good idea to combine these units with a large number of M-Bus units running at 300 baud.

If a unit fails to respond, the WMPro waits for the timeout period specified in the type definition. One or more faulty units can therefore have a significant effect on the update times.

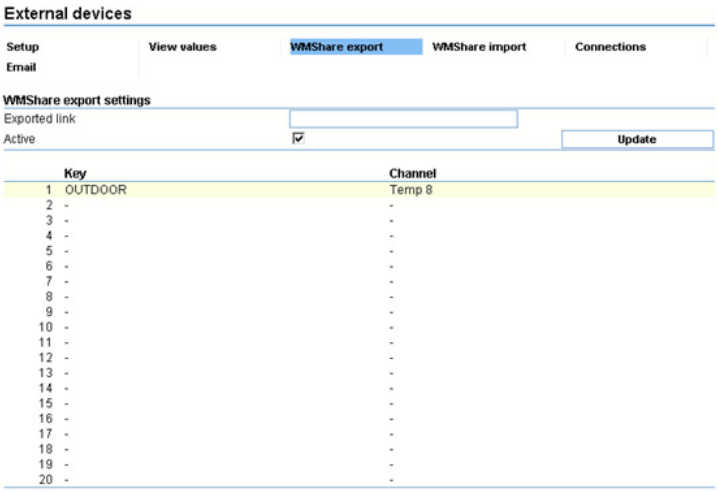
The operator panel works best if it is connected to the expansion port. You could also connect it to the same terminals as GFBI, but it does not always work well with other units. The operator panel needs fast communication. That is why every second message is sent to the operator panel if necessary. Even so, the speeds might be much slower if the operator panel is used in combination with other units.

18.9 WMShare

18.9.1 WMShare export

The Settings/Advanced/External units page contains two WMShare tabs. In WMShare export, you can specify the channel values you want to export, making them available to other devices.

A key is a name or identifier for the value being exported. This is the name that is used by the devices importing the value.



The WMShare export tab contains 20 key/channel pairs. Choose a key name that is known to all the devices that will access the value. For example OUTDOOR would be a suitable name for an outdoor temperature you want to distribute. If there is an outdoor sensor at T1, for example, select that channel to export.

We also need to activate WMShare export before the information is made available to other devices. All the keys, with their current channel values, are listed in a file called share.txt, which is not password protected. You can open the file by replacing goliath.htm by share.txt in the browser address bar.

As well as the keys you defined, the file contains some other basic information. The file looks something like this:

SERIALNR=196784

IPADDRESS=192.168.2.81

MODNAME=Modulnamn

MODTEXT=Moduladress

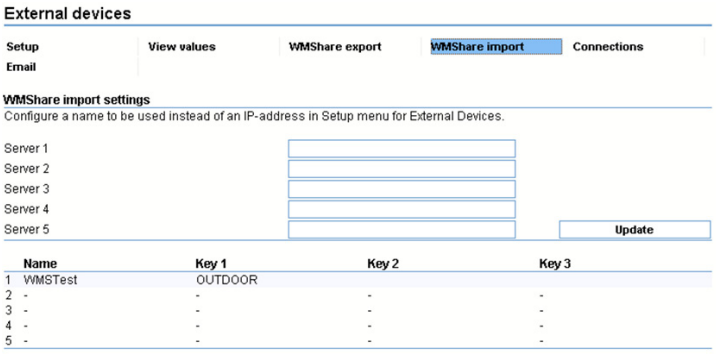
EXTLINK=

OUTDOOR=18.3°C

EOF

OUTDOOR is the key we defined, and the details above it relate to the WMPro we loaded the file from.

18.9.2 WMShare import

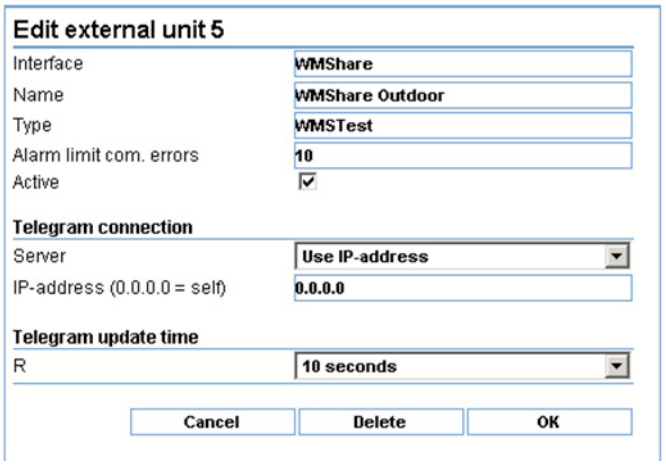


To import values from another WMPro, create an external unit using WMShare as the interface connected to the IP number of the other WMPro. As with all external units, there must be a type definition. You can use the script language to create WMShare type definitions, but it is easier to use the web interface. The import tab allows you to define up to five type definitions. A WMShare type definition is simply a list of the keys to be exported. All the keys in a type definition must be configured in the device you are importing from, otherwise there will be an error. However, you can export keys that are not included in the type definition.

To import the outdoor temperature we defined in the export tab, we need to define a type with the key OUTDOOR. You should also give the type definition a name that actually means something – for example Outdoor temperature.

18.9.3 Defining a WMShare unit

To create a WMShare unit, go to Settings/ Advanced/External units, then Setup. Select WMShare as the interface, set the correct WMShare type, check the Active box and save.



Next, select the unit you just activated to see an extended dialog. Specify the IP address of the WMPro you want to import values from, and how often you want to update. If you set a very short time, the WMPro might not manage to update as often as you want.

A WMShare unit only contains values that can be imported – in other words there are no parameter values. The available values are listed as keys in the type definition.

You are free to create more than one external unit with the same WMShare type. For example you could obtain several outdoor temperatures to calculate a menu value or simply to act as a backup.

18.9.4 Server list (URLs)

In Settings/Advanced/External units and WMShare import (see above) you can enter up to five web addresses in the form of URLs (the names you enter in a browser address bar). You can use these names as the address instead of an IP number. This may be useful if the unit supplying the value does not have a fixed IP number.

18.9.5 Other uses for WMShare

Because the WMShare data is stored in a simple text file, you can use the file to share the data with other systems.

For example, you could easily import the file to a PC-based system and process it there. Or you could set up a web server with a file called share.txt and use WMShare to import information to a WMPro. The file must use the correct syntax.

19 Troubleshooting

19.1 General

19.1.1 POWER LED off, device unresponsive

The POWER LED in the bottom right will always be lit if the device is connected to the power supply. If the LED is off, check that the power supply is connected properly as described in 2.3.1. Test the voltage to check it is correct. If the LED still does not light up, the device may be damaged.

19.1.2 STATUS LED off, device not working properly

The STATUS LED lights up when the device starts up and begins running its scripts. Startup takes about a minute, or longer if you have imported a file.

If the application script contains an error, the STATUS LED stays off and the device cannot run any other scripts. As a result, it cannot operate any controllers. There may be a problem with the file, or the file may use a different firmware version. Update the script, the firmware and – to make absolutely sure – the device web pages.

19.2 Communication

19.2.1 Ethernet - no contact with the device. LINK LED off

The LINK LED should be lit if you have used an Ethernet cable to connect a WMPro to a running computer, hub or switch. There are two types of network cable – straight-through and cross-over. If the LINK LED fails to light up, either you are using the wrong type of cable, or the cable or the contacts are damaged.

19.2.2 Ethernet - no contact. LINK LED on and LAN LED flashes sporadically

Check you are using the correct IP address. You can use an operator panel to check the IP address of a device. Check you are using the correct PC settings as described in section 3.

Run the route print command in a Windows command prompt to check if you have used route add correctly. Check for other devices in the network that are using the same IP address.

Is your WMPro using a gateway? See 3.3.

19.3 Modem

19.3.1 About modem problems in general

A quick and easy way to solve problems with modem connections is to connect the modem directly to your computer and establish a remote connection. If it works there, it is likely to work with the WMPro too.

Consult the system log (on the System page) to find out what went wrong.

19.3.2 Modem does not dial out

Have you activated PPP? If your modem is connected via an exchange, the modem might not be able to detect the dial tone. You can solve this problem by changing the init string so the modem does not wait for the dial tone. Usually this means adding X3. Read the modem manual.

19.4 Email

19.4.1 Emails not received

Check you entered the addresses correctly. The recipient email addresses and the server address must all be correct (3.7). If the email server address is not an IP number, make sure the DNS server IP number is defined correctly (3.5).

19.4.2 Authorisation problems

If all the addresses are correct, the problem might be the email server preventing the device sending emails. Some servers are configured to accept emails from specified senders. Other senders need server authentication using a protocol that is not supported by WMPro. Check with your server administrator.

19.5 Controllers

19.5.1 % and V settings

The controller settings define whether the controller uses a percentage (0 to 100) or 0 to 10 V. The settings must be the same in the channel controlling the actuator. If the controller uses a percentage, the channel needs to rescale it to a suitable output signal. Otherwise it will fluctuate rapidly between the end positions. If the controller instead uses volts while the channel is set to use a percentage, the actuator will hardly be affected at all.

19.5.2 Controller self-oscillating

P-area too small or amplification too great. Increase the P-area or reduce the amplification until the self-oscillation stops.

19.5.3 The controller error on the controller settings page is less than the difference between the actual value and the set value

This is not actually an error. The controller error on the settings page should never be more than half the defined P-area. If this happens regularly, the P-area may be too small, causing the controller to self-oscillate. Increase the P-area.

A Technical data

A.1 Databases

A.1.1 Hourly and daily values

1-50 channels, 45,000 values in each database (hour and day). Configurable logging of momentary values, mean values, max, min, variance and standard deviation.

A.1.2 Short time log

1-50 channels, 105,000 momentary values. Short time logging can be set between 1 sec and 1 min.

A.2 Inputs

A.2.1 Temperature

Quantity:	8 (can also be configured as digital in status)
Sensor:	Resistive e.g. Pt 1000Ω, Ni 1000Ω DIN,Ni 1000Ω L&G (adjustable)
Measuring range:	-50 - +150 °C (Pt 1000Ω) 800-1580Ω
Resolution:	0.1 °C
Accuracy:	± 0.25 °C (PT 1000 excl. sensor accuracy)
Sensor current:	2.3 mA (1000Ω)

A.2.2 Analog in

Quantity:	4 0-10 V, 4 0(4)-20 mA (adjustable)
Resolution:	0.1%
Accuracy:	± 0.5 %
Input impedance:	235 Ω for current, 182 kΩ for voltage
Max input signal cont:	30 mA for current, ± 100 V for voltage

A.2.3 Digital in

Quantity:	8, of which 4 can be used as frequency/pulse counter
Sensor:	Dry contact or open collector
Max frequency:	200 Hz
Min pulse length:	2.5 ms
Input current:	5 mA (0 V)
Open circuit voltage:	12 VDC
Switch level:	5 V on, 6 V off
Hysteresis:	1V

A.3 Outputs

A.3.1 Analog out

Quantity:	8
Output signal:	0-10 V
Resolution:	8 bit
Max current:	2mA

A.3.2 3. Digital out

Quantity:	8
Output:	Open collector
Max current:	0.5A
Max voltage:	36 VDC
Protection:	Short circuit proof, protected from excessive temperatures and transients

A.4 Communication

A.4.1 Protocols

Protocols:	InterNische TCP/IP stack: TCP, IP, UDP, ARP, SLIP, ICMP, TFTP
Web server:	HTML, CGI, SSI, SSP
PPP:	CHAP, PAP, VJ compression, FTP
Email:	SMTP

A.4.2 Ethernet

Speed:	10 Mbit/s
Standard:	IEC 802.3
Connector:	RJ45 TP (twisted pair)
Cable:	Cat5
Max length:	100 m

A.4.3 RS 232

Quantity:	1
Speed:	Configurable 1.2-38.4 kbps
Handshake:	DTR, RTS, CTS
Connector:	9-pol Dsub male
Max cable length:	15 m (9600 bps)

A.4.4 RS 485

Quantity:	2
Connector:	One with screw terminal and one RJ12 modular contact
Speed:	Configurable (1.2-115 kbps)
Max cable length:	1200 m (19.2 kbps)

A.5 Other

Processor:	M16C80 - 20 MHz
Operating system:	RTXC
RAM:	1 Mbyte CMOS
Flash:	4 Mbyte Flash
Parameter memory:	32 kbyte EEPROM
Real time clock:	Year,month,day,hour,min,sec
Clock backup:	Capacitor, at least 24 hours, usually 7 days.

A.5.1 Enclosure

Type:	Module enclosure 9 units for DIN rail
Dimensions:	156x85x60 mm
Class:	IP21
Colour:	Grey
Weight:	0.3 kg
Power supply:	12 VDC, 24 VDC or 24 VAC
Power consumption:	Max 10 VA
Temperature range:	Operation: -40 to +50 °C
Air humidity:	Max 90 % rel. humidity, non-condensing.

A.5.2 EMC

Tested and approved to the following standards:
Emission;

Family:	EN 61000-6-3:2001 (Residential, commercial and light-industrial environments)
Standard:	EN44022 (Class B)

A.5.3 Immunity

Family:	EN 61000-6-2:2001 (Immunity for industrial environments)
Standard:	EN 61000-4-3 (Electromagnetic RF-field 10V/m)
	EN 61000-4-2 (Electrostatic discharge 4 kV contact, 8 kV air)
	EN 61000-4-6 (Electromagnetic conductive RF 10 V/m)
	EN 61000-4-4 (EFT/Bursts, 2 kV AC/DC power, 1 kV I/O
	EN 61000-4-5 (Surge 2 kV AC, ext transformer, 1 kV I/O)
Processor:	M16C80
Operating system:	RTXC
Protocols:	InterNische TCP/IP stack: TCP, IP, UDP, ARP, SLIP, ICMP, TFTP
Web server:	HTML, CGI, SSI, SSP
PPP:	CHAP, PAP, VJ compression, FTP
Email:	SMTP

Abelko reserves the right to make changes to this specification without notice.

http://www.abelko.se

This user guide contains most of the information that most users will need to use the IMSE WebMaster Pro. More documents are available for download from the Abelko web site, www.abelko.se. You can download reference manuals with more detailed information, and example applications to help and inspire you. The web site also contains news and WMPro software updates.

You can also find out about other products in the IMSE range, including the IMSE operator panel, the Comprobo server application and the RTD-04 temperature measuring module.

The web site also includes details of other Abelko products in automation, energy technology, M2M communication and medical technology. You can read about our R&D department, contact our sales team and see our calendar of events.