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Service and support

For support information and help, please contact our Swedish support organisation by calling +46 (0)13-21 09 15.

At www.wisi.se, you will find the documentation and the software. This software manual is also available from the EFM-200/210/220/230's web UI (in the **SUPPORT** tab, in the **System options** view).

1 EFM-200, EFM-210, EFM-220, EFM-230

This manual covers both the EFM-200, the EFM-210, the EFM-220 and the EFM-230. The EFM-200 is the 4-channel version with an external AC/DC adapter. The EFM-210/220/230 are the 4/8/12-channel versions, housed in a 1U 19" mechanics. The EFM-210/220/230 contains one/two/three EFM-200 modules and an Ethernet switch. The Ethernet switch routes the control IP traffic between the Control Ethernet port and the EFM-200 modules. It also routes the Streaming IP traffic between the Streaming Ethernet port and the EFM-200 modules.

Both the EFM-200 and the modules inside the EFM-210/220/230 use the same software, so in the rest of this manual they will be referred to as EFM-200. In the places where the software behaves differently between the four products, this will be described.

2 Getting started

This chapter briefly describes how you get the EFM-200/210/220/230 up and running.

2.1 Connecting

Connect the power input. The EFM-200 is powered using the AC/DC adapter that is delivered with it. The EFM-210/220/230 is powered using its AC inlet.

The EFM-200/210/220/230 is configured via Ethernet.

- For EFM-200, connect its Ethernet port using an Ethernet cable to a computer/network.
- For EFM-210/220/230, connect its Control Ethernet port using an Ethernet cable to a computer/network.

Note that the Ethernet cables must be shielded to keep electromagnetic emission within limits.

See chapter 4.2 for information on how the EFM-200/230's Ethernet port is configured.

For EFM-210/220/230, when streaming audio via IP, connect its Streaming Ethernet port using an Ethernet cable to a computer/network.

When using multiple EFM-200/210/220/230, make sure that they use different IP addresses. For EFM-220/230, make sure that each of the modules inside of it uses different IP addresses. See chapter 5 on how to do this.

Connect an input signal to the RF connectors.

When streaming audio via the analog audio outputs, connect the audio outputs to line inputs or headphones.

2.2 Configuring the EFM-200/210/220/230

Configure the EFM-200/210/220/230 to do its desired task. See chapter 4 and onward in this document for more information.

3 Security

The EFM-200/210/220/230 is not designed to provide Internet security. This means that the EFM-200/210/220/230 is immediately vulnerable if it is connected to an Ethernet network.

It is therefore advised that the EFM-200/210/220/230 is connected to a secured network (not Internet). If it is connected to the Internet, it should be placed behind a firewall. A VPN can then be used to access the EFM-200/210/220/230 through the firewall.

Obvious weak points are:

- Weakness against (D)DOS attacks.
- Lack of secure authentication. The web UI uses non-encrypted communication. The web UI is always enabled.
- The EFM-200/210/220/230's Telnet interface does not have password protection.

4 The EFM-200/210/220/230 web user interface

The EFM-200/210/220/230 is controlled via its web UI (web user interface). The web UI will work with most browsers, except for Microsoft Internet Explorer versions prior to 11.

4.1 EFM-210/220/230

The web UI is located on each of the one/two/three EFM-200 modules, using their unique IP address. So to configure the entire EFM-210/220/230, each of the EFM-200 modules inside of it must be configured separately. The rest of this chapter describes how each of the three EFM-200 modules is configured.

4.2 Accessing the web UI

4.2.1 EFM-200

The default IP address for the EFM-200's web UI is 192.168.0.20. To use the web UI, simply connect the EFM-200's Ethernet port to a computer, either directly or via a network. If the EFM-200 is connected directly to a computer, the computer's TCP/IP settings must match the EFM-200's. A safe way is to set the computer's IP address to 192.168.0.10 and the computer's netmask to 255.255.255.0.

Use the computer's web browser to connect by typing the IP address of the EFM-200 in the address field of the browser.

4.2.2 EFM-210/220/230

The default IP address for the EFM-210's web UI is 192.168.0.20. The default IP address for the EFM-220's web UIs are 192.168.0.20, 192.168.0.21. The default IP address for the EFM-230's web UIs are 192.168.0.20, 192.168.0.21, 192.168.0.22. To use the web UI, simply connect the EFM-210/220/230's Control Ethernet port to a computer, either directly or via a network. If the EFM-210/220/230 is connected directly to a computer, the computer's TCP/IP settings must match the EFM-200 modules'. A safe way is to set the computer's IP address to 192.168.0.10 and the computer's netmask to 255.255.255.0.

Use the computer's web browser to connect by typing the IP address of the EFM-200 module in the address field of the browser.

4.3 The web UI structure

The web UI is designed to be easy to use. Close to the top there are 3 headings; **Status**, **Radio** and **System Options**. In the remainder of this manual, these are referred to as "views";

- **Status** shows some basic information.
- **Radio** is for configuring the RF inputs, the encoding, the analog outputs and the IP streaming outputs.
- **System Options** is for managing the remaining things, like networking, software upload, reboot and backup.

In the **Radio** view, each of the four signal paths (RF in → Encoding → IP streaming out) are located in the tabs **RF 1**, **RF 2**, **RF 3** and **RF 4**. The **System options** view uses six separate tabs for **MAINTENANCE**, **SOFTWARE**, **NETWORKING**, **DATE & TIME**, **LOG** and **SUPPORT**. This way, all statuses and settings can be reached with just two clicks.

The screenshot shows the EFM-200 web interface. At the top, there is a navigation bar with three tabs: 'Status', 'Radio', and 'System options'. A red box highlights these tabs, with a red arrow pointing to the 'System options' tab. Below the navigation bar is a 'CHANNEL SEARCH' button. The main content area is titled 'RF 2' and is divided into two columns: 'Input' and 'Output'. The 'Input' section shows status information (No error, SNR: 4 dB, Level: -96 dBm 13 dBµV, Service label: Disco, Dynamic label (DLS): Bangles - Manic Monday -1985, Time and date: 2017-03-21 22:00:00 (UTC)) and a 'Settings' table. The 'Output' section shows status information (Running, Codec: MPEG-1 (Audio layer II), 192 kbit/s, Left ch. audio level average/peak (dBFS RMS): -16.9 / -3.7, Right ch. audio level average/peak (dBFS RMS): -17.5 / -3.9) and a 'Settings' table. A context menu is shown over the 'Output' settings, with a yellow arrow pointing to it. At the top right of the main content area, there are four tabs labeled 'RF 1', 'RF 2', 'RF 3', and 'RF 4'. A green box highlights these tabs, with a green arrow pointing to them. A yellow arrow points to a context menu icon (three horizontal lines) located below the 'RF 4' tab.

To change settings, select **Edit** from the context menu or click on the field that is to be edited.

Some settings take effect immediately, while other settings require that the is clicked. Before clicking the , the settings that have been modified will be shown on a yellow background. This way, it is easy to see what the changes are, and it shows where it is needed to apply the changes by clicking the .

4.4 RF Input

The EFM-200 can receive four radio signals simultaneously. The radio signals can be either FM or DAB/DAB+.

For FM, the received frequency contains one channel. An FM channel consists of mono sound and most often also a stereo difference signal and an RDS signal. EFM-200 supports FM with 50 µs pre-emphasis.

For DAB/DAB+, the received frequency most often contains several channels (or services, as it is denoted in DAB/DAB+) and meta information. Each DAB channel consists of digitally compressed audio (theoretically it is possible to not send audio at all on a DAB frequency). The compressed audio can be mono, stereo or separate channels. The EFM-200 supports stereo audio.

All configurations for the RF inputs, except for **Channel search**, are available from the RF inputs respective tab in the **Radio** view.

4.4.1 Channel search

To ease installation, the EFM-200 can perform a channel search by clicking the **CHANNEL SEARCH** button in the **Radio** view. The channel search will scan all common FM and DAB/DAB+ frequencies for a valid channel. A channel is considered valid if its signal quality is good, and in case of DAB/DAB+ contains audio. Checkboxes to the left makes it possible to select which RF inputs to include in the search. A search takes typically 20 seconds to perform and while searching, the audio outputs are muted. The channel search will display the result from the last performed channel search, meaning that it will remember the last search even after a reboot.

When the search has completed, all found channels are listed. To use a found channel, close the channel search window and go to the RF input tab that is to be configured. For FM, the channel is selected using the **Frequency** drop-down menu. For DAB/DAB+, the channel is selected using the **DAB channel** drop-down menu.

4.4.2 Status

The detected signal level is always shown and is accurate to within a few decibels. After the receiver has locked to the FM or DAB/DAB+ signal, the signal-to-noise ratio will be shown. **Status** will reflect the received signal, and should indicate **No Error**.

For FM, the following RDS information is shown:

- **Program service**, which is RDS information (PS) that is used to identify the station name.
- **Program information**, which is RDS information (PI) that contains a unique code that is used to identify the station.
- **Program type**, which is RDS information (PTY) that is used to signal the type of material that is broadcasted. The EFM-200 displays the values as they are coded in Europe.
- **Radio text**, which is RDS information (RT) that contains a generic text field that can contain up to 64 characters.
- **Clock time**, which is RDS information (CT) that contains the UTC time.

For DAB/DAB+, the following meta information is shown:

- **Service label**, which is DAB information that used to identify the service (Service label). Analogous to the station name for FM radio.
- **Dynamic label (DLS)**, which is DAB information that contains generic text messages. Often used to show which track that is being broadcasted.
- **Time and date**, which is DAB information that contains the UTC time.

4.4.3 Name

Each RF input can be given a name. The EFM-200 will only use the name for log purpose.

4.4.4 Mode

Configures whether the RF input on the EFM-200 should receive FM or DAB/DAB+.

4.4.5 FM, Frequency

Available when **Mode** is set to **FM**. Configures the FM channel to receive on the RF input. EFM-200 can receive FM signals in the range 76-108 MHz.

If **Manual** is selected, the frequency of the FM signal to receive on the RF input must be configured.

If a channel search has found any FM channels, it is possible to select which of them to receive on the RF input.

4.4.6 DAB, Channel

Available when **Mode** is set to **DAB/DAB+**. If **Manual** is selected, the frequency of the DAB/DAB+ signal to receive on the RF input must be configured. EFM-200 can receive DAB/DAB+ signals in the range 168-240 MHz. Besides the frequency, the service ID and component ID for the channel to receive must be configured.

If a channel search has found any DAB/DAB+ channels, it is possible to select which of them to receive on the RF input.

4.4.7 Level guard

The EFM-200 can detect when the input level is below a configurable threshold. When the input level goes below this threshold, the radio's IP streaming output will be disabled. When the input level goes above another threshold, the radio's IP streaming output will be enabled. The level guard feature can for example be used (together with other equipment) to switch between radio sources.

To use this feature, set **Level guard** to **On** and set **Disable output if input is below (dBuV)** and **Re-enable output if input is above (dBuV)**. Set **Level guard** to **Off** to disable the level guard feature. **Disable output if input is below (dBuV)** configures the input level (in dBuV) at which the IP streaming will be disabled. **Re-enable output if input is above (dBuV)** configures the input level (in dBuV) at which the IP streaming will be enabled. To avoid the IP streaming output from toggling on and off, the deactivate threshold should normally be at least 5 dB higher than the activate threshold.

4.5 IP streaming output

For EFM-200, IP streaming and Control uses the same Ethernet port.

The EFM-200 can encode and transmit four stereo audio signals, that are received via the RF inputs. Each stereo audio signal is encoded as MPEG-1 layer II, stereo mode, with a sample rate of 48 kHz and at a bit rate of 192 kbit/s.

Each encoded stereo audio signal is then packetised in an MPEG transport stream. The MPEG transport stream bit rate is constant at 326 kbit/s and includes audio, PAT, PMT and SDT. The service type in the SDT is set to 0x02 (digital radio sound service).

Each MPEG transport stream is sent out over IP as SPTS, with seven MPEG transport stream packets per datagram. TTL is set to 63.

The IP SPTS signal is sent out as CBR (Constant Bit Rate) but the stream is somewhat bursty. Some receivers needs to be configured for VBR (Variable Bit Rate) to handle this.

The MPEG transport stream is encapsulated in UDP IP packets.

The Dynamic Label Segment and the Service Label information that is broadcasted in the DAB/DAB+ stream is retransmitted in the MPEG transport stream's EIT (Event Information Table) Present. The Dynamic Label Segment is sent as EIT Text and the Service Label is sent as EIT Event Name. The text encoding is fixed to ISO/IEC 8859-1.

The Program Service and the Radio Text that is broadcasted in the FM's RDS stream is retransmitted in the MPEG transport stream's EIT (Event Information Table) Present. The Radio Text is sent as EIT Text and the Program Service is sent as EIT Event Name. The text encoding is fixed to ISO/IEC 8859-1.

IP streaming output is enabled by selecting **IPTV** from **Output mode**. If IP streaming is being output, the analog audio outputs on the EFM-200 are muted.

The audio's output level for IP streaming cannot be adjusted. For DAB/DAB+, the output level is the same as the input level. For FM, the output level is -2 dBFS for a 1 kHz stereo signal that is modulated to ± 62.5 kHz deviation (± 75 kHz MPX deviation).

Configuration of the IP streaming outputs are available from the RF inputs respective tab in the **Radio** view.

4.5.1 Status

The detected signal level is always shown. After the receiver has locked to the FM or DAB/DAB+ signal, the signal-to-noise ratio will be shown.

For **Output mode Analog**, **Status** will always be **Running**, even if no signal is output.

For **Output mode IPTV**, the following information is shown:

- **Status. Running** indicates that encoding has been started.
- **Codec**, shows some of the encoding properties.

- **Left ch. audio level average/peak (dBFS RMS)**, which is the average and peak sound level for the left audio channel, measured over a three second time period. The levels are updated each time a measurement is completed.
- **Right ch. audio level average/peak (dBFS RMS)**, which is the average and peak sound level for the right audio channel, measured over a three second time period. The levels are updated each time a measurement is completed.

4.5.2 Output enabled

Setting **Output enabled** to **Off**, will stop the EFM-200 from transmitting via IP.

4.5.1 Destination address

The IP packets can be sent as Unicast or Multicast. Unicast is a one-to-one connection, while Multicast is a one-to-any connection between the EFM-200 and the receiving device.

Addresses 224.0.0.0 through 239.255.255.255 are designated as multicast addresses, so if the Destination address is set in that range, the EFM-200 will automatically output a multicast IP stream. Be aware that 224.0.0.0 and 239.255.255.255 should not be used. Multicast will not work over the Internet since those addresses are blocked by the routers. IP address range 239.0.0.0 through 239.255.255.255 is normally used for Multicast within an organization.

To stream Unicast, set Destination address to match the IP address of the IP stream receiver. It cannot be a multicast address.

4.5.2 Port

Sets the UDP port to use for transmitting the IP stream. The UDP port on the EFM-200 must be the same as the UDP port of the receiving device. Allowed range is 1-65535.

4.5.3 Service name

The service name in the SI data can be configured. Must be between 0 and 255 chars.

4.5.4 Service ID

The service ID in the SI data can be configured. Must be a number between 0 and 65535.

4.5.5 Audio PID

The PID for the audio in the MPEG transport stream can be configured. Must be a number between 32 and 8190.

4.6 Analog audio output

Analog audio output is enabled by selecting **Analog** from **Output mode**. If Analog audio is being output, the IP streaming outputs on the EFM-200 are disabled.

The output voltage swing can be adjusted ± 12 dB from the nominal level of $0.95 V_{p-p}$. For FM, the nominal level corresponds to a 1 kHz stereo signal that is modulated to ± 62.5 kHz deviation (± 75 kHz MPX deviation). For DAB/DAB+, the nominal value corresponds to -2 dBFS).

4.7 Uploading software

The software is uploaded to the EFM-200 via the **SOFTWARE** tab in the **System options** view. A progress bar will indicate the status of the upload. When the file has been uploaded successfully, the EFM-200 must be rebooted.

4.8 Maintenance

Following settings can be done in the **MAINTENANCE** tab in the **System options** view:

4.8.1 Reboot

On some rare occasions, the EFM-200 requires a reboot. This is done by clicking the **REBOOT** button.

4.8.2 Factory reset

The EFM-200 can be reset to the same status as when delivered from the factory, apart from the software version and the Ethernet port (Control Ethernet port for EFM-210/220/230) networking settings, which will remain as before the factory reset. This is done by clicking the **FACTORY RESET** button.

4.8.3 Backup and restore

The EFM-200's entire configuration can be saved and restored by downloading and uploading a backup file from it. This can be useful for copying configurations between different installations, or keeping the possibility to upload the original configuration to an EFM-200 if a different configuration has been tested. The file is downloaded/uploaded by clicking the **BACKUP/RESTORE** buttons.

4.8.4 Diagnostic file

The EFM-200's entire configuration, along with internal debug information, can be saved by downloading a diagnostic file from it. This file is used by the WISI support team to help identify any problems. The file is downloaded by clicking the **DIAGNOSTIC FILE** button.

4.9 Date and time

The EFM-200 relies on external NTP time sources for keeping its time. Up to 16 NTP servers can be used. This requires that the EFM-200's Ethernet port, or EFM-210/220/230's Control Ethernet port, is connected to the Internet (unless a local NTP server is available). A DNS server must be configured if NTP servers are to be configured using their domain name.

All time sources supply their time in UTC time, so to get the EFM-200 to use the local time it must be configured to know the offset between the UTC time and the local time. Normally this is straight forward, just select the time zone that matches the geographic area in which the EFM-200 is placed. On some occasions the daylight savings time makes it more complicated. If the geographic area uses non-predictive dates for the daylight savings time, this date has to be manually entered. The EFM-200 has support for this using the POSIX.1 TZ format. This document will not describe the POSIX.1 TZ format, but if the **Time zone** setting is edited, the POSIX.1 TZ format for the selected time zone will be shown. Select time zone **Manual** to use a custom time zone. For daylight savings time to be used by the EFM-200, **Adjust automatically for daylight saving time** must be enabled.

All available time sources and their time are shown under **Time sources**. The EFM-200 will only use the time source if it is enabled.

If multiple time sources are enabled, the EFM-200 will use one of them. The EFM-200 has logic for automatically switching between enabled time sources.

4.10 Log

The EFM-200 logs internal events with a time stamp, a severity level and a message. These events can be viewed in the web UI. Logging is limited to 20 logs per internal module.

If the EFM-200 is configured to have a time, as described in 4.9, the log entries will use this time. If the EFM-200 is not aware of the time, as is the case at boot or when no time source is configured, the log entries will use the time since the last boot. Log messages are displayed using the EFM-200's local time.

The web UI can display log messages with three different priorities: Info, Warning and Critical. To aid in finding specific log messages, the EFM-200 can filter log messages based on both the priority and the log time. The filtering only affects what is shown in the UI, the logs themselves are not affected.

The priority filter has five choices:

- **All** will show all priorities.
- **Is** will show only the selected priority.
- **Is not** will show all but the selected priority.
- **From** will show all priorities that are equal to, or higher than, the selected priority.
- **Between** will show priorities in the range of the selected priorities.

The date filter operates on a daily basis, and has five choices:

- **All** will show all dates.
- **Is** will show only the selected date.
- **Is not** will show all but the selected date.
- **From** will show all dates that are equal to, or later than, the selected date.
- **Between** will show dates in the range of the selected dates.

4.11 Status

The **Status** view gives a general overview over the EFM-200's status:

- **Serial** shows the EFM-200's unique serial number. Used in contact with support and sales.
- **Hardware revision** shows the version of the EFM-200 hardware.
- **Software version** shows the version of the software that the EFM-200 is running.
- **Uptime** shows the time since the EFM-200 was last booted.
- **Name** is a text field that has no meaning to the EFM-200. It is a free text field that can be used by the customer to identify the EFM-200.
- **Location** is a text field that has no meaning to the EFM-200. It is a free text field that can be used by the customer to identify the EFM-200.
- **Description** is a text field that has no meaning to the EFM-200. It is a free text field that can be used by the customer to identify the EFM-200.

5 Networking

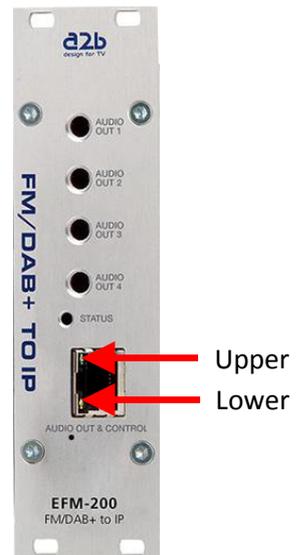
5.1 EFM-200

The EFM-200 has an Ethernet port in the front that supports 10 and 100 Mbit/s, half and full duplex, auto-negotiating, auto-MDI-X and IPv4.

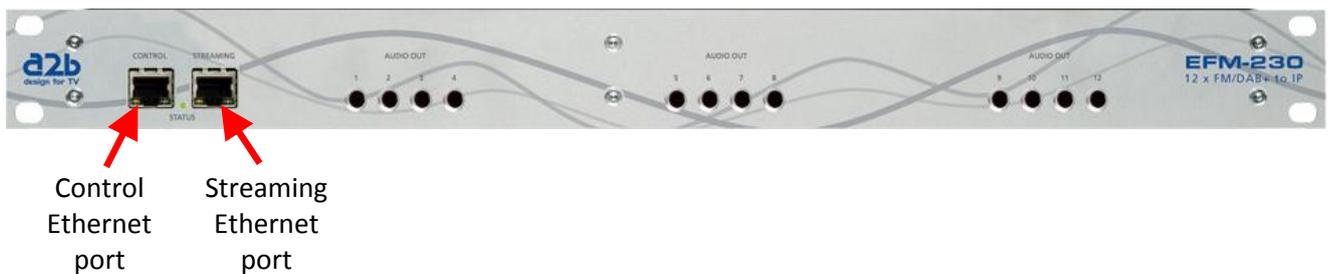
The LED indicators on the RJ45 connector show the status of the link. The upper LED indicates link and activity. If the LED is not lit, there is no link at all. If the LED is constantly lit, a link is established but there is no activity. If the LED blinks, a link is established and there is activity. The lower LED indicates speed. If the LED is not lit, the link speed is 10 Mbit/s. If the LED is yellow, the link speed is 100 Mbit/s.

The Ethernet port is used both for managing the EFM-200 and for streaming the audio.

The IP address, Netmask and Gateway for the Ethernet port must be configured according to the network in which the EFM-200 is placed. These settings are located in the **NETWORKING** tab in the **System options** view. Do not forget to change the IP address in the web browser after changing the EFM-200's IP address.



5.2 EFM-210/220/230



The EFM-210/220/230 has two Ethernet ports in the front that supports 10, 100 and 1000 Mbit/s, half and full duplex, auto-negotiating, auto-MDI-X and IPv4. The Ethernet ports are capable of 1000 Mbit/s but the EFM-200 modules inside can only handle 100 Mbit/s. Therefore, none of the Ethernet ports can handle multicast traffic above approximately 90 Mbit/s. Note that the Ethernet cables must be shielded to keep electromagnetic emission within limits.

The LED indicators on the RJ45 connectors show the status of the link. The left LED on each RJ45 connector indicates link and activity. If the LED is not lit, there is no link at all. If the LED is constantly lit, a link is established but there is no activity. If the LED blinks, a link is established and there is activity. The right LED on each RJ45 connector indicates speed. If the LED is not lit, the link speed is 10 Mbit/s. If the LED is yellow, the link speed is 100 Mbit/s. If the LED is green, the link speed is 1000 Mbit/s.

The Control Ethernet port is used for managing the EFM-200 modules. The Streaming Ethernet port is used for streaming the audio. It is possible to stream the audio on the Control Ethernet port but this must be enabled via a Lua command. Please contact WISI support for more information.

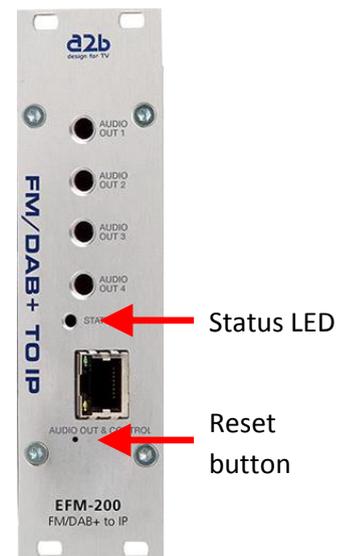
The IP address, Netmask and Gateway for both the Control Ethernet port and the Streaming Ethernet port in each of the EFM-200 modules must be configured according to the network in which the EFM-210/220/230 is placed. These settings are located in the **NETWORKING** tab in the **System options** view. Do not forget to change the IP address in the web browser after changing the Control Ethernet port's IP address.

The Control Ethernet port and the Streaming Ethernet port cannot be configured to be on the same subnet.

6 Status LED

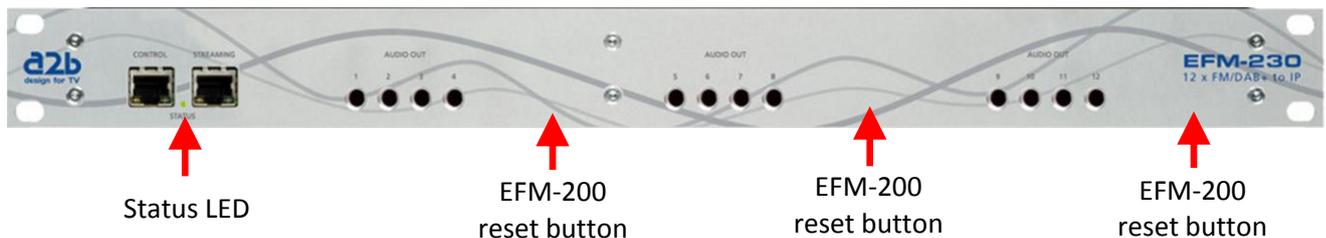
6.1 EFM-200

The status LED on the front panel indicates the operating status of the EFM-200. In normal operation, the status LED will be constant green. When the EFM-200 is in Rescue mode, the status LED will blink red. While booting, the status LED will be orange.



6.2 EFM-210/220/230

The status LED on the front panel indicates the operating status of the switch in the EFM-210/220/230. It does not indicate the status of any its EFM-200 modules. In normal operation, the status LED will be constant green.



7 Rescue mode

Rescue mode is a special mode that the EFM-200 (or the EFM-200 modules in the EFM-210/220/230) can enter if an unrecoverable software bug is triggered. The Rescue mode is a minimalistic mode whose only purpose is to recover the EFM-200. It has a **Status** view and an **Upload** view.

For EFM-200, the status LED on the front panel will blink red if it is in Rescue mode. For EFM-210/220/230, there is no indication if any of its three EFM-200 modules is in Rescue mode.

The first thing to try if the EFM-200/210/220/230 has entered Rescue mode is to click the **Reboot** button in the web UI and see if it starts up in normal mode. If it still starts up in Rescue mode, the software must be uploaded again:

1. Click the **Upload** tab.
2. Click the **Browse** button and select the EFM-200's software file.
3. Click the **Upload** button.
4. Wait until the software has been uploaded. This will take at least half a minute, even if the connection speed is fast. If the connection is slow it will take a longer time. The uploaded file will be listed when the upload has completed. Verify that it is so.
5. Click the **Status** tab.
6. Click the **Reboot** button and wait 20 seconds.

If the EFM-200/210/220/230 starts up in Rescue mode again, a factory reset using the web UI should be performed:

7.1 Factory reset via web UI for EFM-200

1. Click the **Status** tab.
2. Click the **Factory Reset** button.
3. The LED will within about a minute start to blink red again, indicating that the EFM-200 is in Rescue mode. After a factory reset, the EFM-200's Ethernet port network settings and its configuration are reset to default.
4. Connect to the EFM-200 using IP address 192.168.0.20 and upload the software as described in Rescue mode above.

7.2 Factory reset via web UI for EFM-210/220/230

1. Click the **Status** tab.
2. Click the **Factory Reset** button.
3. Wait a little more than a minute. The EFM-200 is then in Rescue mode. After a factory reset, the EFM-200's Control Ethernet port network settings and its configuration are reset to default.
4. Connect to the EFM-200 using IP address 192.168.0.20/192.168.0.21/192.168.0.22 and upload the software as described in Rescue mode above.

If the EFM-200 starts up in Rescue mode again, a factory reset using the reset button should be performed:

7.3 Factory reset using reset button for EFM-200

1. Disconnect the power supply from the EFM-200.
2. Press the reset button behind the front panel, and keep it pressed.
3. Connect the power supply to the EFM-200 (still keeping the reset button pressed).
4. The front panel LED will turn orange and within a few seconds it will turn off. If the LED does not turn off, the reset button is not properly pressed so the procedure must be performed again.
5. Release the reset button after the LED has turned orange again.
6. The LED will within about a minute start to blink red, indicating that the EFM-200 is in Rescue mode. After a factory reset, the EFM-200's Ethernet port network settings and its configuration are reset to default.
7. Connect to the EFM-200 using IP address 192.168.0.20 and upload the software as described in Rescue mode above.

7.4 Factory reset using reset button for EFM-210/220/230

1. Disconnect the power supply from the EFM-210/220/230.
2. Press the reset button for the EFM-200 module (accessed via the small unmarked hole in the front panel), and keep it pressed.
3. Connect the power supply to the EFM-210/220/230 (still keeping the reset button pressed).
4. Wait at least 10 seconds and then release the reset button.
5. Wait a little more more than a minute and connect to the EFM-200 module using IP address 192.168.0.20, 192.168.0.21, 192.168.0.22. After a factory reset, the EFM-200's Control Ethernet port network settings and its configuration are reset to default.
6. Upload the software as described in Rescue mode above.

An alternative way to force the EFM-200 to enter Rescue mode, which does not require the web UI to work, is:

7.5 Forced Rescue mode for EFM-200

1. Disconnect the power supply from the EFM-200.
2. Press the reset button behind the front panel, and keep it pressed.
3. Connect the power supply to the EFM-200 (still keeping the reset button pressed).
4. Release the reset button as soon as the front panel LED turns yellow. If the reset button is kept pressed for about 8 seconds more, the EFM-200 will perform a factory reset.
5. The LED will within a few seconds start to blink red, indicating that the EFM-200 is in Rescue mode.

7.6 Forced Rescue mode for EFM-210/220/230

1. Disconnect the power supply from the EFM-210/220/230.
2. Press the reset button for the EFM-200 module (accessed via the small unmarked hole in the front panel), and keep it pressed.
3. Connect the power supply to the EFM-210/220/230 (still keeping the reset button pressed).
4. Release the reset button after 2 seconds. If the reset button is kept pressed for about 8 seconds more, the EFM-210/220/230 will perform a factory reset.
5. The EFM-210/220/230 is in Rescue mode.

8 Troubleshooting

I can't connect to the EFM-200's web UI.

1. Verify that the front panel LED is constant green. If the LED is not constant green, look further down in this troubleshooting chapter.
2. Connect your computers network cable directly to the EFM-200's Ethernet port.
3. Start the WISI IP Supporter software on your computer. WISI IP Supporter can be downloaded from www.wisi.se.
4. Wait a few seconds for the EFM-200 to show up in the WISI IP Supporter program. Note the network configuration of the EFM-200 and make sure it matches the network that the EFM-200 is situated in. Connect the EFM-200 and your computer to the network again. Use the IP address that WISI IP supporter showed for the EFM-200 in your web browser.

I can't connect to the EFM-210/220/230's web UI.

1. Verify that the front panel LED is constant green. If the LED is not constant green, contact WISI support.
2. Connect your computers network cable directly to the EFM-210/220/230's Control Ethernet port.
3. Start the WISI IP Supporter software on your computer. WISI IP Supporter can be downloaded from www.wisi.se.
4. Wait a few seconds for the EFM-200 modules inside the EFM-210/220/230 to show up in the WISI IP Supporter program. Note the network configuration of the EFM-200 modules and make sure they match the network that the EFM-210/220/230 is situated in. Connect the EFM-210/220/230 and your computer to the network again. Use the IP address that WISI IP supporter showed for the EFM-200 modules in your web browser.

The EFM-200's front panel LED is constant red and I can't connect to it via Ethernet. What should I do?

The EFM-200 is not working as expected. Contact WISI support.

The EFM-200's front panel LED is blinking red and it isn't working. What should I do?

The EFM-200 is in Rescue mode. Try to reboot it via the web UI or by power cycling it. See chapter 7 for more information.

The EFM-200's front panel LED is orange and I can't connect to it via Ethernet. What should I do?

If the LED is orange for over 30 seconds, something is not working as expected. A factory reset using the reset button should be performed. See chapter 7 for more information.

Which IP address, Netmask and Gateway should I use for my EFM-200/210/220/230?

This depends on the network in which the EFM-200/210/220/230 is placed. Contact your network administrator for more information. Note that for EFM-210/220/230, the Control Ethernet port and the Streaming Ethernet port cannot be on the same subnet.

Which DNS server should I choose?

8.8.8.8 is a DNS server hosted by Google. A DNS server is only needed if using NTP servers by their domain name.

I can't receive the IP stream from the EFM-200.

Use VLC media player on your computer to find out if the problem lies in the EFM-200 or if it lies in the network connection between the EFM-200 and the device receiving the IP stream. The problem can of course also lie in the receiving device.

1. Find out the IP address, netmask and gateway of the network interface on your computer (search the Internet for how to do this). Note that you want the address of the interface that you will use to connect to the EFM-200 with.

2. Configure the EFM-200's Ethernet port to match your computer's netmask and gateway settings. Make sure that the EFM-200 is on the same subnet as your computer.
3. Configure the EFM-200's IPTV **Destination address** to be the same as your computer's IP address.
4. Configure the EFM-200 IPTV **Port** to 1234.
5. Start VLC media player on your computer (freely available from <http://www.videolan.org>) and press the Media menu. Then choose Open Network Stream.... Type `udp://@:1234` in Network URL text field (located in the Network tab). Press play.
6. You should now here the sound from the EFM-200 on your computer. If you don't, try the following:
 - Disable any Firewall settings on your computer.
 - Verify that your computer's sound is enabled and that speakers are connected.
 - Try another port. Do not forget to change port both in the EFM-200 and in the VLC media player.
 - Verify that the EFM-200 has **Output enabled** set to **On**.
 - Verify that audio is present in the EFM-200. Look at the audio level in the output's status. The audio level should vary several decibels and typically be at least -20 dB peak.
 - If none of the above helps, try connecting the EFM-200 directly to your computer and repeat steps 1-5.

I can't receive the IP stream from the EFM-210/220/230.

The EFM-210/220/230's two Ethernet ports cannot be on the same subnet. This makes troubleshooting a bit complicated due to the different ways that the Ethernet network is setup.

Which port should I use for IP streaming?

Ports 1024-49151 are defined as User ports by IANA so any of these should be a good choice.

9 Software Release Notes

9.1 Software 0.9

- First release.

9.2 Software 1.0

- Support for EFM-210/220/230.
- Audio streaming output as RTP is now working.
- The web UI's context menus will now be displayed correctly when using newer versions of the Chrome and Opera web browsers.

9.3 Software 1.1

- RTP streaming is now only sent out on the Streaming port for EFM-210/220/230.

9.4 Software 1.2

- Added possibility to disable an input from being streamed on IP output when its input level is below a configurable threshold.
- Removed support for RTP (Real-time Transport Protocol) since it did not work very well.
- The Dynamic Label Segment and the Service Label information that is broadcasted in the DAB stream is now retransmitted in the MPEG transport stream's EIT (Event Information Table).
- The Program Service and the Radio Text that is broadcasted in the FM's RDS stream is now retransmitted in the MPEG transport stream's EIT (Event Information Table).
- The audio PID value is now as configured in the web UI.

9.5 Software 1.21

- The EFM no longer crashes and reboots spontaneously.

9.6 Software 1.3

- Reduced jitter on the IP SPTS output.
- The MPEG transport stream's DTS is now always later than the PCR.
- Added possibility to stream IP SPTS on the Control Ethernet port.



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