

KNX IP INTERFACE

IC-IP-S.1.0

User Manual

Application Program: ver. 1.0

User Manual: ver. 1.0

module-electronic.ru

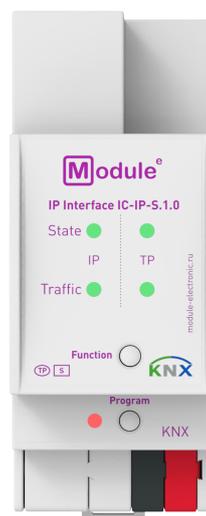
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1 BASIC INFORMATION

The KNX IP interface provides access to the KNX bus from the Ethernet network using the KNXnet/IP protocol. Using to configure, monitor, visualize and manage devices on the KNX network.

- Protocol KNXnet/IP
- Up to 4 connections simultaneously
- Ethernet 10/100 BaseT IP
- LED status indication
- Long telegrams with up to 240 bytes APDU length are supported
- WEB interface for monitoring status and device settings
- Remote firmware update
- Power supply via KNX bus
- DIN rail 35mm mounting

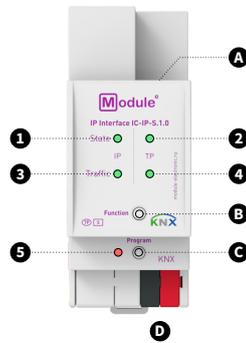


IC-IP-S.1.0

1.1 SPECIFICATION

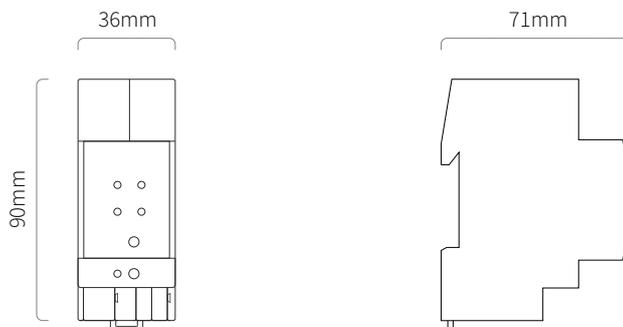
Device model	IC-IP-S.1.0	
Inputs		
Ethernet connector	RJ45, female	
KNX interface		
Specification	TP-256	
Available application software	ETS 4 and later	
KNX connector	4-wire EIB connector (PUSH WIRE spring clips) for standard cable TP1 0,8mm Ø	
Supported protocols	KNXnet/IP, ARP, ICMP, IGMP, HTTP, UPnP discovery, UDP/IP, TCP/IP, DHCP и AutoIP	
KNX physical address by default	15.15.0	
Power supply	via KNX bus: 21...30B DC	
Consumption on the KNX bus (29V DC)	< 20mA	< 600mW
Operation temperature	-5°C ... + 45°C	
Operation humidity	5 ... 95% (no condensation)	
Degree of protection	IP 20, clean environment	
Mounting type	DIN rail 35mm	
Dimensions	36 x 90 x 71mm (2TE)	
Weight	68 g	

1.2 APPEARANCE



- A. Ethernet connector B. Function button C. Programming button D. KNX TP connector
 1. LED IP state 2. LED bus state KNX TP 3. LED telegram traffic IP
 4. LED telegram traffic KNX TP 5. Programming LED

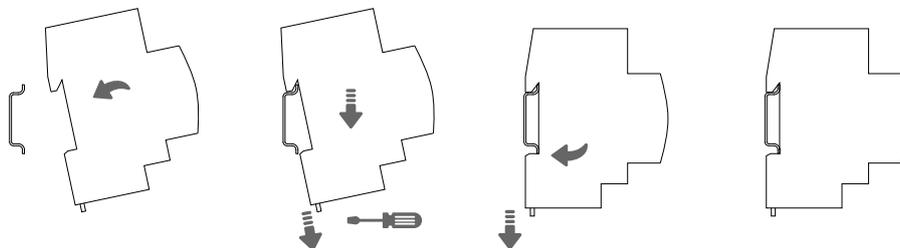
1. IP state	Green: IP line OK OFF: No IP connection
2. Bus state KNX TP	Green: KNX TP line OK OFF: KNX TP line not connection
3. Telegram traffic IP	Green (blinking): Telegram traffic Red (blinking): Transmission error OFF: No telegram traffic
4. Telegram traffic KNX TP	Green (blinking): Telegram traffic Red (blinking): Transmission error OFF: No telegram traffic
5. Programming	Red: Programming Mode / Boot Mode active Red (blinking): No IP connection OFF: Programming Mode / Boot Mode not active



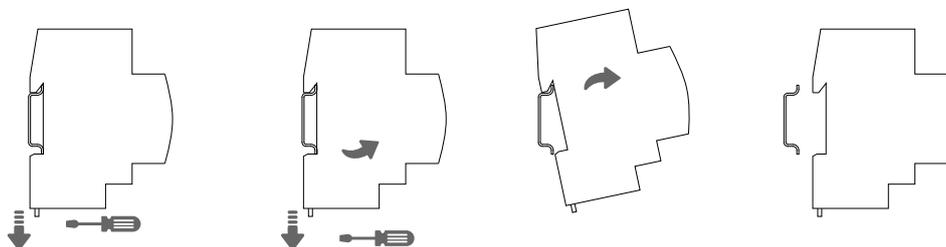
1.3 INSTALLATION AND CONNECTION

INSTALLATION

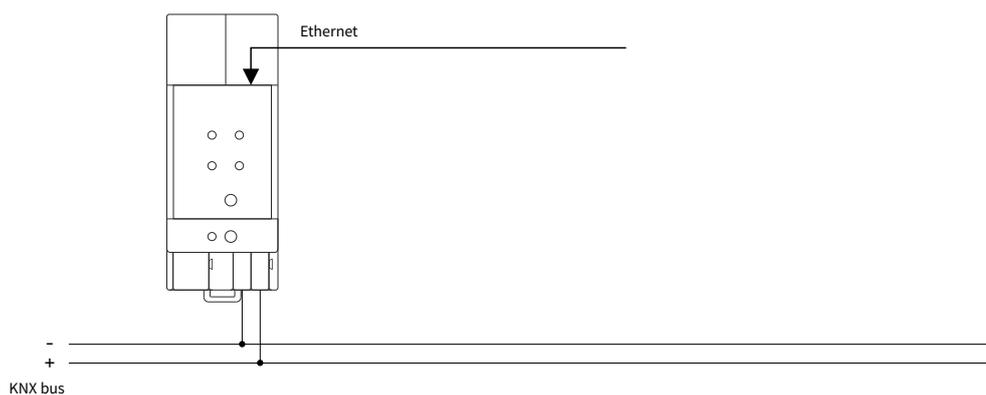
Attaching to DIN rail



Removing from DIN rail



WIRING DIAGRAMS



ATTENTION! Installation and connection of the device to the mains must only be carried out by qualified personnel! Be sure to turn off the power before installing or removing the device! Even when the device is turned off, the output terminals can be live! Do not connect to the outputs a load that exceeds the recommended values! The design of the device meets the requirements of electrical safety according to GOST 12.2.007.0-75.

2 KNXnet/IP

IC-IP-S.1.0 is a KNX IP interface. KNX IP interfaces are highly similar to USB interfaces. The only difference is that they use the IP communication medium and the KNXnet/IP communication protocol. However, KNX end devices can be integrated directly via IP. This makes the Ethernet a real KNX medium.

As documented in the KNXnet/IP protocol specifications, KNX telegrams can be transmitted encapsulated in IP packets. Ethernet networks as well as Internet can be used to route or tunnel KNX telegrams. In this way, IP interfaces and IP routers are an alternative to USB data interfaces and TP line/area/backbone couplers, respectively. In the latter case, a TP backbone can be completely replaced by a fast Ethernet based line then called IP backbone.

2.1 IP TUNNELING

The presence of the Internet Protocol (IP) has led to the definition of the KNXnet/IP protocol. KNXnet/IP offers the possibility for point-to-point connections for the ETS (KNXnet/IP Tunneling) and/or between supervisory system and KNX installation. The KNXnet/IP device management enables KNXnet/IP device configuring via the KNX network in order to reduce the time required for complete network configuration.

2.2 IP ROUTING

IP Routing is the way of interconnecting KNX lines and areas by IP network(s) via KNXnet/IP. In IP networks, the KNXnet/IP Routing defines the way of KNXnet/IP router communication.

2.3 IP BOOTLOADER / BOOT MODE

The IP bootloader function is used to update the firmware and completely rewrite the flash memory content. This is not just a simple application download. Both communication stack and application software are downloaded.

The firmware update procedure via IP is executed by a web front-end, which is independent from ETS, and makes use of special messages to speed up the process. To be protected, their contents are encrypted.

 Entering Boot Mode is equivalent to activating the IP bootloader function.

3 OPERATIONAL DESCRIPTION

In network installations IC-IP-S.1.0 is used as KNX IP interface. After connecting to KNX TP, IC-IP-S.1.0 operates with its default settings. Setting the correct Individual Address is necessary to include IC-IP-S.1.0 in the present KNX bus system.

3.1 IP INTERFACE APPLICATION

IP Interface is designed for use in 10/100 BaseT networks compliant to IEEE802.3. The AutoSensing function sets the baud rate (10 Mbit or 100 Mbit) automatically. IP address can be received from a DHCP server. For this, the automatic assignment setting of the IP address can be set by ETS (use DHCP). If set so and no DHCP server is found, IC-IP-S.1.0 starts an AutoIP procedure and autonomously assigns the IP address. The IP address that IC-IP-S.1.0 receives during its start-up (via DHCP or AutoIP) is retained until next start-up (e.g. due to power off or reprogramming). If IC-IP-S.1.0 is supposed to have a fixed IP address (as well as subnet mask and standard gateway) it can be set by ETS.

 ETS does not provide an unload procedure for applications.

3.2 IP NETWORK

IC-IP-S.1.0 sends telegrams from/to the TP network to/from the IP network in accordance with the KNXnet/IP protocol specification. Important notes:

- All KNX IP devices that are intended to communicate with each other via IP must have the same IP multicast address.
- If the IP address is changed from the IP side it may happen that ETS does no longer recognize the device and connection cannot be maintained (tunneling uses IP addresses). So, it is recommended to change IP addresses and restart only from TP side.
- If problems occur for IP address assignment please ask your network administrator.
- According to the topology, the Tunneling addresses always have to be assigned in the range of subline addresses. For more information about additional Individual Addresses for tunneling please refer to IP Tunneling Address Assignment.
- To program devices of a line different to which the device used for (re)programming is connected, the use of a correct topology is mandatory!

3.3 PROGRAMMING

3.3.1 PROGRAMMING BUTTON

To download the desired Individual Address or an ETS setting the Programming Mode must be activated. Successive pressing the Programming Button will turn on and off the Programming Mode. LED 7 lighting in red colour indicates Programming Mode is active. When Programming Mode is activated, the ETS is able to download the Individual Address.

-  A blinking red Programming LED indicates the Ethernet cable is not properly connected or no IP network connection is available.
-  Also when Boot Mode is active, successive pressing the Programming Button will turn on and off Programming Mode and Programming LED.

3.3.2 INDIVIDUAL ADDRESS ASSIGNMENT

To configure the device an interface connection (IP, USB) to the KNX bus system is required. The device is supplied with the Individual Address 15.15.0. The KNX product database entry (available for ETS4 and higher) can be downloaded from the website and from the KNX Online Catalog.

The Individual Address can be assigned to the device by setting the desired address in the properties window of the ETS. After starting the ETS download and then pressing the Programming Button the device restarts itself.

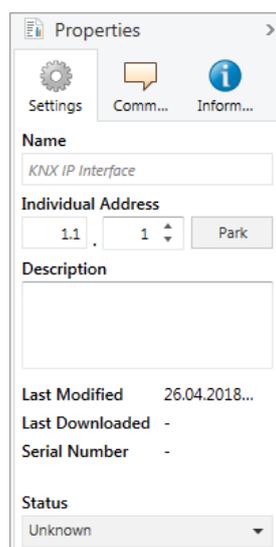


Figure 1. ETS properties window

3.4 FUNCTION BUTTON

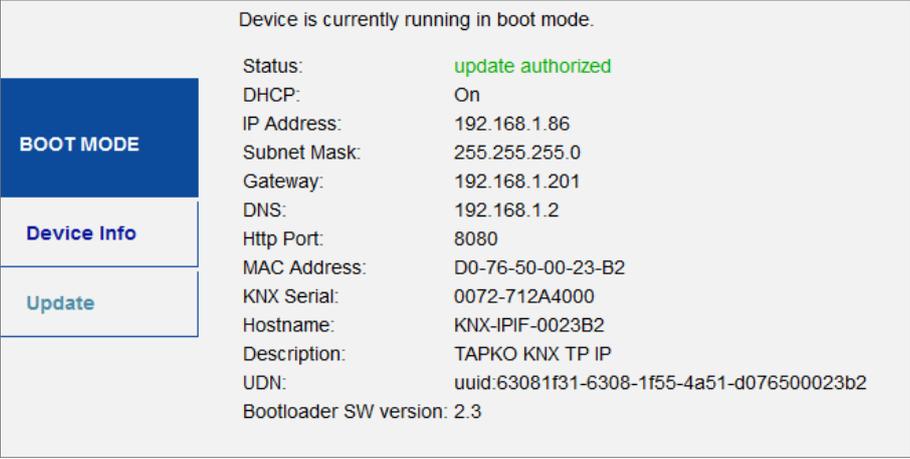
The Function Button activates IC-IP-S.1.0's special function. Factory Reset can be activated. Device settings of IC-IP-S.1.0 can be reset to manufacturer default values with the Factory Reset function. During the firmware update procedure the Function Button has to be pressed for Boot Mode activation.

3.4.1 FACTORY RESET

A long press (≈ 15 sec) of the Function Button soon followed by a short press (≈ 3 sec) executes the Factory Reset. After the first press, the LED display lights like described in Table 1. After the second press, all parameters will be set to factory default (incl. Individual Address). Subsequently, LEDs indicate normal operation again.

3.4.2 BOOT MODE ACTIVATION

For Boot Mode activation the firmware update process must be executed. During the process, the Function Button must be pressed to enter Boot Mode (see chapter 5.4).



Device is currently running in boot mode.

Status:	update authorized
DHCP:	On
IP Address:	192.168.1.86
Subnet Mask:	255.255.255.0
Gateway:	192.168.1.201
DNS:	192.168.1.2
Http Port:	8080
MAC Address:	D0-76-50-00-23-B2
KNX Serial:	0072-712A4000
Hostname:	KNX-IPIF-0023B2
Description:	TAPKO KNX TP IP
UDN:	uuid:63081f31-6308-1f55-4a51-d076500023b2
Bootloader SW version:	2.3

BOOT MODE

Device Info

Update

Figure 2. Boot Mode is active

3.4.3 LED STATUS DISPLAY

Number	LED	Colour	Comment
1	State IP	orange	Lights red if not connected
2	Bus state KNX TP	orange	



Table 1. LED status display for factory reset after first button press

Number	LED	Colour	Comment
1	State IP	green	
2	Bus state KNX TP	blinking green	
3	Telegram traffic IP	blinking green	no the same tempo as LED2
7	Programming LED	red	

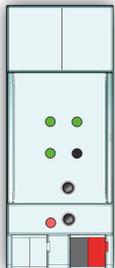


Table 2. LED status display for boot mode

4 ETS DATABASE PARAMETERS

All screen shots are related to the IC-IP-S.1.0 database file R1-1f in ETS5.

4.1 GENERAL

The host name is the name with that the device appears within the Windows network.

1.1.1 KNX IP Interface > General

General Host name KNX IP Interface

IP configuration

Figure 3. General tab parameters

ETS Parameter	Setting {Factory Default}	Comment
Host name	<30 characters allowed> {KNX IP Interface}	Field to enter the device name providing an easy search of the devices by ETS, by Windows Network and by KNXnet/IP visualisation systems.

Table 3. General tab parameter settings

4.2 IP CONFIGURATION

Here, HTTP port and IP address assignment can be configured.

1.1.1 KNX IP Interface > IP configuration

General HTTP Port 80 8080

IP configuration DHCP do not use use

Figure 4. IP configuration tab parameters, DHCP on

ETS Parameter	Setting {Factory Default}	Comment
HTTP port	80 8080 {8080}	Select one of the two official system ports.
DHCP	do not use use {use}	If DHCP is used, no further IP parameters have to be set.

Table 4. IP configuration tab parameter settings, DHCP on

1.1.1 KNX IP Interface > IP configuration

General	HTTP Port	<input type="radio"/> 80 <input checked="" type="radio"/> 8080
IP configuration	DHCP	<input checked="" type="radio"/> do not use <input type="radio"/> use
	IP address	<input type="text" value="0.0.0.0"/>
	Subnet mask	<input type="text" value="255.255.255.0"/>
	Default gateway	<input type="text" value="0.0.0.0"/>
	DNS server	<input type="text" value="0.0.0.0"/>

Figure 5. IP configuration tab parameters, DHCP off

ETS Parameter	Setting {Factory Default}	Comment
IP address	0-255.0-255.0-255.0-255 {0.0.0.0}	IP byte 1 to 4: manual input
Subnet mask	0-255.0-255.0-255.0-255 {255.255.255.0}	SM byte 1 to 4: manual input
Default gateway	0-255.0-255.0-255.0-255 {0.0.0.0}	DG byte 1 to 4: manual input
DNS server	0-255.0-255.0-255.0-255 {0.0.0.0}	DNS byte 1 to 4: manual input

Table 5. IP configuration tab parameter settings, DHCP off

5 WEB FRONT-END

The web front-end can be used to read out IC-IP-S.1.0's actual device parameters (HTTP port, IP address, MAC address, ...), to update its firmware and to adjust the (additional) tunneling addresses. To identify a particular IC-IP-S.1.0 of a KNX network the Programming LED/Programming Mode can be remotely switched on and off without pressing the on-device Programming Button.

-  To switch back from Boot Mode to normal operation it is necessary to run the firmware update procedure and then abort, or wait for the 10 min timeout.

5.1 ACCESSING THE IC-IP-S.1.0 WEB FRONT-END

There are three ways to access the IC-IP-S.1.0. It can be accessed like a Microsoft Windows UPnP network device (Windows7 or later) and by a web browser. For access by a web browser either the IP address or the MAC address, together with the HTTP port, have to be known. How to use IP address and MAC address with the browser's URL bar is described in the following.

-  For access via web browser the HTTP port that is set by ETS (or the factory default parameter value) has to be used.
-  IC-IP-S.1.0 is able to use both official HTTP system port (80 and 8080).
-  Factory default HTTP port is 8080.

5.1.1 VIA WINDOWS NETWORK UPnP

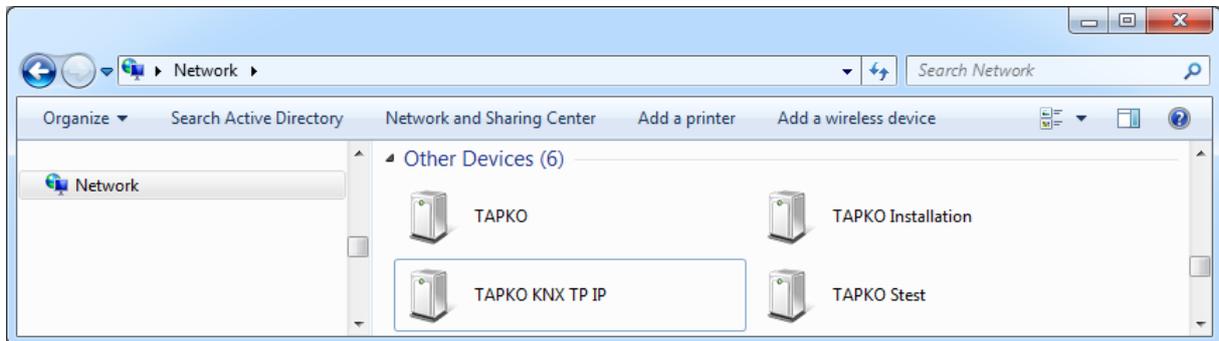


Figure 6. IC-IP-S.1.0 as UPnP network device («KNX TP IP»)

When the UPnP network function is enabled, IC-IP-S.1.0 appears in the Windows Network. A click on the IC-IP-S.1.0 network device opens the web front-end with the standard web browser. If IC-IP-S.1.0 is not visible as an UPnP network device a manual restart is recommended. After that, the device becomes visible in the list of network devices.

5.1.2 VIA IP ADDRESS

When IP address and HTTP port (80 or 8080) are known, this information is sufficient to access the IC-IP-S.1.0 web front-end by a web browser. The actual IP address is shown in the ETS list of Discovered Interfaces.

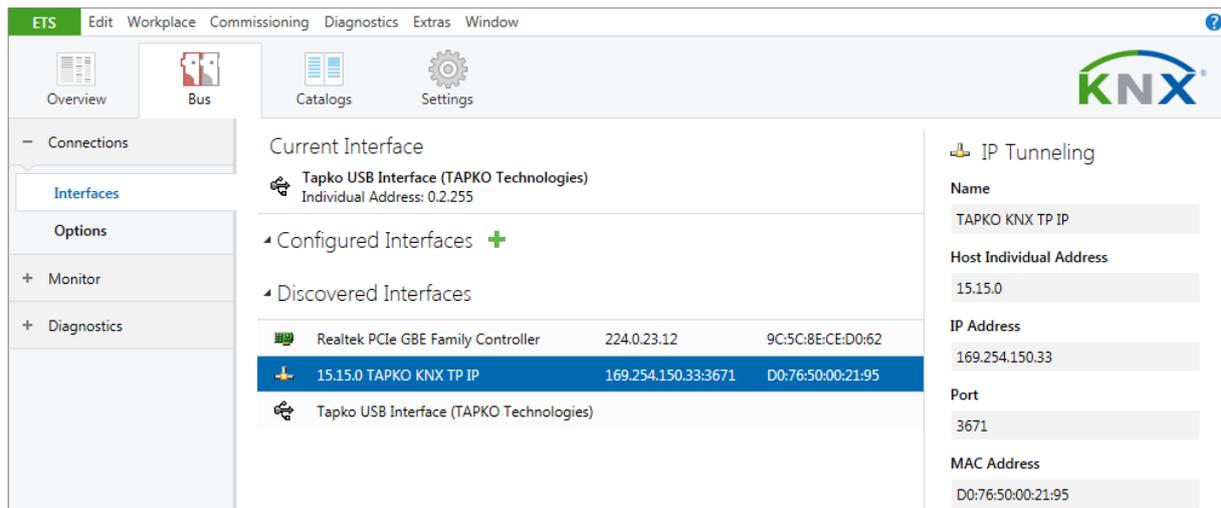


Figure 7. Identifying IC-IP-S.1.0's IP address with ETS

According to IC-IP-S.1.0's pre-set IP configuration (HTTP port, IP address and DHCP, respectively) in the URL bar has to be entered (without brackets):

http://{IP address}:{HTTP port}/

Example1: DHCP is not used. With the latest ETS download the IP address was set to 192.168.1.32 and HTTP port was set to 80. In the browser's URL bar has to be entered «http://192.168.1.32:80/».

Example2: With the latest ETS download HTTP port was set to 8080 and DHCP was activated. The DHCP server assigned a free IP address to IC-IP-S.1.0 and ETS shows this IP address to be 192.168.1.201. In the browser's URL bar has to be entered «http://192.168.1.201:8080/».

5.1.3 VIA MAC ADDRESS

When NetBIOS is installed (by default on Windows systems and Linux systems containing SAMBA) the MAC address that is printed on a label on the side of the IC-IP-S.1.0 housing can be used. Due to name resolution is mandatory to establish communication by Host name, activation of NetBIOS is necessary.

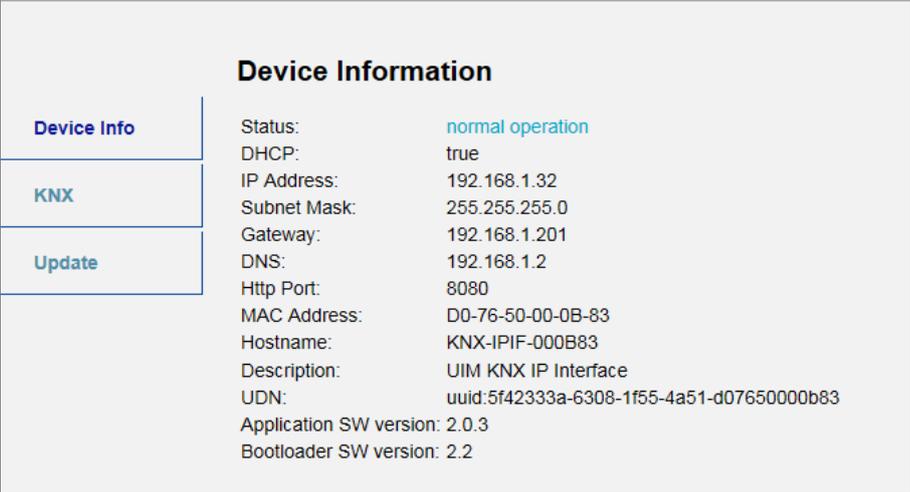
Use the MAC address in the form of AA-BB-CC-XX-YY-ZZ and the pre-set HTTP port to be entered in the browser's URL bar as described here (without brackets):

```
http://knx-ipif-{XXYYZZ}:{HTTP port}/
```

Example1: On the housing side UIMip is labelled with MAC address D0-76-50-11-22-33 and the pre-set HTTP port is 8080. Then, in the web browser's URL bar has to be entered «http://knx-ipif-112233:8080/».

5.2 DEVICE INFO

After accessing the web front-end the Device Info tab is shown. All general information about the current device settings is visible.



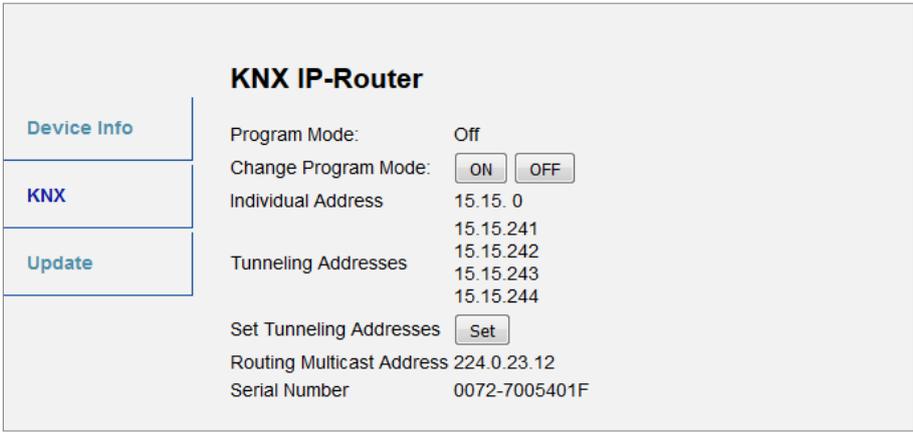
Device Information	
Device Info	Status: normal operation
KNX	DHCP: true
Update	IP Address: 192.168.1.32
	Subnet Mask: 255.255.255.0
	Gateway: 192.168.1.201
	DNS: 192.168.1.2
	Http Port: 8080
	MAC Address: D0-76-50-00-0B-83
	Hostname: KNX-IPIF-000B83
	Description: UIM KNX IP Interface
	UDN: uuid:5f42333a-6308-1f55-4a51-d07650000b83
	Application SW version: 2.0.3
	Bootloader SW version: 2.2

Figure 8. Device info tab

5.3 KNX

Here, all KNX specific addresses are shown. Setting changes can easily be checked. With a simple click on «On» or «Off» Programming Mode can be switched on/off. This function is equivalent to a Programming Button press. Together with the Device Info tab it is easy to distinguish the regarded device (with a certain IP address or MAC address or serial number) from other similar devices in the same IP network.

Four tunneling addresses can be set. ETS sets the first tunneling address. With a click on «Set» the remaining ones are set. Moreover, routing multicast address and serial number of the device are shown.



KNX IP-Router	
Program Mode:	Off
Change Program Mode:	<input type="button" value="ON"/> <input type="button" value="OFF"/>
Individual Address	15.15.0
Tunneling Addresses	15.15.241 15.15.242 15.15.243 15.15.244
Set Tunneling Addresses	<input type="button" value="Set"/>
Routing Multicast Address	224.0.23.12
Serial Number	0072-7005401F

Figure 9. KNX tab

 The web browser used has to support SVG graphics.

5.4 FIRMWARE UPDATE / BOOT MODE

Under the Update tab the IC-IP-S.1.0 firmware can be updated via IP i.e. the Ethernet network like described in following steps. During the remote update process IC-IP-S.1.0 enters Boot Mode. Then LEDs 1, 2, 3, and 7 light as described in Table 2.

-  If Boot Mode is already active only the web front-end instructions from step 3 to step 5 must be followed (refresh, request update).
-  Boot Mode is still active after device reset and after factory reset.

To exit Boot Mode it is necessary to enter the Update tab of the web front-end. Then either the firmware update has to be completed (if a new firmware is available) or the firmware update process has to be stopped by a click on the «Abort» button. After that IC-IP-S.1.0 restarts and continues with normal operation.

Step 1: Open the update tab of the web front-end.



Figure 10. Update tab

Step 2: Activate programming mode (KNX tab or programming button).

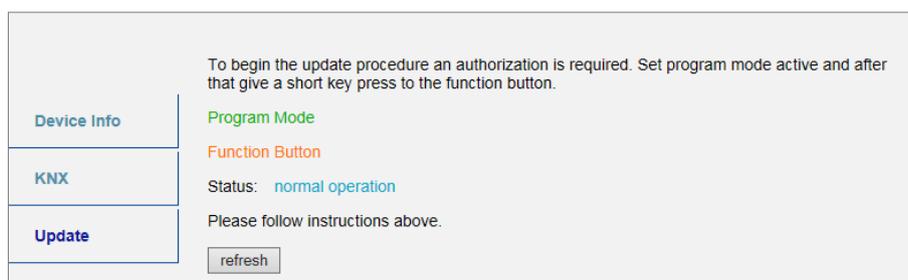
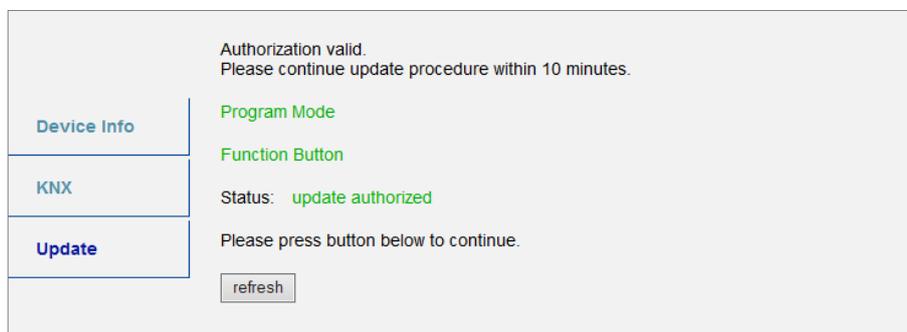


Figure 11. Update tab and activated programming button

Step 3: After Programming Mode activation give a short press to the Function Button. Then click on the «refresh» button (alternatively, refresh the browser).



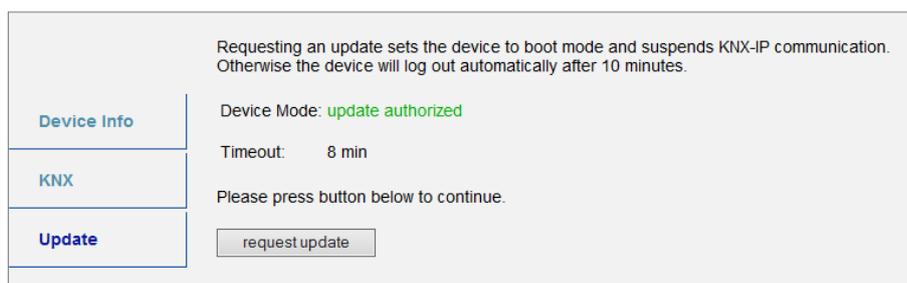
Authorization valid.
Please continue update procedure within 10 minutes.

Device Info	Program Mode
KNX	Function Button
Update	Status: update authorized

Please press button below to continue.

Figure 12. Update authorized

Step 4: When the «request update» button appears it has to be pressed to select the update file and enter «Boot Mode».

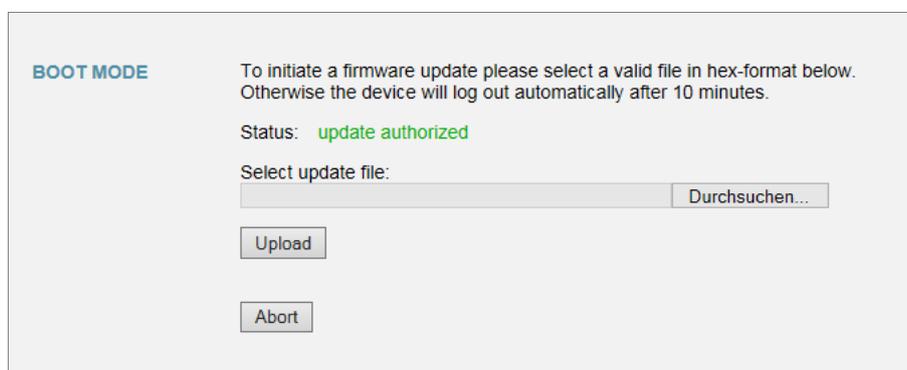


Requesting an update sets the device to boot mode and suspends KNX-IP communication. Otherwise the device will log out automatically after 10 minutes.

Device Info	Device Mode: update authorized
KNX	Timeout: 8 min
Update	Please press button below to continue.

Figure 13. Request update

Step 5: The update file can be selected and uploaded. Clicking on the «Abort» button cancels the firmware update procedure and the device exits Boot Mode.



BOOT MODE

To initiate a firmware update please select a valid file in hex-format below. Otherwise the device will log out automatically after 10 minutes.

Status: update authorized

Select update file:

Figure 14. Select update file

5.5 IP TUNNELING ADDRESS ASSIGNMENT

According to the host's Individual Address assignment the first tunneling address (additional Individual Address) of the IC-IP-S.1.0 can only be set by ETS.

 Please make sure: The additional Individual Addresses for tunneling and the host's Individual Address have to be different.

Step 1: Open the ETS Bus tab and select IC-IP-S.1.0 as the «Current Interface». In the «IP Tunneling» window the already assigned host Individual Address can be read.

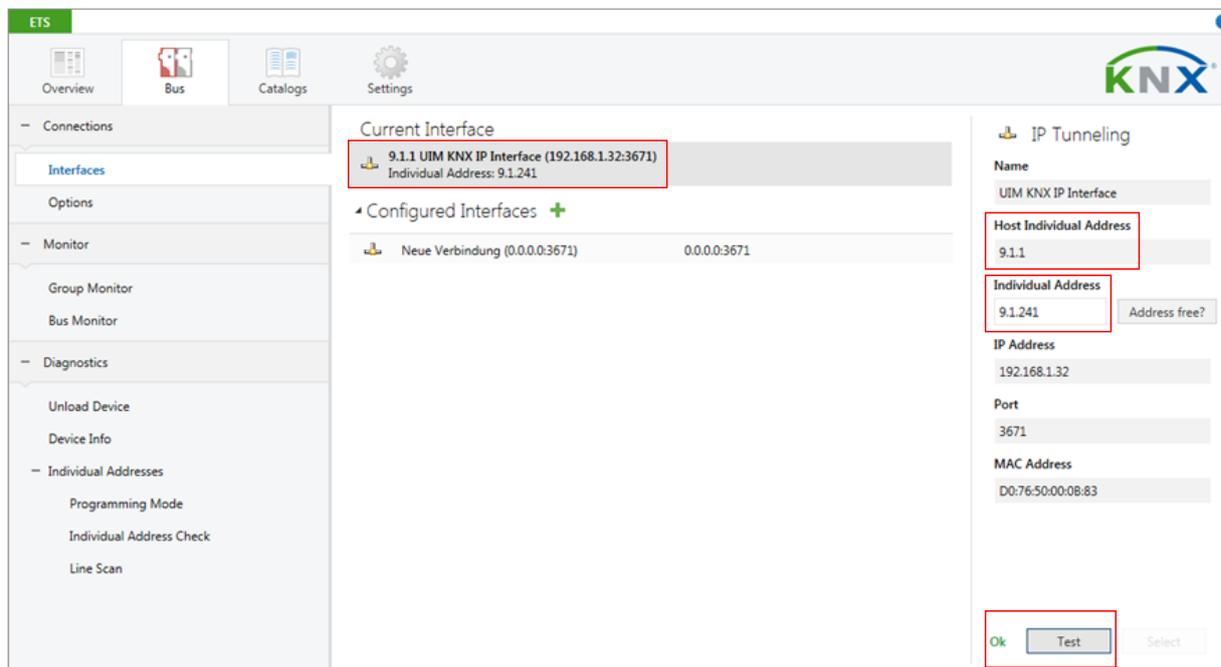


Figure 15. First additional individual address (First Tunneling Address) assignment

Step 2: Set the first additional Individual Address by the «Individual Address» field. Click on the «Test» button. If the green Ok appears, the first tunneling address is set. In this example it is «9.1.241».

Step 3: Now open the KNX tab of the web front-end. Click on the «Set» button to set the remaining three tunneling addresses basing on the first tunneling address as follows.

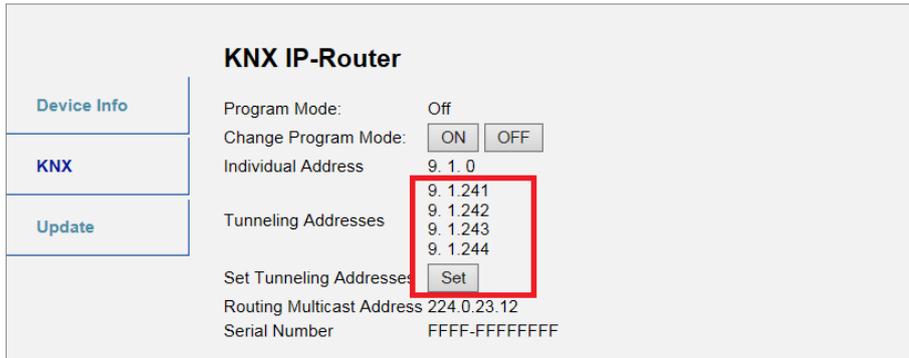


Figure 15. First additional individual address (First Tunneling Address) assignment

6 STATE OF DELIVERY

6.1 DEFAULT FACTORY SETTING

General	
Product	KNX IP Interface
Individual address	15.15.0
Tunneling addresses	<ul style="list-style-type: none"> • 15.15.241 • 15.15.242 • 15.15.243 • 15.15.244

General	
IP address assignment	DHCP/AutoIP

Table 8. Default factory setting

7 LEGAL NOTICE

 Lw IP is used in developing the IC-IP-S.1.0.

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