

# Technical Reference

Vaisala DigiCORA<sup>®</sup> Sounding System  
**MW41**



**VAISALA**

PUBLISHED BY

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# 1. About this document

## 1.1 Version information

This manual provides information on using and maintaining Vaisala DigiCORA Sounding System MW41 and its components. Information on the sounding processing subsystem and its plug-in units is given in *Vaisala Sounding Processing Subsystem SPS311G Technical Reference* and *Vaisala Sounding Processing Subsystem SPS341AG Technical Reference*.

This manual consists of maintenance and advanced-level user tasks. For information on operating the MW41 sounding software, see the online help, embedded in the MW41 sounding software. The information is also available in PDF format on the installation media.

For information on installing the software, see *Vaisala DigiCORA Sounding System MW41 Getting Started Guide*, also available on the installation media.

Table 1 Document versions

Document code	Date	Description
M211415EN-Y	October 2020	Updated for MW41 sounding software version 2.17. Removed references to RS92 and GC25, as they are no longer supported.
M211415EN-W	May 2019	Updated for MW41 sounding software version 2.15. Added information on BUFR 3'09'056 and 3'09'057.
M211415EN-V	February 2019	Updated for MW41 sounding software version 2.14.

## 1.2 Related manuals

Table 2 Related manuals

Document code	Name
M211429EN	<i>Vaisala DigiCORA Sounding System MW41 Getting Started Guide</i>
-	<i>Vaisala DigiCORA Sounding System MW41 Online Help</i> , available in the software web user interface
M211477EN	<i>Upgrading MW11/12/15, MW21 and MW31 to Sounding System MW41 Technical Reference</i>
M211667EN	<i>Vaisala Radiosonde RS41-SG and RS41-SGP User Guide</i>
M211752EN	<i>Vaisala Radiosonde RS41-SGM User Guide</i>
M211952EN	<i>Vaisala Radiosonde RS41-D User Guide</i>
M211596EN	<i>Vaisala Sounding Processing Subsystem SPS311G Technical Reference</i>
M212199EN	<i>Vaisala Sounding Processing Subsystem SPS341AG Technical Reference</i>

Document code	Name
M211594EN	<i>Creating Defense Messages with DigiCORA Sounding System MW41 User Guide</i>
M211690EN	<i>Vaisala Observation Network Manager NM10 User Guide</i>

## 1.3 Documentation conventions



**WARNING! Warning** alerts you to a serious hazard. If you do not read and follow instructions carefully at this point, there is a risk of injury or even death.



**CAUTION! Caution** warns you of a potential hazard. If you do not read and follow instructions carefully at this point, the product could be damaged or important data could be lost.



**Note** highlights important information on using the product.



**Tip** gives information for using the product more efficiently.



Lists tools needed to perform the task.



Indicates that you need to take some notes during the task.

## 1.4 Trademarks

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## 2. Product overview

### 2.1 Introduction to Vaisala DigiCORA Sounding System MW41

Vaisala DigiCORA Sounding System MW41 processes, analyses, archives, and relays sounding data. The system consists of a computer (sounding workstation) that runs the sounding software and is connected to a sounding processing subsystem via a network adapter. The sounding processing subsystem contains the processor units for PTU (Pressure, Temperature and Humidity) and wind finding, and appropriate connections to the required antennas.

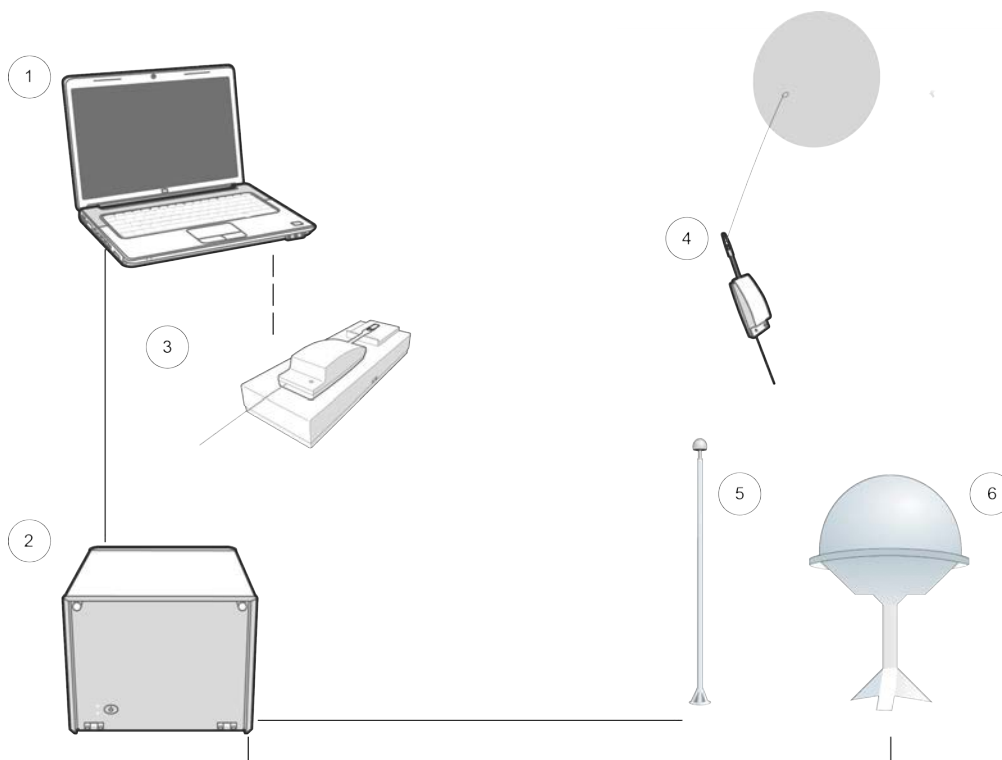


Figure 1 DigiCORA Sounding System MW41 setup

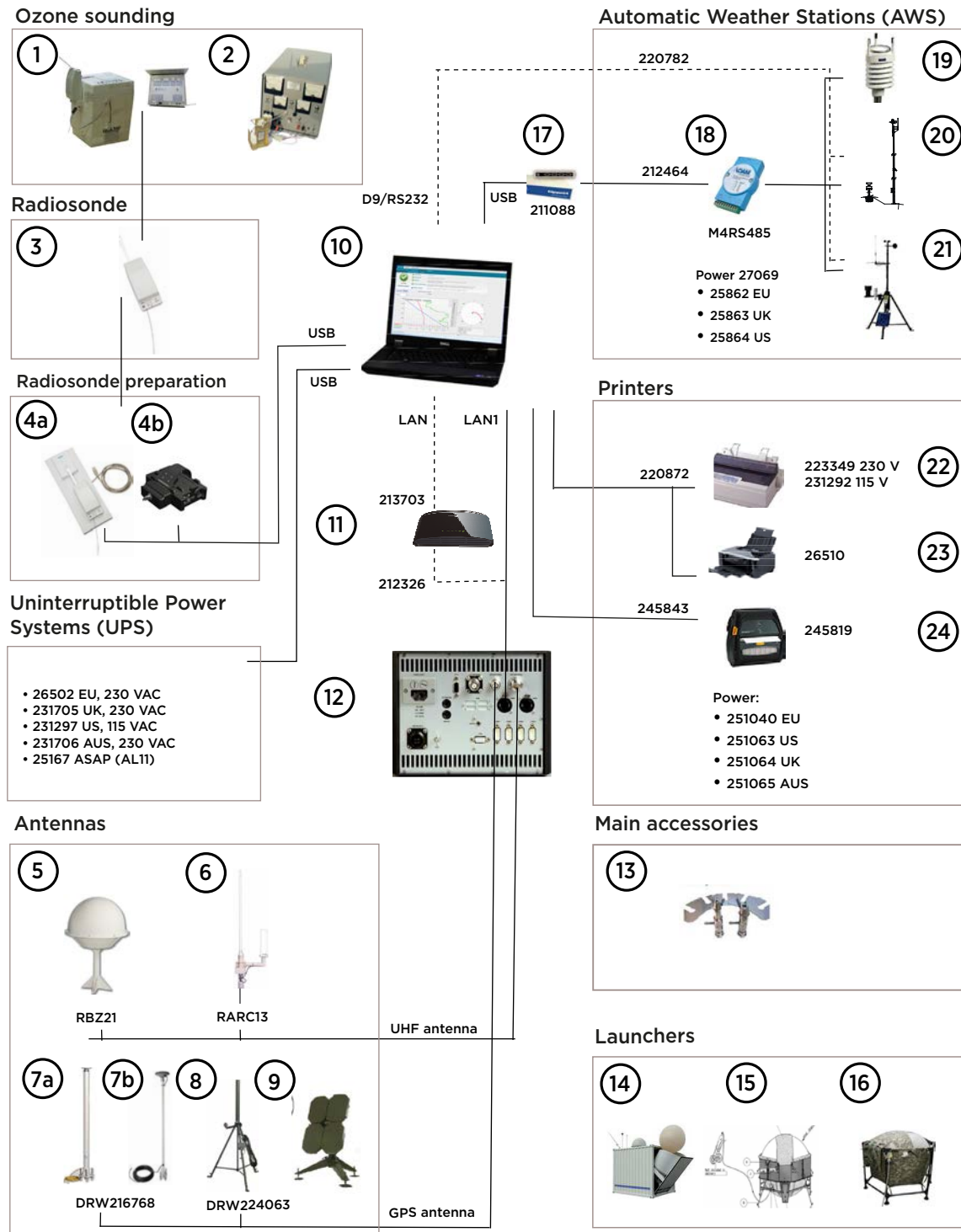
- 1 Sounding workstation
- 2 Sounding Processing Subsystem SPS3xx
- 3 Ground Check Device RI41
- 4 Radiosonde RS41
- 5 GPS antenna
- 6 UHF antenna

Table 3 Compatibility

Item	Description
Radiosondes	Vaisala Radiosonde RS41-SG Vaisala Radiosonde RS41-SGP Vaisala Radiosonde RS41-SGM Vaisala Radiosonde RS41-D RS41 refers to all Radiosonde RS41 models.
Sounding processing subsystems	Vaisala Sounding Processing Subsystem SPS311G Vaisala Sounding Processing Subsystem SPS341AG SPS3xx refers to both SPS311G and SPS341AG.
Ground check devices	Vaisala Ground Check Device MWH322 Vaisala Ground Check Device RI41 Vaisala Ground Check Device RI41-B with a barometer module. RI41 refers to both RI41 and RI41-B.
Wind finding	Vaisala Radiotheodolite RT20 Vaisala Radiotheodolite RT20A Vaisala Radiotheodolite RT20M RT20 refers to all the above.
Printing sounding data	Printer options: <ul style="list-style-type: none"> <li>• Matrix printer 23</li> <li>• Inkjet printer 24</li> <li>• Portable thermal printer</li> </ul>
Remote monitoring	Vaisala Observation Network Manager NM10 software

## 2.1.1 Sounding System MW41 system architecture

The next figure presents Sounding System MW41 system architecture with optional components. For detailed information on the system components, see the appropriate documentation.



- 1 RS41 with flight box and Ozone Sensor Interface Card OIF411
- 2 Ozonizer/Test Unit TSC-1
- 3 Vaisala Radiosonde RS41
- 4a Ground Check Device RI41 for RS41
- 4b Ground Check Device MWH322 for RS41
- 5 Directional Antenna RB31, ASAP-specific model RB31AL



- 6 Omnidirectional Antenna RM32 or RM31N, ASAP-specific model RM32AL
- 7a GPS Antenna GA31/N, ASAP-specific model GA31AL
- 7b GPS Antenna GA41
- 8 Portable Antenna CG31
- 9 Radiotheodolite RT20
- 10 Sounding workstation PC
- 11 Ethernet switch
- 12 Sounding Processing Subsystem SPS3xx
- 13 Vaisala Filling Balance FB13
- 14 ASAP Launcher ALS211
- 15 Balloon Launcher FB15 for 100 ... 350 g balloons, FB16A for 100 ... 600 g balloons
- 16 Balloon Launcher FB32
- 17 Edgeport. Not needed with desktop computer.
- 18 RS232/485 converter
- 19 Weather Transmitter WXT536
- 20 QML201-based weather station, for example AWS310 or AWS430
- 21 MAWS201M TacMet® Weather Station
- 22 Matrix printer
- 23 Inkjet printer
- 24 Portable thermal printer

## 2.1.2 MW41 sounding software

MW41 sounding software provides user-friendly tools for preparing radiosondes, for following soundings, creating messages and sending them forwards. It consists of the sounding processing software running as services on the sounding workstation and an optional remote client for remote access/use.

### More information

- [Requirements for sounding workstation \(page 15\)](#)
- [Requirements for remote client \(page 16\)](#)

### 2.1.2.1 Requirements for sounding workstation

Table 4 Sounding workstation requirements

Property	Description/Value
Supported operating systems	Windows 10 Pro 64-bit (English) .NET version 4.5 or later is required.
Supported web browsers	<ul style="list-style-type: none"> <li>• Microsoft Edge (latest version)</li> <li>• Mozilla Firefox (latest version)</li> <li>• Google Chrome (latest version)</li> </ul>

Property	Description/Value
Minimum hardware requirements	<ul style="list-style-type: none"> <li>• Processor Intel Pentium Dual Core or equivalent, Quad core recommended</li> <li>• Memory 8 GB RAM</li> <li>• Hard Disk Space 160 GB</li> <li>• Display 1366 × 768</li> <li>• Serial port, either integrated or via USB/RS232 converter, for possible Automatic Weather Station (AWS)</li> <li>• USB port for RI41</li> <li>• Ethernet adapter</li> </ul>



**CAUTION!** When taking computers not delivered by Vaisala into use, check energy saver and similar settings of the computer. Default settings may cause shutdown of computer parts if there is a long time period with no input from the user, for example, during a sounding. This might result in a lost sounding.



**CAUTION!** Make sure that your computer name follows the URI RFC syntax. For example, the name may not contain an underscore \_ . If some characters are not recognized as valid URI, this may prevent MW41 from starting.

### 2.1.2.2 Requirements for remote client

It is recommended to use devices that fulfill the same requirements as for sounding workstations. However, it is likely that devices with lower hardware specifications, or other browsers can be used.

## 2.2 Safety

Vaisala DigiCORA Sounding System MW41 delivered to you has been tested for safety and approved as shipped from the factory. Note the safety precautions.



**WARNING!** Ground the product and verify outdoor installation grounding periodically. Failure to provide proper grounding can result in injury or death from electrical shock and can severely damage the equipment.



**WARNING!** Do not substitute parts or modify the system, or install unsuitable parts in the system. Improper modification can damage the product or lead to malfunction.

### 2.2.1 ESD protection

Electrostatic Discharge (ESD) can damage electronic circuits. Vaisala products are adequately protected against ESD for their intended use. However, it is possible to damage the product by delivering electrostatic discharges when touching, removing, or inserting any objects in the equipment housing.

To avoid delivering high static voltages to the product:

- Handle ESD-sensitive components on a properly grounded and protected ESD workbench or by grounding yourself to the equipment chassis with a wrist strap and a resistive connection cord.
- If you are unable to take either precaution, touch a conductive part of the equipment chassis with your other hand before touching ESD-sensitive components.
- Hold component boards by the edges and avoid touching component contacts.

## 3. MW41 message generation

### 3.1 Message types

The messages and their structure are defined under **Messages** in the **Administration** section of the MW41 sounding software. For information on how to create the messages, see the on-line help for the MW41 sounding software, embedded in the software.

#### 3.1.1 Standard messages

The standard MW41 sounding software can generate the following standard messages:

Table 5 Standard messages

Message	Description
FM 35-XI Ext. TEMP	Upper-level pressure, temperature, humidity and wind reports from a fixed land station
FM 36-XI Ext. TEMP SHIP	Upper-level pressure, temperature, humidity and wind reports from a sea station
FM 38-XI Ext. TEMP MOBIL	Upper-level pressure, temperature, humidity and wind reports from a mobile land station
FM 32-XI PILOT	Upper-wind report from a fixed land station
FM 33-XI PILOT SHIP	Upper-wind report from a sea station
FM 34-XI PILOT MOBIL	Upper-wind report from a mobile land station
3'09'050	BUFR for wind sounding (Pressure - PILOT)
3'09'051	BUFR for wind sounding (Height - PILOT)
3'09'052	BUFR for temperature, humidity and wind sounding
3'09'056	BUFR for descending sounding. Includes WIGOS identifiers.
3'09'057	BUFR for temperature, humidity, and wind sounding type data with higher precision of pressure and geopotential height. Includes WIGOS identifiers.

#### 3.1.2 Licensed message options

- Defense messages are available with a separate licence.
- 3'09'053 - BUFR down message requires the Advanced option.
- NILU and World Ozone and Ultraviolet Radiation Data Centre operated by Environment Canada (WOUDC) messages require the Special sensor option.
- WMO FM 75-X CLIMAT TEMP - Report of monthly aerological data from a land station. Requires the Advanced option.

### 3.1.2.1 Defense messages

The following defence messages are available with a licence:

Table 6 Defense messages

Message	Description
METB2/METB3	Standard Ballistic Meteorological Message (STANAG 4061)
METCM	Standard Artillery Computer Meteorological Message (STANAG 4082)
METFM	Standard Fallout Meteorological Message (STANAG 2103)
METSR	Sound Ranging Meteorological Message
METSRX	Sound Ranging Meteorological Message
METTA	Standard Target Acquisition Meteorological Message (STANAG 4140)
METEO 11	Eastern block Ballistic Meteorological Message

For more information on defense messages, see *Creating Defense Messages with DigiCORA Sounding System MW41 User Guide*.

## 3.2 Adding data to BUFR309052

WMO regulations for BUFR309052 allow including additional data after the sequence 309052. The data will be appended at the end of the message.

The default additional data contains the following:

- 0'01'081 Radiosonde serial number
- 0'01'082 Radiosonde ascension number
- 0'02'017 Correction algorithms for humidity measurements
- 0'02'067 Radiosonde operating frequency
- 0'02'095 Type of pressure sensor
- 0'02'096 Type of temperature sensor
- 0'02'097 Type of humidity sensor
- 0'02'191 Geopotential height calculation
- 0'25'061 Software identification and version number.
- 2'05'Y Signify character (to allow insertion of Y characters as a data field of Y x 8 bits in length).



Vaisala uses numbers 060 for letter Y, that is, 2'05'060.

- Any value name with data type SZ. MW41 uses this to store the reason for termination as a text file.

### 3.3 Message end-of-line marker

By default, every message line in a textual message contains a `\0x0d\0x0a` at the end, which means CR+LF (carriage return and line feed).

### 3.4 Special sequences in messages

Message headers can include special sequences starting with a `~` character (tilde). These special sequences are expanded into their positions, containing specific information in a certain format. Message headers containing special sequences can be included in any message.

When you have selected option **Customer defined filenaming convention** as the message destination in MW41, you can also use special sequences in file names.

One time-expanding sequence always consists of five parts.

#### 3.4.1 Special sequences: time

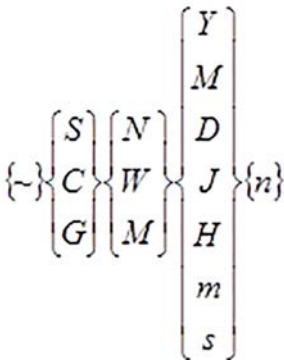


Figure 2 Special sequence parts for expanding time

The following table shows the special sequence letter descriptions related to time.

Table 7 Special sequence letter descriptions (time)

Sequence letter	Description
~	Start of the sequence (ASCII character 7E hexadecimal)
S	Expand start time to this position
C	Expand current time to this position
G	Expand UTC time to this position
N	No time rounding
W	Time rounding according to the WMO rules (rounding to the nearest whole hour)

Sequence letter	Description
M	User-defined time rounding
Y	Year
M	Month
D	Day
J	Julian date
H	Hour
m	Minutes
s	Seconds
n	Number of digits used

The Special Sequence group consists of the above five parts, for example, ~SNH2, all of which **must** be included when creating a group.

In the example above, the sounding start time with no time rounding would be expanded to give a position with two digits for an hour.

For User-defined time rounding (M), the used time rounding is defined in the configuration settings in **Administration > Advanced > Sounding > Messages > WMO > Header time round-up** and **Header time round-down**.

## 3.4.2 Adding information to messages

### 3.4.2.1 Special sequences: value

Another type of special sequence can be used to access information that is stored in the database. This information may either be included in the message headers, or applied as user-defined file naming conventions.

The format is shown below.

```
~V|value|subvalue|format string|
```

The following table shows the letter descriptions related to value.

**Table 8** Special sequence letter descriptions (value)

Sequence letter	Description
~	Tilde sequences always start with a ~ character.
V	Expands a database value to this position.
value	Definition of the data, e.g. station.
subvalue	Subvalue of data definition, e.g. name of the station.

Sequence letter	Description
format string	The width of the field and the number of digits in the decimal fraction of the value. The format is width.precision. The default alignment is right, but width.precision aligns the text to the left. Format string is not mandatory and may also be left out.
	Separator character.    means that format string is missing between the separators.

The following table shows the formatting explanations.

**Table 9** Supported value and subvalue fields for ~V sequence

Tilde sequence	Value
~V RADIOSONDE NUMBER	Radiosonde serial number
~V STATION NAME	Station name
~V STATION NUMBER	Station number
~V STATION LATITUDE	Station latitude
~V STATION LONGITUDE	Station longitude
~V STATION ALTITUDE	Station altitude
~V STATION ICAO	ICAO Station ID
~V STATION FAA	AWIPS XXX (FAA) ID
~V STATION WBAN	WBAN
~V MESSAGE NAME	Message type name
~V MESSAGE NAME	Message name
~V TIMINGOFSOUNDING  RSACTUALLAUNCHTIMEASC	Radiosonde launch time
~V METADATA <metadata key>	Value assigned to <metadata key> from sounding metadata table. See <metadata key> values in next table.

**Table 10** Supported metadata key values

Metadata key	Description
PARACHUTE	Is a parachute used? Valid metadata values for this key are YES and NO.
FLIGHT_NUMBER	Ascension / flight number.
RELEASE_NUMBER	Sounding attempt for a FLIGHT_NUMBER.
BALLOON_TYPE_CODE	Balloon type code.
BALLOON_WEIGHT	Balloon weight (g).
BALLOON_MANUFACTURER	Balloon manufacturer.
TRAIN_LENGTH	Radiosonde wire length (m).



Metadata key	Description
TRAIN_REGULATOR	Is an unwinder used? Valid metadata values for this key are YES and NO.
LIGHTING_UNIT	Is a lighting unit used? Valid metadata values for this key are YES and NO.
SOUNDING_DATE	Sounding date [yyyy-mm-dd]. For example, <b>2018-01-31</b> .
SOUNDING_TIME	Sounding time [HH:mm]. For example, <b>09:01</b> .
NOZZLE_LIFT	Nozzle lift (g).
BALLOON_MANUFACTURE_DATE	Balloon manufacturing date [yyyy-mm-dd]. For example, <b>2018-01-31</b> .
BALLOON_AGE	Balloon age at the time of loading / manual sounding in months (calculated based on BALLOON_MANUFACTURE_DATE).
BALLOON_MANUFACTURE_LOT	Balloon manufacturing LOT number.
FREE_TEXT	Free text entered by operator.
SONDE_SERIAL_NUMBER	Radiosonde serial number.
SONDE_TYPE	Radiosonde type, for example, RS41-SG.
SONDE_BUFR_TYPE	Radiosonde typecode for BUFR messages according to WMO Common Code Table 0 02 011.
SONDE_BUFR_P_SENSOR_TYPE	Radiosonde pressure sensor typecode for BUFR messages according to WMO BUFR Table B section 0 02 095.
SONDE_BUFR_T_SENSOR_TYPE	Radiosonde temperature sensor typecode for BUFR messages according to WMO BUFR Table B section 0 02 096.
SONDE_BUFR_U_SENSOR_TYPE	Radiosonde humidity sensor typecode for BUFR messages according to WMO BUFR Table B section 0 02 097.
OBSERVER_NAME	Observer name
SOUNDING_ID	Sounding ID, for example, <b>9edc58f8-00a6-42bd-bd4d-abda5ff5ed44</b> .
LAUNCH_SITE_GEOPOTENTIAL_HEIGHT	Launch site geopotential height (m).
LAUNCH_SITE_MSL_HEIGHT	Launch site geometric height from mean sea level (m).
LAUNCH_SITE_LATITUDE	Launch site latitude (deg).
LAUNCH_SITE_LONGITUDE	Launch site longitude (deg).
LAUNCH_SITE_DIRECTION_OFFSET	Launch site direction offset (deg).
LAUNCH_SITE_DISTANCE_OFFSET	Launch site distance offset from station location (m).
LAUNCH_SITE_ALTITUDE_OFFSET	Launch site altitude offset from station location (m).

Metadata key	Description
REASON_FOR_TERMINATION	Reason for termination as string.
NWS_REASON_FOR_TERMINATION	Reason for termination code.
SIMULATION_COMMENT	Only present when sounding was simulated. Contains either the source sounding ID or path to the sounding archive file.
ASCENT_RATE_SURFACE_TO_400HPA	Average ascent rate from surface to 400 hPa (m/s).
ASCENT_RATE_400HPA_TO_TERMINATION	Average ascent rate from 400 hPa to sounding termination (m/s).
ASCENT_RATE_SURFACE_TO_TERMINATION	Average ascent rate from surface to sounding termination (m/s).
TERMINATION_HEIGHT	Ascending sounding termination height (m).
TERMINATION_PRESSURE	Ascending sounding termination pressure (hPa).
ARCHIVE_RECOMPUTE_COUNTER	Number of archived recalculations.
GAS_TYPE	Gas type as string.
GAS_VOLUME	Gas volume (l).

Configuration example:

```
TEMP_A;Station;~V|STATION|NAME|_|~V|RADIOSONDE|NUMBER| |
;Long_~V|STATION|LONGITUDE|3.5|;Lat_~V|STATION|LATITUDE|2.5
|;RSLaunch_~V|TIMINGOFSOUNDING|RSACTUALLAUNCHTIMEASC| |
;Start_~SNY4,~SWM2,~SWD2_~SWH2,~SNm2,~SNs2.txt
```

Output example:

```
TEMP_A;Station;Vaisala_;G2524099;Long_024.87901;Lat_60.28154
;RSLaunch_075916;Start_2013,12,12_08,59,16.txt
```

Table 11 No\_Data examples

Tilde sequence	Result	Reason
~V STATION NAEM	No data	Misspelled word NAEM (name).
~V STATION NAME	Vaisala	Station name was found and read from database.

### 3.4.2.2 Adding user-defined information to messages

A special sequence “~F” is used to add user-defined information into message headers or file names. The information is uploaded to MW41 via XML parameter files the user has created following a standard XML syntax.

Files containing the desired information are uploaded in a configuration branch before they are taken into use. Uploading takes place in the MW41 configuration pane, in **Administration > Sounding > Special Sequences**. For detailed information on uploading sequence files, see the online help, embedded in the MW41 sounding software.

Two types of information files are supported:

- Tagged text fields
- Tagged key value fields

Below is an example file with tagged text fields, *TaggedFields.xml*:

```
<?xml version="1.0" encoding="utf-8"?>
<Location>
  <!--An example how to expand tagged text fields with the sequence "~F"
-->
  <NameStr value="Vaisala"></NameStr>
  <System value="MW41"></System>
  <Department value="Production"></Department>
</Location>
```

The following presents an example of how to pick tagged text fields using the ~F tilde sequence:

```
~F|TaggedFields|Location|NameStr||_~F|TaggedFields|Location|System||_~F|
TaggedFields|Location|Department||.txt
```

The expanded string results in text:

```
Vaisala_MW41_Production.txt
```

The file extension *.xml* has been omitted when referencing the uploaded file.

Next is an example file *MonthNames.xml* with tagged key value fields:

```
<?xml version="1.0" encoding="utf-8"?>
<Month>
  <!-- An example how to expand tagged key-value fields with the sequence "~F"
-->
  <Name key="01" value="January"></Name>
  <Name key="02" value="February"></Name>
  <Name key="03" value="March"></Name>
  <Name key="04" value="April"></Name>
  <Name key="05" value="May"></Name>
  <Name key="06" value="June"></Name>
  <Name key="07" value="July"></Name>
  <Name key="08" value="August"></Name>
  <Name key="09" value="September"></Name>
  <Name key="10" value="October"></Name>
  <Name key="11" value="November"></Name>
  <Name key="12" value="December"></Name>
</Month>
```

The following shows an example of how to pick tagged key value fields using the ~F tilde sequence:

```
~CND2 ~F|MonthNames|Month|Name<~CNM2>|| ~CNY4.txt
```

As an expanded string, the date 2014-05-09 results in text

```
09 May 2014.txt
```

Another tilde sequence may also be used as a key to retrieve the respective value field in the uploaded file. The parameter is enclosed in angle brackets. For example, <~CNM2>, as shown in the example above.

An erroneous tilde sequence string leaves the entire sequence output unexpanded. For example, the following string is missing a right angle bracket

```
~CND2 ~F|MonthNames|Month|Name<~CNM2|| ~CNY4.txt
```

which will leave the sequence unexpanded.

This may further lead to an error event during message output which states that an attempt has been made to use illegal file path definition in forming a file name. Thus, you are recommended to first check the validity of a sequence using message headers.

## 3.5 Rounding header time

Rounding is generally understood in this context to refer to the standard time of meteorological observations (0000, 0600, 1200 and 1800 UTC).

The default setting is made according to the WMO rules. The round up/round down time is set to 30/30 minutes, respectively.

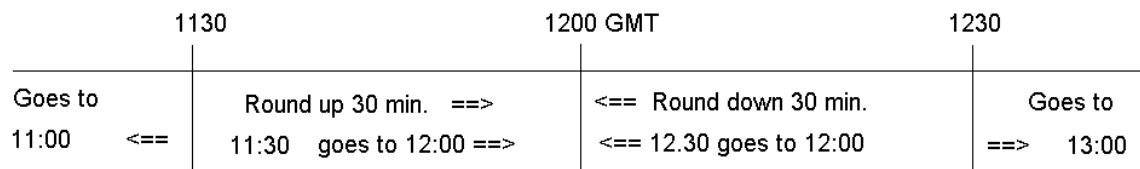


Figure 3 30-minute rounding

Consequently, if the actual time of starting, in other words, the release of the balloon, falls within the setting of the round up/down time, the rounding will be to the nearest standard time of meteorological observations.

According to the actual setting(s), the program will try to round the Hdr time up or down to the nearest standard time. However, when the time of release falls outside the rounding time setting, the time is only rounded up or down, irrespective of the rounding time setting(s), to the nearest whole hour. The rounding times of Hdr are set independently of each other. For example, were the round up/down time set to 60/60 minutes for both Hdr, the result would be as shown below:

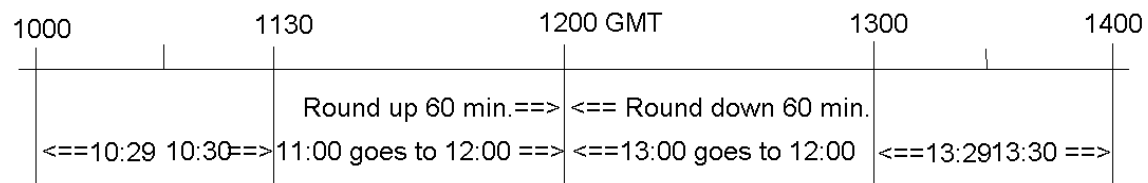


Figure 4 60-minute rounding

According to a WMO recommendation, the actual time of regular upper air observation should be as close as possible to (H-30), H being the standard time of the observation. WMO also recommends that the height of 100 hPa should be reached on the hour exactly of the standard time of observation. However, the flight time taken to reach this level is usually close to 45 minutes, which means that the two requirements are not always attainable or compatible. It is therefore up to the users (meteorological office, country) to decide their priority.

Example number 1:

```
<CR><LF>
<CR><LF>
~SWY2~SWM2~SWD2 ~SWH2:~Swm2<CR><LF>
<CR><LF>
```

This will give message time rounding according to WMO rules. The start of the message could look, for example, like this:

```
890907 12:00
TTAA 57121 02313
99018 13520 34001 00167 11912 15007 85434 06150 26506
70930 13741 etc. ....
```

Example number 2:

```
Started<SP>at:<SP>~SNH2:~SNm2<CR><LF>
```

This will give no time rounding in the header. The start of the message could look, for example, like this:

```
Started at: 11:31
TTAA 78121 02313
99018 13520 34001 00167 11912 15007 85434 06150 26506
70930 13741 etc. ....
```

Example number 3:

```
Sounding<SP>at:<SP>~SMH2:~SMm2<CR><LF>
```

The user-defined time rounding for the message header is defined with two keys in the configuration settings in **Administration > Advanced > Messages > WMO > Header time round-up**.

Table 12 Header time rounding

Name	Default	Description
Header time round-up	30	Maximum value for time rounding up for message header in minutes
Header time round-down	30	Maximum value for time rounding down for message header in minutes

Instead of using default values (30/30), set the suitable value(s), for example: 60/60 minutes, respectively.

If the balloon was released at, for example, 1100 UTC, the start of the message would look like this:

```
Sounding at: 12:00
TTAA 78121 02313
99018 13520 34001 00167 11912 15007 85434 06150 26506
70930 13741 etc.....
```

## 3.6 WMO definitions

### Synoptic observation

A surface or upper air observation made at standard time

### Synoptic hour

An hour expressed in terms of UTC, at which, by international agreement, meteorological observations are made simultaneously throughout the globe. The international agreement stipulates that the standard time at which the upper air observations are carried out, are 0000, 0600, 1200 and 1800 UTC.

### 3.6.1 Extract from code form on TEMP/PILOT reports

#### Section 1 Identification and position data

- TEMP message:

M<sub>i</sub>M<sub>i</sub>M<sub>j</sub>M<sub>j</sub> YYGGI<sub>d</sub> I I I I

For example:

```
TTA A 78061 02313
```

- PILOT message:

M<sub>i</sub>M<sub>i</sub>M<sub>j</sub>M<sub>j</sub> YYGGa<sub>4</sub> I I I I

For example:

```
P P A A 7 8 0 6 0 02313
```

Table 13 Specifications of symbolic letters

Letters	Specification
M <sub>i</sub> M <sub>i</sub>	Identification letters of the report. A TEMP / PILOT report is identified by M <sub>i</sub> M <sub>i</sub> = TT / PP
M <sub>j</sub> M <sub>j</sub>	Identification letters of the report. Part A is identified by M <sub>j</sub> M <sub>j</sub> = AA
YY	Day of the month (UTC), with 01 indicating the first day, 02 the second day, etc., on which the actual time of observation falls. When wind speeds are given in knots, 50 is added to YY. When the speeds are given in meters per seconds, YY is not modified.
GG	Actual time of observation, to the nearest whole hour UTC. The actual time of observation is the time at which the balloon is actually released.
I <sub>d</sub>	Indicator used to specify the hundreds of hectopascals figure of the pressure relative to the last standard isobaric surface for which the wind is reported.
a <sub>4</sub>	Type of measuring equipment used.

## 3.7 CLIMAT message

CLIMAT is an application that produces the WMO FM 75-X CLIMAT TEMP message – a monthly report of aerological data from a land station. CLIMAT is available with the Advanced option.

CLIMAT is a post-processing application; the averages are usually calculated once per month. The source data for CLIMAT are the EDT and STD data mappings from synoptical soundings performed during one month. Calculation parameters are retrieved from the database.

To create a CLIMAT message, you need the files available on the MW41 sounding software installation media, in folder

`\MW41\ScriptLibrary\Climat`

The CLIMAT files are *ClimatTools.py* and *Climat.py.config*. Instructions for creating a CLIMAT message are included in the online help, embedded in the MW41 sounding software.



### 3.7.1 CLIMAT application parameters

Figure 5 CLIMAT parameters window

The following table presents the CLIMAT application parameter descriptions. The default values are set by editing file *Climat.py.config*.

Table 14 CLIMAT application parameter descriptions

Parameter	Description
StationName	Name of the station
StationNumber	WMO station number of the station
StatYear	Year of the report to be produced
StatMonth	Month of the report to be produced
StatUTC (0-23)	Lists the UTC hours to be included in the report, separated by spaces. These are usually the UTC times of the soundings. WMO standard hours are 0, 6, 12 and 18.
UTCShift (h)	Maximum time shift (in UTC) allowed between the start time of the sounding (release of balloon) and the defined UTC hour (listed on StatUTC line). If the start time is too far from the defined UTC hours, the observation is excluded from the statistics.

Parameter	Description
MaxMisObs (%)	Maximum acceptable number of missing observations
MaxMisDays	Maximum acceptable number of calendar days without observations
MaxMisUTC	Maximum acceptable number of observation times without data
MaxMisGap (d)	Maximum acceptable number of consecutive days (gap) without data

The additional parameters can only be set by configuring script *Climat.Tools.py*.

Table 15 Additional CLIMAT application parameters

Parameter	Description
__ReportUpExtrapolatedLevels__	0=No, 1=Yes. Default is 0.

Definitions for the statistics are given in the following table.

Table 16 Statistics file definitions

Column heading	Description
H	Mean height of valid observations
P	Mean pressure
T	Mean temperature
Dewp	Mean dew point temperature
DpD	Mean dew point depression
u	Mean north component of wind, in other words, the sum of individual u values/number of observations
v	Mean east component of wind, in other words, the sum of individual v values/number of observations
Vddd	Direction of the mean vector wind; the mean wind vector is that given by u and v (above)
V <sub>ff</sub>	Length of the mean vector wind, in other words,
ff	Mean wind speed, in other words, the sum of individual ffs/number of observations
Stdff	100%*(V <sub>ff</sub> /ff)

The first row under the unit definitions corresponds to ground level; all the others correspond to WMO standard levels.

Since the wind direction usually varies in observations, V<sub>ff</sub> and ff are not equal. If the wind direction in all observations had been the same, there would have been no difference between the calculated mean vector wind V<sub>ff</sub> and the wind speed ff.

### 3.7.2 CLIMAT TEMP file structure


Code form:



```

CLIMAT TEMP  MMJJJ      llll
g. P0P0P0T0  T0T0D0D0D0
H1H1H1H1nT1  nT1T1T1T1D1  D1D1nv1rf1rf1  dv1dv1dv1fv1fv1
H2H2H2H2nT2  nT2T2T2T2D2  D2D2nv2rf2rf2  dv2dv2dv2fv2fv2
.....
.....
HnHnHnHnnTn  nTnTnTnTnDn  DnDnnvnrfnrfn  dvndvndvnfvnfvn

```

Where:

Letters	Specification
MM	Month of the year (01 ... 12)
JJJ	Three last digits of the year (for example, 999)
ll	WMO block number
g	<p>Observation time indicator:</p> <ul style="list-style-type: none"> <li>• 1: 0000 UTC</li> <li>• 2: 1200 UTC</li> <li>• 3: 0000 and 1200 TUC</li> <li>• 4: 0600 UTC</li> <li>• 5: 1800 UTC</li> <li>• 6: 0600 and 1800 TUC</li> <li>• 7: 0000, 1200 and either 0600 or 1800 UTC</li> <li>• 8: 0600, 1800 and either 0000 or 1200 UTC</li> <li>• 9: 0000, 0600 and 1200 and 1800 UTC</li> <li>• 10: Other hours</li> </ul> <div>  <p>The times of observation are one hour or less from the reported time.</p> </div>
_____P <sub>0</sub> P <sub>0</sub> P <sub>0</sub>	Monthly mean surface pressure, in whole hectopascals, omitting the thousands digit at the time of release of the radiosonde.

Letters	Specification
<div>_____</div> <div>T<sub>0</sub>T<sub>0</sub>T<sub>0</sub></div>	<p>Mean monthly air temperature, in tenths of a degree centigrade, at station level at the time of release of the radiosonde.</p> <p>For negative temperatures, 500 shall be added to the absolute value of the mean temperature (for example, 05.5 -&gt; 05.5 (absolute value) -&gt; 55 (in tenths of a degree) -&gt; 555 or 12.4 -&gt; 12.4 -&gt; 124 -&gt; 624)</p> <div>  <p>The first digit is situated in a different group from the two others.</p> </div>
<div>_____</div> <div>D<sub>0</sub>D<sub>0</sub>D<sub>0</sub></div>	<p>Monthly mean station level dew point depression, in tenths of a degree centigrade (0.1C).</p>
<div>_____</div> <div>H<sub>1</sub>H<sub>1</sub>H<sub>1</sub>H<sub>1</sub></div> <div>_____</div> <div>H<sub>2</sub>H<sub>2</sub>H<sub>2</sub>H<sub>2</sub></div> <div>.....</div> <div>_____</div> <div>H<sub>n</sub>H<sub>n</sub>H<sub>n</sub>H<sub>n</sub></div>	<p>Mean geopotentials of specified pressure surfaces, in standard geopotential meters.</p> <p>In the case of geopotentials above 9 999 standard geopotential meters, the figure indicating the number of tens of thousands shall be omitted.</p>
<div>n<sub>T1</sub>n<sub>T1</sub></div> <div>n<sub>T2</sub>n<sub>T2</sub></div> <div>....</div> <div>n<sub>Tn</sub>n<sub>Tn</sub></div>	<p>Number of days in the month for which temperature observations are missing for the specified isobaric surfaces.</p> <div>  <p>The digits are situated in different groups.</p> </div>
<div>_____</div> <div>T<sub>1</sub>T<sub>1</sub>T<sub>1</sub></div> <div>_____</div> <div>T<sub>2</sub>T<sub>2</sub>T<sub>2</sub></div> <div>_____</div> <div>T<sub>n</sub>T<sub>n</sub>T<sub>n</sub></div>	<p>Mean monthly air temperature, in tenths of a degree centigrade, at special isobaric surfaces.</p> <p>For negative temperatures, 500 shall be added to the absolute value of the mean temperature (for example, -50.0 = 000, -62.4 = 124, etc...)</p>
<div>_____</div> <div>D<sub>1</sub>D<sub>1</sub>D<sub>1</sub></div> <div>_____</div> <div>D<sub>2</sub>D<sub>2</sub>D<sub>2</sub></div> <div>.....</div> <div>_____</div> <div>D<sub>n</sub>D<sub>n</sub>D<sub>n</sub></div>	<p>Monthly mean dew point depression, in tenths of a degree centigrade (0.1C) at specified isobaric surfaces</p>
<div>n<sub>v1</sub></div> <div>n<sub>v2</sub></div> <div>...</div> <div>n<sub>vn</sub></div>	<p>Number of days for which temperature observations are missing for the specified isobaric surface concerned (n<sub>v</sub>= 9) if observations are missing for 9 or more days.</p>

Letters	Specification
$r_{f1}r_{f1}$ $r_{f2}r_{f2}$ ... $r_{fn}r_{fn}$	Steadiness of wind at specified isobaric surfaces.  The steadiness factor is the ratio of speed to the monthly mean vector wind to the speed of the monthly mean scalar wind expressed as a percentage. It is reported to the nearest one percent.
_____ $d_{v1}d_{v1}d_{v1}$ _____ $d_{v2}d_{v2}d_{v2}$ ..... $d_{vn}d_{vn}d_{vn}$	True direction, in whole degrees, of the monthly mean vector wind at specified isobaric surfaces.  500 shall be added to direction when the speed of the monthly mean vector wind is 100 knots or more, up to 199 knots.
_____ $f_{v1}f_{v1}$ _____ $f_{v2}f_{v2}$ .... _____ $f_{vn}f_{vn}$	Speed, in knots, of the monthly mean vector wind at specified isobaric surfaces.

## 3.8 Customer-specific reports

To create customer-specific reports, you need the generic python script files available on the MW41 sounding software installation media, location `\MW41\ScriptLibrary`.

Table 17 Python script files

File	Purpose
<i>ReportMain.py</i>	For configuring MW41 events, sounding data and parameters
<i>BaseReport.py</i>	Base class for the sounding report
<i>LayerReport.py</i>	For reporting layers, for example, height
<i>SpecialReport.py</i>	For creating the customer-specific report

Customer-specific reports scripts are available on the MW41 sounding software installation media, location `\MW41\ScriptLibrary\Reports`.

## 3.9 Combining TEMP and PILOT messages

The python script interface includes a method to access the generated messages. This makes it possible to combine TEMP and PILOT messages. For this purpose, the MW41 sounding software installation DVD includes script files, available on the installation media in `\MW41\ScriptLibrary\MessageCombiner`.

Table 18 TEMP and PILOT script files

File	Purpose
<i>MessageCombiner.py</i>	Main script. Normally this script should not be edited.
<i>CombinerConfigurations.py</i>	Configuration file where the combined message format, message name and message destinations can be configured

For more information, see the script files and the online help, embedded in the MW41 sounding software.

## 3.10 SMS AWS interface messages

### 3.10.1 Data message characteristics

The generic format of the response message sent from the automatic weather station (AWS) to MW41 is:

```
(S:<station name>;D:<YYYYMMDD>;T:<HHMMSS>;<tag 1>:<value 1>;...<tag N>:<value N>)
```

Only ASCII characters a-z, A-Z, whitespace, '+', '-', '/', '\_' or numbers 0 ... 9 are allowed in the observation value. Negative numbers are also allowed.

A missing value is indicated with '/' character (ASCII 47).

Characters : and ; are not allowed in the observation tag.

Table 19 Data message symbols

Symbol	Description
(	ASCII start character
)	ASCII end character
:	Tag and value delimiter
;	Element delimiter

Symbol	Description
<CR>	Carriage return character, ASCII code: 0xD (13)
<CRC>>	CRC Checksum
<LF>	Line feed character, ASCII code 0xA (10)
<tag>	Observation code
<value>	Observation value
D:YYYYMMDD;T:HHMMSS	D: UTC date of report generation according ISO 8601, delimiters omitted. T: UTC time of report generation according ISO 8601, delimiters omitted.

### 3.10.2 CRC calculation

CRC is 32-bit checksum, which is calculated over all characters, except <CR> and <LF>.

The checksum has a fixed length of 8 characters, and it is presented in ASCII HEX format. If the actual checksum value is shorter than 8 characters, leading zero(s) must be added.

The properties of the checksum are:

- Polynomial: 0x04C11DB7
- Initial value: 0xFFFFFFFF
- Reverse data bytes: True
- Reverse CRC result: True
- Invert result bits: True

#### 3.10.2.1 Observations message

MW41 sends the following command to AWS for getting observations:

- SMSOBS

The observations reply message consists of the following observations and respective message tags:

**Table 20** Observations reply message

Observation	Period	Description	Message tag
Air pressure	Instant	Air pressure [hPa]	PA     hPa
Air pressure	10 minute average	Air pressure [hPa]	PA AVG PT10M   hPa
Air temperature	Instant	Air temperature [°C]	TA     degC
Air temperature	10 minute average	Air temperature [°C]	TA AVG PT10M   degC
Relative humidity	Instant	Relative humidity [%]	RH     %
Relative humidity	10 minute average	Relative humidity [%]	RH AVG PT10M   %

Observation	Period	Description	Message tag
Wind direction	Instant	Wind direction [deg]	WD     deg
Wind direction	Instant	Wind direction [deg]	WD AVG PT3S   deg
Wind direction	10 minute average	Wind direction [deg]	WD AVG PT10M   deg
Wind speed	Instant	Wind speed [m/s]	WS     mps
Wind speed	Instant	Wind speed [m/s]	WS AVG PT3S   mps
Wind speed	10 minute average	Wind speed [m/s]	WS AVG PT10M   mps
Sea water temperature	Instant	Sea water temperature [°C]	TW     degC
Sea water temperature	10 minute average	Sea water temperature [°C]	TW AVG PT10M   degC

Example of the observations reply message:

```
<SOH>SMS 1<STX>(S:TEST_STATION;D:20170815;T:092549;PA| || |hPa|:1010.598;PA|AVG|PT10M| ||hPa|:1012.216;TA| || |degC|:14.363;TA|AVG|PT10M| ||degC|:13.753;RH| || |%|:44.303;RH|AVG|PT10M| ||%|:45.379;WD| || |deg|:178.938;WD|AVG|PT10M| ||deg|:180.374;WS| || |mps|:12.501;WS|AVG|PT10M| ||mps|:12.499;TW| || |degC|:7.500;TW|AVG|PT10M| ||degC|:7.500;)8A39FCB1<CR><LF><ETX>
```

### 3.10.2.2 Version information message

MW41 sends the following command to AWS for getting the version information:

- SMSVER

The version information reply message consists of the following tags:

**Table 21** Version information reply message

Version information	Description	Message tag
HWVER	Hardware version string	HWVER
SWVER	Software version string	SWVER
CFGVER	Configuration version string	CFGVER

The value for version information is a human-readable string.

Example of the version information reply message:



```
<SOH>SMS 1<STX>(S:TEST_STATION;D:20170815;T:092552;HWVER||||:AWS hardware  
version 1.0;SWVER||||:AWS software version 3.2.4 build 32;CFGVER||||:AWS  
configuration for Vaisala MW41 ver. 1;)7DF6EA7C<CR><LF><ETX>
```

All serial line parameters can be configured from MW41. The default values to be used are:

- Baud rate: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1

## 4. MW41 data

### 4.1 Location of data in MW41

For information on creating reports and scripts, see also the online help embedded in the MW41 sounding software.

By default, the MW41 sounding system data files are stored in *C:\Program Files\Vaisala\MW41* (32 bit) or *C:\Program Files(x86)\Vaisala\MW41* (64 bit), where the following folders are created:

- *Bin*
- *BufrTables*
- *DB*
- *DBScript*
- *Messages*

By default, log files and imported script files are stored on the C: drive in respective subfolders found under path *C:\ProgramData\MW41*.

Sounding data (archived soundings) are backed up and stored on the D: drive, if drive D: exists on the computer. If not, the sounding data is stored on *C:\SoundingArchive*.

If drive D: exists on the computer, folder *D:\SoundingUpload* is used to upload sounding \*.*mw*x datafiles to the sounding database archive.

Files can be uploaded using the **Upload** function in MW41 **Archive** view, or as batches by copying them to the *SoundingUpload* folder using, for example, Windows Explorer. System services detect the copied files and upload them to the sounding database archive. The copied files are deleted from the *SoundingUpload* folder after they have been uploaded to the database.

### 4.2 MW41 data formats

Each sounding results in a backup datafile (file extension \*.*mw*x), exported from the sounding archive to a default local disk folder, *D:\SoundingArchive*.

The backup files contain multiple separate XML-formatted datafiles, each of them holding different type of data. To save disk space, the files are zipped (compressed). To unzip (extract) the contents, you can use any unzipping program you like, for example, 7-zip, available for downloading at [www.7-zip.org](http://www.7-zip.org). The contents of the \*.*mw*x file are configurable and they are minimized to contain only the essential data sets.

You can also set the sounding system to generate an *.spf* file in addition to \*.*mw*x file.

As with XML files in general, the contents of a subfile are human-readable and self-explanatory.

## 4.3 Sounding data during degraded mode

If one or more radiosonde sensors get broken or the GPS calculation fails during a sounding, but it is still possible to continue the profiling of some parameters, MW41 switches to the degraded mode.

MW41 continues the sounding in the degraded mode after the maximum interpolation time is exceeded for the failed measurement(s). The parameters reported by MW41 during the degraded mode depend on the measurement(s) missing and on the radiosonde type in use as described below.

In the degraded mode, WMO messages are reported normally. The missing measurement data is marked in the messages according to the message format.

**Table 22** Sounding data during degraded mode

Radiosonde	Measurements failed	Parameters reported
RS41-SG or RS41-SGM	Temperature sensor (T)	Winds: Reported normally using GPS Geopotential height: Reported normally using GPS
RS41-SG or RS41-SGM	Humidity sensor (U) and/or temperature sensor (UT)	Winds: Reported normally using GPS Temperature: Reported normally GPS-based pressure: Calculated using predefined, typical atmospheric humidity profile, which leads to slightly increased uncertainty in the reported value.
RS41-SGP	Pressure sensor (P)	MW41 switches to the calculation mode used for radiosonde RS41-SG (GPS-based pressure). EDT data and messages are reported normally with the accuracy specified for RS41-SG.
RS41-SGP	Temperature sensor (T)	Winds: Reported normally using GPS Geopotential height: Sensor-based geopotential height is lost, but GPS-based geopotential height is reported normally. Sensor pressure: Reported normally
RS41-D	Humidity sensor (U) and/or temperature sensor (UT)	Winds: Reported normally Sensor-based geopotential height: Calculated using predefined, typical atmospheric humidity profile, which leads to slightly increased uncertainty in the reported value. Sensor pressure: Reported normally Temperature: Reported normally

### 4.3.1 Sounding data during degraded mode, RS41-SG or RS41-SGM

#### 4.3.1.1 Following measurements failed: T

If the temperature sensor (T) fails in a sounding with radiosonde RS41-SG or RS41-SGM, the following parameters are reported:

- Winds: Reported normally using GPS
- Geopotential height: Reported normally using GPS

#### 4.3.1.2 Following measurements failed: U / UT

If the humidity sensor (U) and/or temperature sensor (UT) on the humidity chip fails in a sounding with radiosonde RS41-SG or RS41-SGM, it prevents the reporting of humidity only.

- Winds: Reported normally using GPS
- Geopotential height: Reported normally
- Temperature: Reported normally
- GPS-based pressure: Calculated using predefined, typical atmospheric humidity profile, which leads to slightly increased uncertainty in the reported value.

### 4.3.2 Sounding data during degraded mode, RS41-SGP

#### 4.3.2.1 Following measurements failed: P

If the pressure sensor (P) fails in a sounding with radiosonde RS41-SGP, MW41 switches to the calculation mode used for radiosonde RS41-SG (GPS-based pressure). EDT data and messages are reported normally with the accuracy specified for RS41-SG.

#### 4.3.2.2 Following measurements failed: T

If the temperature sensor (T) fails during a sounding with radiosonde RS41-SGP, the following parameters are reported:

- Winds: Reported normally using GPS
- Geopotential height: Sensor-based geopotential height is lost, but GPS-based geopotential height is reported normally.
- Sensor pressure: Reported normally

### 4.3.3 Sounding data during degraded mode, RS41-D

#### 4.3.3.1 Following measurements failed: U / UT

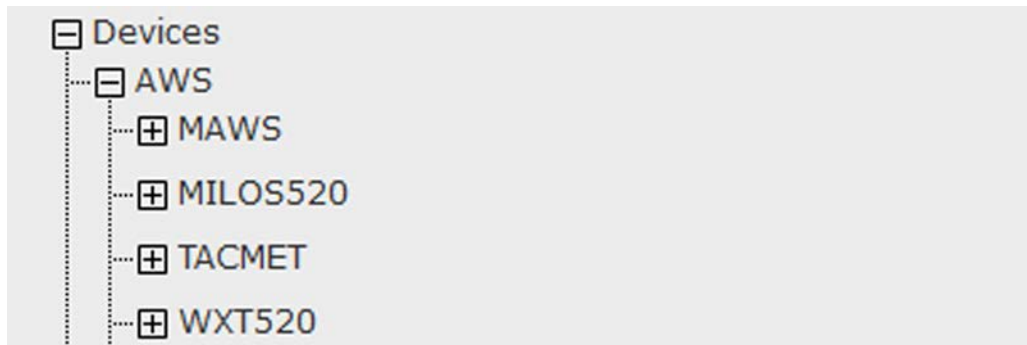
If the humidity sensor (U) and/or temperature sensor (UT) on the humidity chip fails during a sounding with radiosonde RS41-D:

- Winds: Reported normally
- Sensor-based geopotential height: Calculated using predefined, typical atmospheric humidity profile, which leads to slightly increased uncertainty in the reported value.
- Sensor pressure: Reported normally
- Temperature: Reported normally

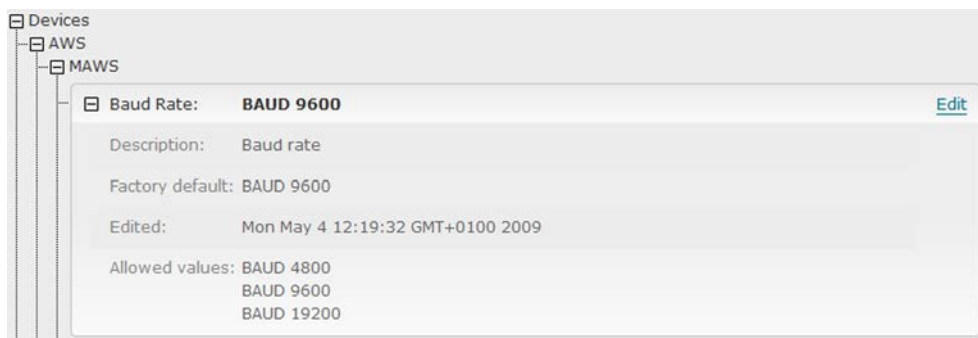
## 5. MW41 advanced configuration

### 5.1 Viewing and editing advanced configuration data

- ▶ 1. To access the advanced configurations in MW41, click **Administration** on the application toolbar and select the **Advanced** tab.
- 2. To view the system settings, click the **+** sign to open the folder that contains the setting you wish to view.  
For operator-level configuration settings, see the online help, embedded in the MW41 sounding software.



The configuration view includes a description of the setting, the default value, allowed values, and the time when the setting has been edited.



3. To edit the setting, click **Edit** and **Save**. To restore the default values set at the factory, click **Restore default value**.

The screenshot shows a configuration window for MAWS. On the left, a tree view shows 'Devices' > 'AWS' > 'MAWS'. The main area displays the 'Baud Rate' setting, which is currently set to 'BAUD 9600'. Below this, it shows the 'Description: Baud rate', 'Factory default: BAUD 9600', and 'Edited: Mon May 4 12:19:32 GMT+0100 2009'. A list of 'Allowed values' includes 'BAUD 4800', 'BAUD 9600', and 'BAUD 19200'. At the bottom, there is a note '\* Field required.' and three buttons: 'Restore default value', 'Save', and 'Cancel'.

## 5.2 Devices

In **Devices**, you can configure the settings for automatic weather stations. See:

- [Automatic Weather Station \(AWS\) \(page 44\)](#)

### 5.2.1 Automatic Weather Station (AWS)

Table 23 File AWS

Setting	Allowed values	Factory default	Description
Expiration time	1 ... 240	120	Surface weather expiration time in minutes.

Table 24 Generic AWS

Setting	Allowed values	Factory default	Description
Baud rate	4800 9600 19200	9600	
Data bits	7, 8	8	Data bits
Parity bits	None Even Odd	None	Parity bits
Read observations command		SMSOBS	Read observations command

Setting	Allowed values	Factory default	Description
Read version command		SMSVER	Read version command
Read timeout	0 ... 10000	5000	Read timeout in ms
Stop bits	One Two OnePointFive	One	Stop bits
Write timeout	0 ... 10000	5000	Write timeout in ms

Table 25 MAWS

Setting	Allowed values	Factory default	Description
Baud rate	4800 9600 19200	9600	
Data bits	7, 8	8	Data bits
Device identifier	-	A	Device identifier character
Parity bits	None Even Odd	None	Parity bits
Read timeout	0 ... 10000	5000	Read timeout in ms
Stop bits	One Two OnePointFive	One	Stop bits
Write timeout	0 ... 10000	5000	Write timeout in ms

Table 26 MILOS520

Setting	Allowed values	Factory default	Description
Baud rate	4800 9600 19200	9600	
Data bits	7, 8	8	Data bits
Parity bits	None Even Odd	None	Parity bits
Read timeout	0 ... 10000	5000	Read timeout in ms
Stop bits	One Two OnePointFive	One	Stop bits

Setting	Allowed values	Factory default	Description
Write timeout	0 ... 10000	5000	Write timeout in ms

Table 27 TACMET

Setting	Allowed values	Factory default	Description
Baud rate	4800 9600 19200	9600	
Data bits	7, 8	8	Data bits
Parity bits	None Even Odd	None	Parity bits
Read timeout	0 ... 10000	5000	Read timeout in ms
Stop bits	One Two OnePointFive	One	Stop bits
Write timeout	0 ... 10000	5000	Write timeout in ms

Table 28 WXT

Setting	Allowed values	Factory default	Description
Baud rate	4800 9600 19200	19200	
Data bits	7, 8	8	Data bits
Parity bits	None Even Odd	None	Parity bits
Read timeout	0 ... 10000	5000	Read timeout in ms
Stop bits	One Two OnePointFive	One	Stop bits
Write timeout	0 ... 10000	5000	Write timeout in ms



## 5.2.2 SW radio

Table 29 SW radio

Setting	Allowed values	Factory default	Description
Free channel level limit	-100 ... -50	-80	Free channel limit (dB). When the signal level is above this limit, the frequency is considered to be in use.
Signal treshold	0 ... 100	10	Threshold value (dB) for radio spectrum peak and free frequency detecting. This value is added to the calculated signal noise level to get the actual threshold value.

## 5.3 User interface

In **User Interface**, you can configure the user interface settings. See:

- [Login screen \(page 47\)](#)
- [Locale \(page 47\)](#)
- [User session expiration timeout \(page 48\)](#)

### 5.3.1 Login screen

Table 30 Login screen

Setting	Allowed values	Factory default	Description
Notification Text			Notification text to be displayed in the login window.

### 5.3.2 Locale

Table 31 Locale

Setting	Allowed values	Factory default	Description
Locale	English (U.S.) French (France) German (Germany) Japanese (Japan)	English (U.S.)	Defines the language, country and any special variant preferences of the user interface.

### 5.3.3 User session expiration timeout

Table 32 User session expiration timeout

Setting	Allowed values	Factory default	Description
User session expiration timeout	1 ... 6000	30	Timeout in minutes for a logged in user session to expire if the MW41 application window has been closed. This parameter does not affect active users.

## 5.4 Soundings

In **Soundings**, you can configure the sounding settings. See:

- [Calculations \(page 48\)](#)
- [Significant levels \(page 49\)](#)
- [Start/Stop detection \(page 54\)](#)
- [Synchronized sounding data \(page 55\)](#)
- [Continue descending sounding \(page 55\)](#)
- [Degraded sounding \(page 56\)](#)
- [Entering successful sounding criteria \(page 57\)](#)
- [Database \(page 58\)](#)
- [MWH322 \(page 59\)](#)
- [Messages \(page 59\)](#)
- [RI41 \(page 68\)](#)
- [Reports \(page 70\)](#)
- [Radiosonde \(page 70\)](#)
- [Surface observations \(page 71\)](#)
- [System \(page 72\)](#)

### 5.4.1 Calculations

Table 33 GPS calculation

Setting	Allowed values	Factory default	Description
Use differential corrections	Yes No	Yes	If Yes, differential corrections are used when possible.

Table 34 PTU calculation

Setting	Allowed values	Factory default	Description
Adiabatic duration check start time	0 ... 60	0	Time after launch when minimum duration checking is started in a diabatic test (s).
Include surface level to adiabatic test	Yes No	Yes	Selects if the surface level should be included in the adiabatic test.
Max humidity before release	106 ... 160	120	Maximum humidity value before release.

## 5.4.2 Significant levels

### 5.4.2.1 PTU criteria

Table 35 Humidity

Setting	Allowed values	Factory default	Description
Use temperature SigPs	No Yes	No	If Yes, temperature SigPs are used as basis for humidity. More humidity points are calculated.
Tolerance	0 ... 100	15	Defines the tolerance for determining the relative humidity significant levels (RH%). This tolerance is used throughout the sounding.
Tolerance to join with temp	0 ... 100	6	Defines tolerance for making the RH significant levels coincide exactly with the temperature significant levels (RH%).

Table 36 Isothermal and inversion layers

Setting	Allowed values	Factory default	Description
Humidity change	10 ... 100	20	Defines the change in relative humidity required when determining an isothermal inversion layer (RH%).
Pressure limit	0 ... 1100	300	Defines the pressure level, above which isothermal and inversion layers are not determined (hPa).

Setting	Allowed values	Factory default	Description
Temperature threshold	-	0	Isothermal and inversion layer temperature difference threshold.
Thickness	10 ... 1100	20	Defines the minimum thickness required when determining an isothermal or inversion layers (hPa).

Table 37 Temperature

Setting	Allowed values	Factory default	Description
Pressure level to change tolerances	0 ... 1100	300	Defines the limiting pressure level for changing FirstTolerance (hPa).
Switch tolerance from pressure	No, Yes	Yes	If Yes, temperature tolerance is switched from pressure limit.
Switch tolerance from tropopause	No, Yes	Yes	If Yes, temperature tolerance is switched from tropopause when the tropopause is reached.
First tolerance	-	1	The first temperature tolerance. Defines the tolerance for determining the temperature significant levels in the lower atmosphere (°C). This tolerance is used until the tropopause or the limiting pressure level <b>Pressure level to change tolerances</b> is reached.
Second tolerance	-	2	The second temperature tolerance. Defines tolerance for determining the temperature significant levels in the upper atmosphere (°C). This tolerance is used when the tropopause or the limiting pressure level <b>Pressure level to change tolerances</b> is reached.

Table 38 Force 100 hPa SigP

Setting	Allowed values	Factory default	Description
Force 100 hPa SigP	No, Yes	Yes	Forces the nearest level below 100hPa to be a significant level of temperature and humidity. Must be set to Yes if TEMP message is coded during the ascent (real time TEMP message).

Table 39 Force 1st SigP

Setting	Allowed values	Factory default	Description
Force 1st SigP	No, Yes	No	Defines whether the first edited data level with no interpolated PTU data above the ground is forced to be marked as a significant level for T and RH (and thus be included in the TEMP message).

Table 40 Lowest tropopause level

Setting	Allowed values	Factory default	Description
Lowest tropopause level	0 ... 1100	500	Above and including this pressure, a level will be determined to be a tropopause if it meets the criteria (hPa).

#### 5.4.2.2 Wind criteria

Table 41 Direction

Setting	Allowed values	Factory default	Description
Minimum speed	0 ... 100	5	If wind speed is less than this limit value (m/s), significant levels are not determined for wind direction.

Setting	Allowed values	Factory default	Description
First tolerance	0 ... 359	10	Defines the tolerance (in degrees) for determining the wind speed significant levels in the lower atmosphere. This tolerance is used until the limiting level <b>Pressure level to change tolerances</b> is reached.
Second tolerance	0 ... 359	10	Defines the tolerance (in degrees) for determining the wind speed significant levels in the upper atmosphere. This tolerance is used when the limiting pressure level <b>Pressure level to change tolerances</b> is reached.
Tolerance to join with speed	0 ... 359	6	Tolerance (in degrees) for making wind direction significant levels coincide exactly with the wind speed significant levels.

Table 42 Maximum wind

Setting	Allowed values	Factory default	Description
Low pressure limit	0 ... 1100	500	Above and including this pressure, a level will be determined to be a maximum wind level if it meets the criteria (hPa).
Minimum speed	0 ... 100	30	This and the greater wind speed values will be determined to be a maximum wind level if they meet the criteria (m/s).
Use Canadian criteria	No, Yes	No	Defines whether Canadian rules for reporting maximum wind both below and above 100 hPa level is used.

Table 43 Speed

Setting	Allowed values	Factory default	Description
First tolerance	0 ... 100	5	Defines the tolerance for determining the wind speed significant levels (m/s) in the lower atmosphere. This tolerance is used until the limiting level <b>Pressure level to change tolerances</b> is reached.
Second tolerance	0 ... 100	5	Defines the tolerance for determining the wind speed significant levels (m/s) in the upper atmosphere. This tolerance is used when the limiting pressure level <b>Pressure level to change tolerances</b> is reached.

Table 44 Calculate SigP to missing layer

Setting	Allowed values	Factory default	Description
Calculate SigP to Missing Layer	No, Yes	Yes	If Yes, SigP is calculated in the middle of the missing layer.

Table 45 Force 100 hPa SigP

Setting	Allowed values	Factory default	Description
Force 100 hPa SigP	No, Yes	Yes	If yes, SigP is calculated to the last level over 100 hPa.

Table 46 Force 1st SigP

Setting	Allowed values	Factory default	Description
Force 1st SigP	No, Yes	No	When Yes, forces the first edited data level with no interpolated wind data above ground to be marked as a significant level for dd and ff and thus be included in the TEMP message.

Table 47 Mark calm layers to SigPs

Setting	Allowed values	Factory default	Description
Mark calm layers to SigPs	No, Yes	No	When No, normal TEMP/PILOT message coding is done. When Yes, the lower and upper boundary of calm strata are forced significant points.

Table 48 Mark missing layers to SigPs

Setting	Allowed values	Factory default	Description
Mark missing layers to SigPs	No, Yes	Yes	When Yes, missing layers are marked to SigPs (start and end).

Table 49 Pressure level to change tolerances

Setting	Allowed values	Factory default	Description
Pressure level to change tolerances	0 ... 1100	3	Defines limiting pressure level for changing from First to Second tolerance (hPa).

Table 50 Ignore duration

Setting	Allowed values	Factory default	Description
Ignore duration	0 ... 60	0	Duration (s) from the sounding start during which time levels are ignored from calculation.

### 5.4.3 Start/Stop detection

Table 51 Start/Stop detection

Setting	Allowed values	Factory default	Description
Average descent speed for detecting balloon burst	2 ... 10	4	Defines the threshold value (m/s) for automatic sounding stop detection.
Sounding auto stop	Enabled Disabled	Enabled	Enables or disables automatic sounding stop detection.



Setting	Allowed values	Factory default	Description
Minimum average velocity	0.5 ... 5 0 ... 0	1.9	Defines the minimum average up velocity (m/s) to detect auto start. Value 0 means that this feature is disabled (when detecting start from pressure).

#### 5.4.4 Synchronized sounding data

Table 52 Synchronized sounding data

Setting	Allowed values	Factory default	Description
Data rate	Radiosonde rate 2 s 5 s 10 s 20 s	Radiosonde rate	Time difference between two sequential results.

#### 5.4.5 Continue descending sounding

Table 53 Continue descending sounding

Setting	Allowed values	Factory default	Description
Continue descending sounding	Enabled Disabled	Disabled	Defines whether radiosonde continues transmitting after balloon burst.



EDT data is not calculated during radiosonde descent, and the MW41 EDT graphic is not updated.

## 5.4.6 Degraded sounding

Table 54 Degraded sounding

Setting	Allowed values	Factory default	Description
Degraded sounding	Enabled Disabled	Disabled	Enables the degraded mode. A sounding is degraded when one or more radiosonde sensors get broken or the GPS calculation fails during the sounding, but it is still possible to continue the profiling of some parameters. MW41 continues the sounding after the maximum interpolation time is exceeded for the failed measurement(s).

## 5.4.7 Successful sounding criteria

Table 55 Successful sounding criteria

Setting	Allowed values	Factory default	Description
<b>Gap duration</b>			
Humidity	0 ... 18 000	0	Defines the maximum duration (s) for a gap in humidity data continuity in the sounding. 0 means that the value is not in use.
Pressure	0 ... 18 000	0	Defines the maximum duration (s) for a gap in pressure data continuity in the sounding. 0 means that the value is not in use.
Temperature	0 ... 18 000	0	Defines the maximum duration (s) for a gap in temperature data continuity in the sounding. 0 means that the value is not in use.
Wind	0 ... 18 000	0	Defines the maximum duration (s) for a gap in wind data continuity in the sounding. 0 means that the value is not in use.
<b>Gap height</b>			

Setting	Allowed values	Factory default	Description
Humidity	0 ... 50 000	0	Defines the maximum height limit (m) for a gap in humidity data continuity in the sounding. 0 means that the value is not in use.
Pressure	0 ... 50 000	0	Defines the maximum height limit (m) for a gap in pressure data continuity in the sounding. 0 means that the value is not in use.
Temperature	0 ... 50 000	0	Defines the maximum height limit (m) for a gap in temperature data continuity in the sounding. 0 means that the value is not in use.
Wind	0 ... 50 000	0	Defines the maximum height limit (m) for a gap in wind data continuity in the sounding. 0 means that the value is not in use.
Maximum height	0 ... 50 000	0	Defines the lowest height (gpm) which the radiosonde must reach for the sounding to be successful. 0 means that the value is not in use.
Continuous measurands	Pressure Temperature Humidity Wind	-	Defines which of the measurands are in use for gap duration and gap height. Enter the measurand(s) you want to use and make sure to include the semi-colon, e.g. <b>Pressure;</b> MW41 checks data continuity for the measurements defined and terminates the sounding if there are gaps longer than defined in <b>Gap Height</b> or <b>Gap Duration</b> parameters.
Minimum duration	0 ... 300	0	Minimum duration (in minutes) for the sounding to be successful.
Minimum pressure	0 ... 1100	0	Minimum pressure (hPa) for the sounding to be successful.

#### 5.4.7.1 Entering successful sounding criteria

1. Enter the values for **Maximum Height**, **Minimum Duration**, and **Minimum Pressure**. You can enter one or any combination of these values.

2. Enter the measurands you want to use. The options are:

- **Pressure;**
- **Temperature;**
- **Humidity;**
- **Wind;**

Make sure to include the semi-colon ; at the end of the measurand.

3. After this, enter values for **Gap Height** and **Gap Duration**.

## 5.4.8 Database

Table 56 Database

Setting	Allowed values	Factory default	Description
Automatic backup	None Launched Soundings All Soundings	Launched Soundings	Selects soundings for automatic back-up.
Backup path	-	Default is <i>C:\SoundingArchive</i>	Automatic back-up location for sounding data.
Delete aborted soundings	Enabled Disabled	Disabled	If sounding is aborted, it is deleted from the database.
Generate SPF file on sounding termination	Enabled Disabled	Disabled	Generates sounding archive file in SPF format after sounding termination. The .spf file is generated in addition to .mwx file and it can be viewed in <b>Archive</b> .
Max amount of soundings	1 ... 800	120	Maximum number of soundings visible in the <b>Archive</b> view.
Max archive duration	1 ... 36000	21600	Maximum duration of auto archived sounding, including preparation (s).
Minimum required disk space for the backup	0 ... 1024	50	The minimum required disk space to be available for the back-up in MB.
Minimum required disk space for an exported sounding	0 ... 1024	20	The minimum required disk space to be able to export a sounding in MB.
Upload path	-	<i>C:\SoundingUpload</i>	Automatic upload location for the sounding data.

## 5.4.9 MWH322

Table 57 MWH322

Setting	Allowed values	Factory default	Description
Baro module calibration accepted offset	5 ... 30	5	Accepted BARO module calibration offset.
Baro module averaging time	0 ... 60	10	Baro module averaging time in seconds (s).
Baro module status	Both pressure modules enabled Pressure module 1 disabled Pressure module 2 disabled Both pressure modules disabled	Both pressure modules enabled	Enables or disables one or both MWH322 baro module(s).
Baro module poll interval	10 ... 240	10	Baro module poll interval in seconds (s).
Enable baro module polling	Enabled Disabled	Enabled	Determines whether the polling of MWH322 baro module is enabled or not.
Humidity in-built check limit	0 ... 100	2	Failure limit for radiosonde humidity sensor in-built check.
Non-office condition	Enabled Disabled	Disabled	Determines whether radiosonde preparation is done in non-office conditions.
Temperature in-built check limit for non-office conditions	0 ... 100	5	Radiosonde air and humidity temperature sensor difference threshold for non-office conditions.
Pressure difference limit	0 ... 10	1	Maximum allowed pressure difference between the two BARO-1 modules (hPa).
Radiosonde stabilization timeout	60 ... 360	120	Timeout for radiosonde stabilization in seconds (s).
Temperature in-built check limit	0 ... 100	3	Radiosonde air and humidity temperature sensor difference threshold.

## 5.4.10 Messages

### 5.4.10.1 BUFR

The current BUFR table version is 31.

Table 58 Additional BUFR Std levels

Setting	Allowed values	Factory default	Description
Additional BUFR Std Levels	-	-	Additional standard pressure levels for BUFR messages.

Table 59 Message time round-down

Setting	Allowed values	Factory default	Description
Message time round-down	0 ... 240	30	Round-down of message time in minutes.

Table 60 Message time round-up

Setting	Allowed values	Factory default	Description
Message time round-up	0 ... 240	30	Round-up of message time in minutes.

Table 61 Radiosonde ascension number

Setting	Allowed values	Factory default	Description
Radiosonde ascension number	-	-1	Radiosonde ascension number.

## 5.4.10.2 PILOT

Table 62 Regional standard level heights

Setting	Allowed values	Factory default	Description
Standard level heights for Africa	1500 3000 5700 7500 9600 10800 12300 14100 16500 18600 20700 23400 25800 29700	-	The values are separated with a semi-colon ;.

Setting	Allowed values	Factory default	Description
Standard level heights for Asia	1500 3100 5800 7600 9500 10600 12300 14100 16600 18500 20600 24000 26500	-	This setting affects PILOT A and C messages.
Standard level heights for Europe	1500 3000 3400 7200 9000 10500 12000 13500 15900 18300 23700 26400 30900	-	

Table 63 Height unit

Setting	Allowed values	Factory default	Description
Height Unit	300, 500	300	Height unit of regional fixed levels and significant levels in meters

Table 64 Vertical level

Setting	Allowed values	Factory default	Description
Vertical level	Pressure, Height	Pressure	Determines if standard pressure levels are height or pressure-based.

Table 65 Vertical level

Setting	Allowed values	Factory default	Description
Report significant levels of wind	Fixed regional levels and significant levels Fixed regional levels	Fixed regional levels and significant levels	Defines which levels are reported in PILOT B and D parts. This parameter is not used if Asecna practice is in use.

Table 66 Standard level heights

Setting	Allowed values	Factory default	Description
Standard level heights	-	-	<p>Approximate standard pressure level heights in meters. These heights are used in PILOT section 2. If any values have been defined for this setting, they are used instead of regional standards.</p> <p>The setting affects PILOT A and C messages, such as “Standard level heights for Asia”.</p> <p>By default, this table does not list any values. In the three regions where the height level values are regionally defined by WMO (Africa, Asia, Europe), the values given in <a href="#">Table 62 (page 60)</a> are used, respectively, and there is no need to make any changes. In other regions, unless otherwise defined, the European values given in <a href="#">Table 62 (page 60)</a> are also used by default, if no values are entered to table StandardLevelHeights.</p> <p>However, if the user adds their own pressure level height values to table StandardLevelHeights, they are always used, independent of the region setting. The values are separated with a semi-colon ;.</p>



Table 67 Use ASECNA practice


Setting	Allowed values	Factory default	Description
Use ASECNA practice	Enabled Disabled	Disabled	<p>Determines if the ASECNA practice is used for PILOT coding.</p> <div>  <p>To enable ASECNA practice, WMO region number must be set to <b>Africa (1)</b> in <b>Sounding &gt; Station</b>.</p> </div>

Table 68 Fixed height levels

Setting	Allowed values	Factory default	Description
Fixed height levels	Yes No	Yes	Determines if fixed height levels are reported in PILOT section 4.

### 5.4.10.3 Reports

Table 69 Sounding quality report

Setting	Allowed values	Factory default	Description
<b>Automatic generation</b>			
Enable automatic report creation	Enabled Disabled	Enabled	Enables automatic message generation.
Automatic generation destinations	-	Local folder	List of destinations where to send automatically generated messages.
Automatic generation after sounding	Enabled Disabled	Disabled	Enables automatic message generation after the sounding has been terminated.
Automatic generation after sounding or when enabled sounding is aborted	Enabled Disabled	Enabled	Enables automatic message generation after an ascending sounding has ended or a sounding has been aborted.
Automatic generation at 100 hPa SigP	Enabled Disabled	Disabled	Automatic generation when T, U, and W SigPs are ready at 100 hPa level.

Setting	Allowed values	Factory default	Description
Automatic generation heights	-	-	Array of height values for automatic message generation in meters.
Automatic generation pressures	-	-	Array of pressure values for automatic message generation in hPa.
Enable automatic report sending	Enabled Disabled	Enabled	Enables automatic report sending.
Automatic generation after given time from launch	-	-	Array of seconds from launch used for automatic message generation.
Automatic generation at given time of day	-	-	Array of seconds from the start of day (in UTC) used for automatic message generation.

#### 5.4.10.4 STANAG

Table 70 Limits

Setting	Allowed values	Factory default	Description
Max. time of validity	0 ... 9	9	Maximum time of validity
Min. time of validity	0 ... 9	0	Minimum time of validity

#### 5.4.10.5 TEMP

Table 71 National practices

Setting	Allowed values	Factory default	Description
Report all tropopauses	Enabled Disabled	Disabled	Enable or disable all tropopauses.
Report incomplete tropopauses	Enabled Disabled	Disabled	Determines whether to report incompletely defined tropopauses.
Report TEMP section 8	Enabled Disabled	Enabled	Determines whether to include section 8 in TEMP messages.
Report TEMP section 9	Enabled Disabled	Enabled	Determines whether to include section 9 in TEMP messages.

### 5.4.10.6 WMO

Table 72 Regional levels

Setting	Allowed values	Factory default	Description
First region 6 level for TEMP	0 ... 30000	1000	First region 6 level for TEMP in meters.
Fixed altitude levels for Africa	600, 900, 2100, 3900, 4500, 5100, 21000, 24000, 27000, 30000, 33000, 36000, 39000, 42000, 45999, 48000, 51000, 54000	600, 900, 2100, 3900, 4500, 5100, 21000, 24000, 27000, 30000, 33000, 36000, 39000, 42000, 45999, 48000, 51000, 54000	Fixed altitude levels for Africa.
Fixed altitude levels for Asia	300, 600, 900, 2100, 3600, 4500, 6000	300, 600, 900, 2100, 3600, 4500, 6000	Fixed altitude levels for Asia. This setting affects BUFR, PILOT B, and PILOT D messages. In Asia (region 2), the setting does not affect TEMP messages. In North and Central America (region 4), this setting also affects TEMP B and D messages.
Fixed altitude levels for South America	300, 600, 900, 2100, 2400, 4200, 6000, 8100, 33000, 39000, 42000, 45000, 48000, 51000, 54000	300, 600, 900, 2100, 2400, 4200, 6000, 8100, 33000, 39000, 42000, 45000, 48000, 51000, 54000	Fixed altitude levels for South America.
Fixed altitude levels for North and Central America	300, 600, 900, 1200, 1800, 2100, 2400, 2700, 3600, 4200, 4800, 6000, 7500, 9000, 10500, 15000, 21000, 27000, 30000, 33000, 42000, 45000, 48000, 51000, 54000	300, 600, 900, 1200, 1800, 2100, 2400, 2700, 3600, 4200, 4800, 6000, 7500, 9000, 10500, 15000, 21000, 27000, 30000, 33000, 42000, 45000, 48000, 51000, 54000	Fixed altitude levels for North and Central America.
Fixed altitude levels for South-West Pacific	900, 2100, 4200	900, 2100, 4200	Fixed altitude levels for South-West Pacific.
Fixed altitude levels for Europe	900, 2100, 4200	900, 2100, 4200	Fixed altitude levels for Europe.
Fixed altitude levels for stations in the Antarctic	-	-	Fixed altitude levels for stations in the Antarctic.

Table 73 Country code

Setting	Allowed values	Factory default	Description
Country code	None Australia Austria Canada Portugal Japan Korea	None	WMO country code.

Table 74 Double space after message ID

Setting	Allowed values	Factory default	Description
Double space after message ID	Enabled Disabled	Enabled	Determines whether a double space is included after the message ID.

Table 75 Groups per line

Setting	Allowed values	Factory default	Description
Groups per line	9 ... 15	9	Number of groups shown per line.

Table 76 Header time round-down

Setting	Allowed values	Factory default	Description
Header time round-down	0 ... 240	30	Round-down of header time in minutes.

Table 77 Header time round-up

Setting	Allowed values	Factory default	Description
Header time round-up	0 ... 240	30	Round-up of header time in minutes.

Table 78 Message time round-down

Setting	Allowed values	Factory default	Description
Message time round-down	0 ... 240	30	Round-down of message time in minutes.

Table 79 Message time round-up

Setting	Allowed values	Factory default	Description
Message time round-up	0 ... ^ 240	30	Round-up of message time in minutes.

Table 80 Report extra station ID

Setting	Allowed values	Factory default	Description
Report extra station ID	Enabled Disabled	Disabled	Flag to report extra station ID, required by AES.

Table 81 Sections start with new line

Setting	Allowed values	Factory default	Description
Sections start with new line	Enabled Disabled	Enabled	Defines whether each section starts with a new line.

Table 82 Enable wind shear

Setting	Allowed values	Factory default	Description
Enable wind shear	Enabled Disabled	Enabled	Defines whether wind shear group will be included in the maximum wind section in TEMP and PILOT messages.

#### 5.4.10.7 Generate messages with only surface observations

Table 83 Generate messages with only surface observations

Setting	Allowed values	Factory default	Description
Generate messages with only surface observations	Enabled Disabled	Disabled	Determines whether to generate messages with only surface observation data.

### 5.4.10.8 Message generation timeout

Table 84 Message generation timeout

Setting	Allowed values	Factory default	Description
Message generation timeout	0 ... 120	0	Message generation timeout in minutes. Value 0 means that it is disabled.

### 5.4.11 RI41

Table 85 Customer GC correction limits

Setting	Allowed values	Factory default	Description
Pressure customer correction limit	0 ... 3	3	Customer correction limit for pressure in hPa.

Table 86 Baro module calibration accepted offset

Setting	Allowed values	Factory default	Description
Baro module calibration accepted offset	5 ... 30	5	Accepted BARO module calibration offset.

Table 87 Baro module averaging time

Setting	Allowed values	Factory default	Description
Baro module averaging time	0 ... 60	10	Baro module averaging time in seconds (s).

Table 88 Baro module poll interval

Setting	Allowed values	Factory default	Description
Baro module poll interval	10 ... 240	10	Baro module poll interval in seconds (s).

Table 89 Enable Baro module polling

Setting	Allowed values	Factory default	Description
Enable baro module polling	Enabled Disabled	Enabled	Determines whether the polling of RI41 baro module is enabled.

Table 90 Humidity in-built check limit

Setting	Allowed values	Factory default	Description
Humidity in-built check limit	0 ... 100	2	Failure limit for radiosonde humidity sensor in-built check.

Table 91 Non-office condition

Setting	Allowed values	Factory default	Description
Non-office condition	Enabled Disabled	Disabled	Determines whether radiosonde preparation is done in non-office conditions.

Table 92 Temperature in-built check limit for non-office condition

Setting	Allowed values	Factory default	Description
Temperature in-built check limit for non-office conditions	0 ... 100	5	Radiosonde air and humidity temperature sensor difference threshold for non-office conditions.

Table 93 Radiosonde stabilization timeout

Setting	Allowed values	Factory default	Description
Radiosonde stabilization timeout	60 ... 360	120	Timeout for radiosonde stabilization in seconds (s).

Table 94 Temperature in-built check limit

Setting	Allowed values	Factory default	Description
Temperature in-built check limit	0 ... 100	3	Radiosonde air and humidity temperature sensor difference threshold.

## 5.4.12 Reports

Table 95 Limits

Setting	Allowed values	Factory default	Description
<b>Control parameters</b>			
Max. elapsed time	0 ... 10800	10800	Maximum value for elapsed time in seconds.

Table 96 Maximum line length

Setting	Allowed values	Factory default	Description
Maximum line length	60 ... 1000	80	Maximum number of characters to output on one line in reports.

Table 97 Truncate layer headers

Setting	Allowed values	Factory default	Description
Truncate layer headers	Enabled Disabled	Disabled	Determines if the layer headers are truncated to fit narrower report layer columns.

## 5.4.13 Radiosonde

Table 98 Radio silence

Setting	Allowed values	Factory default	Description
Radio silence trigger type	Disabled Time Height Both	Time	Determines the radio silence mode to be shown for the sounding.

Table 99 Enable encrypted data transmission

Setting	Allowed values	Factory default	Description
Enable encrypted data transmission	Enabled Disabled	Disabled	Determines whether encrypted data transmission is enabled in supported radiosonde types.



Table 100 RS41 transmitter power

Setting	Allowed values	Factory default	Description
RS41 transmitter power	0 ... 7	3	RS41 radiosonde transmitter power on the ground.

Table 101 RS41-D transmitter power

Setting	Allowed values	Factory default	Description
RS41-D transmitter power	0 ... 7	0	RS41-D radiosonde transmitter power on the ground.

## 5.4.14 Surface observations

Table 102 Limits

Setting	Allowed values	Factory default	Description
ASAP status	-	20 ... 99	<p>If the input value is outside the limit boundaries, this group in the message will be replaced with a group of information about tracking technique. For example:</p> <pre>ZCZCUKXX99 XXXX 280800UUBB DorisTEST 78086 99603 10249 2500400980 0313021212 00980 0000031313 47806 80822 9005941414 // 51515 11000 30005=</pre> <p>If ASAP status is enabled, and the system has an AWS device connected that can provide seawater temperature, that value is automatically fetched from the AWS device.</p> <p>ASAP status is only reported in TEMP SHIP.</p>
Humidity	-	0 ... 100	Humidity range value for surface observations in %.
Pressure	-	350 ... 1100	Pressure range value for surface observations in hPa.
Sea water temperature	-	268.15 ... 313.15	Sea water limits for surface observations in K. Sea water temperature is only reported in TEMP SHIP.

Setting	Allowed values	Factory default	Description
Temperature	-	213.15 ... 323.15	Temperature value for surface observations in K.
Wind direction	-	0 ... 360	Wind direction range for surface observations in degrees.
Wind speed	-	0 ... 100	Wind speed range value for surface observations in m/s.

Table 103 Try read from radiosonde

Setting	Allowed values	Factory default	Description
Try read from radiosonde	Yes, No	No	If surface observation reading automatically from AWS fails, try to read values from radiosonde.

## 5.4.15 System

Table 104 GPS time

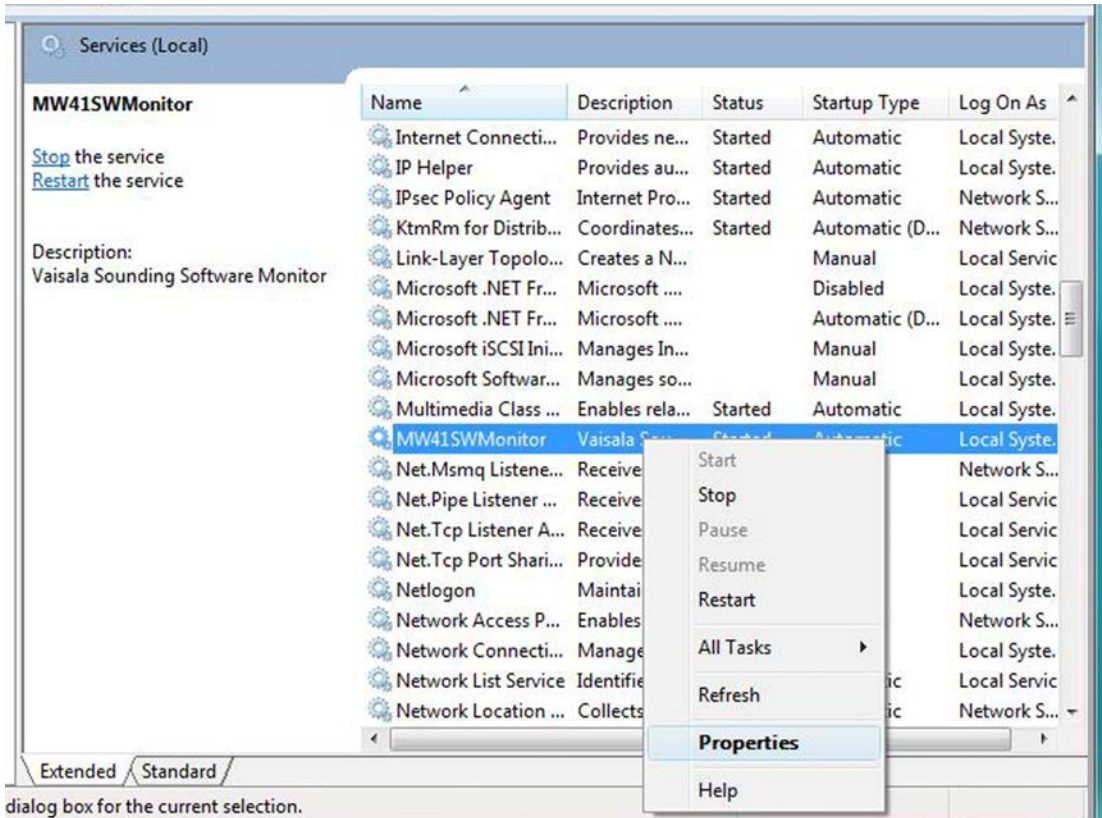
Setting	Allowed values	Factory default	Description
Previous GPS week	0 ... 1024	999	Previously used GPS week.
Rollover count	0 ... 65535	1	Number of rollovers from the rollover date.

## 5.5 Changing printer

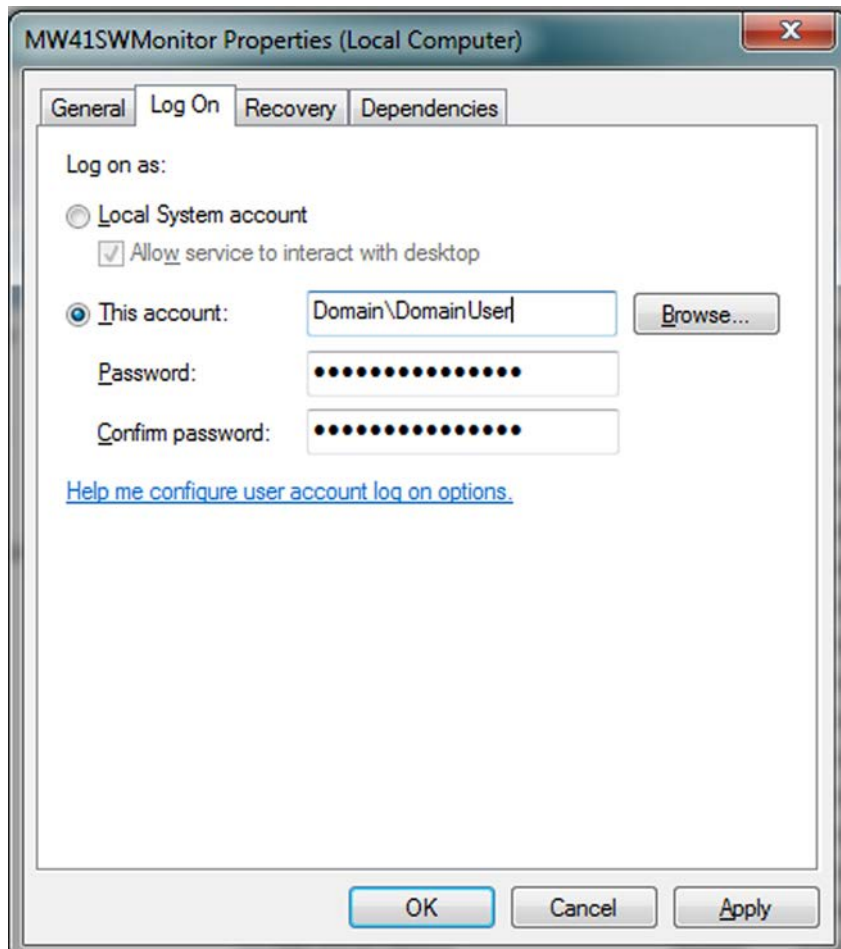
By default, the MW41 sounding software is connected to a local printer in the server network. To change the printer to a domain server printer, follow the steps.

1. Select the **Start** menu and open **Services**. You can open it by, for example, typing **services** in the search field.

2. Right-click **MW41SWMonitor** and select **Properties**.



3. Select the **Log On** tab and click **This account**. Enter your domain credentials and click **OK**.



4. Click **Apply**.
5. A message appears, indicating that you have been granted the Log On As A Service right. Click **OK**.
6. Restart MW41SWMonitor.
7. In the MW41 sounding software, go to **Administration > Sounding > Messages > Message destinations** and open **Add new destination**.

8. Select the correct printer in the **Printer name** drop-down list and click **Add**.  
The list displays the domain printers configured, that is, the same printers that are displayed in Windows printer options.

The screenshot shows the VAISALA / MW41 Sounding System Administration interface. The top navigation bar includes 'Sounding', 'Archive', and 'Administration' (selected). Below this, a sub-navigation bar shows 'Devices', 'Sounding', 'User Management', 'Diagnostics', and 'Advanced'. The main content area is titled 'Station' with an 'Edit' link. A sidebar on the left contains a tree view with 'Messages' expanded, showing 'Message destinations' and 'Add new destination'. The 'Add new destination' form has the following fields: 'Type' (set to 'Printer'), 'Destination name' (required), 'Description', 'Printer name' (set to 'help64/HEL-HPColo...', required), and 'Character encoding' (set to 'iso-8859-1', required). An 'Add' button is at the bottom right of the form. Below the form, there are sections for 'File: Local folder' (with an 'Edit' link), 'WMO messages', and 'Reports'. At the bottom, there is a 'Radiosonde selection mode' section with an 'Edit' link.

## 6. WXT configuration

### 6.1 WXT520 configuration code

The configuration code for WXT520 connected to MW41 consists of the following:

**WXT52 0AAB0BXX1B0**

where:

- **A** = Measurement Parameters: Wsd + RH + T + P +R
- **A** = Communication Interface: SDI-12 v. 1.3, 1200 baud, 7, E, 1
- **B** = Communication Interface: RS-232, Standard ASCII auto, 19200 baud, 8, N, 1
- **0** = Enhancements: None
- **B** = Connector: 8-pin Male Connector and Bushing and Grounding Accessories
- **X** = Cable. X here stands for any of the following options:
  - **A** = No cable
  - **B** = Shielded 8-pin M12 cable, length 2 m
  - **C** = Shielded 8-pin M12 cable, length 10 m
  - **E** = Shielded 8-pin M12 cable, length 10 m, connectors at both ends
- **X** = Installation Accessories. X here stands for any of the following options:
  - **0** = None
  - **1** = Mounting Kit
  - **2** = Bird Spike
  - **3** = Mounting Kit and Bird Spike
- **1** = Supporting Software: Service Pack 2: Vaisala Configuration Tool for Windows, USB Service Cable
- **B** = Manual Language: English
- **0** = Packing: Standard

### 6.2 WXT530 configuration code

The configuration code for WXT530 connected to MW41 consists of the following:

**WXT53 6B1B1AXX2B1B**

where:

- **6** = Version: WXT536 Parameters: W, R, P, T, U
- **B** = Communication Interface: RS-232, Std. ASCII auto, 19200 baud, 8, N, 1
- **1** = Analog Interfaces: None
- **B** = Data Connector: 8-pin M12 Male Connector (Bushing and Grounding Accessories Included)
- **1** = Heating: None
- **A** = User Profile: Standard

- X = Cable. X here stands for any of the following options:
  - 1 = No cable
  - 2 = Shielded 8-pin M12 cable, length 2 m, connector at one end
  - 3 = Shielded 8-pin M12 cable, length 10 m, connector at one end
  - 4 = Shielded 8-pin M12 cable, length 10 m, connector at both ends
- X = Installation accessories. X here stands for any of the following options:
  - A = None
  - B = Mounting Kit
  - C = Bird Spike
  - D = Mounting Kit and Bird Spike
- 2 = Supporting Software: Configuration Tool for Windows + USB Service Cable
- B = Manual: English Manual
- 1 = Packing: Standard Packing
- B = Calibration Certificate: Factory Test Reports

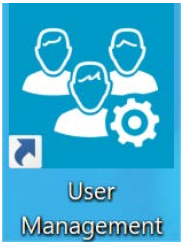
## 6.3 WXT communication protocol

WXT uses the ASCII communication protocol, polled with CRC. For detailed information, see the appropriate WXT User Guide.

# 7. Managing MW41 users

## 7.1 User management overview

When you install the MW41 sounding software, an icon for starting the **User Management** application appears on the desktop:



In **User Management**, a user with the **User Administrator** role can manage all users: add, edit and delete users. If you use MW41 together with AUTOSONDE, you can also assign AUTOSONDE user roles to the users.

The application includes the following views:

**Users Logged In**

For viewing information on active users and sessions

**Users**

For adding, editing and deleting users

**Password Configuration**

For configuring password settings

**Identity Configuration**

For configuring identity settings

**Audit Trail Log**

For viewing information on the past login and logout events

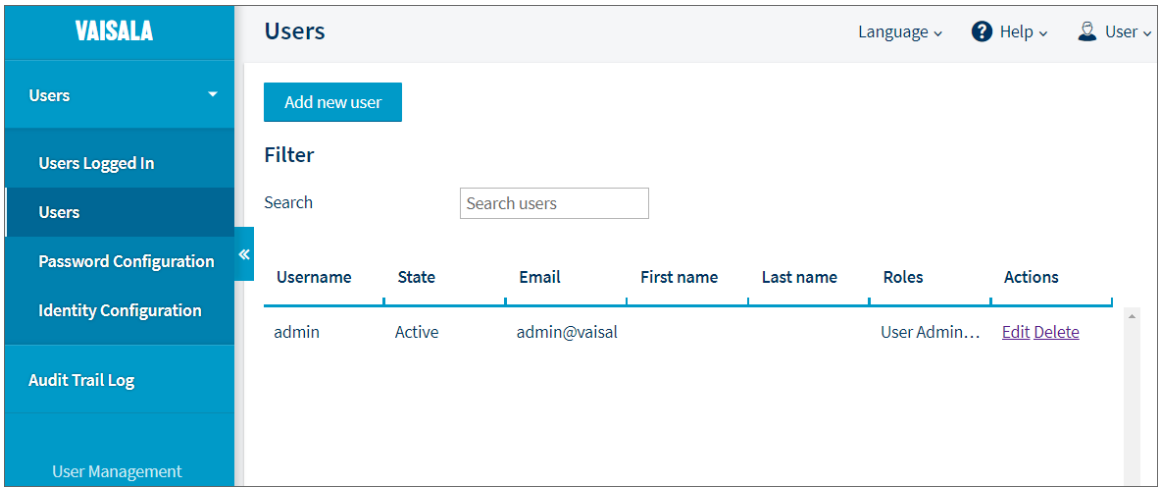


Figure 6 **User Management** main view





Only a user with the **User Administrator** role has the rights to manage users.

#### More information

- [Editing existing users when updating MW41 sounding software \(page 94\)](#)

### 7.1.1 MW41 user roles

In MW41, users are categorized into four groups with different privileges.

Table 105 MW41 user roles

Role	Description
<b>User Administrator</b>	Has the rights to manage users in the <b>User Management</b> application.
<b>MW41 Administrator</b>	Has full access rights to the system, including the Advanced configuration.
<b>MW41 Manager</b>	Has extended operator rights. Allowed to perform system configuration.
<b>MW41 Operator</b>	Has normal sounding rights. Not allowed to delete a sounding from the archive or upload or download a sounding, or perform system configuration.



**CAUTION!** Make sure that the system has **User Administrator** and **MW41 Administrator** at all times. Without **User Administrator**, you are unable to do user management tasks. Without **MW41 Administrator**, you are unable to do system configuration tasks, and may need to reinstall the MW41 software.




The same user may have roles for both AUTOSONDE and MW41 software and log in to both. For example, it may be convenient that administrator-level users have both **AS41 Administrator** and **MW41 Administrator** roles.

Vaisala recommends assigning one software-specific user role per a user. If a user is assigned more than one of the MW41 user roles, only the role with the most extensive privileges is active.

### 7.1.2 Default username and password for User Administrator

The system comes with one preconfigured user having the **User Administrator** role and access rights to the **User Management** application. The default password is in the **Password expired** state, which means that you must change it when you log in to **User Management** for the first time.



The password is case-sensitive. You must write it in exactly the same way as shown below.

Table 106 Default username and password for **User Administrator**

Username	Password	Role
admin	A4uEmaCc	<b>User Administrator</b>

## 7.2 Logging in

- ▶
1. Select **User Management** on your desktop.



2. Log in with your username and password.  
If you are logging in for the first time, type the default username and password.

**VAISALA**  
User Management

Login

Username

Password

Log in

3. If you are logging in for the first time, you are prompted to change the default password. Type the default password, the new password, confirm the new password, and select **Change**.

### Change password

Your password has expired

Username

Password

New password

Confirm new password

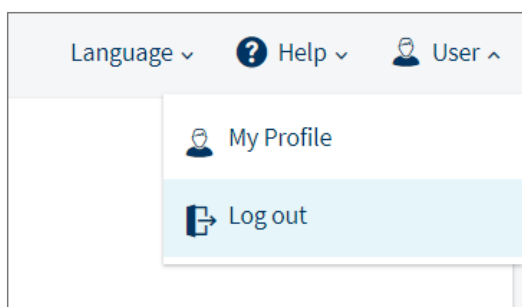
You will be logged out automatically after changing the password

#### More information

- [Default username and password for User Administrator \(page 79\)](#)

## 7.3 Logging out

1. Select **User > Log out**.



## 7.4 Viewing information on users and sessions

1. Select the **Users Logged In** view.  
You see a list of the users who are currently logged in in the MW41 sounding software.

Users logged in						Language ▾	? Help ▾	User ▾
<b>Filter</b>								
Search		<input type="text" value="Search sessions"/>						
Username	Host	Last login time	Last access time	Login duration	Actions			
Nicole.Nelson	172.24.49.78	2018-11-21 11:44	2018-11-21 11:45	9 minutes	<a href="#">Remove user session</a> ^			
Bob Bauer	172.24.49.78	2018-11-21 11:48	2018-11-21 11:48	5 minutes	<a href="#">Remove user session</a>			
admin	172.24.49.78	2018-11-21 11:47	2018-11-21 11:49	6 minutes	<a href="#">Remove user session</a>			



You can do a search by typing a searchword in the **Search** field.

### Username

Username for the user

### Host

IP address of the client at the time of the last login

### Last login time

Time when the user last logged in

### Last access time

Time of the last activity by the user

### Login duration

Duration of the last login session

### 7.4.1 Forcing a logout

1. In the **Users Logged In** view, find the user you want to force to log out.



You can do a search by typing a searchword in the **Search** field.

2. In the user row, select **Remove user session**.  
A confirmation message appears.

## 7.5 Adding users



Only a user with the **User Administrator** role has the rights to manage users.

Before you add a user to the system, determine which user role(s) the user will need.

- ▶ 1. In the **Users** view, select **Add new user**.

The screenshot shows the VAISALA system's user management interface. On the left, a blue sidebar contains the following menu items: VAISALA, Users (selected), Users Logged In, Password Configuration, Identity Configuration, and Audit Trail Log. The main content area is titled 'Users' and features an 'Add new user' button. Below this is a 'Filter' section with a search input field labeled 'Search users'. A table of users is displayed with the following columns: Username, State, and Email. The table contains one entry: 'admin' with state 'Active' and email 'admin@vaisala.com'.

Username	State	Email
admin	Active	admin@vaisala.com

2. In the **Add user** window, fill in the user account information. The mandatory fields are marked with a circle.

### Add user

- Username
- Password 

Type in new password or generate it automatically Note!  
New password will not be delivered to the user automatically
- State
- Email
- First name
- Last name
- Roles

#### Username

Username for the user.

Vaisala recommends that you give users individual usernames instead of generic names linked to the user role, such as operator.

#### Password

The user's password. Type a password or select **Generate password** to get an automatically generated password. The password must fulfill the requirements defined in **Password Configuration**.

#### State

The state of the user account. By default, **Password expired**.



To maintain sufficient level of security, Vaisala recommends that you always select the default state **Password expired** as the initial state for all user accounts. This means that users must change their passwords into an individual password of their own choice when logging in for the first time.

Table 107 User account states

State	Description
<b>Password expired</b>	Default state. The user must change the password on the first login.
<b>Active</b>	User account is active with the password defined in the <b>Password</b> field. The user can log in with the password.
<b>Locked</b>	User account is locked. The user cannot log in.

### Email, First name, Last name

Optional fields

### Roles

Role(s) for the new user. Make the selection(s) from the multi-selection drop-down list.



The same user may have roles for both AUTOSONDE and MW41 software and log in to both. For example, it may be convenient that administrator-level users have both **AS41 Administrator** and **MW41 Administrator** roles.

### 3. Select **Save**.

A confirmation message appears.

The new user appears in the list of users.

Username	State	Email	First name	Last name	Roles	Actions
admin	Active	admin@vaisala.com			User Administrator	<a href="#">Edit</a> <a href="#">Delete</a>
Test user	Password expired				MW41 Operator	<a href="#">Edit</a> <a href="#">Delete</a>

### More information

- [MW41 user roles \(page 79\)](#)

## 7.6 Deleting users



Only a user with the **User Administrator** role has the rights to manage users.

Deleting a user means that the user account is permanently deleted from the system. However, the deleted user is still visible in the **Audit Trail Log**.

- 1. In the **Users** view, find the user you want to delete from the system.



You can do a search by typing a searchword in the **Search** field.

2. In the user row, select **Delete**.

Last name	Roles	Actions
	User Administrator	<a href="#">Edit</a> <a href="#">Delete</a>
	MW41 Operator	<a href="#">Edit</a> <a href="#">Delete</a>

3. In the **Delete user** window, select **Delete**.

×

Delete user

Test user

Are you sure you want to delete the user?

Delete

Cancel

A confirmation message appears.



## 7.7 Editing users



Only a user with the **User Administrator** role has the rights to manage users.

1. In the **Users** view, find the user whose user account you want to edit.

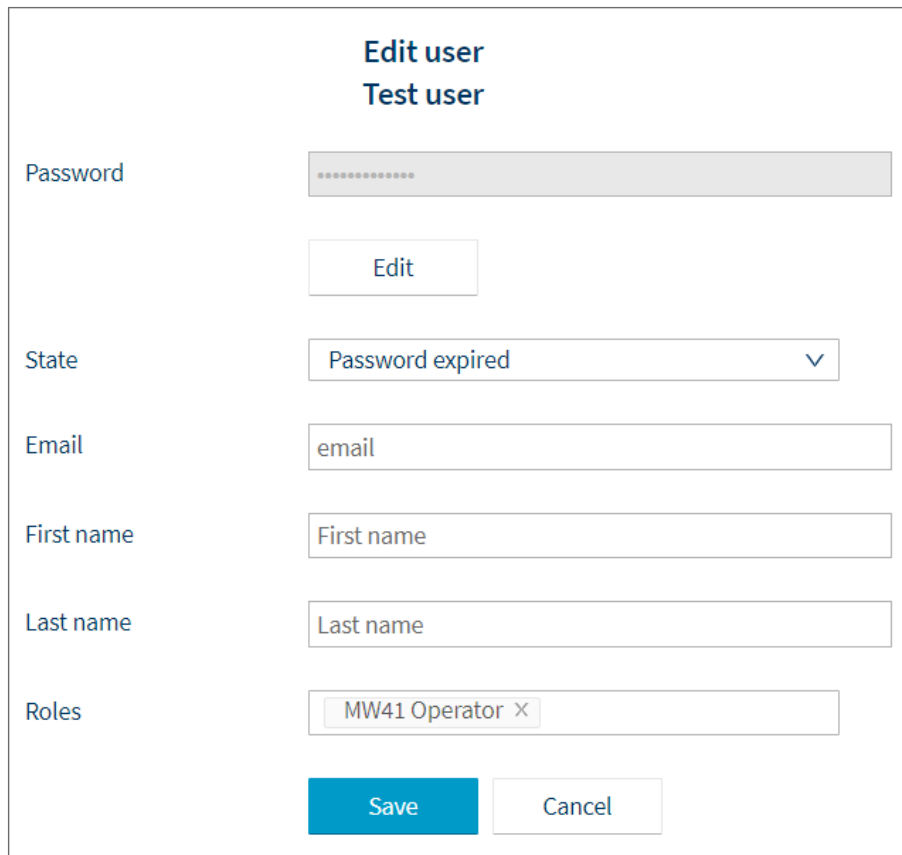


You can do a search by typing a searchword in the **Search** field.

2. In the user row, select **Edit**.

Last name	Roles	Actions
	User Administrator	<a href="#">Edit</a> <a href="#">Delete</a>
	MW41 Operator	<a href="#">Edit</a> <a href="#">Delete</a>

3. In the **Edit user** window, make the desired changes. All the fields are editable.



The screenshot shows the 'Edit user' window for a user named 'Test user'. The window contains several input fields and buttons:

- Password:** A text field with masked characters (dots). Below it is an 'Edit' button.
- State:** A dropdown menu currently showing 'Password expired' with a downward arrow.
- Email:** A text field containing the placeholder text 'email'.
- First name:** A text field containing the placeholder text 'First name'.
- Last name:** A text field containing the placeholder text 'Last name'.
- Roles:** A field showing 'MW41 Operator' with a close button (X).
- Buttons:** At the bottom, there are 'Save' and 'Cancel' buttons.

4. Select **Save**.  
A confirmation message appears.

## 7.7.1 Changing a password



Only a user with the **User Administrator** role has the rights to manage users.

1. In the **Users** view, find the user whose password you want to change.



You can do a search by typing a searchword in the **Search** field.

2. In the user row, select **Edit**.

Last name	Roles	Actions
	User Administrator	<a href="#">Edit</a> <a href="#">Delete</a>
	MW41 Operator	<a href="#">Edit</a> <a href="#">Delete</a>

3. In the **Edit user** window, select **Edit**.

**Edit user**  
**Test user**

Password

Edit

4. In the **Change password for user** window, type a new password or select **Generate** to get an automatically generated password.

**Change password for user Test user**

New password

Generate

Type in new password or generate it automatically. Note! New password will not be delivered to the user automatically.

Change

Cancel

5. Select **Change**.

6. The **Edit user** window opens again. In the **State** drop-down list, select the state for the user account.



To maintain sufficient level of security, Vaisala recommends that you always select the default state **Password expired** as the initial state for all user accounts. This means that users must change their passwords into an individual password of their own choice when logging in for the first time.

Table 108 User account states

State	Description
<b>Password expired</b>	Default state. The user must change the password on the first login.
<b>Active</b>	User account is active with the password defined in the <b>Password</b> field. The user can log in with the password.
<b>Locked</b>	User account is locked. The user cannot log in.

7. Select **Save**.  
A confirmation message appears.

## 7.8 Configuring password settings



Unless otherwise specified, these settings apply to all user accounts and user roles, including **User Administrator**.

- ▶ 1. Select the **Password Configuration** view.

2. Edit the password settings.

### Password Configuration

Minimum length	<input type="text" value="4"/>
Maximum length	<input type="text" value="20"/>
Numbers	<input checked="" type="checkbox"/> On
Upper and lower case letters	<input type="checkbox"/> Off
Special characters	<input type="checkbox"/> Off
Number of previous passwords to exclude	<input type="text" value="2"/>

#### Minimum length

4 characters

#### Maximum length

20 characters

#### Numbers

If you set this option to **On** (default), the password must include at least one number.

#### Upper and lower case letters

If you set this option to **On**, the password must include both lowercase and uppercase letters. The minimum is one lowercase and one uppercase letter. Default is **Off**.

#### Special characters

If you set this option to **On**, the password must include special characters. Default is **Off**.

#### Number of previous passwords to exclude

When the users are prompted to change their passwords after the time period set in **Identity Configuration > Expire password**, this setting defines the number of previous passwords which the system does not accept as the new password. The password history starts with the current password. Default is 2.

3. Select **Save**.

A confirmation message appears.

## 7.9 Configuring identity settings



Unless otherwise specified, these settings apply to all user accounts and user roles, including **User Administrator**.

1. Select the **Identity Configuration** view.
2. Edit the identity settings.

The 'Identity Configuration' dialog box contains the following settings:

- Lock on failure:** A toggle switch set to 'On'.
- Number of attempts before lock:** A text input field containing the value '4'.
- Lock duration:** A drop-down menu showing '1 min'.
- Expire password:** A drop-down menu showing 'Never'.

At the bottom right, there are 'Save' and 'Cancel' buttons.

### Lock on failure

If you set this option to **On** (default), a user can try to log in as many times as defined in **Number of attempts before lock** before the user account is set to the **Locked** state.



If the user account of **User Administrator** is locked, **User Administrator** is allowed to log in to **User Management** again after 1 minute.

### Number of attempts before lock

Number of failed login attempts allowed, after which the user account is set to the **Locked** state. Default is 4.

### Lock duration

Duration for the **Locked** state. Make the selection from the drop-down list. Default is 1 minute.

### Expire password

Time period after which the passwords of all users expire and the users are prompted to change their passwords when they log in. Make the selection from the drop-down list. Default is **Never**.

3. Select **Save**.  
A confirmation message appears.

## 7.10 Viewing the audit trail log

In the audit trail log, you can see the last 1000 login and logout events. Both successful and unsuccessful login events are shown.

1. Select the **Audit Trail Log** view.



You can do a search by typing a searchword in the **Search** field.

## 7.11 Viewing and editing my profile

In **My Profile**, you can edit your profile, for example, change your password.

1. Select **User > My Profile**.
2. In the **Edit profile** window:
  - Select **Edit** to change your password.
  - Edit the profile information: **Email**, **First name**, **Last name**.

### Edit profile

Username	admin
	<input type="button" value="Edit"/>
State	Active
Email	<input type="text" value="admin@vaisala.com"/>
First name	<input type="text" value="First name"/>
Last name	<input type="text" value="Last name"/>
Roles	User Administrator
	<input type="button" value="Save"/> <input type="button" value="Cancel"/>

3. Select **Save**.  
A confirmation message appears.

## 8. Managing MW41 software

### 8.1 Updating MW41 sounding software

For instructions on installing the MW41 sounding software for the first time, see *Vaisala DigiCORA Sounding System MW41 Getting Started Guide*.



**CAUTION!** Updating MW41 sounding software version causes the current archived sounding data to disappear. However, the data is always backed up as .mwX files (default location *D:\SoundingArchive*) and the archived soundings can be restored after the new version has been installed. System settings are automatically backed up and restored by default during the software update process.

To update MW41 sounding software, follow the steps carefully:

- ▶ 1. Click the *Starthere.exe* file on the root of the installation media.
2. Click the **Uninstall MW41 <version number>** link.
3. Click **Yes**.
4. After the old software version has been uninstalled, the MW41 installation window opens.
  - a. If you are updating from MW41 versions 2.16.2 and earlier, it is recommended to select the **Recreate HTTPS certificate** checkbox.  
Recreating the certificate adds a SAN (Subject Alternate Names) field to the certificate, ensuring compatibility with modern browsers. The installer removes the old certificates and creates new ones.
  - b. Click the installation link to begin the installation.

The MW41 Installation Wizard guides you through the rest of the installation process.

### 8.2 Editing existing users when updating MW41 sounding software



Only a user with the **User Administrator** role has the rights to manage users.

From MW41 software version 2.13 onwards, MW41 user management takes place in the **User Management** application. When you update the MW41 software to version 2.13 or later, the default MW41 users **soundingadmin**, **soundingmanager** and **soundingoperator** no longer exist. Other user accounts are initially in the **Locked** state.



**User Administrator** needs to take the following steps in **User Management** before the existing users can start using the new version of the MW41 sounding software.

- ▶ 1. Log in with the default username and password.
  - When prompted, change the default password into an individual password of your own choice.

For instructions, see [Default username and password for User Administrator \(page 79\)](#) and [Logging in \(page 80\)](#).
2. Log in again with your new password.
3. Go through each user account and define the following: **Username**, **Password**, **State** and **Roles**. At the minimum, you must create new passwords. For instructions, see [Editing users \(page 87\)](#).
  - Alternatively, you can delete the old users and create entirely new users. For instructions, see [Deleting users \(page 86\)](#) and [Adding users \(page 83\)](#).



To maintain sufficient level of security, Vaisala recommends that you always select the default state **Password expired** as the initial state for all user accounts. This means that users must change their passwords into an individual password of their own choice when logging in for the first time.

Users can now start using the new version of the MW41 sounding software.

## 8.3 Changing MW41 default security certificate

The MW41 sounding software uses a security certificate to support the HTTPS protocol in the web browser interface. For instructions on installing the security certificate, see *Vaisala DigiCORA Sounding System MW41 Getting Started Guide* *Vaisala MW41 for MROS Getting Started Guide*.



The security certificate is installed after the MW41 sounding software is installed for the first time. It is not required after an update.

By default, the security certificate is a self-signed HTTPS certificate. If you want to use a certificate signed by Certificate Authority (for example, VeriSign, Thawte), or by your own organization, you can change the default certificate. Follow the steps below:

- ▶ 1. Create a Java keystore file that contains your new certificate.  
For instructions, see the Java Keytool manual: <https://docs.oracle.com/javase/8/docs/technotes/tools/windows/keytool.html>.

2. Replace the default keystore with the new keystore.  
The location of the MW41 default keystore is `C:\ProgramData\MW41\Keystore\full.computer.name.jks`, where *full computer name* is the name of your computer. Use the same name and location for your new keystore file.



To find out the name of your computer, check the information in the **System Properties** window. You can access the window, for example, by pressing the Windows and Pause keys on the keyboard simultaneously.

3. Restart your computer.

## 8.4 Creating operating system backup

A sounding software computer purchased from Vaisala includes a backup of the computer's hard drive on an external hard drive.

When customized settings are ready, a new backup is recommended.

On a computer not acquired from Vaisala, it is recommended to create a backup when the system setup is ready.

Backup and restore procedures are explained in the following document, available on the installation media:

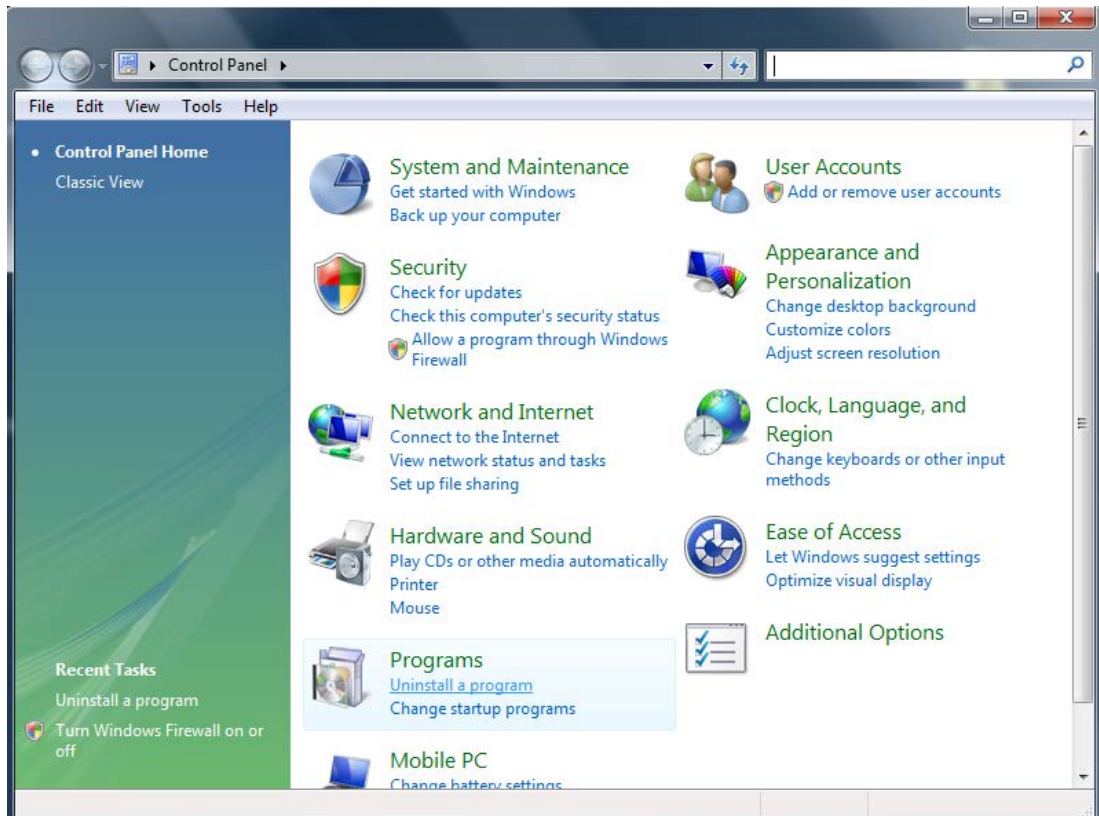
- *Backing Up and Restoring Windows 10 for MW41 Sounding System*

## 8.5 Uninstalling MW41 sounding software

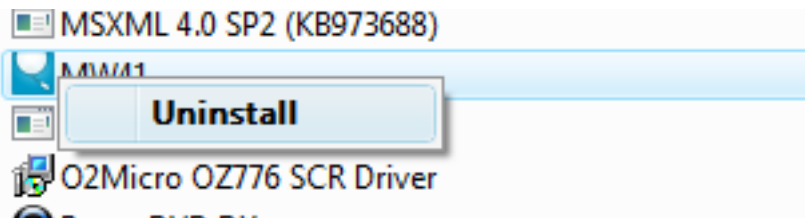
Follow the steps to uninstall the MW41 sounding software. Before beginning the uninstallation, wait for a few minutes for MW41 services to start.

- ▶ 1. Go to **Start** menu and select **Control Panel > Programs**.

2. Select **Programs > Uninstall a Program**.



3. Select **MW41**, right-click and select **Uninstall**. If you want to remove all the components installed with MW41 software, you must uninstall them one by one.



4. Click **Yes** to confirm the uninstallation.
5. Click **Yes** to restart the computer. After the computer has restarted, the MW41 sounding software has been removed.  
Alternatively, you can click the **Complete uninstallation** link in the MW41 installation window. Clicking this link removes the MW41 software and all its software packages, firewall rules and licenses at once.

## 8.6 Updating RI41 or MWH322 software

To start the update, click *UpdateGC41.exe* in directory *C:\Program Files (x86)\Vaisala\MW41\GC41Update*.

To update the software, the ground check device must be connected to the sounding workstation PC with the USB cable during the entire update process.



**CAUTION!** Do not disconnect the ground check device USB cable from the sounding workstation PC during the update, or interrupt the update in any way. Switching the ground check device off before the update is finished may cause serious malfunction.

- ▶ 1. In the GC41/RI41 Updater window, click **Update**.
2. The update command has now been sent to RI41 and you must wait for 10 seconds.
3. The update begins. A progress bar is displayed in the Updater window.
4. When the software has been successfully updated, click **Close**.  
A pop-up window displaying information on the updated device is shown.
5. Click **OK** to close the pop-up window.

The software has now been updated.

### 8.6.1 Software version already exists

If the ground check device already contains the software version you are about to update, click **Exit** to cancel the update.

If you wish to update the software anyway, click **Update anyway**.

### 8.6.2 RI41 or MWH322 cannot be found

If the message *Cannot find any connected GC41 device* is shown, connect the ground check device to the sounding workstation PC with the USB cable and click **OK**.

If the message is displayed again after you have connected the cable, wait a while and then click **OK** again.

## 8.7 Updating SPS3xx software



Unless otherwise mentioned, SPS3xx refers to all Sounding Processing Subsystem models (SPS311G and SPS341AG).



**CAUTION!** Power must be on all the time while the software update is in progress. Switching the unit off before the update is finished may cause serious malfunction.

Updating the SPS311G software means updating the software in MRP111 Receiver Processor. Updating the SPS341AG software means updating the software in MPU121A Main Processor Unit.

## 8.7.1 SPS311G MRP11 software update



**CAUTION!** The subsystem power must be on all the time while the software update is in progress. Switching the unit off before the update is finished may cause serious malfunction.

Updating the SPS311G software means updating the software in MRP111 Receiver Processor. The folder *EmbeddedSoftware\MRP111* on the installation media contains the latest version of the unit software for MRP111.

- ▶ 1. Switch on the sounding workstation and the sounding processing subsystem, and wait until the system is ready for operation.
2. Locate the *EmbeddedSoftware\MRP111* folder and click the *update.exe* file.
3. A command line window opens with text Enter the hostname or the IP address of the updated Embedded PC.  
Type the IP address of MRP111 and press **ENTER**. The default IP address for the unit is 192.168.0.10.



**CAUTION!** The maximum number of characters for the hostname is 15. If this number is exceeded, the unit stops working. Vaisala recommends that you do not change the hostname.

4. For the question *Verify previous update?* press **n** and **ENTER**.
5. When the update is completed, text *Vaisala Embedded Software Update complete* is displayed. Press any key and the window will close.
6. Switch the sounding processing subsystem power off and on again to complete the update.

Vaisala recommends that you verify the update.

### 8.7.1.1 Verifying the SPS311G MRP11 software update

After the MRP111 software is updated, you can verify the update as follows:

- ▶ 1. Switch on the sounding workstation and the sounding processing subsystem, and wait until the system is ready for operation.
- 2. Locate the *EmbeddedSoftware\MRP111* folder and click the *update.exe* file.
- 3. A command line window opens with text Enter the hostname or the IP address of the updated Embedded PC.  
Type the IP address of MRP111 and press **ENTER**. The default IP address for the unit is 192.168.0.10.



**CAUTION!** The maximum number of characters for the hostname is 15. If this number is exceeded, the unit stops working.  
Vaisala recommends that you do not change the hostname.

- 4. Text `Verify previous update` is displayed. Press **y** and **ENTER**.
- 5. The system checks that all files are correctly updated. When this is done, you will see text `Vaisala Embedded Software Update complete` and `Press any key to continue`.
- 6. Press any key and the window will close.

If the update was not successful, text `Embedded PC update was incomplete` is displayed. See [SPS311G MRP11 software update \(page 99\)](#).

### 8.7.1.2 Checking the software version of MRP111

To check the software version installed on the MRP111 card, do the following:

- ▶ 1. Switch on the sounding workstation and the sounding processing subsystem, and wait until the system is ready for operation.
- 2. Locate the *EmbeddedSoftware\MRP111* folder and click the *verinfo.exe* file.
- 3. A command line window opens. Type the IP address of the unit and press **ENTER**. The default IP address for the unit is 192.168.0.10.
- 4. The program checks the version of the embedded software. Version information of hardware, embedded NT image and application is displayed.
- 5. Text `Press any key to continue` is displayed.
- 6. Press any key and the window will close.

### 8.7.2 SPS341AG MPU121A software update



**CAUTION!** The subsystem power must be on all the time while the software update is in progress. Switching the unit off before the update is finished may cause serious malfunction.

Updating the SPS341AG software means updating the software in MPU121A Main Processor Unit.

The folder *EmbeddedSoftware\MPU121A* on the installation media contains the latest version of the unit software for MPU121A.

- ▶ 1. Switch on the sounding workstation and the sounding processing subsystem, and wait until the system is ready for operation.
- 2. Locate the *EmbeddedSoftware\MPU121A* folder and click the *update.exe* file.
- 3. A command line window opens with text `Enter the hostname or the IP address of the updated Embedded PC.`  
Type the IP address of MPU121A and press **ENTER**. The default IP address for the unit is 192.168.0.10.



**CAUTION!** The maximum number of characters for the hostname is 15. If this number is exceeded, the unit stops working.  
Vaisala recommends that you do not change the hostname.

- 4. For the question `Verify previous update?` press **n** and **ENTER**.
- 5. When the update is completed, text `Vaisala Embedded Software Update complete` is displayed. Press any key and the window will close.
- 6. Switch the sounding processing subsystem power off and on again to complete the update.

Vaisala recommends that you verify the update.

#### 8.7.2.1 Verifying the SPS341AG MPU121A software update

After the MPU121A software is updated, you can verify the update as follows:

- ▶ 1. Switch on the sounding workstation and the sounding processing subsystem, and wait until the system is ready for operation.
- 2. Locate the *EmbeddedSoftware\MPU121A* folder and click the *update.exe* file.
- 3. A command line window opens with text `Enter the hostname or the IP address of the updated Embedded PC.`  
Type the IP address of MPU121A and press **ENTER**. The default IP address for the unit is 192.168.0.10.



**CAUTION!** The maximum number of characters for the hostname is 15. If this number is exceeded, the unit stops working.  
Vaisala recommends that you do not change the hostname.

- 4. Text `Verify previous update` is displayed. Press **y** and **ENTER**.
- 5. The system checks that all files are correctly updated. When this is done, you will see text `Vaisala Embedded Software Update complete` and `Press any key to continue.`
- 6. Press any key and the window will close.

If the update was not successful, text `Embedded PC update was incomplete` is displayed. See [SPS341AG MPU121A software update \(page 100\)](#).

## 8.8 Transferring PC warranty

As it may take as long as 15 days to get the warranty transferred, you are recommended to transfer the warranty of the PC delivered by Vaisala as soon as possible after the system has been set up. To transfer the warranty, fill in the Ownership Transfer form on Dell's web page: [www.dell.com/support/retail/us/en/04/ownershiptransfer/IdentifySystem](http://www.dell.com/support/retail/us/en/04/ownershiptransfer/IdentifySystem)

- ▶ 1. Start by entering Service Tag information. The Service Tag sticker is attached on the PC.
2. Click **Continue**.
3. Fill in the current owner (Vaisala) information on the Previous Owner Information page. Provide at least the following information:
  - First Name:
  - Last Name:
  - Company Name: Vaisala
  - State/Prov/Cnty: Finland
  - Zip Code: 01670
4. Click **Continue**.
5. Fill in your information on the New Owner Information page.
6. Click **Continue**.

The warranty has now been transferred.



## 9. Maintaining MW41 hardware

### 9.1 Calibrating RI41 barometer module

To calibrate the barometer module, you must first check the RI41 status in the MW41 **Diagnostics** window.

- ▶ 1. Log in to MW41 as **MW41 Administrator**.
2. Click **Administration > Diagnostics** and select **Check status for: GC41/RI41**.
3. The system shows you the diagnostics information and the barometer pressure reading. If the system notices an error in RI41 at this point, you cannot calibrate the barometer module and the **Calibrate** button is inactive.
4. Type a reference pressure value and click **Calibrate**.
5. The system calculates new offset values and sends the calculated offset value to the barometer module.
6. New pressure and offset values are shown.
7. In case of error, calibrate again.

### 9.2 Replacing RI41-B BARO module



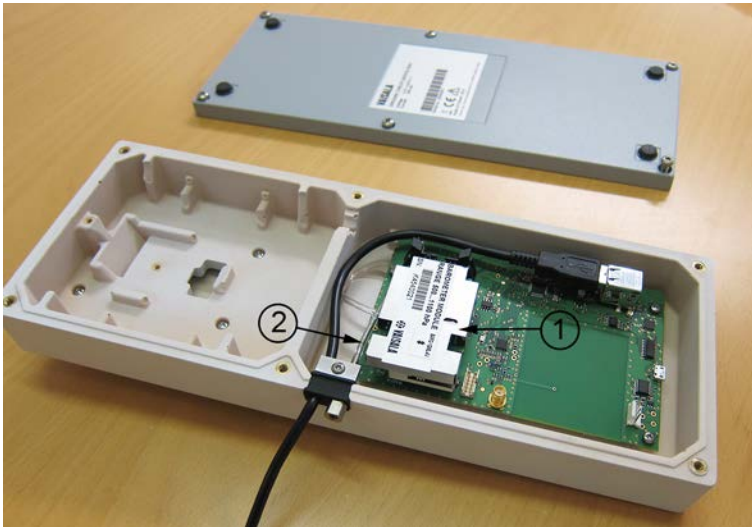
- Flathead screwdriver
- Torx T20 screwdriver

#### 9.2.1 Removing old BARO module



**CAUTION!** Disconnect RI41-B from the MW41 workstation before replacing the BARO module.

- 1. Remove the six screws on the bottom of RI41-B with the Torx screwdriver and remove the bottom cover.

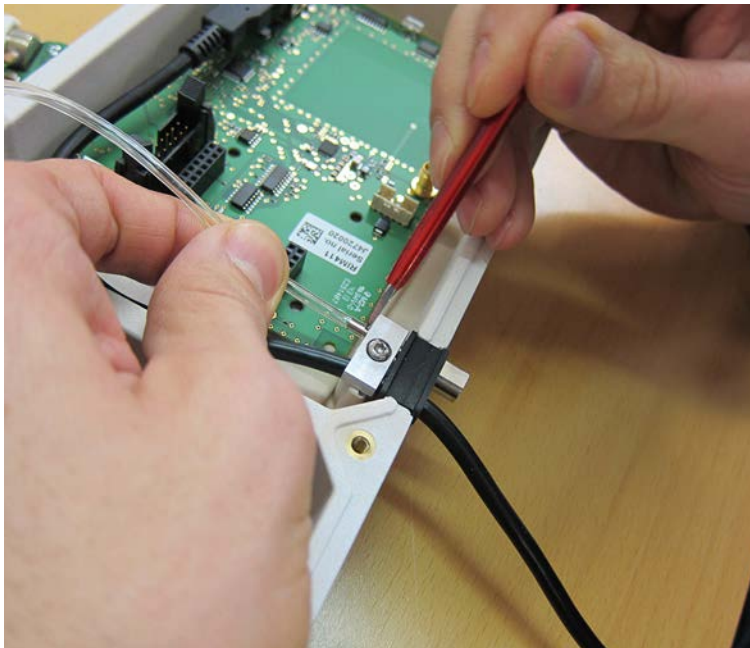


- 1 BARO module inside RI41-B  
2 BARO module pressure tube

2. Remove the BARO module.



3. Use the flathead screwdriver to loosen the pressure tube.

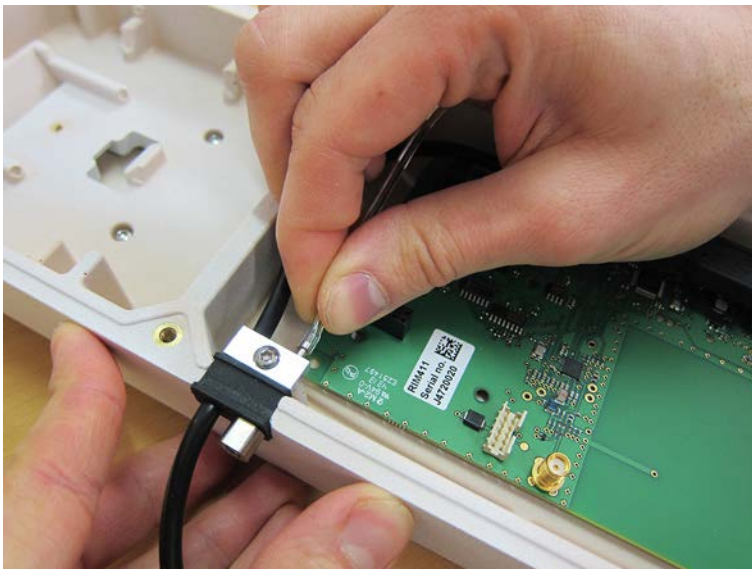


4. Pull the pressure tube out of the tube fitting piece



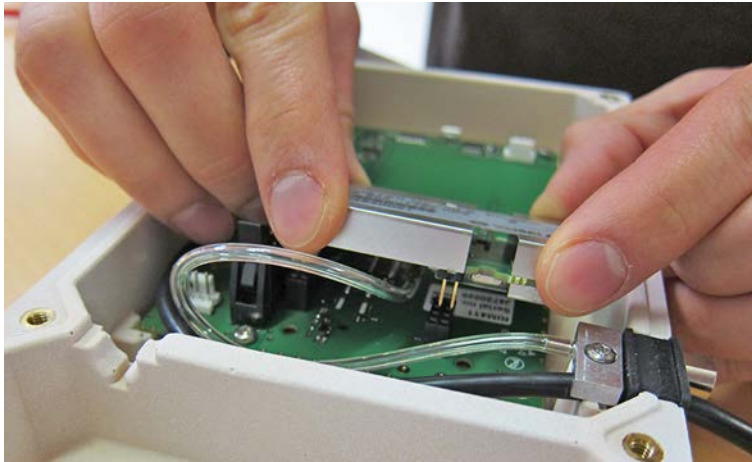
### 9.2.2 Attaching new BARO module

1. Attach the new BARO module's pressure tube by pushing it to the tube fitting piece.

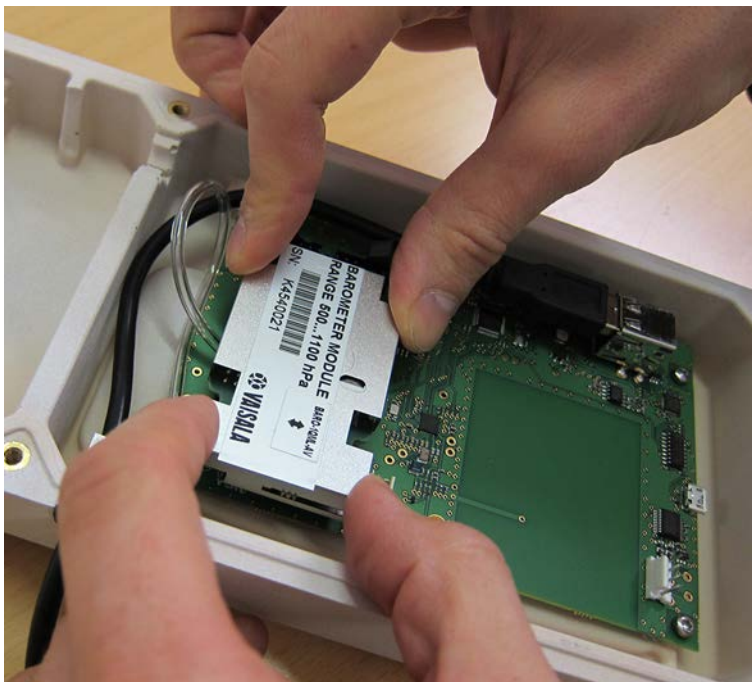




2. Check the connector positions on the BARO module and place the BARO module in the correct position in RI41-B.



3. Push the BARO module in place.



4. Attach the RI41-B bottom cover using the Torx T20 screwdriver and reconnect RI41-B to the MW41 workstation.

# 10. MW41 spare parts

## 10.1 General information about spare parts

For information on antenna spare parts, see the antenna manuals, included on the MW41 installation media.

For information on balloon launcher spare parts, see the balloon launcher manuals, included on the MW41 installation media.

## 10.2 Sounding System MW41 spare parts

Table 109 Sounding System MW41 spare parts

Code	Item
212326SP	Ethernet cable, 2 meters
213703SP	LAN switch 5-port, EU
231708SP	LAN switch 5-port, UK
231709SP	LAN switch 5-port, US
231710SP	LAN switch 5-port, AUS
211088SP	USB to 4 x RS-232 port
MWWKSTASP	Sounding PC, monitor not included
MWLAPPCSP	Laptop PC
MWRUGPCSP	Ruggedized PC
ASM211025SP	Transport case

## 10.3 SPS311G spare parts

Table 110 SPS311G spare parts and accessories

Code	Item
SPS311GSPSET	Spare part set SPS311G for DigiCORA System. Including: <ul style="list-style-type: none"> <li>• MRR111</li> <li>• MRP111</li> <li>• MRG114</li> <li>• MWP312</li> <li>• MWP411</li> </ul>

Code	Item
<b>Plug-in units:</b>	
MRR111SP	400 MHz Receiver Unit
MRP111SP	Receiver Processor Unit
MRG114SP	GPS Receiver Unit
MWP312SP	Power Supply Unit
MWP411SP	AC Power Supply Unit
<b>Fuses:</b>	
7048SP 5 AT, 10 pcs	
210704SP 2.0 AT, 10 pcs	
<b>Other:</b>	
DRW231652SP	Frame
212830SP	Fan

## 10.4 SPS341AG spare parts

Table 111 SPS341AG Spare parts and accessories

Code	Item
SPS341AGSPSET	Spare part set SPS341AG for DigiCORA System. Including: <ul style="list-style-type: none"> <li>• MRR111</li> <li>• MRP121</li> <li>• MPU121A</li> <li>• MWP312</li> <li>• MWP411</li> </ul>
<b>Plug-in units:</b>	
MRR111SP	400 MHz Receiver Unit
MRP121SP	Receiver Processor Unit
MPU121A	Main Processor Unit
MWP312SP	Power Supply Unit
MWP411SP	AC Power Supply Unit
<b>Fuses:</b>	
7048SP 5 AT, 10 pcs	
210704SP 2.0 AT, 10 pcs	
<b>Other:</b>	

Code	Item
DRW231652SP	Frame
212830SP	Fan

## 10.5 Ground Check Device RI41 and RI41-B spare parts

RI41 is replaced as a whole device. In RI41-B, the BARO module is available as a spare part. The AUTOSONDE-specific RI41 is always replaced as a whole device.

Table 112 Ground Check Device RI41-B spare parts

Code	Item
BARO-1QML-AV	Barometer module BARO-1QML-AV (A-class)



# 11. Troubleshooting MW41

## 11.1 General information about troubleshooting

- For troubleshooting the MW41 sounding software, see also the online help, embedded in the MW41 sounding software.
- For antenna troubleshooting information, see the antenna user guides.
- For troubleshooting various ground equipment options, see the appropriate ground equipment documentation.

All relevant documentation is available on the MW41 installation media.

## 11.2 Troubleshooting MW41

Table 113 Software-related problems

Problem	Solution
You get an error message that the system cannot connect to backend.	The error message occurs when the computer name has been changed. To fix the error, uninstall and reinstall the MW41 software. The MW41 configuration and license will remain the same, but you must reinstall the HTTPS certificate, otherwise a warning will occur.

Table 114 Sounding processing subsystem-related problems

Problem	Solution
Connection to the SPS does not work properly.	<ol style="list-style-type: none"> <li>1. Check that the IP connection from the sounding PC to the SPS works. Firewall can prevent the connection.</li> <li>2. The sounding system uses ports 42990 and 42900 for communication between the SPS and the PC. Check that those are not blocked by firewall.</li> </ol>

### 11.2.1 Log files for troubleshooting purposes

By default, the MW41 processes create log files to the C: drive, path `C:\ProgramData\MW41\Log`. The path can also be changed when the MW41 software is installed.

The log files are mainly for Vaisala service personnel use. The content and format of the log files can change without prior notice. For troubleshooting purposes, Vaisala recommends that you send the contents of the entire log directory to Vaisala Helpdesk in a zipped file.

Each running script writes its own log file to `C:\ProgramData\MW41\Scripts\<script name>\.`

Table 115 MW41 log files

File name	Description
AWSSERVICE_TRACE.LOG	Log file from the AwsServer process
COMMUNICATIONSSERVICE_TRACE.LOG	Log file from the CommunicationConService process
DATASERVICE_TRACE.LOG	Log file from the DataServer process
EXTERNALSYSTEMSERVICE_TRACE.LOG	Log file from the ExternalSystemServer process
JavaMessageService.log	Log file from the Java message service
JNBridgeDotNetSide.log	Log file from the JNBridgeDotNetSide process
LisenceActivationOutput.log	Log file from license activations
MESSAGESERVICE_TRACE.LOG	Log file from the MessageServer process
mw41-java.<date>.log.zip	Daily compressed log file from the MW41 control service
mw41-java.log	Log file of the current day from the MW41 control service
mw41-java-error.log	Error logs from the MW41 control service
MW41_Install_<date>_<time>.log	Log file from the MW41 installation
MW41_Uninstall_<date>_<time>.log	Log file from the MW41 uninstallation
NAMESERVICE_TRACE.LOG	Log file from the NameServer process
RADIOSERVICE_TRACE.LOG	Log file from the RadioServer process
SIMULATORSERVICE_TRACE.LOG	Log file from the SimulatorServer process
SONDESERVICE_TRACE.LOG	Log file from the SondeServer process
SWMONITORSERVICE_TRACE.LOG	Log file from the SoundingSWMonitorWinService process
Tomcat	Directory containing the logs from the Tomcat server
Tomcat.log	Log file from the Tomcat server
WEBSERVICESTARTER_TRACE.LOG	Log file from the WebServiceStarter process
WebServiceStop.log	Log file from the latest stop of the web services

## 12. MW41 technical data

### 12.1 Specifications

For MW41 sounding workstation requirements, see *Operating System Compliance* in this document.

For antenna technical specifications, see the antenna user guides. For radiosonde specifications, see the radiosonde user guides.

For Ground Check Device RI41 and MWH322 specifications, see the appropriate data sheets.

# Appendix A. MW41 Sounding System metadata

## A.1. MW41 Sounding System metadata

This appendix describes sounding system metadata, the structure of database tables used for storing information about sounding events.

For the listed tables, a respective .xml file is stored in the sounding database archive at the end of each sounding. The .xml files are located inside \*.mwX datafiles.



Vaisala Radiosonde RS92 and Vaisala Ground Check Set GC25 are no longer supported in MW41 software release 2.17 and later. They are replaced by the Vaisala Radiosonde RS41 and Ground Check Device RI41.

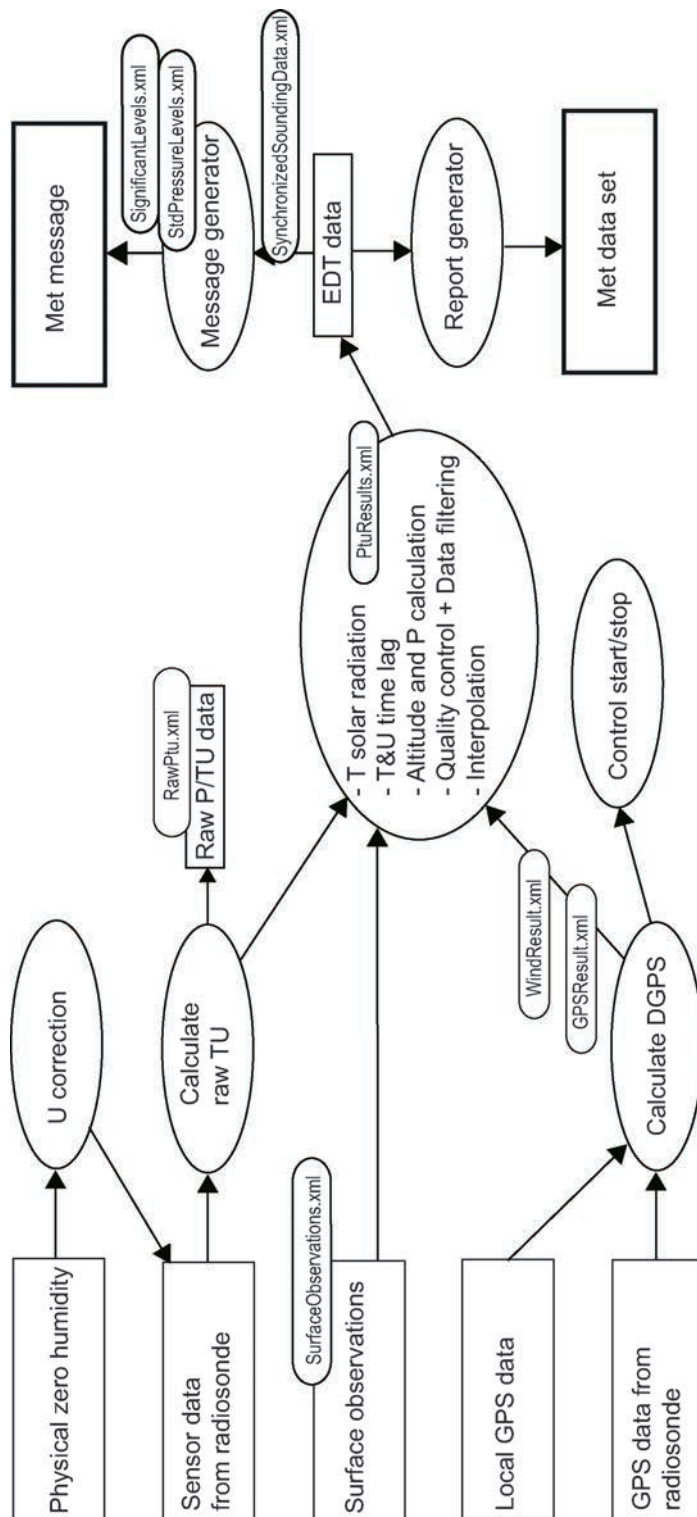


Figure 7 MW41 and RS41 data processing

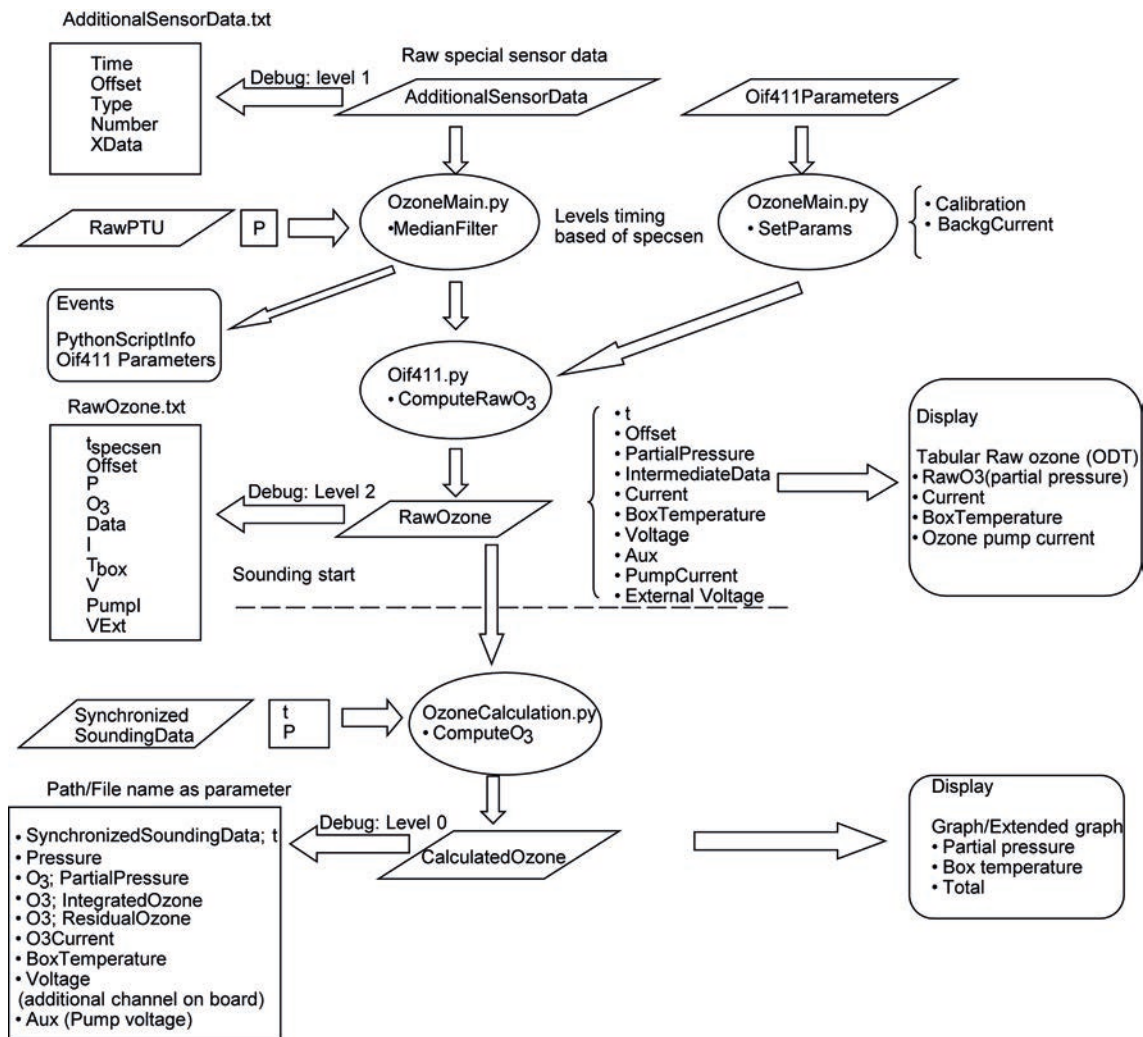


Figure 8 MW41 ozone calculation with RS41 and OIF411

Debug level is added as a command line parameter to the script.

## A.2. ADDITIONALSENSORDATA

Contains additional sensor data from the radiosonde.

Table 116 ADDITIONALSENSORDATA

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORTIMEPK	Double	Radio time [s].
INSTRUMENTTYPEPK	String	Instrument type identifier.
INSTRUMENTNUMBERPK	String	Instrument number.

Name	Type	Description
MEASUREMENTOFFSET	Double	Measurement time offset of the additional sensor data [s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
GPSTIMEOFFSET	Byte	Offset to the frame's GPS time [1/20 s].
XDATA	String	XDATA from the additional sensor.

## A. ADDITIONALSOUNDINGINFORMATION 3.

Contains additional sounding information used for flight summary.

Table 117 ADDITIONALSOUNDINGINFORMATION

Name	Type	Description
SOUNDINGIDPK	String	Unique sounding id.
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
STATIONIDENTIFIER	String	Station ID
WMONUMBER	String	WMO number
SLANTRANGE	Double	Slant range [m]
LASTWINDHEIGHT	Double	Last wind height GPH [m]
MINIMUMTEMPERATURE	Double	Sounding's minimum temperature [K]
MEANLOWLEVELWINDSPEEDFROMSURFACETO5000FEET	Double	Mean low level wind speed from surface to 5000 feet [m/s].
MEANLOWLEVELWINDDIRECTIONFROMSURFACETO5000FEET	Double	Mean low level wind direction from surface to 5000 feet [deg].
MEANLOWLEVELWINDSPEEDFROM5000TO10000FEET	Double	Mean low level wind speed from 5000 to 10000 feet [m/s].
MEANLOWLEVELWINDDIRECTIONFROM5000TO10000FEET	Double	Mean low level wind direction from 5000 to 10000 feet [deg].
TOTALPTUINTERVALS	Int	Total PTU intervals.
TOTALWINDINTERVALS	Int	Total wind intervals.
MISSINGANDREJECTEDDRAWPRESSUREORHEIGHT	Int	Missing & rejected raw pressure/height
MISSINGANDREJECTEDDRAWTEMPERATURE	Int	Missing & rejected raw temperature
MISSINGANDREJECTEDDRAWHUMIDITY	Int	Missing & rejected raw humidity

Name	Type	Description
MISSINGANDREJECTEDDRAWWIND	Int	Missing & rejected wind data
FREEZINGLEVELHEIGHTLOW	Double	Freezing level crossing height low [m]
FREEZINGLEVELHEIGHTMEDIUM	Double	Freezing level crossing height medium [m]
FREEZINGLEVELHEIGHTHIGH	Double	Freezing level crossing height high [m]
ADDITIONALFREEZINGLEVELCOUNT	Int	Additional freezing level count
MINUS20CELSIUSHEIGHT	Double	-20 C height [m]
ASCENTRATE	Double	Sounding's average ascent rate [m/s].
ASCENTRATE100HPATOTERMINATION	Double	Average ascent rate from 100hPa to termination
ASCENTRATE400HPATOTERMINATION	Double	Average ascent rate from 400hPa to sounding termination [m/s].
ASCENTRATESURFACETO100HPA	Double	Average ascent rate from surface to 100hPa
ASCENTRATESURFACETO400HPA	Double	Average ascent rate from surface to 400hPa [m/s].

Primary keys: SOUNDINGIDPK

Foreign keys: SOUNDINGIDPK -> SOUNDINGS.IDPK

## A.4. CALCULATEDOZONE

Contains calculated ozone data (ozone layer data with pressure correction applied).

Table 118 CALCULATEDOZONE

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORTIMEPK	Double	Radio time [s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
PARTIALPRESSURE	Double	Calculated ozone partial pressure [mPa].
BOXTEMPERATURE	Double	Sensor box temperature [Kelvin].
O3CURRENT	Double	Bias and pressure corrected current [uA].
INTEGRATEDOZONE	Double	Ozone accumulated up to the current sounding level [DU] (Dobson Unit).
RESIDUALOZONE	Double	Estimated residual ozone above the current sounding level [DU] (Dobson Unit).



Name	Type	Description
VOLTAGE	Double	OIF411: battery voltage measurement [V]. OIF92: : channel 3 data.
AUX	Double	OIF92: Channel 4 data. OIF411: Ozone pump current value [mA].
PUMPCURRENT	Double	OIF411: ozone pump current value [mA]. OIF92: 0

## A.5. GCCORRECTIONS

Contains ground check corrections.

Table 119 GCCORRECTIONS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
DATASRVTIMEPK	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
PRESSUREREERENCE	Double	Pressure reference [hPa].
TEMPERATUREREERENCE	Double	Temperature reference [K].
HUMIDITYREFERENCE	Double	Humidity reference [%].
USERPRESSUREREERENCE	Double	User-set pressure reference [hPa].
USERTEMPERATUREREERENCE	Double	User-set temperature reference [K].
USERHUMIDITYREFERENCE	Double	User-set humidity reference [%].
SONDEPRESSURE	Double	Radiosonde pressure [hPa].
SONDETEMPERATURE	Double	Radiosonde temperature [K].
SONDEHUMIDITY1	Double	Radiosonde humidity 1 [%].
SONDEHUMIDITY2	Double	Radiosonde humidity 2 [%].
PRESSUREDIFFLIMIT	Double	Limit for pressure correction [hPa].
TEMPERATUREDIFFLIMIT	Double	Limit for temperature correction [degrees].
HUMIDITYDIFFLIMIT	Double	Limit for humidity correction [%].

## A.6. GROUNDCHECKVALUES

Table 120 GROUNDCHECKVALUES

Name	Type	Description
SOUNDINGIDPK	String	Unique sounding ID.
DATASRVTIMEPK	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
PRESSURE	Double	Ground check reference pressure [hPa].
TEMPERATURE	Double	Ground check reference temperature [K].
HUMIDITY	Double	Ground check reference humidity [%].
SONDEPRESSURE	Double	Radiosonde pressure [hPa].
SONDETEMPERATURE	Double	RS92 temperature [K].
SONDEHUMIDITY1	Double	RS92 sensor 1 humidity [%].
SONDEHUMIDITY2	Double	RS92 sensor 2 humidity [%]
SELFHECKTEMPERATURE	Double	RS41 self check temperature [K].
SELFHECKHUMICAPTEMPERATURE	Double	RS41 self check humicap temperature [K].

## A.7. GPSRAWCHANNELDATA

Contains radiosonde-specific information on the tracked satellites.

Table 121 GPSRAWCHANNELDATA

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
RECEIVERROLEPK	String	Specifies the role of the receiver in calculation (Local or Remote).
PRNPK	Int	
RECEIVERTYPE	String	Specifies the possible types of GPS receiver: <ul style="list-style-type: none"> <li>• AstechG12</li> <li>• VaisalaRS92</li> <li>• SiRF</li> <li>• uBlox4</li> <li>• uBlox5</li> <li>• uBlox6</li> <li>• Unknown</li> </ul>
CHANNELNUMBER	Int	Channel number.
PSEUDORANGE	Double	Observed pseudorange measurement of the satellites.

Name	Type	Description
DOPPLER	Double	Observed integrated doppler of the satellites.
CHANNELSTATUS	Int	Carrier and code lock status.
SNR	Int	Channel signal level.

## A.8. GPSRAWMEASUREMENTS

Contains GPS raw measurements (both local and remote).

Table 122 GPSRAWMEASUREMENTS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
RECEIVERROLEPK	String	Specifies the role of the receiver in calculation (Local or Remote).
RECEIVERTYPE	String	Specifies the possible types of GPS receiver: <ul style="list-style-type: none"> <li>• AstechG12</li> <li>• VaisalaRS92</li> <li>• SiRF</li> <li>• uBlox4</li> <li>• uBlox5</li> <li>• uBlox6</li> <li>• Unknown</li> </ul>
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
GPSWEEK	Int	GPS week.
GPSSECONDS	Double	GPS seconds.
WGS84LATITUDE	Double	Latitude in WGS84 coordinates.
WGS84LONGITUDE	Double	Longitude in WGS84 coordinates.
WGS84ALTITUDE	Double	Altitude in WGS84 coordinates.
VELOCITYX	Double	X velocity in XYZ coordinates.
VELOCITYY	Double	Y velocity XYZ coordinates.
VELOCITYZ	Double	Z velocity XYZ coordinates.
NUMBEROFSATELLITESUSED	Int	Number of satellites used in calculation.
POSACCURACYESTIMATE	Double	Position accuracy estimate.
PDOP	Double	PDOP.
GAIN	Byte	Gain read from message UBX-MON PT.

## A.9. GPSRESULTS

Contains GPS result data from any type of GPS calculation.

Table 123 GPSRESULTS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
DATASRVTIME	String	Data server timestamp[yyyy-MM-dd HH:mm:ss.fff].
GPSSECONDS	Double	GPS seconds.
GPSWEEK	Int	GPS week.
GEOMETRICHEIGHTFROM SEALEVEL	Double	Geometric height from sea level [m].
GEOPOTHEIGHT	Double	Geopotential height [m].
CLOCKDRIFT	Double	Remote clock drift [s].
POSRESIDUAL	Double	Position residual.
VELRESIDUAL	Double	Velocity residual.
VELOCITYNORTH	Double	Radiosonde north velocity.
VELOCITYEAST	Double	Radiosonde east velocity.
VELOCITYUP	Double	Radiosonde up velocity.
WINDSOLUTIONSTATUS	Int	Wind solution status: 0 = Undefined 1 = NoMeasurementData 2 = BadSigma4d 3 = TooFewSatellites 4 = IterationFailed 5 = Gps station position not Initialized 6 = PreviousResult 7 = CalculationFailed 8 = Autonomous 9 = Differential 10 = Generated
WGS84LATITUDE	Double	Radiosonde WGS84 latitude position.
WGS84LONGITUDE	Double	Radiosonde WGS84 longitude position.
WGS84ALTITUDE	Double	Radiosonde WGS84 altitude position.
WGS84X	Double	Radiosonde X position.
WGS84Y	Double	Radiosonde Y position.
WGS84Z	Double	Radiosonde Z position.

Name	Type	Description
NEUNORTH	Double	Radiosonde north distance from the station position.
NEUEAST	Double	Radiosonde east distance from the station position.
NEUUP	Double	Radiosonde up distance from the station position.
HDOP	Double	Horizontal dilution of precision.
VDOP	Double	Vertical dilution of precision.
PDOP	Double	Position dilution of precision.
TDOP	Double	Time dilution of precision.
GDOP	Double	Geometry dilution of precision.

## A.10. IONOCORRECTIONS

Contains ionosphere correction parameters.

Table 124 IONOCORRECTIONS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
GPSSECONDS	Double	GPS seconds.
GPSWEEK	Int	GPS week.
SETTIMEWEEK	Int	Time when parameters are set to the satellite [week].
SETTIMESECONDS	Double	Time when parameters are set to the satellite [s].
FLAGS	UInt	Parameter flags.
BETA 0-3	Double	Klobuchar beta parameters.
ALPHA 0-3	Double	Klobuchar alpha parameters.

## A.11. MESSAGECOUNTERS

Contains message send counter data.

Table 125 MESSAGECOUNTERS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
MESSAGETYPENAMEPK	String	Message type name.
COUNTER	Int	Message send counter value.

## A.12. MESSAGEINFORMATION

Contains message information data.

Table 126 MESSAGEINFORMATION

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
MESSAGEIDPK	String	Message identifier.
MESSAGETYPENAME	String	Message type name.
MESSAGETYPEDISPLAYNAME	String	Message type display name.
ISBINARYMESSAGE	Bool	True if message is binary message, otherwise false.
ISREPORT	Bool	True if message is report, otherwise false.
MESSAGETRIGGERTYPE	Int	Message trigger type: 0 = None 1 = Pressure 2 = Height 3 = Time 4 = TimeFromLaunch 5 = Sigp100hPa 6 = AscendingSoundingEnd 7 = ManuallyCreated 8 = DescendingSoundingEnd 9 = AscendingSoundingEnd-OrAbort
TRIGGERVALUE	Double	Numeric trigger value that is used for message generation.
TRIGGERDESTINATIONS	String	Selected message destinations.
CREATIONTIME	Timestamp	Message creation time.

Name	Type	Description
MESSGESTATUS	Int	Message generation status: 0 = Unknown 1 = WaitingForTrigger 2 = Generating 3 = Generated 4 = GenerationFailed 5 = TriggerNotReached 6 = ManuallyEdited
MESSAGEDATA	Byte[]	Message content.

## A.13. MESSAGEPARAMETERS

Contains sounding-specific parameters for message generation.

Table 127 MESSAGEPARAMETERS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
MESSAGETYPENAMEPK	String	Message type name.
TIMEOFVALIDITY	Int	Time of validity
CLOUDCODE	Int	Cloud code.
CODEDLOCATION	String	Sounding's coded location.

## A.14. MESSAGETRANSMISSIONINFO

Contains message transmission information.

Table 128 MESSAGETRANSMISSIONINFO

Name	Type	Description
SOUNDINGIDPK	String	Unique sounding ID.
MESSAGEIDPK	String	Message identifier.
LATESTTRANSMISSIONSTATUS	Int	Latest transmission status: 0 = Unknown 1 = NoTransmissionDefined 2 = TransmissionPending 3 = TransmissionInProgress 4 = TransmissionCompleted 5 = TransmissionFailed

Name	Type	Description
LATESTDESTINATIONCOUNT	Int	Latest message destination count.
LATESTTRANSMISSION-COMPLETECOUNT	Int	Latest completed transmissions count.
LATESTTRANSMISSION-FAILCOUNT	Int	Latest failed transmissions count.

## A.15. MESSAGETRANSMISSIONLOG

Contains information about each message transmission.

Table 129 MESSAGETRANSMISSIONLOG

Name	Type	Description
SOUNDINGIDPK	String	Unique sounding ID.
MESSAGEIDPK	String	Message identifier.
DESTINATIONNAMEPK	String	Destination name.
TRANSMISSIONTIMEPK	Timestamp	Time when the transmission took place.
TRANSMISSIONSTATUS	Int	Latest transmission status: 0 = Unknown 1 = NoTransmissionDefined 2 = TransmissionPending 3 = TransmissionInProgress 4 = TransmissionCompleted 5 = TransmissionFailed
REASONFORFAILURE	String	Reason for failure.
REASONFORFAILURELOCALIZATIONKEY		Reason for failure localization key.

## A.16. OIFPARAMETERS

Contains OIF92 or OIF411 ozone parameters.

Table 130 OIFPARAMETERS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
SENSORTYPE	String	Sensor type code.
SERIALNUMBER	String	OIF92: Serial number. OIF411: null



Name	Type	Description
SZSERIALNUMBER	String	Ozone sensor serial number.
CALIBRATIONPRESSURE	Double	Applied calibration pressure [hPa].
SOLUTIONVOLUME	Double	Cathode solution volume [cm <sup>3</sup> ].
MEDIANFWRADIUS	Double	Median filter window radius.
FLOWRATE	Double	Pump airflow rate [s/100cm <sup>3</sup> ].
IOFFSET	Double	OIF92: Offset correction for current measurement. OIF411: null
IREFLIN	Double	OIF92: Iref linear temperature coefficient [1/K]. OIF411: null
IREFQUAD	Double	OIF92: Iref quadratic temperature coefficient [1/K <sup>2</sup> ]. OIF411: null
IREFZEROC	Double	OIF92: Iref at 0 C temperature [uA]. OIF411: null
RNTC25C	Double	OIF92: Sensor thermistor resistance at 25 °C temperature [Ohm]. OIF411: null
VREFCH3	Double	OIF92: Reference value for voltage channel [V]. OIF411: null
VREFCH4	Double	OIF92: Reference value for AUX channel [V]. OIF411: null
BGCURRENT	Double	Sensor background current [uA].

## A.17. OZONERESULTS

Contains the ozone results (summary of calculated ozone data).

Table 131 OZONERESULTS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
INTEGRATEDOZONE	Double	Ozone accumulated up to the sounding termination [DU] (Dobson Unit).
RESIDUALOZONE	Double	Estimated residual ozone above the termination level [DU] (Dobson Unit).
SENSORTYPE	String	Sensor type code.

Name	Type	Description
INTERFACETYPE	String	Ozone interface type (UNDEFINED, OIF92 or OIF411).
SERIALNUMBER	String	OIF serial number.
DIAGNOSTIC	Int	OIF411: Diagnostic word OIF92: 0
BGCURRENTCORRMETHOD	String	Background current correction method.
SMOOTHINGMETHOD	String	OIF92: Method for smoothing measured data OIF411: null
CALIBRATIONPRESSURE	Double	Applied calibration pressure [hPa].
BGCURRENT	Double	Sensor background current [uA].
SOLUTIONVOLUME	Double	Cathode solution volume [cm3]
OZONEPRIORSTART	Double	Ozone at the surface level prior to the launch [DU] (Dobson Unit).
PRIORSTARTMEASDURATION	Double	Duration of surface ozone measurement duration [min].

## A.18. PTURESULTS

Contains the sounding's PTU results.

Table 132 PTURESULTS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORTIMEPK	Double	Radio time [s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
SENSORPRESSURE	Double	Sensor pressure [hPa].
PRESSUREFROMHEIGHT	Double	Pressure calculated from height [hPa].
TEMPERATURE	Double	Temperature [K]
HUMIDITY	Double	Humidity [%]
HEIGHT	Double	Height [m]

Name	Type	Description
STATUS	Int	Status flags: 0x100000 = PressureReady 0x200000 = HeightReady 0x300000 = PressureAnd-HeightReady 0x400000 = TemperatureReady 0x800000 = HumidityReady 0xF00000 = PtuAndHeightReady 1 = PressureInterpolated 2 = HeightInterpolated 4 = TemperatutInterpolated 8 = HumdityInterpolated 16 = TelemetryBreak 32 = AdiabtictCheckFailed 64 = PressureFromHeight-Interpolated
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.

## A.19. RADIODIAGNOSTICS

Contains software radio diagnostics data.

Table 133 RADIODIAGNOSTICS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
SIZEOF	UInt	Size of IPC_DIAG_STATUS_DATA.
VERSION	UInt	Version number of IPC_DIAG_STATUS_DATA.
RECEIVERSYNC	UInt	0: No frames received in the last 2 seconds. 1: Frames received in the last 2 seconds.
TRSEQMAXCORR	Double	Maximum correlation.
RADIOSONDECARRIER	Double	Current carrier frequency [Hz].
AFCFREQCORR	Double	Since previous status [Hz].
SIGNALLEVELPEAK	Double	Signal level peak [dB]. ADC full scale is 0 dB.
NOISEFLOOR	Double	Noise floor [dB]. ADC full scale is 0 Db.
SIGNALPOWER	Double	Signal power [dB], at receiver -3 dB bandwidth.

Name	Type	Description
NOISEPOWER	Double	Noise power. GMSK 400: 7 kHz (baseband) Narrow FM: 130 kHz (PTU, GPS) Wide FM: 240 kHz (Loran-C)
SNR	Double	
TOTALCOUNT	UInt	Number of frames sent.
FRAMECOUNT	UInt	Number of frames received.
FRAMEERRORCOUNT	UInt	Number of received frames with CRC error.
MISSINGFRAMECOUNT	UInt	Number of missing frames.
SONDESTATUSWORD	UInt	Status word from radiosonde. RS41: see RS41 data format, general radiosonde data and diagnostics.
GMSKRECEIVERSTATUS	UInt	Status from DSP software.
DIAGNOSTICWORD	UInt	GMSK: See RS92 data format, ID 101. FSK 1200 GPS: see "track flags".
ANTENNATYPE	UInt	Types of antenna: 0 = Omnidirectional 1 = Directional 2 = Art 3 = Max
ANTENNASEARCHMODE	UInt	Search mode: 0 = Off 1 = Manual 2 = Automatic
ANTENNADIRECTION	UInt	Antenna direction: 0 = Up 1 = North 2 = North-East 3 = South-East 4 = South 5 = South-West 6 = North-West 7 = No change 8 = Automatic 9 = Above 25 degrees 10 = Below 25 degrees
ANTENNAPOWER	UInt	Antenna power: 0 = Off 1 = On 2 = Art

Name	Type	Description
ANTENNASEARCH	UInt	Antenna search: 0 = Off 1 = On
TELEMETRYSTRENGTH	Int	Signal strength ("star" reading).

## A.20. RADIOSONDES

Contains information about the found radiosondes.

Table 134 RADIOSONDES

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
SERIALNBR	String	Serial number.
SONDETYPEFK	Int	Radiosonde type.
SONDEFAMILY	String	Radiosonde family: 0 = Undefined 1 = RS92 2 = RS41
EEPROM	Byte[]	Radiosonde EEPROM data.
COMPATIBILITYNUMBER	Double	Radiosonde ground equipment minimum version number.
CONFIGURATIONNUMBER	Double	Radiosonde configuration number.
FREQUENCY	Double	Radiosonde frequency [MHz].
WINDFINDINGTYPE	String	Wind finding type.

## A.21. RAWOZONE

Contains raw ozone data (ozone layer data without pressure correction).

Table 135 RAWOZONE

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].

Name	Type	Description
MEASUREMENTOFFSETPK	Double	Measurement time offset.
PARTIALPRESSURE	Double	Raw (uncorrected) ozone partial pressure [mPa].
INTERMEDIATE	Double	Intermediate data used in calculation.
CURRENT	Double	Current measured by sensor [uA].
BOXTEMPERATURE	Double	Sensor box temperature [K].
VOLTAGE	Double	Channel 3 battery voltage measurement [V].
AUX	Double	OIF92: Channel 4 data. OIF411: 0
EXTERNALVOLTAGE	Double	OIF411: External voltage measurement [V]. OIF92: 0
PUMPCURRENT	Double	OIF411: ozone pump current value [mA]. OIF92: 0

## A.22. RAWPTU

Contains raw PTU results.

Table 136 RAWPTU

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
PRESSURE	Double	Pressure [hPa].
TEMPERATURE	Double	Temperature [Kelvin]
HUMIDITY1	Double	RS92: Humidity value of sensor 1 [%]. RS41: Humidity value of sensor [%].
HUMIDITY2	Double	RS92: Humidity value of sensor 2 [%]. RS41: Humidity value of sensor [%].
ASCENTRATE	Double	Ascent rate [m/s].
PRESSUREOK	Bool	Pressure quality indicator. True if value is OK.
TEMPERATUREOK	Bool	Temperature quality indicator. True if value is OK.
HUMIDITYOK	Bool	Humidity quality indicator. True if value is OK.

## A.23. RDFRESULT

Contains RDF results.

Table 137 RDFRESULT

Name	Type	Description
SOUNDINGIDPK	String	Unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
GENERATED	Bool	True if value is generated.
WINDNORTH	Double	Raw wind north component.
WINDEAST	Double	Raw wind east component.
RAWUP	Double	Raw wind up component.
FILTEREDWINDNORTH	Double	Filtered wind north component.
FILTEREDWINDEAST	Double	Filtered wind east component.
AZIMUTH	Double	Azimuth.
ELEVATION	Double	Elevation.
ALTITUDE	Double	Radiosonde altitude.
LATITUDE	Double	Radiosonde latitude.
LONGITUDE	Double	Radiosonde longitude.
NEUNORTH	Double	Radiosonde north position.
NEUEAST	Double	Radiosonde east position.
NEUUP	Double	Radiosonde up position.

## A.24. SATELLITEORBIT

Contains satellite ephemeris or almanac data.

Table 138 SATELLITEORBIT

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
GPSWEEK	Int	GPS week.

Name	Type	Description
GPSSECONDS	Double	GPS seconds.
TYPEOFORBITDATA	Int	Type of orbit data.
SETTIME	Int	Set time (dummy).
SATELLITEID	Int	Satellite PRN number (1-32).
TIMEUPDATED	Int	Time updated [s].
TIMEOFOBSOLETE	Int	Time obsolete [s].
EPHEMERISHEALTH	Int	Ephemeris health (0 = OK).
EPHEMERISREFWEEK	Int	Anti-spoof status (dummy 0).
EPHEMERISREFSECONDS	Double	Ephemeris GPS reference time [s].
ECCENTRICITY	Double	Ephemeris reference week number.
SQRTOAXIS	Double	Ephemeris reference time of week [s].
ARGUMENTOFPERIGREE	Double	Eccentricity.
MEANANOMALY	Double	Square root of semi-major axis (sqrt(m)).
RIGHTASCENSIONS	Double	Argument of perigee (-Pi - Pi) [rad].
RATEOFRIGHTASCENSIONS	Double	Rate of right ascensions [rad/s].
MEANMOTIONDIFFERENCE	Double	Mean motion difference [rad/s].
INCLINATIONANGLE	Double	Inclination angle at reference time (-Pi - Pi) [rad].
INCLINATIONANGLERATE	Double	Inclination angle rate [rad/s].
LATCOSHARMONIC-CORRECTION	Double	Latitude cos harmonic correction [rad].
LATSINHARMONIC-CORRECTION	Double	Latitude sin harmonic correction [rad].
ORBITRADIUSCOS-HARMONICCORRECTION	Double	Orbit radius cos harmonic correction [m].
ORBITRADIUSSIN-HARMONICCORRECTION	Double	Orbit radius sin harmonic correction [m].
INCLINATIONCOS-HARMONICCORRECTION	Double	Inclination cos harmonic correction [rad].
INCLINATIONSIN-HARMONICCORRECTION	Double	Inclinations sin harmonic correction [rad].
ACCURACYALERT	Int	Accuracy alert (UERE actually).
CLOCKDATAREFWEEK	Int	Clock data reference week number.
CLOCKDATAREFSECONDS	Double	Clock data reference time of week [s].
AF0CORRECTION	Double	AF0 clock correction [s].
AF1CORRECTION	Double	AF1 clock correction [s/s].
AF2CORRECTION	Double	AF2 clock correction [s/s/s].



Name	Type	Description
GROUPDELAY	Double	Group delay [s].
ISSUEOFEPHEMERISHDATA	Int	Issue of Ephemeris data [s].

## A.25. SATELLITESTATUS

Contains information on satellites tracked by local and radiosonde's GPS receivers.

Table 139 SATELLITESTATUS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
IDPK	Int	Satellite PRN number.
LOCALSATELLITESTATUS	Int	Local GPS satellite status: 0 = Invalid or unidentified satellite. 1 = Satellite is identified. 2 = Satellite is identified and tracked by GPS receiver. 3 = Satellite is identified, tracked and used in calculation.
SONDESATELLITESTATUS	Int	Radiosonde GPS satellite status: 0 = Invalid or unidentified satellite 1 = Satellite is identified 2 = Satellite is identified and tracked by GPS receiver. 3 = Satellite is identified, tracked and used in calculation

## A.26. SIGNIFICANTLEVELS

Contains significant level information.

Table 140 SIGNIFICANTLEVELS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
SOURCEPK	Int	Source: 0 = Calculation 1 = User
ISTEMPERATURE	Bool	If true, level is a significant level for temperature.

Name	Type	Description
ISHUMIDITY	Bool	If true, level is a significant level for humidity.
ISTROPOPAUSE	Bool	If true, level is a tropopause level.
ISWINDSPEED	Bool	If true, level is a significant level for wind speed.
ISWINDDIR	Bool	If true, level is a significant level for wind direction.
ISWINDMAX	Bool	If true, level is the maximum wind level.
ISWINDVECTOR	Bool	If true, level is a significant point using wind vector criteria.
ISTROPOPAUSE-INCOMPLETELYDEFINED	Bool	If true, tropopause is incompletely defined.

## A.27. SONDEANGLES

Contains radiosonde azimuth and elevation angles.

Name	Type	Description
SOUNDINGIDPK	String	Unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
SONDEAZ	Double	Azimuth angle to radiosonde (0-360).
SONDEEL	Double	Elevation angle to radiosonde (0-360).
TRACKINGMODE	Int	Track mode status. 0 = manual 1 = auto
MANUALSTARTLEVEL	Int	Manual start level.

## A.28. SOUNDINGMETADATA

Table 141 SOUNDINGMETADATA

Name	Type	Description
SOUNDINGIDPK	String	Unique sounding ID.
METADATAKEYPK	String	Metadata key.
METADATAVALUE	String	Metadata value.
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].

## A.29. SOUNDINGPARAMETERS

Contains parameter values that were used in the sounding.

Table 142 SOUNDINGPARAMETERS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
PARAMETERNAMEPK	String	Parameter name.
PARAMETERVALUE	String	Parameter value.
PARAMETERATYPE	Int	Parameter type code (TypeCode enum as an integer).
ISARRAYPARAMETER	Bool	True if parameter is an array parameter, otherwise false.

## A.30. SOUNDINGS

Contains general information about a sounding.

Table 143 SOUNDINGS

Name	Type	Description
IDPK	String	Randomly generated, unique sounding ID.
BEGINTIME	Timestamp	Beginning of sounding in UTC time (time of launch when launch has happened) [yyyy-MM-dd HH:mm:ss.fff].
LAUNCHTIME	Double	Sounding launch radio time [s].
DURATION	Double	Sounding duration [s].
HEIGHT	Double	Station geopotential height [gpm].
ALTITUDE	Double	Station geometric altitude from mean sea level [m].
LATITUDE	Double	Station latitude [deg].
LONGITUDE	Double	Station longitude [deg].
RADIORESETTIME	Timestamp	UTC time of radio time reset [yyyy-MM-dd HH:mm:ss.fff]
MINPRESSURE	Double	Sounding's minimum pressure [hPa].
MAXALTITUDE	Double	Sounding's maximum altitude [m].
ASCENTRATE	Double	Sounding's average ascent rate [m/s].

Name	Type	Description
REASONFORTERMINATION	Int	Reason for sounding termination: 0 = Unknown 1 = IncreasingPressure 2 = ManualStop 3 = BatteryLow 4 = KillerTimeOut 5 = TemperatureSensorFailure 6 = PressureSensorFailure 7 = HumiditySensorFailure 8 = SondeSignalLost 9 = UnknownRadiosonde 10 = PtuFilteringStopped 11 = HumidityTemperatureSensorFailure 12 = PreparationFailed 13 = SondeDisconnected 14 = SystemShutdown 15 = UnsupportedRadiosonde 16 = PtuSensorFailure 17 = RadioFailure
FAILUREASON	Int	Reason for sounding failure flags: 0x0 = Unknown or no failure 0x01 = In-built functional temperature check failed 0x02 = In-built functional humidity check failed 0x04 = Ground check pressure difference limit was exceeded 0x08 = Ground check temperature difference limit was exceeded 0x10 = Ground check humidity difference limit was exceeded 0x20 = Other failure reported by radiosonde 0x40 = Preparation initialization failed 0x80 = Radiosonde was disconnected before end of preparation 0x100 = Radio signal lost 0x200 = Support for used radiosonde requires a license which the system does not have.
FAILUREDETAILS	String	Details about the sounding failure.
TELEMETRYNOISELEVEL	Double	Average telemetry noise level.
MEANSATELLITETRACKCOUNT	Double	Mean satellite track count.
FRONTDIRECTIONANGLE	Double	RT20 antenna's front directional angle (FDA).
MINELEVATION	Double	Minimum elevation angle for RT20 sounding.
ALTITUDEOFFSET	Double	Launch site altitude offset [m].

Name	Type	Description
DIRECTIONOFFSET	Double	Launch site direction offset [deg].
DISTANCEOFFSET	Double	Launch site distance offset [m].
SOFTWAREVERSION	String	Software version of the system performing the sounding.
ALTITUDECONFIDENCE	Int	Altitude confidence value for the sounding.
STATIONNAME	String	Sounding station name.
SYSTEMNAME	String	Sounding system name.
BAROMETEROFFSET	Double	Barometer offset from the station height [m].
GPSANTENNAOFFSET	Double	GPS antenna offset from the station height [m].
CONTINUEDESCENDING	Bool	If true, continues sounding with descending data.
SSDRATE	Int	Synchronized sounding data rate [s].
STATUS	Int	Successful sounding criteria check result flags: 0 = Ok 1 = PressureNotReached 2 = HeightNotReached 4 = TimeNotReached 8 = WindNotContinuous 16 = PressureNotContinuous 32 = TemperatureNotContinuous 64 = HumidityNotContinuous
SPECIALSENSORTYPE	Int	Special sensor type. 0 = None 1 = Generic 2 = Ozone
ISSIMULATED	Bool	True, if sounding is simulated from the UI.
PTUFINDINGTYPE	String	PTU finding type: <b>CompHeightFromPtu</b> <b>CompPressureFromGpsHeightAndTu</b>

## A.31. STABILITYINDEX

Starting from software version 2.3, sounding software MW41 automatically calculates the following stability index values for each sounding. The indices are available in StabilityIndex.xml file in the sounding archive after the sounding has completed.

Table 144 STABILITYINDEX

Name	Type	Description
SOUNDINGIDPK	String	Unique sounding ID.
NAMEPK	String	Stability index name.
ORDERPK	Int	Order number of the index.
VALUE	Double	Value of the stability index.
DATASRVTIMEPK	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].

Table 145 Stability Index Names and Values

Name	Description
LCL_T, LCL_P, LCL_Z	Lifting Condensation Level
LFC	Level of Free Convection
EL	Equilibrium Level
LI	Lifted Index
SI	Showalter Index (also known as SSI = Showalter Stability Index)
CAPE	Convective Available Potential Energy
CINH	Convective Inhibition
K_index	K-Index
TT_index	Total Totals Index
S_index	S-Index
Ko_index	Ko-Index
CCL_P, CCL_T, CCL_Z	Convective Condensation Level

## A.32. STDPRESSURELEVELS

Contains standard pressure levels.

Table 146 STDPRESSURELEVELS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
PRESSUREPK	Double	Pressure [hPa].
HEIGHT	Double	Geopotential height [gpm].
TEMPERATURE	Double	Temperature [Kelvin].
HUMIDITY	Double	Humidity [%].

Name	Type	Description
WINDDIRECTION	Double	Wind direction [deg].
WINDSPEED	Double	Wind speed [m/s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
LATITUDE	Double	Radiosonde latitude [deg]
LONGITUDE	Double	Radiosonde longitude [deg].
RADIORXTIME	Double	Radio time [s].
DROPPINGPK	Bool	True if data is from a dropping (descending) sounding.
TEMPERATUREQUALITY	Int	Measurement quality: 0 = passed 1 = missing 2 = reject 3 = questionable
HEIGHTQUALITY	Int	Measurement quality: 0 = passed 1 = missing 2 = reject 3 = questionable
DATAQUALITYCHECKINDICATOR	Int	Data quality check indicator flags: 0x00 = None 0x01 = MissingDataCheck 0x02 = DataPlausibilityCheckAboveLimits 0x04 = DataPlausibilityCheckBelowLimits 0x08 = SuperadiabaticLapseRateCheck 0x10 = AscensionRateCheck 0x20 = ExcessiveChangeFromPreviousFlight 0x40 = GrossLimitCheck 0x80 = MoistureCheck 0x100 = TemperatureCheck

## A.33. SURFACEOBSERVATIONS

Contains surface observations data.

Table 147 SURFACEOBSERVATIONS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.

Name	Type	Description
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
PRESSURE	Double	Pressure [hPa].
LAUNCHSITEPRESSURE	Double	Launch site pressure [hPa].
TEMPERATURE	Double	Temperature [K].
HUMIDITY	Double	Humidity [%].
WINDDIRECTION	Double	Wind direction [deg].
WINDSPEED	Double	Wind speed [m/s].
CLOUDGROUP	String	WMO cloud group for TEMP and BUFR.
SPECIALGROUP1	String	Optional special group 1 for weather messages.
SPECIALGROUP2	String	Optional special group 2 for weather messages.
ASAPSTATUS	Int	ASAP status for TEMP SHIP.
SEAWATERTEMPERATURE	Double	Temperature of sea water for TEMP SHIP.
SOURCE	Int	Surface observation source: 0 = Manual 1 = Radiosonde2 = AWS
MODE	Int	Surface observation mode: 0 = AWS auto 1 = AWS manual before release 2 = AWS manual after release 3 = Radiosonde manual 4 = Radiosonde auto 5 = Manual before release 6 = Manual after release
WEATHERCODE	String	Optional weather code WWWW.
PREVIOUSTEMPERATURE	Double	Optional previous temperature [K].
DRYBULBTEMPERATURE	Double	Optional surface dry-bulb temperature [K].
DEWPOINTTEMPERATURE	Double	Optional surface dewpoint temperature [K].
WETBULBTEMPERATURE	Double	Optional surface wet-bulb temperature [K].

## A.34. SURFACEWEATHER

Contains AWS surface weather observation data.



Table 148 SURFACEWEATHER

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
DATASRVTIMEPK	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
INSTANTPRESSURE	Double	Instant pressure [hPa].
INSTANTTEMPERATURE	Double	Instant temperature [K].
INSTANTHUMIDITY	Double	Instant humidity [%].
INSTANTWINDDIRECTION	Double	Instant wind direction [deg].
INSTANTSEAWATERTEMPERATURE	Double	Instant seawater temperature [K].
AVERAGEPRESSURE	Double	Average pressure [hPa].
AVERAGETEMPERATURE	Double	Average temperature [K].
AVERAGEHUMIDITY	Double	Average humidity [%].
AVERAGEWINDDIRECTION	Double	Average wind direction [deg].
AVERAGEWINDSPEED	Double	Average wind speed [m/s].
AVERAGESEAWATERTEMPERATURE	Double	Average seawater temperature [K].

## A.35. SYNCHRONIZEDSOUNDINGDATA

Contains synchronized sounding data. Wind and height are interpolated to PTU time.

Table 149 SYNCHRONIZEDSOUNDINGDATA

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
PRESSURE	Double	Pressure [hPa]
TEMPERATURE	Double	Temperature [Kelvin]
HUMIDITY	Double	Humidity [%]
WINDDIR	Double	Meteorological wind direction (opposite to air molecule movement) [deg].
WINDSPEED	Double	Wind speed [m/s].

Name	Type	Description
WINDNORTH	Double	Wind speed (molecule movement) north component [m/s].
WINDEAST	Double	Wind speed (molecule movement) east component [m/s].
HEIGHT	Double	Geopotential height calculated from PTU or measured height [gpm].
ALTITUDE	Double	Radiosonde WGS84 altitude [m].
PTUSTATUS	Int	PTU status flags: 1 = PressureInterpolated 2 = HeightInterpolated 4 = TemperatuInterpolated 8 = HumdityInterpolated 16 = TelemetryBreak 32 = AdiabaticCheckFailed 64 = PressureFromHeight-Interpolated
WINDINTERPOLATED	Bool	Wind status. If true, wind is marked as interpolated.
LATITUDE	Double	Radiosonde latitude [deg].
LONGITUDE	Double	Radiosonde longitude [deg].
NORTH	Double	Radiosonde north distance [m].
EAST	Double	Radiosonde east distance [m].
UP	Double	Radiosonde up distance [m].
DROPPING	Bool	True if data is from a dropping (descending) sounding.

## A.36. SYSTEMEVENTS

Contains sounding's system events.

Table 150 SYSTEMEVENTS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
DATASRVTIMEPK	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
EVENTTYPE	String	Event type (Info, Warning or Error).
ENUMARATIONTYPE	String	Event name.
DATA	String	Optional, free-formed data.
DEBUGMESSAGE	String	Optional information for internal use.

## A.37. TELEMETRYDATA

Contains radiosonde's telemetry frame.

Table 151 TELEMETRYDATA

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
GPSRADIORXTIME	Double	GPS measurement radio time [s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
GPSWEEK	Int	GPS week.
GPSSECONDS	Double	GPS seconds.
CARRIERFREQUENCY	Double	Frequency [Hz].
FRAMELENGTH	UInt	Length of the frame in bytes.
RECEIVERTYPE	UInt	Receiver type
CHECKSUM	UInt	Checksum result for all sections. 0 = OK 1 = Error in one or more sections
REEDSOLOMONRESULT	UInt	Reed-Solomon result
REEDSOLOMONRESULT2	UInt	Reed-Solomon result 2
FRAMEDATA	Byte[]	Frame data.

## A.38. VERSIONINFO

Contains the device's version data.

Table 152 VERSIONINFO

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
DEVICEPK	String	Device identifier.
UNITPK	String	Device's unit identifier.
VERSION	String	Device's or unit's version string.

## A.39. WINDRESULTS

Contains filtered wind values.

Table 153 WINDRESULTS

Name	Type	Description
SOUNDINGIDPK	String	Randomly generated, unique sounding ID.
RADIORXTIMEPK	Double	Radio time [s].
DATASRVTIME	String	Data server timestamp [yyyy-MM-dd HH:mm:ss.fff].
NORTH	Double	Filtered north velocity [m/s].
EAST	Double	Filtered east velocity [m/s].
UP	Double	Filtered up velocity [m/s].

# Technical support



Contact Vaisala technical support at [helpdesk@vaisala.com](mailto:helpdesk@vaisala.com). Provide at least the following supporting information as applicable:

- Product name, model, and serial number
- Software/Firmware version
- Name and location of the installation site
- Name and contact information of a technical person who can provide further information on the problem

For more information, see [www.vaisala.com/support](http://www.vaisala.com/support).

# Warranty

For standard warranty terms and conditions, see [www.vaisala.com/warranty](http://www.vaisala.com/warranty).

Please observe that any such warranty may not be valid in case of damage due to normal wear and tear, exceptional operating conditions, negligent handling or installation, or unauthorized modifications. Please see the applicable supply contract or Conditions of Sale for details of the warranty for each product.

# Recycling



Recycle all applicable material.



Follow the statutory regulations for disposing of the product and packaging.





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