

**techfass**

# **CON 110.IP**

*Cloud connector*

*User's guide*



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## 2 Cloud connector CON 110.IP description

The CON 110.IP cloud connector is a device that enables configuration and management of APS mini Plus systems via a web interface - web browser. For its function it needs an Internet connection via Ethernet, a connection to RS 485 of APS mini Plus system and 12 V / 24 V DC power supply. The configuration and administration are done in a web browser on the web page of TECH FASS cloud with online service WebHit.

### 2.1 Cloud connector CON 110.IP

The CON 110.IP connector occupies two module units on a DIN rail, contains power, RS 485 and cloud communication.



*Pic. 1: CON 110.IP*

## 3 Technical parameters

### 3.1 Product version

Product version	Product description	Color	Catalogue number	Connectivity		
				Ethernet	Wifi	USB
	CON 110.IP	Black & White	57411000	✓	✗	○

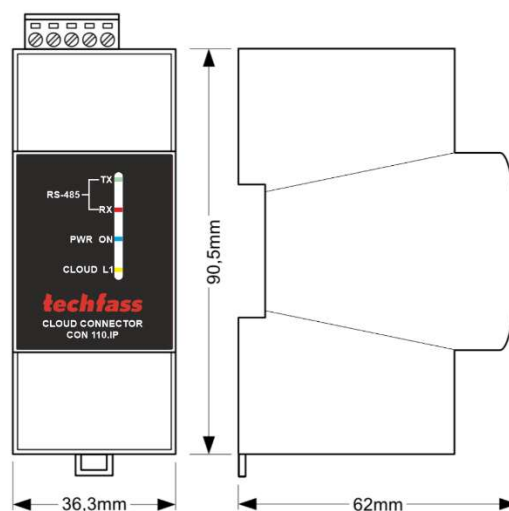
Table 1: Product version

### 3.2 Technical features

Technical features	Supply voltage		9 ÷ 28 VDC
	Current consumption	Low CPU load mode	170 mA @ 12 V, 100 mA @ 24 V
		High CPU load mode	410 mA @ 12 V, 220 mA @ 24 V
	Current fuse (polyfuse)		1,11 A
	Typical input power, peak input power		2 W, 13 W
	Ethernet port		10 / 100 Mbit / s
	USB port 2.0 type A		2x, not active
	RS 485		System bus
	ESD protection RS 485	Human body model	±15 kV
		Contact discharge	±8 kV
	Real time clock (RTC)		Yes, backup battery CR1220 / BR1220; 2 years w/o power otherwise replace every 5 years
	LED signalization		<ul style="list-style-type: none"> <li>- RS 485 RX, TX</li> <li>- Power</li> <li>- Cloud communication</li> </ul>

Table 2: Technical features

## 4 Mechanical design



*Pic. 2: CON 110.IP dimensions*

Mechanics	Weight	160 g
	Operating temperature range	-20 ÷ 70 °C
	IP code	IP 20
	Color	White
	Dimension (h x w x d)	90,5x36,3x62 mm
	Mounting	DIN rail, 2 M size

*Table 3: Mechanical design*

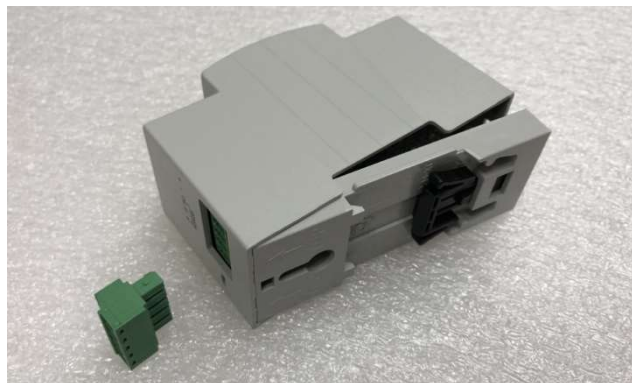
## 4.1 Opening the case of CON 110.IP

The opening of the case is necessary for the following operations:

- Replacement of the backup battery for RTC
- Connection of termination resistor 100  $\Omega$
- Disconnection of fail save pullup and pulldown resistors 620  $\Omega$  (idle state)

### Procedure

- Disconnect the power supply and the communication
- Remove the green pluggable terminal block
- Remove the black plastic DIN rail hook
- With a small flat screwdriver gently separate the bottom case and boards assembly from the top cover; lift the side next to the DIN rail hook first
- Process the needed operation
- Replace the circuit boards assembly inside the case; ensure that the USB/Ethernet connectors are aligned with the opening in the case
- Replace the case bottom, inserting the side opposite to the DIN rail hook first, then gently push the other side in place
- Replace the black plastic DIN rail hook.



*Pic. 3: Opened case of CON 110.IP*

## 4.2 Replacing the RTC backup battery

This product uses a small lithium non-rechargeable battery to power its internal real time clock (RTC). CON 110.IP is shipped with a CR1220 Lithium / Manganese Dioxide (Li/MnO<sub>2</sub>) battery installed. The battery is only used to power the RTC chip when the main power is not available. Depending on operating conditions it should last up to two years if the CON 110.IP is not powered, more if it regularly receives external power (it is recommended to replace the battery every five years). The RTC backup battery holder is on the vertical circuit board, opposite the Compute Module slot. In the CON 110.IP, the battery is not accessible from the outside. You should first remove the case body to gain access to the CON 110.IP circuit boards. Follow the procedure described at chapter 4.1 to open and replace the case.



*Improper handling of lithium batteries can result in an explosion of the batteries and/or release of harmful substances. Worn-out or defective batteries can compromise the function of this product. KEEP OUT OF REACH OF CHILDREN. Swallowing may lead to serious injury or death in as little as 2 hours due to chemical burns and potential perforation of the esophagus. Immediately see doctor.*

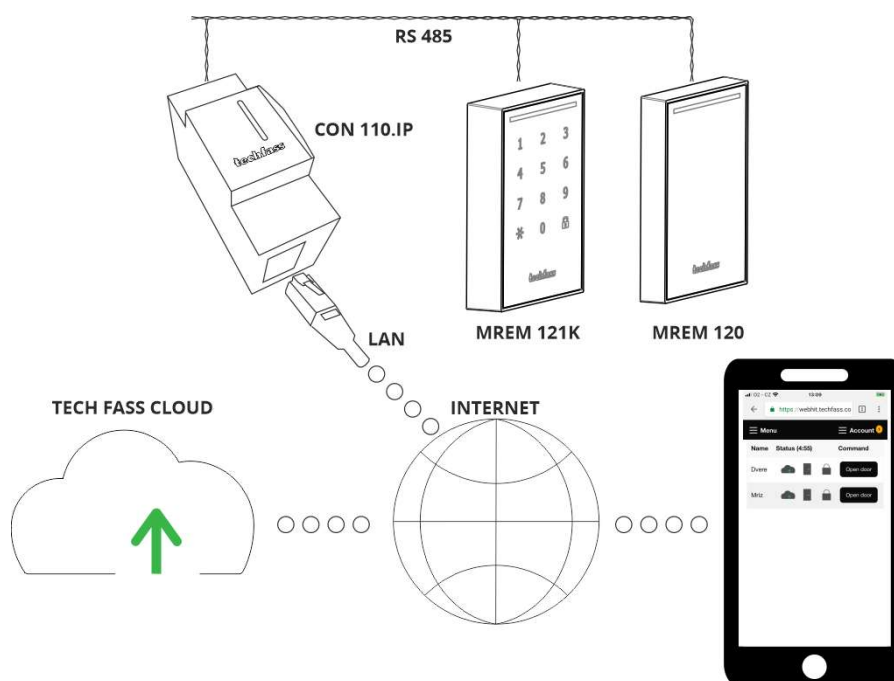
*Do not throw lithium batteries into fire, do not solder on the cell body, do not recharge, do not open, do not short-circuit, do not reverse polarity, do not heat above 100°C and protect from direct sunlight, moisture and condensation.*

*Dispose of used batteries according to local regulations and the battery manufacturer's instructions.*



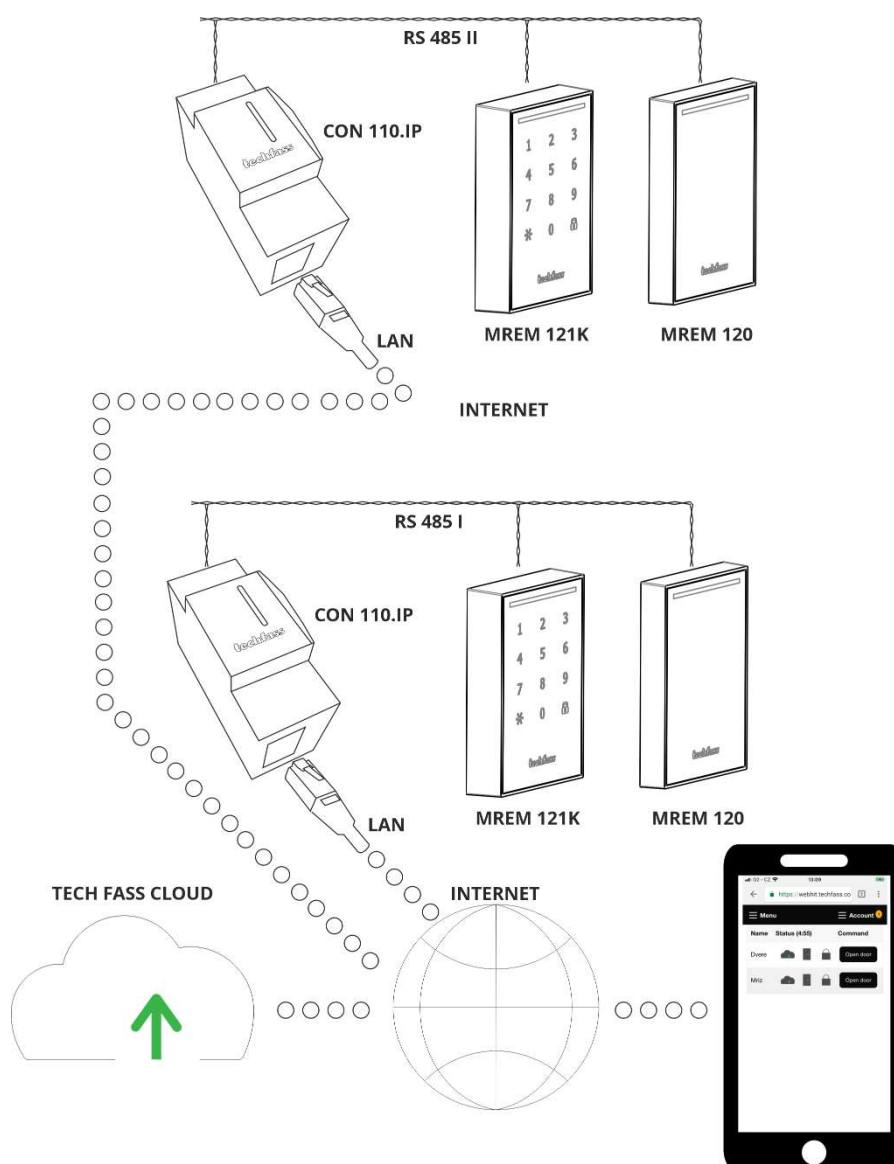
*Pic. 4: The placement of the battery holder for RTC.*

## 5 Wiring diagram

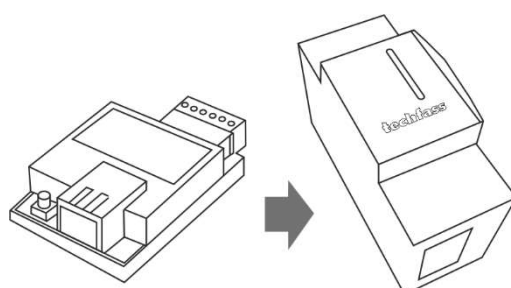


*Pic. 5a: The cloud connector CON 110.IP is connected to the internet network via ethernet and via RS 485 bus to the APS mini Plus system.*





*Pic. 5b: It is possible to connect several cloud connectors CON 110.IP in parallel and manage them as one installation from the web.*



*Pic. 5c: Any current installation with APS mini Plus system is able to control and manage through the cloud just by replacing the APSLAN converter by cloud connector CON 110.IP or adding it if no converter is present.*

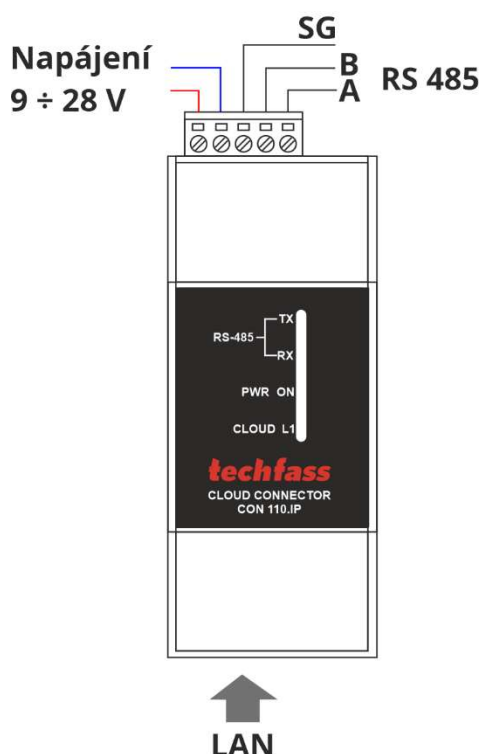
## 6 The plug-able terminal block wiring

In addition to the Ethernet port and two USB ports, there is a green five-pin terminal block on the cloud connector. This terminal block serves for connection of power supply and serial communication (RS 485). The maximum cross-section of connectable wires is 1.5 mm<sup>2</sup> (16 AWG) or 0.5 mm<sup>2</sup> when using a conductor sleeve. The recommended length of the stripped part is 5 mm. Screw threads are M2 size, maximum tightening torque 0.25 Nm.

pins description	#	Pin / Port	Description
	1	Vin	+ 8 ÷ + 28 VDC
	2	GND	Power GND
	3	SG	Signal ground
	4	B	B pin of RS 485
	5	A	A pin of RS 485
	6	RJ 45	Ethernet port (internet)
	7	USB 1	Temporarily not available
	8	USB 2	Temporarily not available

Table 4: Description of pins & ports

### 6.1 The wire connections



Pic. 6: Connection of green terminal block of CON 110.IP and LAN port.

## 6.2 The power supply

The actual CON 110.IP requires a maximum power consumption of up to 13 W for its function. Typical power consumption is around 2 W.

## 6.3 The RS 485 bus (APS mini Plus bus)

The RS 485 serial port is galvanically separated from the CON 110.IP internal circuits, thus avoiding potential ground loops that occur when connecting different ground potentials to devices that communicate with each other via the RS 485 line.

### 6.3.1 The cabling

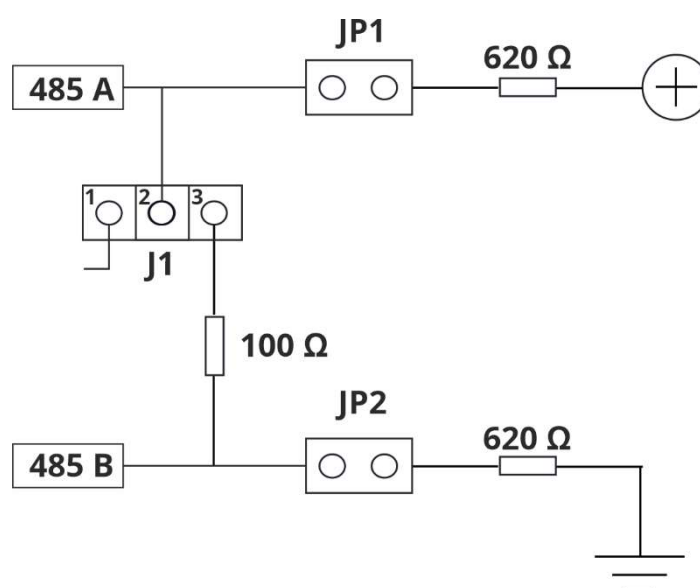
Always use twisted-pair cable for RS 485 to eliminate noise. The most commonly used cable is UTP CAT 5e with a characteristic impedance of 100  $\Omega$ . If the RS 485 line could be disturbed eg from other cabling beside it, it is of course possible to use a shielded FTP cable.

### 6.3.2 The bus termination

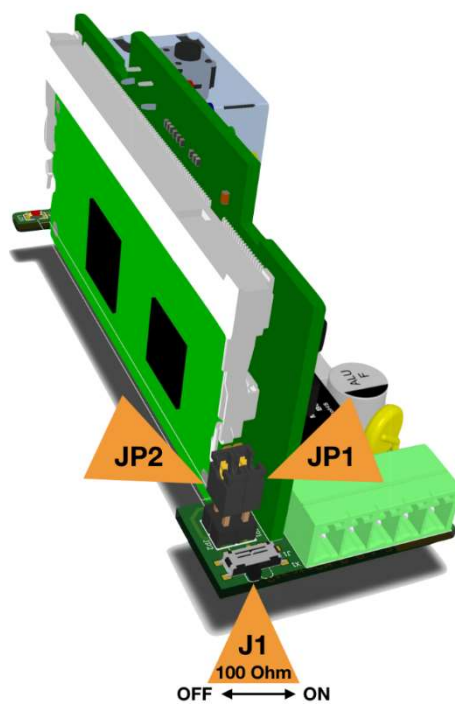
All products of the APS mini Plus system are half-duplex transceivers, so they send and receive a signal via RS 485, so it is advisable to terminate the bus on both sides with a resistor with the characteristic line impedance value - in our case with 100  $\Omega$  resistor (UTP CAT 5e). The termination is made at both ends of the line between conductors A and B. The CON 110.IP connector enables the connection of an internal 100  $\Omega$  resistor by switching the J1 switch towards the green terminal block. By default, the 100  $\Omega$  terminating resistor is disconnected (*pic. 7 and 8*).

### 6.3.3 The idle state

if any transceiver on the line is transmitting, it is recommended, that the receiver inputs on the transceivers are in a defined state. For this purpose, there are 620  $\Omega$  pulldown and pullup resistors that define the state in this case - in the idle state. By default, these resistors are connected to the CON 110.IP via JP1 and JP2 jumpers (*pic. 7 and 8*).



*Pic. 7: The termination resistor 100  $\Omega$  and pullup, pulldown resistors 620  $\Omega$ .*



*Pic. 8: The position of jumpers JP1, JP2 and the switch J1 inside the case.*

## 7 LED indicators, reset button

The LEDs are located on the front panel. They signal to the user that the device is powered or communicates over the serial line and to the cloud.

Indicators	Power	Blue LED is on ✓
	Disk operations	Blue LED flashing ✓
	Serial communication RS-485 TX	Green LED ✓
	Serial communication RS-485 RX	Red LED ✓
	Depending on active service	Yellow LED ✓

Table 5: Indicators

### 7.1.1 Green and red LED behavior

The green LED indicates transmit, the red LED receive of the data on the RS 485 line (in any operating mode CON 110.IP).

In the *Communication Converter* operating mode (see below), the communication is controlled by the master system. The APS mini Plus communication protocol is generally of the master / slave type. In this protocol type the response (red LED flashes) should quickly follow the request (green LED flashes). If no response is received (red LED does not flash), the master waits for short time ("response timeout") and sends new request (green LED flashes). If there is a problem communicating with the connected devices, you can see the problem on the LED behavior.

In the *Advanced communication converter* and *Cloud Connector* operating modes the communication on RS 485 is controlled by the converter itself. The general meaning of the green and red LEDs is the same as the *Communication converter* mode, the behavior in typical situations looks like this:

- If neither the green nor the red LED is flashing, no communication with any device is configured, the converter is not sending requests.
- If the devices are connected and configured correctly, the green and red LEDs lights up (in fact they are flashing very fast, but it is not human visible).
- If the configuration is partially incorrect (for example, communication with some addresses that are connected and some disconnected), the green and red LEDs "flashes together".
- If only the green LED flashes, the converter tries to communicate only with addresses that are not connected.
- If only the red LED flashes, communication with no device is configured, but another master is trying to communicate on the communication line.
- If the flashing LED is out of the above (they flashes "somewhat strangely"), there may be a problem with an address conflict, poorly wired RS 485, multiple masters on the line, or a combination of these problems.

### 7.2 Blue LED behavior

The blue LED indicates the power supply of the converter (lit) and reading / writing to the "disk" (flashes).

## 7.3 Yellow LED behavior

In the *Cloud Connector* operating mode:

- Steady on... connected to the cloud.
- Single flash... communication with the cloud (received / sent message).
- Steady off - you cannot connect to the cloud.
- Fast flashing (approx. 2 Hz) - communication with the cloud is prohibited by the cloud.
- Slow flashing (approx. 1 Hz) - failed to read configuration or other internal converter error.

In the *Communication Converter / Advanced communication converter* operating modes:

- Short flash every 2 seconds.

## 7.4 Reset button

The reset button is placed under the cover of the indicator LEDs (*pic. 8*). Pressing the reset button for at least 4 seconds will:

- Enable the configuration interface,
- reset the configuration password (default value the same as the *Activation Key*),
- set the default IP port of the configuration interface (9999),
- enable DHCP client service,
- restart the device.

## 8 Operating modes, configuration interface

### 8.1 CON 110.IP operating modes

CON 110.IP can operate in three operating modes:

- **Cloud Connector** ... connects the APS mini Plus system to the TECH FASS® Cloud, where the system is also managed.
- **Communication Converter** ... the device works as a communication converter TCP / IP - RS 485 for the APS mini Plus system.
- **Advanced communication converter** ... the device works from the point of view of PC software as a communication converter, but it controls communication with connected devices on the RS 485 line autonomously.

The device obtains the network configuration from the DHCP server. There is no need to set anything in the **Cloud Connector** operating mode. It is important that the converter can connect to the TECH FASS® Cloud.

If the device operates as a communication converter (operating modes **Communication Converter** and **Advanced communication Converter**), it is recommended to set a static IP address. The setting of the operating mode, static IP address and other configuration parameters is performed via the configuration interface.

### 8.2 Configuration interface

The configuration interface is accessible via the TELNET protocol (by default on IP port 9999). It may be necessary to install the TELNET client in your system. A password is required to connect to the configuration interface. The default password is the same as the **activation key** for connecting the converter to the TECH FASS® Cloud. After entering the password, the basic menu of the configuration interface is displayed. Each line of the menu contains one option. The option consists from its selection number and description:

```
CON 110.IP SN 66530000, Configuration server, version 2.4.0.4, copyright (c) 2020 - 2023  
TECH FASS s.r.o.
```

```
Main menu
```

- ```
1 Device information  
2 Service configuration  
3 System configuration  
4 Upgrade services (internet connection required)  
5 Tools  
8 Discard changes and exit  
9 Save and exit
```

```
Your choice? [1/2/3/4/5/8/9]:
```

## 8.2.1 Option "1 Device information"

Displays basic information about the device and its configuration. It may vary depending on the installed services and their versions (the example bellow is simplified to a single service):

```
CON 110.IP SN 66530000, Configuration Interface, version 2.2.0.4, copyright (c) 2020 -
2023 TECH FASS s.r.o.

Service status

* Cloud connector
  Installed:      true
  Version:       2.0.0.0
  Enabled:       False
  Active:        False

...

System information
* DHCP client
  Enabled:      True
  Active:       True
* eth0 (B8:27:EB:51:BD:65)
  IP address:   192.168.56.35 (static)
  Subnet mask:  255.255.255.0
  Gateway address: 192.168.56.1
  DNS address:  192.168.56.2
* eth0 (B8:27:EB:51:BD:65)
  IP address:   192.168.56.126 (dynamic)
  Subnet mask:  255.255.255.0
  Gateway address: 192.168.56.1
  DNS address:  192.168.56.2
* Time options
  Time zone:    Europe/Prague
  NTP:          Enabled
  Synchronized: Yes
  UTC time:     2023-04-03 11:37:49
  Local time:   2023-04-03 13:37:49
* Database status
  Version:      10
* System resources
  CPU usage:    11.75 % (1 min), 11.25 % (5 min), 12.25 % (15 min)
  Disk usage:   87 % (2.89 GB / 3.51 GB, "/dev/root")
  Memory usage: 34 % (324 MB / 927 MB)
```

Note: In the above example, it can be seen that both a dynamic (if a DHCP server is available and the DHCP client service is enabled on the CON 110.IP device, it is always set) and a static IP address is set. In such a case, it is recommended that both addresses are on the same network. The network functions of the device are then available at both addresses.



### 8.2.2 Option "2 Service configuration"

Here you can select the required operating mode of the device. Symbol "("\*)" after operating mode (service) name indicates the currently selected operating mode.

```
Service configuration
1 Cloud connector
2 Communication converter (*)
3 Advanced communication converter
8 Cancel
9 OK
```

### 8.2.3 Option "3 System configuration"

Allows to set the converter parameters. The current values of the individual parameters (except of the configuration interface password) are displayed in brackets:

```
System configuration
1 Static IP configuration (192.168.57.35)
2 Dynamic IP configuration (DHCP client enabled)
3 Configuration interface
4 Communication converter IP port (10001)
5 Advanced communication converter configuration IP port (9998)
6 Time options
8 Cancel
9 OK
```

#### Option "1 Static IP address"

Allows to set the static IP address of the device. To set the static IP address is required:

- IP address,
- subnet mask,
- gateway IP address,
- DNS server IP address.
- Option "Delete static IP address" deletes all static IP address settings.

#### Option "2 Dynamic IP configuration"

Allows to enable / disable the DHCP client service.

#### Option 3 "Configuration interface"

Allows:

- Turn off the configuration interface,
- set the IP port of the configuration interface,
- set the password of the configuration interface.

Note: Default values can be set using the Reset button (see chapter 7.4).

## Option 4 “Communication converter IP port”

Allows to set the IP port for system communication (the port for the configuration software connection – e.g. APS HiT) of the *Communication Converter* and *Advanced Communication Converter* services. Its default value is **10001**.

Note: The above services cannot be started at the same time, the system communication port is the same for both services.

## Option 5 “Advanced communication converter configuration IP port”

The *Advanced Communication Converter* service (see chapter 9.3) is configured with its own configuration interface on own IP port. It can be changed here, the default value is **9998**.

Note: The password for entering the configuration interface of the *Advanced Communication Converter* service is the same as the password for entering the configuration interface of the converter.

## Option 6 “Time options”

Use the option 6 to set the time zone and enable / disable time synchronization from the internet.

Note: Disabled time synchronization is meaningful in the *Advanced Communication Converter* operating mode where no internet connection is available. For detailed information see the chapter 9.3:Advanced communication converter operating mode.

## 8.2.4 Option “4 Upgrade services”

Allows upgrading the device’s software services:

```
1 Configuration server
2 Other services at once
3 All services individually
9 OK
```

When performing the upgrade, it is recommended to start with the configuration server (option 1). After the configuration server is upgraded the connection to the configuration interface will be terminated. New connection can be established after approximately 30 s. In the second step it is possible to upgrade all other services at once (option 2) or select a specific service (option 3).

### 8.2.5 Option 5 „Tools“

Contains various tools for general device operation:

- 1 Remote support
- 2 Reboot
- 3 Ping
- 9 OK

#### *Option „1 Remote support“*

Allows to configure and use the producer remote support access.

Note: An agreement with a technical support representative is required before remote technical support interface is configured and enabled. This interface should only be turned on while it is in use.

#### *Option “2 Reboot”*

Performs device reboot.

#### *Option “3 Ping”*

Performs standard ping to entered host name or IP address.

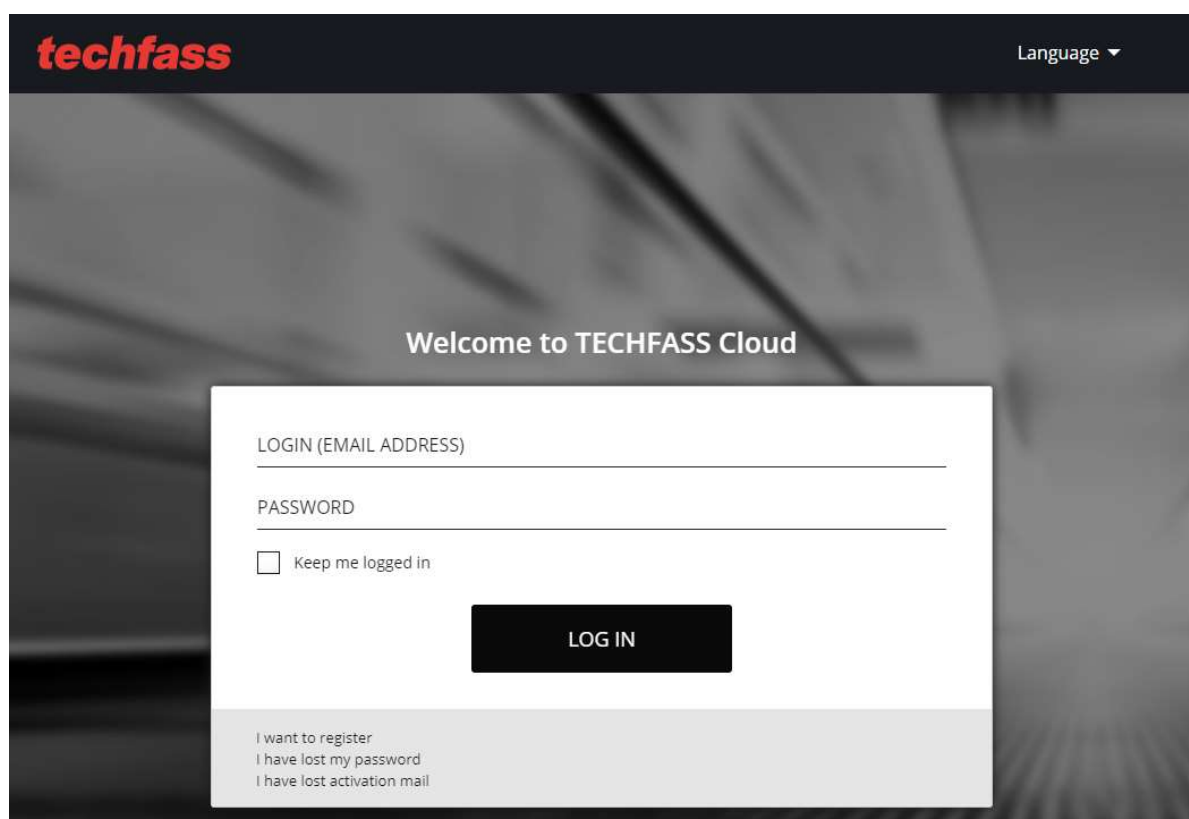
## 9 Commissioning

The device is primarily designed to connect APS mini Plus systems to the TECH FASS cloud, thus enabling easy remote management via a web browser, controlling doors or appliances from a mobile device, being informed of user arrivals, door statuses, etc. (*Cloud Connector* operating mode).

However, the device can also be used only as an ordinary local communication converter of the APS mini Plus system from the RS 485 line to the Ethernet (*Communication Converter* operating mode) and as *Advanced communication converter*, which allows to increase count of the ID's used in the APS mini Plus system and to increase the events archive size. For increasing the ID's count the *MLO* license in the APS mini Plus modules is required.

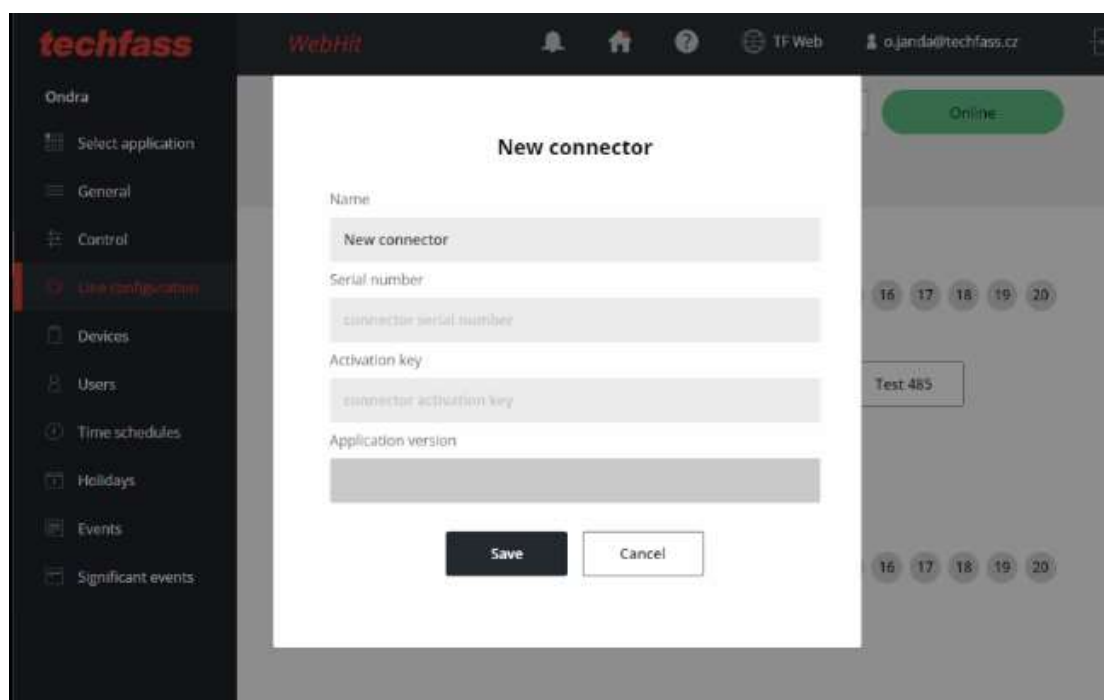
### 9.1 The cloud operation mode

After connecting the RS 485 line and connecting the CON 110.IP to the internet, all you have to do is open the web browser from any device (mobile phone, tablet, PC), which is connected to internet as well, enter the URL to the TECH FASS cloud website and log in.



Pic. 9: cloud.techfass.com

After logging into the TECH FASS cloud, the user selects the WebHit service, creates a new installation and goes to the line configuration item in the left menu and click on the add connector button.



Pic. 10: The dialog pop up window for adding the new cloud connector CON 110.IP

Add the name of your cloud connector, serial number SN and the activation key. If you are missing the serial number or the activation key, contact us please on [support@techfass.cz](mailto:support@techfass.cz).

## 9.2 The Communication Converter operating mode

In this mode, CON 110.IP does not communicate with the TECH FASS cloud and acts as a converter of TECH FASS systems from RS 485 to LAN via Ethernet. Device configuration is described above.

## 9.3 The Advanced Communication Converter operating mode

### 9.3.1 Communication with APS mini Plus devices

In the *Advanced Communication Converter* operating mode (*ACC*) the CON 110.IP does not communicate with the TECH FASS cloud. However, the communication with the APS mini Plus devices is controlled by the CON 110.IP independently of the connected software (the software does not have to be connected at all, except for uploading the access permission and configuration or reading the event archive). It communicates with the software like the communication converter.

### 9.3.2 Events archive and permissions memory

Events from connected APS mini Plus devices are read by the CON 110.IP and stored to its local database (size of the CON 110.IP events database is 1.000.0000 events). The events are sent to the software when it is connected and reads the events. If the readers are equipped with the MLO license, access authorization can be transferred to the converter and higher count of the IDs can be used than the readers themselves allows.

### 9.3.3 Time synchronization

The clock of the converter and connected devices can be synchronized either with the time from the Internet (recommended) or via master software. Both methods cannot be used at the same time. If clock synchronization from the Internet is enabled (see chapter 8.2: Converter configuration interface), the converter will ignore the clock settings by the master software.

Note: APS Server synchronizes the clock permanently, other software as a part of the configuration data.

### 9.3.4 ACC service configuration interface

In order to the converter to be able to control communication with the connected readers independently of the master software, it is necessary to configure the addresses to be connected on the communication line. The configuration interface is, similarly to the configuration interface of the CON 110.IP itself, accessible via the TELNET protocol. For the ACC service, it is in the factory setting on port 9998, the password is the same for both configuration interfaces.

After logging in, there are following options:

```
CON 110.IP SN 66530000, Advanced Communication Converter Service, version 2.4.0.4,
copyright (c) 2020 - 2023 TECH FASS s.r.o.

Main menu

  1 Device information
  2 Communication line
  9 Exit

Your choice? [1/2/5/7/9]:
```

#### Option "1 Device information"

Displays basic information about the device and the option to display current information about the ACC service database (database version, number of events currently stored in the converter archive).

#### Option "2 Communication line"

After entering the configuration of the communication line, the following menu is displayed:

```
Communication line configuration

  1 Communication line status
  2 Connect device
  3 Disconnect device
  4 Show device information
  5 Set authorization mode
  6 Explore communication line
  9 Exit

Your choice? [1/2/9]:
```

#### Option „1 Communication line status“

Reads information about connected devices and displays them:

```
Connected devices

o
|- #01: online, SN: EE3C0000, FW: 5.15.1236, MWGD 46.IP 12V, MLO: YES, authorization mode: Converter
|- #02: online, SN: EE3C0000, FW: 5.15.1236, MWGD 46.IP 12V, MLO: YES, authorization mode: Converter
|- #04: online, SN: 8B210000, FW: 6.03.1240, MREM 64 BK-EM, MLO: YES, authorization mode: Device
|- #09: online, SN: 8C210000, FW: 6.03.1240, MREM 64 BK-EM, MLO: YES, authorization mode: Device
|- #15: online, SN: A60A0001, FW: 6.03.1240, MREM 76 E-EM, MLO: YES, authorization mode: Device
o
```

The following information is displayed for each connected address:

- Hardware address,
- communication status (*online* / *online\_poorcommunication* - errors occur when communicating with the device / *offline* - communication with the device failed),
- serial number,
- firmware version,
- business name,
- *MLO* license status (*YES* = the device contains a license, *NO* = it does not)
- selected permission verification mode (*Converter* = verification is provided by the converter, *Device* = verification is provided by the device).

#### *Options „2 Connect device“ and „3 Disconnect device“*

Through these options, another address can be connected to the line, or the selected address (all connected addresses) can be disconnected.

#### *Option "4 Show device information"*

Displays detailed information about the connected device (business name, serial number, firmware version and status of all licenses).

#### *Option "5 Set authorization mode"*

Allows change of the authentication mode (from Converter to Device and vice versa).

#### *Option "6 Explore communication line"*

explores the communication line (similar to APS Reader or APS HiT). If devices not connected in the configuration are found, it is possible to connect them directly after the line is explored.

Note: Because the communication on the line is controlled by the converter independently of the connected software, it is not meaningful to explore it by the software (only those devices that are connected to the line in the converter configuration will be displayed).



## 10 Declaration of conformity



The manufacturer Sfera Labs S.r.l. declares, that the product follows legal requirements and fulfils necessary European directives. The declaration of conformity document can be downloaded from our web site:

<https://www.techfass.com/en/download/11/conformity-declaration>

## 11 Electrical waste



According to WEEE directive (2012/19/EU), this product cannot be disposed of as unsorted municipal domestic waste and has to be returned to recycling center after its lifetime is over.



## 12 Legislation

The product complies following harmonization legislation of EU

| Legislation | Product    | European harmonization legislation |
|-------------|------------|------------------------------------|
|             | CON 110.IP | 2014/30/EU; "EMCD"                 |
|             |            | 2014/35/EU; "LVD"                  |
|             |            | 2011/65/EU & 2015/863/EU "RoHS"    |
|             |            | "REACH"                            |

*Table 7: Legislation*