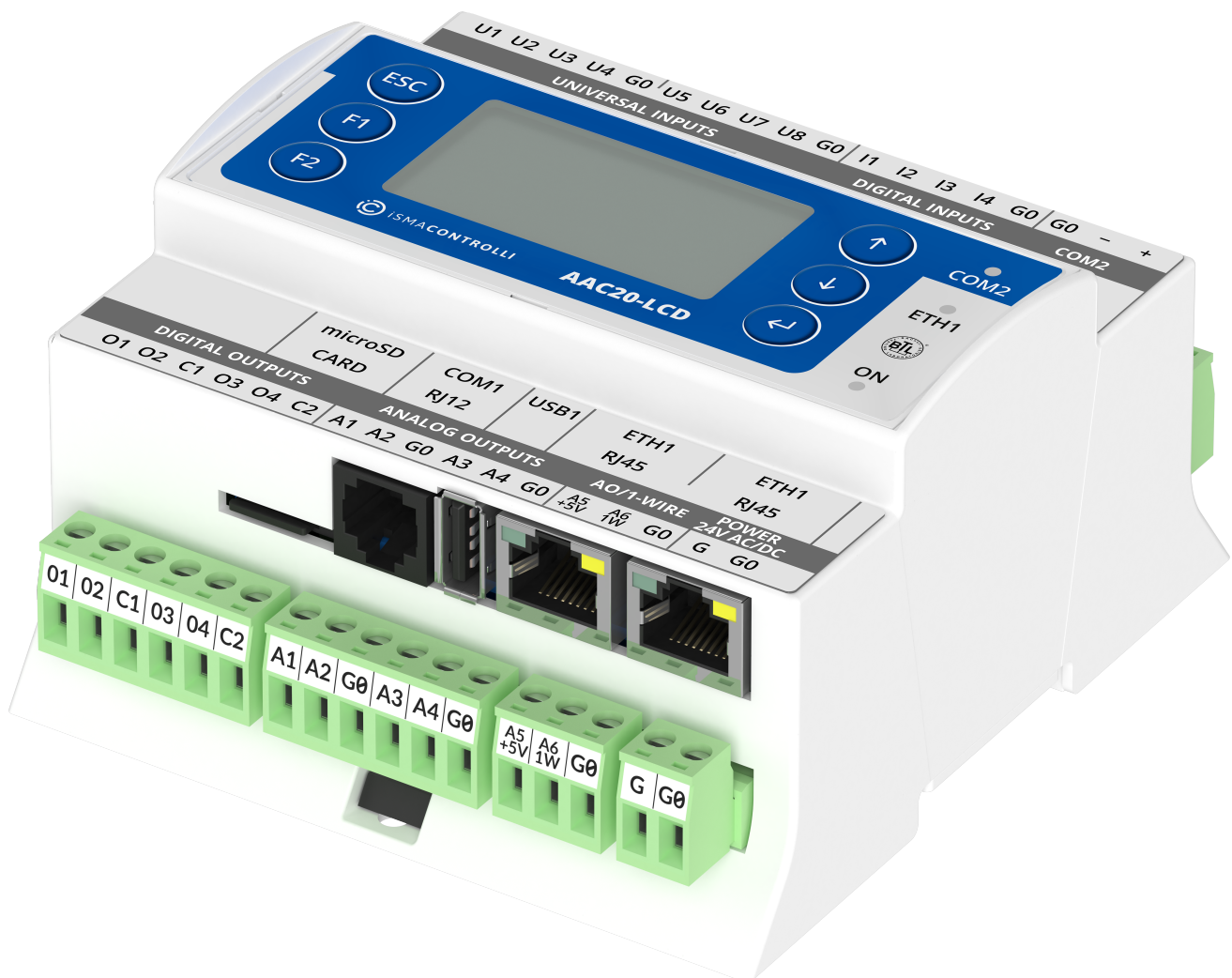


iSMA-B-AAC20

User Manual

Weather Kit



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1 Introduction

This manual contains information about the Weather kit in the AAC20 controller. The Weather kit can be used in all AAC20 hardware versions with firmware 3.4 version or higher. Before installation, it is recommended to update the firmware to the latest version.

The Weather component uses the Open Weather Map Service, therefore, the AAC20 controller must have an access to the Internet for proper work.

The Sun position and Moon position components work without the Internet connection, they operate on a system time and geographic location.

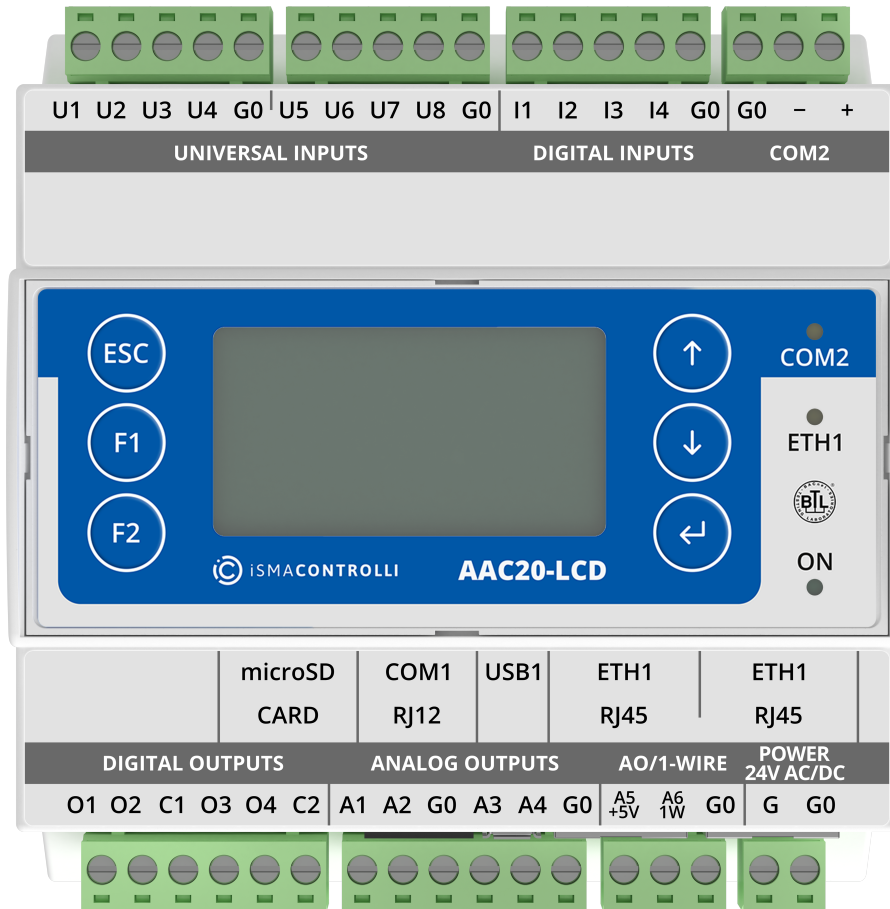


Figure 1. AAC20-LCD controller

1.1 Revision History

Rev.	Date	Description
1.0	24 May 2017	First edition
1.1	16 Jul 2020	Weather service update
1.2	28 Feb 2022	Rebranded Added information about available sockets

Table 1. Revision history

2 Installation of iSMA Weather Kit

2.1 Sockets Available in iSMA-B-AAC20 Controller

To install the Weather kit, go to the Kit Manager (opened for a connected and defined device, for details check the iSMA Tool Manual), select the iSMA_weather kit, and click the Update option for the device selected to work with. The Kit Manager shows that the selected kit will be installed to the device once the Update option is chosen.

The iSMA-B-AAC20 controller has 16 sockets for Modbus network. 3 out of 16 sockets are permanently occupied for:

- Modbus server;
- SOX;
- web server.

Consequently, there are 13 sockets left to use in the device, for example, the Modbus TCP network can communicate with 13 devices with different IP addresses and connect them to application (adding more devices automatically forces them into the fault status). Also, adding any of the iSMA Weather or iSMA MailService kits occupies 1 socket per each kit (which becomes apparent after adding the kit and its components, saving the application, and rebooting the controller). The iSMA MailService kit can occupy more sockets if the mail service is configured for one account on one host—each next host occupies next sockets.

2.2 Installing Kit

WARNING! Before installing the kit, make sure that the latest iSMA Tool version is in use. The latest software bundle is available at the iSMA CONTROLLI support website: ismacontrolli.com.

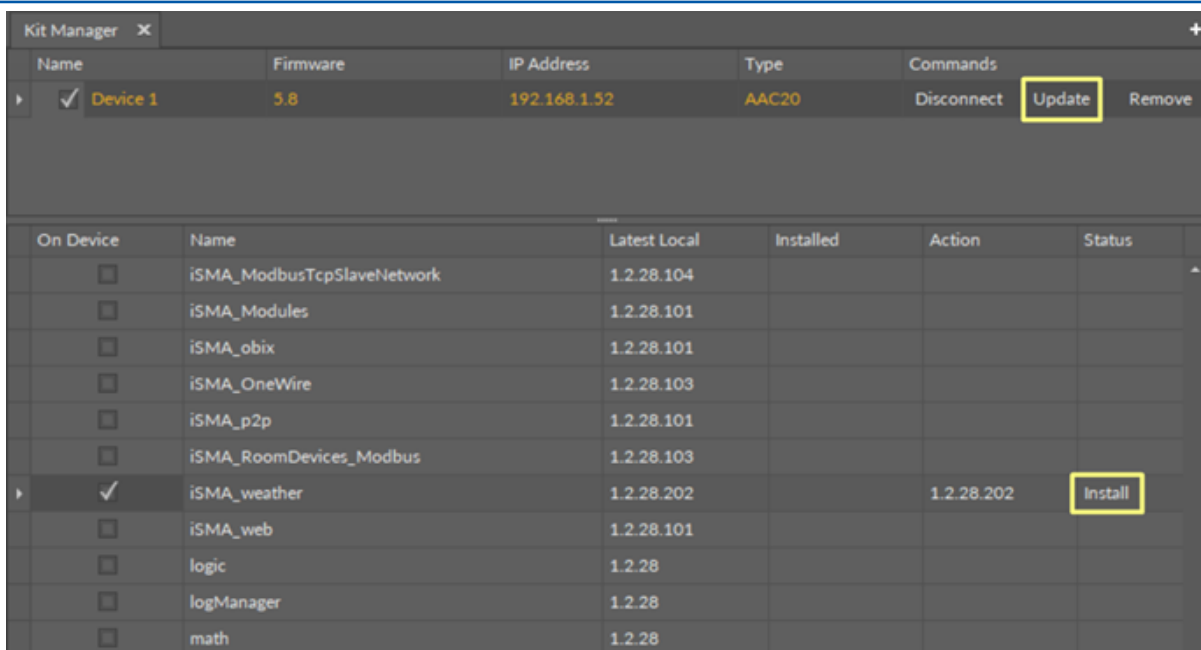


Figure 2. The Kit Manager

2.3 Updating Kit

Once the new version of the Weather kit becomes available it is displayed in the Kit Manager in the Latest Local column. In order to update the kit, check and uncheck it, which makes the latest version appear in the Action column. Then click the Update option in the Commands section.

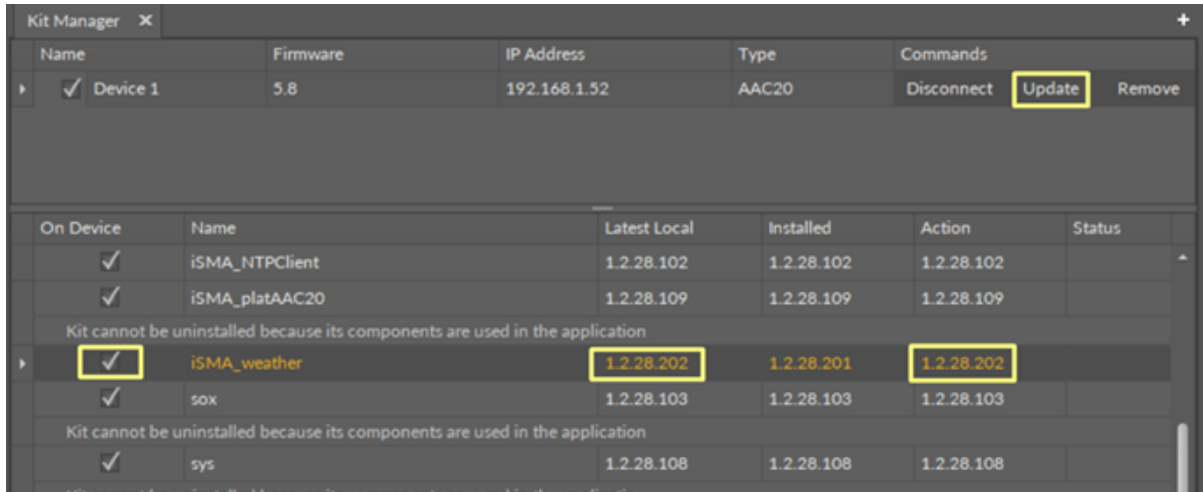


Figure 3. Updating the kit

2.4 Removing Kit

In order to remove the selected kit, first, remove all kit's components from applications—if any component, which is a part of the selected kit, is being used in any application, the iSMA Tool blocks its removal in the Kit Manager. Once all components are removed from applications, go to the Kit Manager, uncheck the iSMA_weather kit, and click the Update option for the device selected to work with. The Kit Manager shows that the selected kit will be uninstalled from the device, once the Update option is chosen.

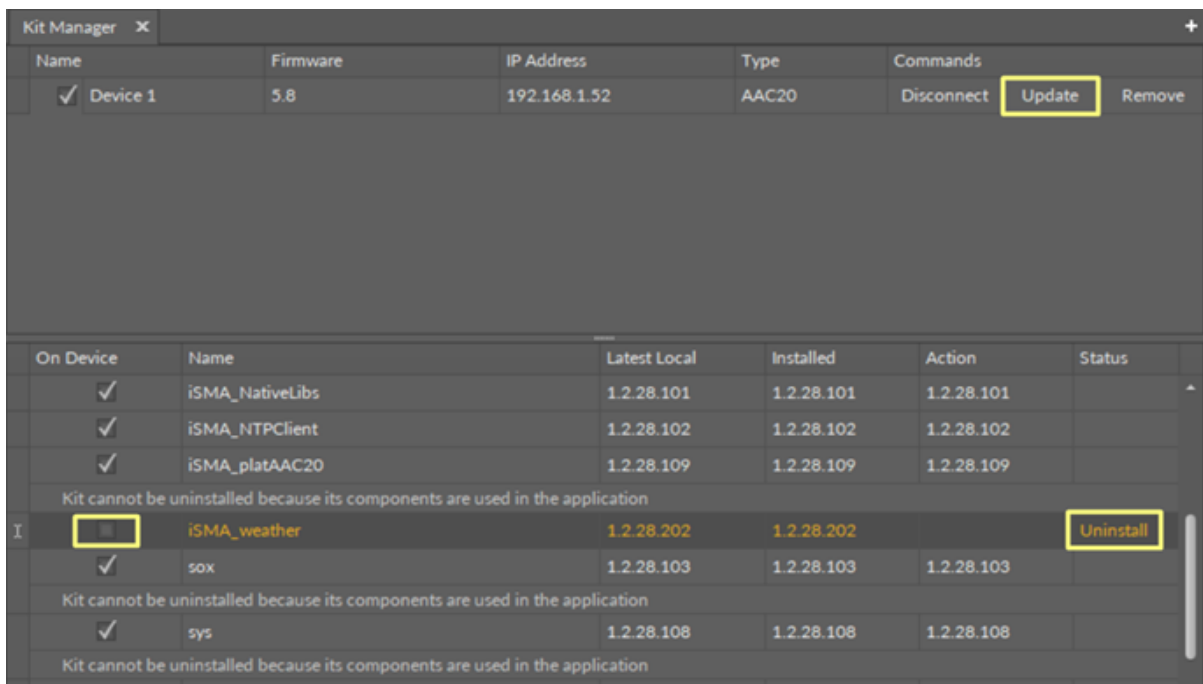


Figure 4. Removing the kit

3 Weather Kit

The Weather kit consists of three components:

- Weather: shows current weather conditions;
- SunPosition: shows the position of the sun;
- MoonPosition: shows the current moon phase.

WARNING! Prior to starting the weather service on the iSMA-B-AAC20 controller, make sure that the controller's default gateway and DNS (if the Obtain DNS Server Address Automatically slot is set to false) are properly set in the plat service.

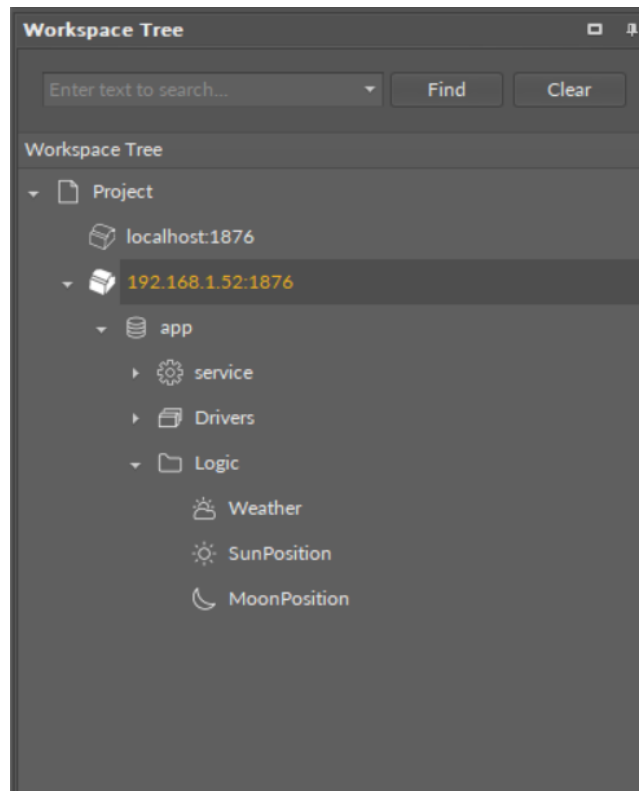


Figure 5. Weather kit components

3.1 Weather

The Weather component is the main component of the kit, it provides weather data and allows the SunPosition and MoonPosition components to work properly. The component is based on the Open Weather Map Service (available at: <https://openweathermap.org>), so for proper work the controller must be connected to the Internet. The Open Weather Map Service is free for a basic use-up to 60 requests per minute or up to 1.000.000 requests per month. In case the number of devices in use implies higher number of requests per minute or per month, the Open Weather Map Service offers paid subscription plans (available at: <https://openweathermap.org/price>).

In order to enable the Weather kit components, an Open Weather Map Service API key is necessary. To receive the API key, create an account on the Open Weather Map Service (https://home.openweathermap.org/users/sign_up), and go to the API keys tab. The default API key is generated up to two hours after a first sign-in, and more individual keys can be generated afterwards.

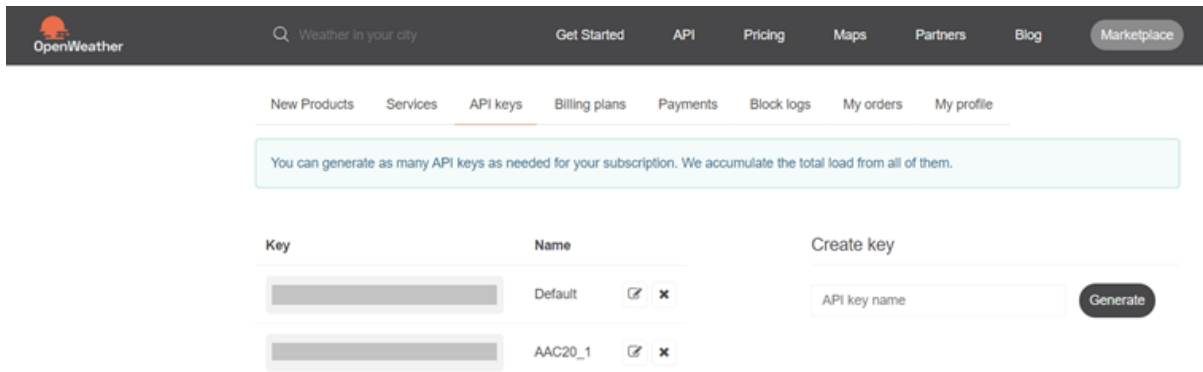
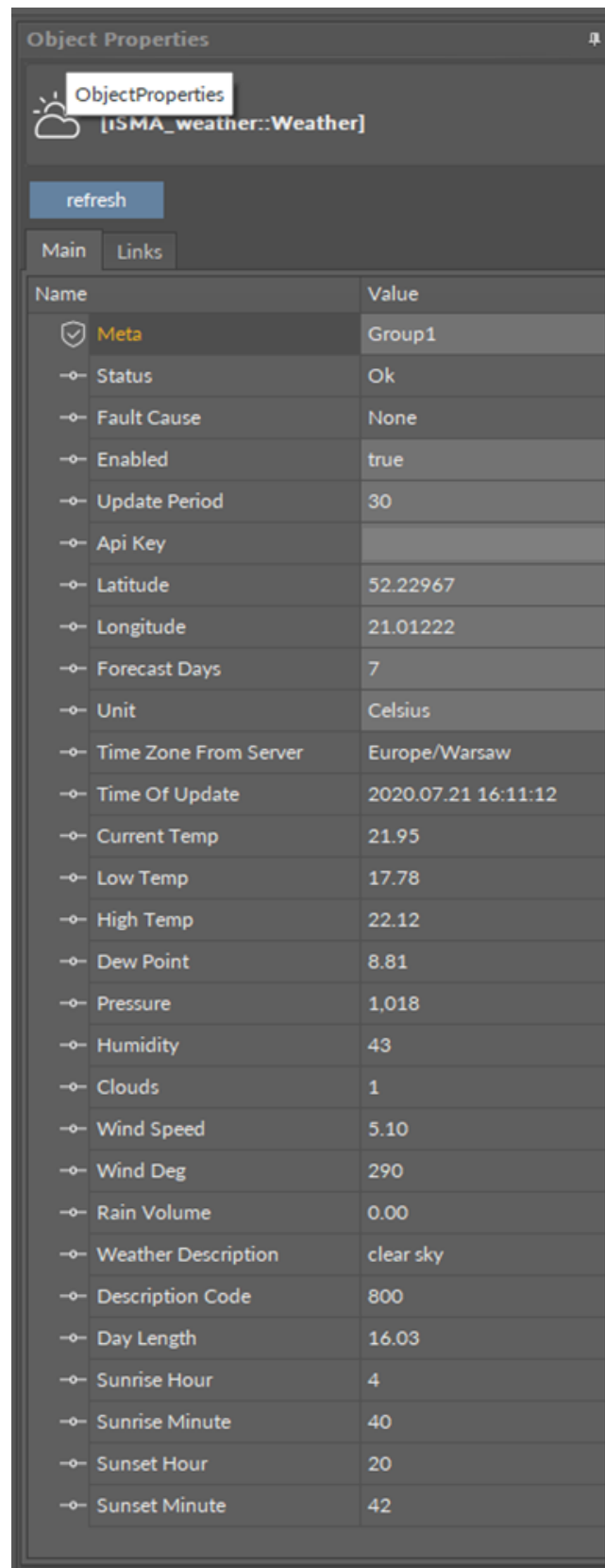


Figure 6. The Open Weather Map service view

Once the API key is generated, it has to be entered in the API key slot in the Weather component.



Name	Value
✓ Meta	Group1
→ Status	Ok
→ Fault Cause	None
→ Enabled	true
→ Update Period	30
→ Api Key	
→ Latitude	52.22967
→ Longitude	21.01222
→ Forecast Days	7
→ Unit	Celsius
→ Time Zone From Server	Europe/Warsaw
→ Time Of Update	2020.07.21 16:11:12
→ Current Temp	21.95
→ Low Temp	17.78
→ High Temp	22.12
→ Dew Point	8.81
→ Pressure	1,018
→ Humidity	43
→ Clouds	1
→ Wind Speed	5.10
→ Wind Deg	290
→ Rain Volume	0.00
→ Weather Description	clear sky
→ Description Code	800
→ Day Length	16.03
→ Sunrise Hour	4
→ Sunrise Minute	40
→ Sunset Hour	20
→ Sunset Minute	42

Figure 7. Weather component

The Weather component has the following slots:

- **Status:** shows the component's status;

- Available information: OK (the component is working properly), Disabled (the component is disabled, the Enable slot is set to false), Discovering (the component is refreshing its data and downloading new data from the server);
- **Fault Cause:** shows a description of a fault cause that occurred in the component;
- **Enabled:** change of the slot's value enables or disables the component—if the component becomes disabled, it stops to read values from the server;

Note: By default, the component is disabled. In order to work properly, it needs to be enabled manually.

- **Update Period:** time after which the weather data are refreshed (expressed in minutes);
- **Api Key:** the API key generated from the Open Weather Maps Service;
- **Latitude:** geographical latitude; geographic coordinates define the place which the component shows the weather conditions for;
- **Longitude:** geographical longitude; geographic coordinates define the place which the component shows the weather conditions for;
- **Forecast Days:** allows to set a number of days for the weather forecast;

Note: Smaller number of the forecast days means less time for the controller to process data.

- **Unit:** allows to set a measured temperature units (Celsius or Fahrenheit);
- **Time Zone From Server:** shows the time zone name of the place defined by geographical coordinates;
- **Time Of Update:** shows the date and time of the last update from the server;
- **Current Temp:** shows the current temperature in the place defined by geographical coordinates;
- **Low Temp:** shows the minimum temperature for the day in the place defined by geographical coordinates;
- **High Temp:** shows the maximum temperature for the day in the place defined by geographical coordinates;
- **Dew Point:** shows the dew point temperature for the place defined by geographical coordinates;
- **Pressure:** shows the pressure value for the place defined by geographical coordinates (expressed in hPa);
- **Humidity:** shows the humidity value for the place defined by geographical coordinates (expressed in percentage);
- **Clouds:** shows the cloud cover for the place defined by geographical coordinates (expressed in percentage);
- **Wind Speed:** shows the wind speed in the place defined by geographical coordinates (expressed in meters per second);
- **Wind Deg:** shows the wind direction in the place defined by geographical coordinates (expressed in degrees);
- **Rain Volume:** shows the rain volume in the place defined by geographical coordinates (expressed in mm);
- **Weather Description:** shows a text descriptor summarizing current weather conditions;
- **Description Code:** shows a weather description code according to the list available at <https://openweathermap.org/weather-conditions>;
- **Day Length:** shows the current day length in the place defined by geographical coordinates (expressed in hours);

- **Sunrise Hour:** together with the Sunrise Minute value shows the time of sunrise in the place defined by geographical coordinates (expressed in HH:MM format, here shows the HH value);
- **Sunrise Minute:** together with the Sunrise Hour value shows the time of sunrise in the place defined by geographical coordinates (expressed in HH:MM format, here shows the MM value);
- **Sunset Hour:** together with the Sunset Minute value shows the time of sunset in the place defined by geographical coordinates (expressed in HH:MM format, here shows the HH value);
- **Sunset Minute:** together with the Sunset Hour value shows the time of sunset in the place defined by geographical coordinates (expressed in HH:MM format, here shows the MM value).

The screenshot shows a window titled "Weather" with a status bar indicating "Off" and the address "172.16.1.34:1876 - Weather [iSMA_weather::Weather]". The main content is a table with columns "Name", "Value", and "Info". The table is organized into a tree view with expandable sections for "Day1", "Day2", "Day3", "Day4", "Day5", "Day6", and "Day7". Each day's section contains a "Meta" row (Group1) and several data rows: "Date", "Low Temp", "High Temp", "Weather Description", and "Description Code".

Name	Value	Info
- Day1		
☑ Meta	Group1	
→ Date	2020.07.16	Buf As String, Max length: 20
→ Low Temp	15.97	[-3.40282347E+38 - 3.40282347E+38]
→ High Temp	18.98	[-3.40282347E+38 - 3.40282347E+38]
→ Weather Description	light rain	Buf As String, Max length: 64
→ Description Code	500	[-2147483648 - 2147483647]
+ Day2		
☑ Meta	Group1	
→ Date	2020.07.17	Buf As String, Max length: 20
→ Low Temp	14.33	[-3.40282347E+38 - 3.40282347E+38]
→ High Temp	24.53	[-3.40282347E+38 - 3.40282347E+38]
→ Weather Description	overcast clouds	Buf As String, Max length: 64
→ Description Code	804	[-2147483648 - 2147483647]
+ Day3		
☑ Meta	Group1	
→ Date	2020.07.18	Buf As String, Max length: 20
→ Low Temp	16.84	[-3.40282347E+38 - 3.40282347E+38]
→ High Temp	26.98	[-3.40282347E+38 - 3.40282347E+38]
→ Weather Description	moderate rain	Buf As String, Max length: 64
→ Description Code	501	[-2147483648 - 2147483647]
+ Day4		
+ Day5		
+ Day6		
+ Day7		

Figure 8. Day 0-7 components view

The Weather component also receives weather the weather forecast for next 0 to 7 days.

Day 0-7 components have the following slots:

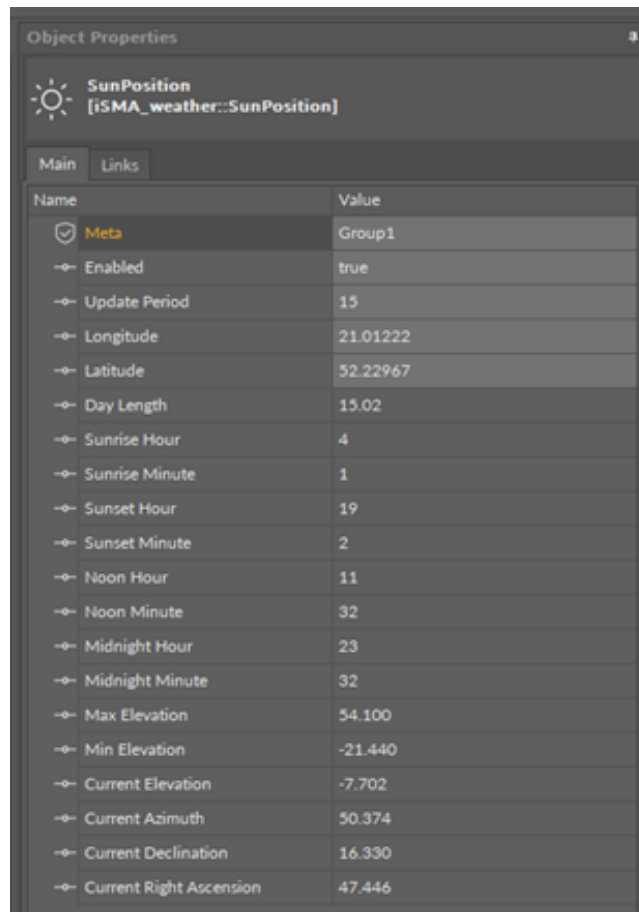
- **Date:** shows the date/timestamp of the weather report;
- **Low Temp:** shows the minimum temperature for the day of forecast in the place defined by geographical coordinates;
- **High Temp:** shows the maximum temperature for the day of forecast in the place defined by geographical coordinates;
- **Weather Description:** shows a text descriptor summarizing weather conditions for the day of forecast in the place defined by geographical coordinates;
- **Description Code:** shows a weather description code according to the list available at <https://openweathermap.org/weather-conditions>.

The Weather component has an available action:

- **Refresh:** allows to manually refresh the data downloaded from the server.

3.2 SunPosition

The SunPosition component calculates a current sun position based on the current time and geographical coordinates. The Internet connection is not required for its proper work.



Name	Value
Meta	Group1
Enabled	true
Update Period	15
Longitude	21.01222
Latitude	52.22967
Day Length	15.02
Sunrise Hour	4
Sunrise Minute	1
Sunset Hour	19
Sunset Minute	2
Noon Hour	11
Noon Minute	32
Midnight Hour	23
Midnight Minute	32
Max Elevation	54.100
Min Elevation	-21.440
Current Elevation	-7.702
Current Azimuth	50.374
Current Declination	16.330
Current Right Ascension	47.446

Figure 9. SunPosition component

The SunPosition component has the following slots:

- **Enabled:** change of the slot's value enables or disables the component—if the component becomes disabled, it stops to operate;
- **Update Period:** time after which the weather data are refreshed (expressed in minutes);
- **Longitude:** geographical longitude; geographic coordinates define the place which the component shows the sun position for;
- **Latitude:** geographical latitude; geographic coordinates define the place which the component shows the sun position for;
- **Day Length:** shows the current day length for the place defined by geographical coordinates;
- **Sunrise Hour:** together with the Sunrise Minute value shows the time of sunrise in the place defined by geographical coordinates (expressed in HH:MM format, here shows the HH value);

- **Sunrise Minute:** together with the Sunrise Hour value shows the time of sunrise in the place defined by geographical coordinates (expressed in HH:MM format, here shows the MM value);
- **Sunset Hour:** together with the Sunset Minute value shows the time of sunset in the place defined by geographical coordinates (expressed in HH:MM format, here shows the HH value);
- **Sunset Minute:** together with the Sunset Hour value shows the time of sunset in the place defined by geographical coordinates (expressed in HH:MM format, here shows the MM value)
- **Noon Hour:** together with the Noon Minute value shows the time of noon in the place defined by geographical coordinates (expressed in HH:MM format, here shows the HH value);
- **Noon Minute:** together with the Noon Hour value shows the time of noon in the place defined by geographical coordinates (expressed in HH:MM format, here shows the MM value);
- **Midnight Hour:** together with the Midnight Minute value shows the time of midnight in the place defined by geographical coordinates (expressed in HH:MM format, here shows the HH value);
- **Midnight Minute:** together with the Midnight Hour value shows the time of midnight in the place defined by geographical coordinates (expressed in HH:MM format, here shows the MM value);
- **Max Elevation:** shows the maximum sun elevation in the place defined by geographical coordinates (expressed in degrees);
- **Min Elevation:** shows the minimum sun elevation in the place defined by geographical coordinates (expressed in degrees),
- **Current Elevation:** shows the current sun elevation in the place defined by geographical coordinates (expressed in degrees),
- **Current Azimuth:** shows the current sun azimuth angle for the place defined by geographical coordinates (expressed in degrees);
- **Current Declination:** shows the current sun's declination for the place defined by geographical coordinates (expressed in degrees);
- **Current Right Ascension:** shows the current right ascension of the sun (expressed in degrees).

3.3 MoonPosition

The MoonPosition component calculates a current Moon's position based on the current time. The Internet connection is not required for proper work.

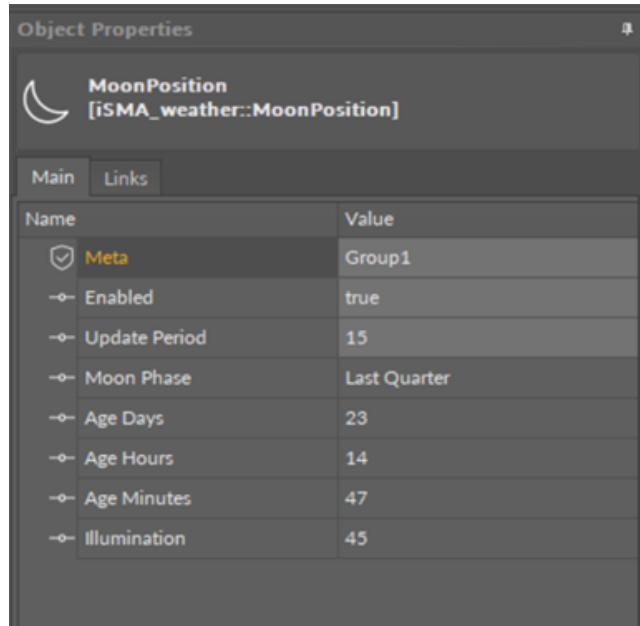


Figure 10. MoonPosition component

The MoonPosition component has the following slots:

- **Enabled:** change of the slot's value enables or disables the component—if the component becomes disabled, it stops to operate;
- **Update Period:** time after which the weather data are refreshed (expressed in minutes);
- **Moon Phase:** shows the current moon phase;
- **Age Days:** together with the Age Hours and Age Minutes values shows the time since the last new moon in the place defined by geographical coordinates (expressed in DD:HH:MM format, here shows the DD value);
- **Age Hours:** together with the Age Days and Age Minutes values shows the time since the last new moon in the place defined by geographical coordinates (expressed in DD:HH:MM format, here shows the HH value);
- **Age Minutes:** together with the Age Days and Age Hours values shows the time since the last new moon in the place defined by geographical coordinates (expressed in DD:HH:MM format, here shows the MM value);
- **Illumination:** shows the percentage of the moon’s illumination by the sun.

3.4 Weather Status Value Description

ID	Main	Description
200	Thunderstorm	Thunderstorm with light rain
201	Thunderstorm	Thunderstorm with rain
202	Thunderstorm	Thunderstorm with heavy rain
210	Thunderstorm	Light thunderstorm
211	Thunderstorm	Thunderstorm
212	Thunderstorm	Heavy thunderstorm

ID	Main	Description
221	Thunderstorm	Ragged thunderstorm
230	Thunderstorm	Thunderstorm with light drizzle
231	Thunderstorm	Thunderstorm with drizzle
232	Thunderstorm	Thunderstorm with heavy drizzle
300	Drizzle	Light intensity drizzle
301	Drizzle	Drizzle
302	Drizzle	Heavy intensity drizzle
310	Drizzle	Light intensity drizzle rain
311	Drizzle	Drizzle rain
312	Drizzle	Heavy intensity drizzle rain
313	Drizzle	Shower rain and drizzle
314	Drizzle	Heavy shower rain and drizzle
321	Drizzle	Shower drizzle
500	Rain	Light rain
501	Rain	Moderate rain
502	Rain	Heavy intensity rain
503	Rain	Very heavy rain
504	Rain	Extreme rain
511	Rain	Freezing rain
520	Rain	Light intensity shower rain
521	Rain	Shower rain
522	Rain	Heavy intensity shower rain
531	Rain	Ragged shower rain
600	Snow	Light snow
601	Snow	Snow
602	Snow	Heavy snow

ID	Main	Description
611	Snow	Sleet
612	Snow	Light shower sleet
613	Snow	Shower sleet
615	Snow	Light rain and snow
616	Snow	Rain and snow
620	Snow	Light shower snow
621	Snow	Shower snow
622	Snow	Heavy shower snow
701	Mist	Mist
711	Smoke	Smoke
721	Haze	Haze
731	Dust	Sand or dust whirls
741	Fog	Fog
751	Sand	Sand
761	Dust	Dust
762	Ash	Volcanic ash
771	Squall	Squalls
781	Tornado	Tornado
800	Clear	Clear sky
801	Clouds	Few clouds: 11-25%
802	Clouds	Scattered clouds: 25-50%
803	Clouds	Broken clouds: 51-84%
804	Clouds	Overcast clouds: 85-100%

Table 2. Weather status codes

The list is available at: <https://openweathermap.org/weather-conditions>.