



TELEMATICS
MOBILE INFORMATION EXCHANGE

**MiX4000/6000
Technical Information**



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1 Overview

The MiX4000 and MiX6000 are the second generation on-board computers from the MiX Telematics stable, built on the all new MiX2000 platform. The new platforms consists of hardware, firmware, and software and has been specifically engineered to address the current and future demands placed on the Telematics industry.

The MiX4000 is intended to replace the FM Communicator and FM Tracer in certain market segments and is designed to deliver an affordable, compact product that provides entry-level fleet functionality.

The MiX6000 is intended to replace the FM 3xxx product range in the high-end segment/sector of the market as it is designed to provide advanced fleet functionality.

2 MESA Platform

The MiX2000/4000/6000 devices make use of the MESA (MiX Embedded System Architecture) platform. MESA is an embedded hardware and firmware platform, which is more adaptable and makes it easy to port features to and from the MiX2000, MiX4000, and MiX6000.

3 Hardware Features

FM3xxx	MiX4000	MiX6000
38k RAM 2M Flash Max CPU speed = 24 MHz	256k RAM (>6 time more than FM) 16M Flash Max CPU speed = 180 MHz	512M RAM (2048 times MiX 4000 and 13000 Times FM). 2.6G Flash, + optional SD card Max CPU speed = 530 MHz
2G or 3G	2G, 3G, 4G (North America only)	3G
1 x SIM	1 x SIM (Nano)	2 x SIM (Nano)
External GSM and GPS only	Internal GSM antenna only. GPS internal and external	External and Internal antennas for GSM and GPS
1 x CAN	2 x CAN*	2 x CAN*
1 x TTL, 1 X RS232	2 x Serial ports	4 x Serial ports
Accelerometer	Accelerometer	Accelerometer + Gyro*
Tabs – external PBS, 433MHz/915MHz	Magix on-board - 433MHz for 2G and 433MHz/915MHz for 3G	Magix on-board - Frequency selectable: 433 or 915 MHz
8 x digital/analog 4 x frequency 1 x positive drive 5V PSU needed for CAN Sense 1 x output (relay)	4 x digital/analog (open wire detect*) 2 x high speed frequency (open wire detect*) 4 x positive drive 5V power output for CAN Sense 2 x outputs	8 x digital/analog (open wire detect*) 4 x high speed frequency (open wire detect*) 8 x positive Drive 5V power output for CAN Sense 8 x outputs
Wi-Fi and Bluetooth - external Kit	No Wi-Fi, on-board Bluetooth	On-board Wi-Fi with hotspot, on-board Bluetooth
No built-in hardware tamper detect	Hardware tamper detect when housing is opened*	Hardware tamper detect when housing is opened*

Notes: The hardware supports all these features, firmware and software development is still required to expose the features marked with an asterisk.

4 Commissioning

The MiX4000/6000 uses a Commissioning Server to send units their communications settings i.e. URL and port numbers. This is the same Commissioning Server used for the MiX2000 devices.

4.1 Commissioning server (Alpha)

The Commissioning Server, referred to as Alpha, is hosted at za.mixtelematics.com.

1. Login to za.mixtelematics.com
2. Select Manage
3. Select Mobile device admin

4.2 Commissioning Groups

1. To the left of the Mobile device admin page is a list of Commissioning groups
2. Select the Commissioning group by clicking on the radio button to the left of the group name
 - Users can only see the commissioning groups to which they have access

The Commissioning Server consists of multiple Commissioning Groups, each with its own URL and port numbers. A Commissioning Group contains multiple APNs, each with a Mobile Network Code and Mobile Country Code assigned.

The MiX4000/6000s IMEI number is added to a commissioning group and once powered up it will receive its URL based on the commissioning group it is assigned to i.e. if the IMEI is assigned to the “MiX AU – Production” commissioning group then it will receive the AU Data Centre’s communications URL and port numbers.

If the IMEI hasn’t been assigned to a commissioning group by the time the unit connects to Alpha for the first time, it will automatically be added to the Unassigned commissioning group and will have to be moved from that commissioning group to a desired commissioning group. The unit will only receive the correct communications URL and port numbers if it was assigned to a commissioning group.

4.2.1 Manage APNs – CSO and RSOs Only

1. Click on the actions dropdown to the right of the Commissioning group name
2. Select Manage APNs
 - If this option is not available log a ticket with CSO Support to update your permissions.

When “Manage APNs” is selected, the user is navigated to a page that lists all of the APNs associated to the Commissioning group, as well as the Mobile Network Code, Mobile Country Code and whether roaming is allowed.

Users are able to remove invalid APNs as well as edit existing ones and add new ones.

Note:

If an APN is required that makes use of an MNC and MCC that is exactly the same as an existing APN within the group, a new commissioning group will need to be added. Please log a ticket with CSO Support to assist.

4.3 Device list

To the right of the Mobile device admin page is a list view of all devices assigned to the selected commissioning group.

When a new order of MiX4000/6000s is shipped to a RSO, a list containing all the IMEIs associated with the order is imported into the Commissioning Group that is most relevant to the RSO. This import is currently done by CSO Logistics.

4.3.1 Columns

IMEI – This is the IMEI number found on the back of the MiX4000/6000 unit

Device type – The device type will display “Default” and once commissioned will display the device type e.g. MiX4000 or MiX6000

First connection (UTC) – The date and time that the device first connected to the Commissioning Server

Last connection (UTC) – The date and time of the last connection to the Commissioning Server

Info issued (UTC) – The date and time the unit received and acknowledged its URL and settings

4.3.2 Adding a device

1. In the top right corner is an Add icon
2. Click on this button
3. Enter the IMEI number
4. Click Save

Notes:

If an exception is displayed stating that the IMEI has already been added then it has either been added to the group already or the IMEI is associated with a different Commissioning group. If you cannot find it in any group to which you have access, please contact CSO Support and request that they locate and move the IMEI to the correct commissioning group.

4.3.3 Devices import template

1. In the top right corner is a Download import template icon
2. Click on this icon
3. Open the file and paste all IMEIs into the file
4. Click on the Import icon

4.3.4 Moving devices between Commissioning groups

1. Select the checkbox to the left of the IMEI number
2. Drag and drop the device into the new Commissioning group

Notes:

Some RSOs have multiple commissioning groups and therefore the RSO has to move the IMEIs between groups.

If a bulk move of IMEIs needs to be performed (i.e. more than 100 IMEIs) it is recommended to log a ticket with CSO Support who are able to run a script to delete the IMEIs.

The import template can then be used to import the deleted devices into the correct Commissioning group.

When a device is moved from one group to another it will clear the “Info issued” column. The next time the device connects to the Commissioning server (this could take anywhere from a few minutes up to 24hours) it

will get its new URL and settings. It is important to compile and upload configuration once it has received these by checking “Info issued” column as all settings would have been set back to default.

4.3.5 Status

1. Click on the actions dropdown next to a device
2. Select View status

The following information will be displayed:

BootLoaderVersion:
DeviceDateTime:
FirmwareVersion:
GpsFixStatus:
Hdop:
Heading:
Imei:
Imsi:
InternalBatteryChargeMode:
InternalBatteryMilliCelsius:
InternalBatteryMilliOhms:
InternalBatteryMilliVolts:
InternalBatterySocPercentage:
InternalBatteryState:
Latitude:
Longitude:
MobileCountryCode:
MobileNetworkCode:
NoOfSatellites:
Odometer:
PlatformVersion:
RoamingStatus:
SettingsVersion:
SpeedMetresPerHour:
StatusFlagBits:

This information is updated every time the unit connects to the commissioning server.

4.3.6 Reset

1. Click on the actions dropdown next to a device
2. Select Reset

What does a reset do on a MiX4000/6000?

The “Reset” option sends the communications URL and APN. It will clear the “Info Issued” column and wait for the unit to connect to the Commissioning Server. Once the unit has connected it will receive the communications URL and APN. Once completed the “Info Issued” column will once again be populated.

4.4 Commissioning Process

4.4.1 First Commissioning

- When the unit is powered up for the first time and internet connectivity is available, the commissioning service will try to open a User Datagram Protocol (UDP) socket to the Commissioning Server once every 10 minutes.
 - If the unit is in a basement or area with poor network coverage it needs to be moved into an area with good coverage.
- The connection manager then chooses an Access Point Name (APN) as follows:
 - It cycles through the static APN list (hardcoded in the firmware) and tries to find one that matches the Mobile Country Code and Mobile Network Code of the SIM card (IMSI).
 - If no match is made from the static list it will try the public APN “internet”.
 - If this is unsuccessful the APN will have to be set manually via the MiX TechTool or serial upgrader.
- If an APN match is made a valid UDP socket is opened and the unit sends the commissioning message to the Commissioning Server.
- The Commissioning Server then replies with settings (Commissioned APN, and server addresses).
- The unit then acknowledges settings and sets its commissioning flag as “commissioned”.
- Commissioning is now complete.

Verifying that the unit has commissioned:

- Once a unit has been commissioned the “Info issued”, “Mobile device type” and “Last connection” columns will be populated.
- The behaviour of the Red LED on the unit will also change from being mostly on to mostly off.

4.4.2 Daily check-in

- Once a unit is commissioned, it will communicate with the Commissioning Server every 24 hours via the APN it was commissioned with.
- If however the unit is in a basement or area with poor coverage then the 24 hours will roll over as the unit needs good GSM quality to check in.
- The Last connection date and time displays the date and time of the last connection with the Commissioning server.

Q&A:

Does a unit need GPS lock to connect to the Commissioning Server?

The unit does not require GPS lock to commission. GSM quality is important - if the unit does not have good GSM quality it means a connection can't be established with a cell tower.

What is the relationship between the Commissioning Server and MiX Fleet Manager?

The Commissioning Server provides a unit with its communications settings and tells the unit which data centre to send its data to. There is no other relationship between Commissioning Server and MiX Fleet Manager.

Step	Description	Actions if successful	Actions if failed
1	<p>Create the asset in MiX Fleet Manager, assign a MiX4000/6000 config group, and save it.</p> <p>Associate the IMEI number to the Asset on the Mobile device settings tab.</p>	Go to step 2	<p>Check that the IMEI is not already assigned to another vehicle by searching for the IMEI number on the Asset list or below Data Centre Admin > IMEI search.</p> <p>Check that the IMEI is correctly specified with 15 digits.</p>
2	<p>If you use a SIM/Network provider that has never been used before, check that it is listed in the following document: List of APNs.</p>	Go to step 3	<p>Use the serial upgrader tool to configure the commissioning APN.</p> <p>Use the TechTool to set the APN.</p> <p>Contact CSO support to add the APN details to commissioning or get Firmware to update hardcoded list.</p>
3	<p>Log into za.mixtelematics.com and navigate to Mobile Device Admin. Select the commissioning group to which the IMEI should belong and use the search function to search for it.</p>	Go to step 4	<p>If the IMEI is not found add it to the group</p> <p>If it fails to add because it is already added in a different group search for it in the other groups and move it or log a ticket to CSO Support to have it moved to the correct group</p>
4	<p>Insert the SIM card and connect the unit to power:</p> <ul style="list-style-type: none"> • On bench - Supply voltage > 14V to start trip • In vehicle - Start the vehicle 	<p>The unit connects to the commissioning server and First Connection, Last Connection and Info Issued fields will be populated.</p> <p>While the Red LED is mostly ON the unit is still commissioning – when it is mostly off it has started its communication with the selected Data Centre.</p>	<p>The unit will retry every 10 minutes until it can make a connection. If you have waited for more than 10 minutes and it still does not connect, check the following:</p> <ol style="list-style-type: none"> a. SIM card is properly Inserted b. SIM card is active c. Unit has proper GSM connectivity
6	<p>Navigate back to MiX Fleet Manager and compile and upload config to the asset.</p>	Go to step 7	<p>Check the compile error/message or code and correct the error.</p>

7	Switch ignition off	<p>The unit should double-beep when configuration is loaded. Maximum size is 54 kB Retry Period = 2 minutes. Total time to download config and settings should be around 3 minutes.</p> <p>MiX Fleet Manager will update the “Last Position” and “Config Upload Date” on the asset page.</p>
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5 MiX6000 Dual SIM

The MIX6000 currently does not support intelligent selection of SIM cards when dual SIMs are inserted. This means it does not test if the selected SIM works and will not select a different SIM card if this is the case.

5.1 Existing logic

SIM detection (physical presence in SIM holder) is only done after Linux boot up (cold boot, reset), or while the MIX6000 application runs and the SIM presence changes (SIM inserted or removed from the SIM slot).

If the unit powers up for the first time with two SIMs inserted, SIM 1 will be selected by default. If a single SIM is inserted in either slot 1 or slot 2 then the SIM will be detected correctly.

Whichever SIM slot gets selected the first time, will be saved and used as long as it is detected at boot up.

Whenever the saved SIM is removed, the remaining SIM will be used if the dual SIM functionality is used.

5.2 Implications and recommendations

It is safest to advise users to always have the MiX6000 powered up (not in sleep mode) while inserting the dual SIMs to ensure detection is done correctly.

When preparing units for install always first remove all SIMs for 30 seconds and then insert SIM intended to be used FIRST, followed by the backup SIM (if required).

6 International Mobile Equipment Identity (IMEI)

The MiX4000/6000 uses an IMEI number as its unique identifier. All data sent to the MiX Fleet Manager backend uses the IMEI number as a reference. There is no need to plug the unit with an Asset ID, as is the case with the FM.

Mobile device settings

1. Navigate to the Assets page
2. Add the new asset
3. Assign the asset to a MiX4000 or MiX6000 configuration group
4. Click Save
5. A Mobile device settings tab is now available to the left of the screen

6. Select this tab
7. On this page is a “Unique identifier” field
8. Enter the unit’s IMEI number
9. Click Save
10. The unit is now linked to the asset

Notes:

Validation is applied to the “Unique identifier” field in order to ensure that it is unique per Data Centre. The IMEI number should always be 15 numbers long.

An IMEI search is available below Data Centre Administration > IMEI search when searching for an asset linked to the IMEI.

7 Config Admin

7.1 Firmware library

Make the latest version of the MiX4000 Firmware available

7.2 Mobile device library

Navigate to the Mobile device library and make the MiX4000 available

Features and Settings

Base mobile device feature set

Ignition wired	If ignition will be wired then it is very important to enable this option.
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7.2.1 Command interpreter

Enable/disable Command interpreter	Enable the Command interpreter to enable commands to mobile device
Enable/disable progressive shutdown over the air	Same as FM

7.2.2 Require company ID on blue plug

Enable/disable Require company ID on blue plug	Enable if company ID is required on blue plugs
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7.2.3 Send AVLs

Configure the AVL rate - the default is 30 seconds and it is recommended to change this to match the AVL rate of the FMs within the fleet.

7.2.4 Unit Power Management

Unit power is no longer a line on the Mobile device template and is found on the MiX4000/6000 mobile device below Unit power management. Configure this to control the unit’s power management settings.

7.2.5 Peripheral Power Management

Positive drive is no longer a line on the Mobile device template and is now found on the MiX400/6000 mobile device below Peripheral power management. Configure this to control the power management for connected peripherals.

7.3 Peripheral library

7.3.1 CAN Scripts

- CAN J1708 and OBDII Auto Ignition is not supported, only J1939 and OBDII Wired Ignition
- If CAN is used ensure that the relevant CAN script has been made available
 - Verify that “Allow Can speed”, “Allow CAN RPM”, and “Allow CAN Fuel” has been enabled on the script
- Ensure that the following peripheral devices are available:
 - J1708/CAN - Fuel
 - J1708/CAN - Speed
 - J1708/CAN – RPM
- These will be connected to the newly added Speed, RPM and Fuel lines on the Mobile device template. If these are not connected CAN will not record properly.

Notes:

If the J1708/CAN – Fuel is not available on the Fuel line, even if it has been made available and the new peripherals loaded for the organisation, it means that the CAN script was not updated to include the fuel peripheral. Please log a ticket with CSO Support to resolve this.

7.3.2 Frequency devices

- If frequency devices are required please ensure that the relevant peripheral devices have been made available
- Make the following peripheral devices available:
 - If Speed Sender is installed then ensure that Speed from Speed sender is also made available
 - If RPM signal is installed ensure that RPM from RPM signal is also made available
 - If EDM fuel flow meter is used ensure that Fuel from EDM fuel flow meter is also made available
- These will be connected to newly added Speed, RPM, and Fuel lines on the Mobile device template. If these are not connected data will not be recorded properly.

7.3.3 Iridium

- There are two Iridium 9602/9603 modems available in the library
- One connects to the FM and the other to the MiX4000/6000
- When selecting the modem on the serial line it will only display the Iridium modem that can be connected to that Mobile device i.e. if it is a MiX4000/6000 mobile device template then only the MiX4000/6000 Iridium will display in the dropdown list
- The MiX4000/6000 Iridium has fewer settings exposed and therefore a new peripheral was created
- Development is planned to make it easier differentiate the two from within the library

7.4 Mobile device template

Line	Connection	Notes
C1	CAN script	Connect the required CAN script.
C2	3D module - DTCO download	C2 can only be used for DTCO downloads (Europe only).
F1/I3	Frequency device	Speed sender, RPM signal, EDM fuel flow meter. Shared line so if I3 is required then F1 should not be used.
F2/I4	Frequency device	Speed sender, RPM signal, EDM fuel flow meter. Shared line so if I3 is required then F1 should not be used.
Speed	J1708/CAN – Speed or Speed from Speed Sender	Select the speed source on this line i.e. if CAN then J1708/CAN – Speed and if Speed then Speed from Speed sender
RPM	J1708/CAN – RPM or RPM from RPM signal	Select the RPM source on this line i.e. if CAN then J1708/CAN – RPM and if RPM signal then RPM from RPM signal
Fuel	J1708/CAN – Fuel or Fuel from EDM fuel flow meter	Select the fuel source on this line i.e. if CAN then J1708/CAN – Fuel and if EDM then Fuel from EDM fuel flow meter
I1	Connect required input device	
I2	Connect required input device	
I3/F1	Not connected	Shared line so if frequency device connected to F1 then I3 can't be used
I4/F2	Not connected	Shared line so if frequency device connected to F2 then I3 can't be used
O1	Event controlled output relay drive 1	Previously known as Relay. Event controlled output relay drive 1.
O2	Immobiliser	Previously known as Relay. Immobiliser or Event controlled output relay drive 2. Immobiliser can only be connected to O2.
S1	Serial device	Serial port 1
S2	Serial device	Serial port 2
K	3D module - DTCO download or 3D module - DTCO live	K line can only be used for DTCO downloads (Europe only). 3D module - DTCO live on a MiX4000 requires a K line converter to be installed.
OB1	GPS module	Connected by default. Important to enable External GPS antenna setting if external antenna is connected.
OB2	GSM module	Connected by default.

OB3	3D module	Only the 3D module can be connected on this line (Europe only).
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7.5 Event template

The MiX4000/6000 uses the FM Event engine and therefore makes use of the same events as the FM. You can assign the same event template that the FMs in the fleet use or create a new one.

7.6 Location Template

The MiX4000/6000 uses the same extended config for on-board geofences so the same Location template can be used between FMs and MiX4000s.

8 Configuration

8.1 Config and Settings

The MiX4000/6000 config is a combination of config and settings that is compiled and uploaded to the unit.

What is the difference between config and settings?

- For FM units, only the config contains configuration data for the device.
- On a MiX2000, only settings contains configuration data for the device.
- For the MiX4000 and MiX6000, both config and settings contain configuration data for the device
 - Settings mostly contain configuration data pertaining to the device's physical installation state e.g. ignition state, speed input, relay connections, etc.
 - Config mostly contains event-related configuration data e.g. RIBAS events, custom events, extended config i.e. driver access lists, on-board geofences, etc.
 - **Note:** This is a general rule of thumb - there are exceptions.

8.2 Config Upload

Config is compiled and uploaded from the Configuration groups page.

What happens when a configuration upload is requested?

The upload of a configuration can be requested in two ways:

Immediately - Compile configuration and select "Upload immediately". The configuration compiler service will automatically request the upload when it has completed the compile process.

Not now (compiled configuration saved to the database) – Compile configuration and upload at a later stage.

In both cases any existing pending configuration uploads are cancelled and superseded by the latest request.

Configuration upload actions constitute requests to the comms system (MiX Connect) and still requires the OBC to "pull" the files from MiX Connect. This means that if a unit does not have an active connection with the server no notification will be initiated by the server to enable the transfer process. In short, all data transfers (commands, configuration uploads), are initiated from the unit.

After what amount of time does a config upload request expire?

Unless cancelled by a newer request, config upload requests remain valid for a period of 7 days.

What to do if the transfer of settings or config files fail

If the transfer of settings and/or config has failed (as reported on the Comms log), a new compile and upload of the unit's configuration will be required.

When does a config file get applied?

Config gets applied out-of-trip, i.e. when received by the OBC during a trip, it is staged and only applied after the trip has ended. E.g. for the case of the MiX4000/MiX6000 you might see the file transfer complete during a trip (by viewing the Comms log), but the unit can only go into a Configuration accepted state after the trip has ended (displayed in the "Configuration status" column on the Configuration Groups page) and the unit has sent the configuration loaded message.

When does a settings file get applied?

Settings for MiX2000/MiX4000/MiX6000 get applied upon receipt by the OBC, i.e. immediately and regardless of the trip state. In firmware version 4.2.x for all platforms, this will be changed to both only apply out of trip.

8.3 Comms log for Config and Settings

Config

- Configuration file loaded from database – New configuration command created
- Waiting for unit to connect – Command sent to unit awaiting response
- Notifying unit of new configuration file – Command received and acknowledged by unit
- Transfer completed successfully – Config transfer completed
- Transfer failed – Config transfer failed
- Transfer cancelled – Config transfer cancelled

Settings

- Settings file loaded from database – New settings command created
- Waiting for unit to connect – Command sent to unit awaiting response
- Notifying unit of new settings file – Command received and acknowledged by unit
- Transfer completed successfully – Settings transfer completed
- Transfer failed – Settings transfer failed
- Transfer cancelled – Settings transfer cancelled

Notes:

We do not display a Configuration accepted status in the Comms log and this should be verified on the Diagnostics modal or Configuration groups page – A successful transfer does not mean the config has been applied i.e. accepted.

Currently we'll only display the last command for Config and Settings sent to the unit in the comms log.

The comms log is not as detailed as the FM comms log. Development work is planned to enhance this.

8.4 Scheduler

The MiX4000/6000 does not have a scheduler. Config, settings and FW are applied as soon as the unit is in the correct state to accept these. Users are no longer able to select a date and time that the config or FW

should be loaded. It is also important to note that Config and FW can no longer be loaded via a Custom group or Org group/Site as this is a Scheduler specific functionality.

8.5 Time

How does the unit get its time?

The unit gets its time the first time it gets a GPS fix. The unit will not go into trip until it has a time larger than the year 2000.

8.6 Calibration of Frequency Devices

Calibration of frequency devices (such as the Speed Sender and RPM signal) can currently only be done via the MiX TechTool. The EDM fuel flow meter is still calibrated server-side.

8.7 Fuel

A configuration compile and upload is required after calibration changes are made to fuel.

9 Firmware

9.1 Uploading firmware over-the-air

1. Navigate to Configuration groups
2. Click on the actions dropdown next to an Asset or Configuration Group
3. Select Upload Firmware

9.2 MiX4000 - Firmware upload process

Phase 1 – Sending Command to unit

1. The command is issued to MiX Connect that the unit needs to download firmware.
2. MiX Connect waits for the unit to connect so that it knows to which IP to send the command. It will wait up to 3 days to send this command. There are also retries built into sending this command down to the unit.
3. MiX Connect sends the new command down to unit with firmware particulars (size, type, etc.).

Phase 2 – Downloading the firmware package

1. Once the unit receives a new command, it will try to download the firmware by requesting the block of data.
2. Since the unit asks for the next data block it is in control of the download at this point.
3. The unit keeps downloading firmware until complete unless a Cancel command is received, or if a new Transfer command is received.
4. A firmware download will resume if the unit reboots for any reason during the download.

Phase 3 – Application of the firmware package

1. Once the complete package has been downloaded, the firmware verifies the package for target type and checksum.
2. If the firmware is acceptable a transfer complete command is sent back to MiX Connect.
3. The installation service then logs an upgrade firmware command for the bootloader and then reboots the unit in order to enter the bootloader.
4. This checks the firmware type and checksum and then applies the firmware.

The firmware for a MiX4000 is approximately 420 Kbyte in size and, depending on the network connection, it can take between 10 minutes and 20 minutes to download over-the-air (OTA).

The firmware for a MiX6000 is 60 MB and can take an hour or more to download and apply.

After what amount of time does a firmware upload request expire?

Unless cancelled by a newer request, firmware upload requests remain valid for a period of 3 days.

When does firmware get applied?

Firmware for MiX2000/MiX4000/MiX6000 devices gets applied upon receipt by the OBC, i.e. immediately and regardless of the trip state for all firmware versions before 4.0.x Firmware versions 4.2.x and higher only applies the firmware out of trip.

How do the retries work, how many tries and over what period?

The device will retry downloading as long as the schedule stays active on the server. It will resume from the last point of success.

There are 2 stages here.

1. State 1 is getting the command to the unit and has 10 retries, each at 2 minutes. If it failed sending the command to the unit 10 times (because the unit did not acknowledge the command), the request is cancelled.
2. State 2 is if the unit accepted and acknowledged the command. The unit will then request the data from the server. If this takes longer than 3 days, the server will send a cancel command to the unit at which point the unit will stop requesting the firmware.

What takes priority when config and firmware uploads are scheduled at the same time?

MiX2000/MiX4000/MiX6000 configuration uploads always get priority when requested. If a firmware upload has been scheduled but not commenced when a config upload is requested, the firmware upload is cancelled and automatically rescheduled after the config upload.

9.3 Comms log for FW uploads

- Firmware package loaded from database – New firmware command created
- Waiting for unit to connect – Command sent to unit awaiting response
- Notifying unit of new firmware package – Command received and acknowledged by unit
- Transfer completed successfully – Firmware transfer completed
- Transfer failed – Firmware transfer failed
- Transfer cancelled – Firmware transfer cancelled

Notes:

Currently we only display the last commands for Firmware sent to the unit in the comms log and not a history of commands.

9.4 CAN Firmware

CAN firmware is embedded into the MiX4000/6000 FW so there is no longer a need to load separate CAN FW.

9.5 MiX4000 Serial Upgrader

The serial upgrader is a software tool that allows the user to upgrade firmware on the bench. Firmware versions older than V1.5.11 can only be upgraded with the Serial Upgrader as earlier versions sometimes experienced problems upgrading over-the-air. Any firmware version including V1.5.11 can be upgraded OTA during or after the installation process. When using the serial upgrader it should take less than 5 minutes to upgrade the FW.

Tools required

- Windows PC/Laptop
- Serial Harness
- USB to Serial Converter - only required if you do not have a serial port on the PC that terminates in a DB9 connector
- DB9 Female-to-Female Null Modem cable
- Serial upgrader for latest FW version

Notes:

The MiX6000 firmware cannot be serially upgraded, only over-the air or in emergency cases via USB stick.

10 MiX4000/6000 Data

The MiX4000/6000 makes use of a new communications system and does not work with the legacy FMSS comms solution. The MiX4000/6000 sends data via GSM to MiX Connect. MiX Connect then publishes it to an Incoming Service within the Device Integration Service (DIS). The DIS then sends it to Lightning (Data store) via the Lightning Outgoing Service. This data is then displayed in the MiX Fleet Manager user interface.

What happens when a unit goes out of coverage?

- The unit will continue to log events.
- The rate at which event storage is used depends on configuration and settings (how often events/AVLs are logged).
- Event storage is a circular buffer – this means that if full, old data will be overwritten by new data.
- If the unit is out of coverage for too long, old data will be lost when it is overwritten by new data.
- The MiX6000 can log considerably more data than the MiX4000 before event storage becomes full.

What are DAT-files and message backups?

DAT-files and message backups are archiving mechanisms used by the FM Downloader (DAT-files) and DIS (Message Backups) for analysis and issue investigation purposes.

On the FM, trips and passive events (i.e. events not sent immediately) are consolidated in a single upload that occurs at trip-end (or optionally when requested by a user via the scheduler). These are processed and stored as DAT-files server-side and then archived.

All DIS-supported devices (MiX2000/MiX4000/MiX6000/Teltonika/G52/Remora/Oyster/TDI) are stored upon receipt before being forwarded to the DIS DataProcessor. These are stored in a dedicated database for a specific retention period (normally 60 days).

11 Fleet Admin

11.1 Diagnostics

The Diagnostics modal for the MiX4000/6000 differs from the FM.

Asset details

Asset description
Registration number
Asset ID
Organisation
Site
Asset type
Status
Vehicle Identification Number (VIN)
Asset site time

Configuration details

Configuration group
Configuration status
Configuration status time

Mobile device details

Raw unit date & time
Mobile device
IMEI
IMSI
Firmware version
Firmware version upload date
Hardware version
External battery voltage
Internal battery voltage
Internal battery state
Internal battery temperature

Peripheral details

Line	Connection
C1	
C2	
F1	
F2	
Speed	
RPM	
Fuel	
I1	
I2	
I3	
I4	
O1	

O2
S1
S2
K
OB1
OB2
OB3

Trip information

Trip mode
Driver
Speed
Odometer
Engine hours
Current sub-trip distance

GPS status information

Longitude
Latitude
GPS velocity
Heading
Number of satellites
HDOP
Age of data

Latest position information

Date and time of last AVL
Longitude
Latitude
GPS velocity
Heading
Number of satellites
HDOP
Age of data
Distance since last record

Notes:

There are some missing diagnostic information including GSM signal quality, APN, Speed, RPM, Trip mode time, values for inputs.
The diagnostic modal does not auto refresh, users need to click on the refresh icon.
The information displayed is read from the Database and a request for status information is no longer sent to the unit.

11.2 Trips

GPS lock

The MiX4000/6000 requires GPS lock in order to record the first trip. Ensure that the unit is installed correctly, GPS facing upwards and away from impediments. It is also recommended to install a GPS antenna. Remember to select this in the config to ensure better GPS performance.

How are trips constructed?

MiX4000/6000 trips are constructed by the DIS DataProcessor by combining all trip-related events (trip start/end, subtrip start/end) at the end of the trip. These messages are sent as they occur by the OBC (FM Event Engine) and temporarily stored by the DIS DataProcessor. When the end-of-trip is received, these temporarily stored trip-related messages are assembled to construct a completed trip.

What is the difference between trips and subtrips?

Trips are recorded when a configurable set of conditions are met, e.g. ignition on/off and/or speed/revs detected. A trip comes to an end when these conditions are again met and additionally only when the unit's "Arming Delay" (also configurable) is reached.

Subtrips can only occur within trips and are governed by movement (speed / GPS position). Subtrips are ended when movement ends, but only after the "Standing Delay" is reached. Only FM, MiX4000 and MiX6000 units record subtrips.

New unit remained in trip even after config download?

MiX4000/6000s from factory will go into trip on voltage alone. While it remains in trip it will not apply config. Switch power off or lower voltage to apply config.

11.3 Tacho

Tacho is sent independently of trips and therefore it is possible to see tacho on the timeline before a trip has appeared. Tacho is sent via a Block Transfer Service (BTS) to MiX Connect. Tacho on the MiX4000/6000 also records until the arming delay has completed which differs from the FM where it only records until Ignition off.

How does tacho get packaged and sent, as this differs from FM?

FM

- FM logs its tacho separately just like the MiX4000/6000 does.
- Tacho files get uploaded at trip end or trip start (depending on config).
- All Tacho is sent via UDP (FM only does UDP).

MiX4000

- Tacho gets logged in 512 byte files on the unit.
- Tacho files get sent in 8 kByte blocks through a TCP connection.
- Tacho gets sent immediately when the 8 kB block is full while in trip.
- At trip end the remaining tacho files (which is left over from the 8 kBytes block) is sent.

11.4 Odometer and Engine Hours

Odometer and Engine hours data are no longer stored on the device. The FW sends raw odometer and engine hours data at the end of each trip. An offset is stored on the server that is applied to the raw value in order to display the correct odometer and engine hours values. Odometer and engine hours no longer have to be scheduled to be sent to the unit. Odometer and Engine hours are updated on an Asset level and can be found on the Mobile device settings tab.

When does odometer and engine hour updates get applied?

On the MiX2000/MiX4000/MiX6000 actual odometer and engine hours values are stored server-side and updated at trip-end.

11.5 Server-Side Events

Since the MiX4000/6000 only sends data actively it is important to note that Server-side events work differently to that of the FM. FM uses both AVLs and passive data to generate SSEs. The MiX2000/4000/6000 only uses AVLs.

11.6 Access Control

The MiX4000/6000 only supports unit based access control and not plug based. When the access control list is updated a configuration compile and upload is required.

11.7 Plugs

The MiX4000/6000 only supports the blue Driver plug and the red Hours of Service plug.

12 Additional Notes

Connectivity

The MiX4000 is heavily reliant on GSM connectivity and GPS lock in order to commission and record trips so it currently does not support offline installs i.e. in areas with no coverage.

Satellite's always seem to be a 12 even when no fix, but HDOP = 0

The GPS information is time-stamped. Thus all data shown is as it were on that point in time. If the unit lost lock, only the fix status will be cleared. The old position is kept, while just the lock status is changed to reflect that there is no fix. This is done in order to keep track of where the unit last had a valid position.

13 Diagnostic Tools

13.1 MiX TechTool

The MiX4000/6000s are Bluetooth enabled devices, which allows the MiX TechTool mobile application to connect to the devices and read parameters from the unit.

It is available on Android and iOS and can be downloaded from the Play store or App Store.

Log in using your MiX Fleet Manager credentials.

Displays Asset details, Installation summary, and Diagnostics.

Ability to set odo, engine hours, and APN if required.

Used to calibrate Speed sender and RPM signal.



Notes:

Bluetooth will switch off after 12 hours so it is important to power cycle a unit that has been on for longer than this amount of time otherwise connection to the unit will fail.