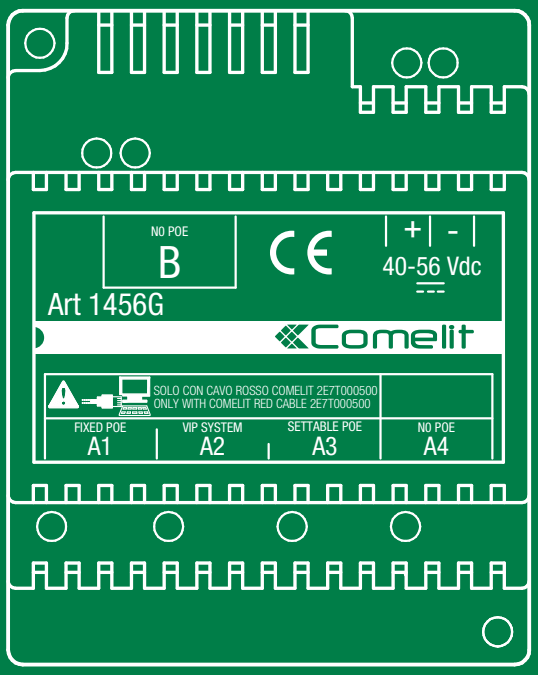
EN

TECHNICAL
MANUAL



Technical manual for the ViP interface for third-party terminals - Art. 1456G

Comelit®
Passion. Technology. Design.

Warning

- Install the equipment by carefully following the instructions given by the manufacturer and in compliance with the standards in force.
- All the equipment must only be used for the purpose it was designed for. **Comelit Group S.p.A.** does not assume responsibility for improper use of the apparatus, for modifications made by third parties for any reason or purpose, or for the use of non-original accessories and materials.
- All the products comply with the requirements of the 2014/30/EU and 2014/35/EU directives. This is proved by the **CE** mark on the products themselves.
- Do not route the riser wires in proximity to power supply cables (230/400V).
- Installation, assembly and servicing operations of electrical devices must only be performed by specialised electricians.
- Disconnect the power supply before carrying out any maintenance work.

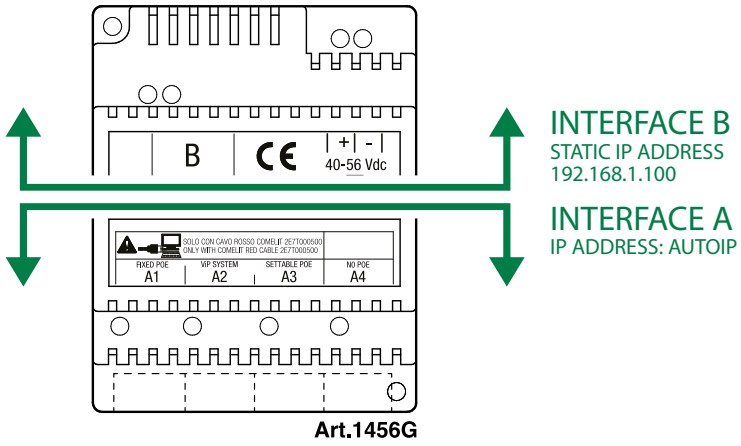
Table of contents

Description of Art.1456G

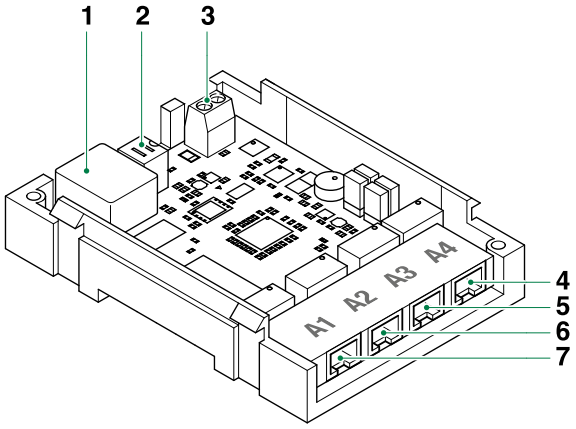
Article 1456G is a ViP interface for third party terminals:

- it enables integration between the ViP door-entry phone protocol and the VoiP (SIP) standard telephone protocol
- it enables integration with third-party products

Article 1456G has 2 network interfaces ‘A’ and ‘B’, as shown in the figure.



Art.1456G



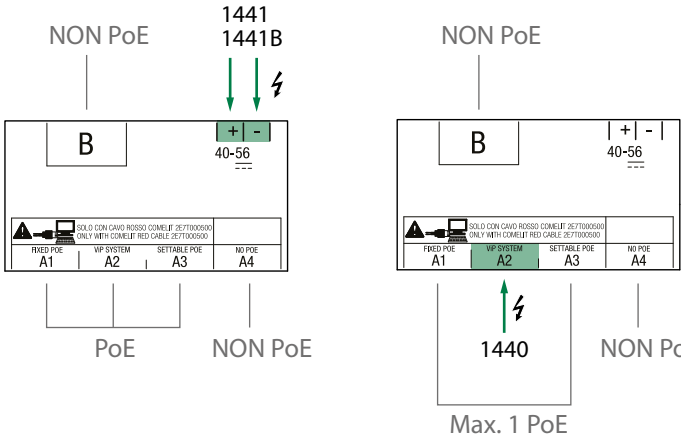
1. **Ethernet port** side B (default: interface not utilised, **Dynamic IP address** 192.168.1.100, subnet mask 255.255.255.0)
2. **Dip Switch** to perform the procedure "Reboot with predetermined network settings" on page. 22, "Restore factory settings" on page. 22, "Recovery for firmware update" (from version 1.0.0) on page 23.
3. **Input for power from power supply unit Art. 1441, Art. 1441B**.
4. **A4 non PoE** Ethernet port for PC or router connection (default: **Autoip**)
5. **A3 POE** Ethernet port (default: **Autoip**)*
6. **A2 POE** Ethernet port for **ViP network** riser input (default: **Autoip**)
7. **A1 POE** Ethernet port (default: **Autoip**)*

* For use of ports A1 and A3 with the device powered via port A2, see “Power supply mode”.

With PoE port (A1, A2, A3) DO NOT use standard Ethernet cable to connect to the router or to the PC; use only the red Comelit cable Art.2E7T000500 to connect to the router or to the PC.

Power supply mode

With the device powered by Art. 1440 (or Art. 1456) via port A2, there will be sufficient PoE power available to operate a maximum of 1 door on either port A1 or A3.



Art.1456G configuration

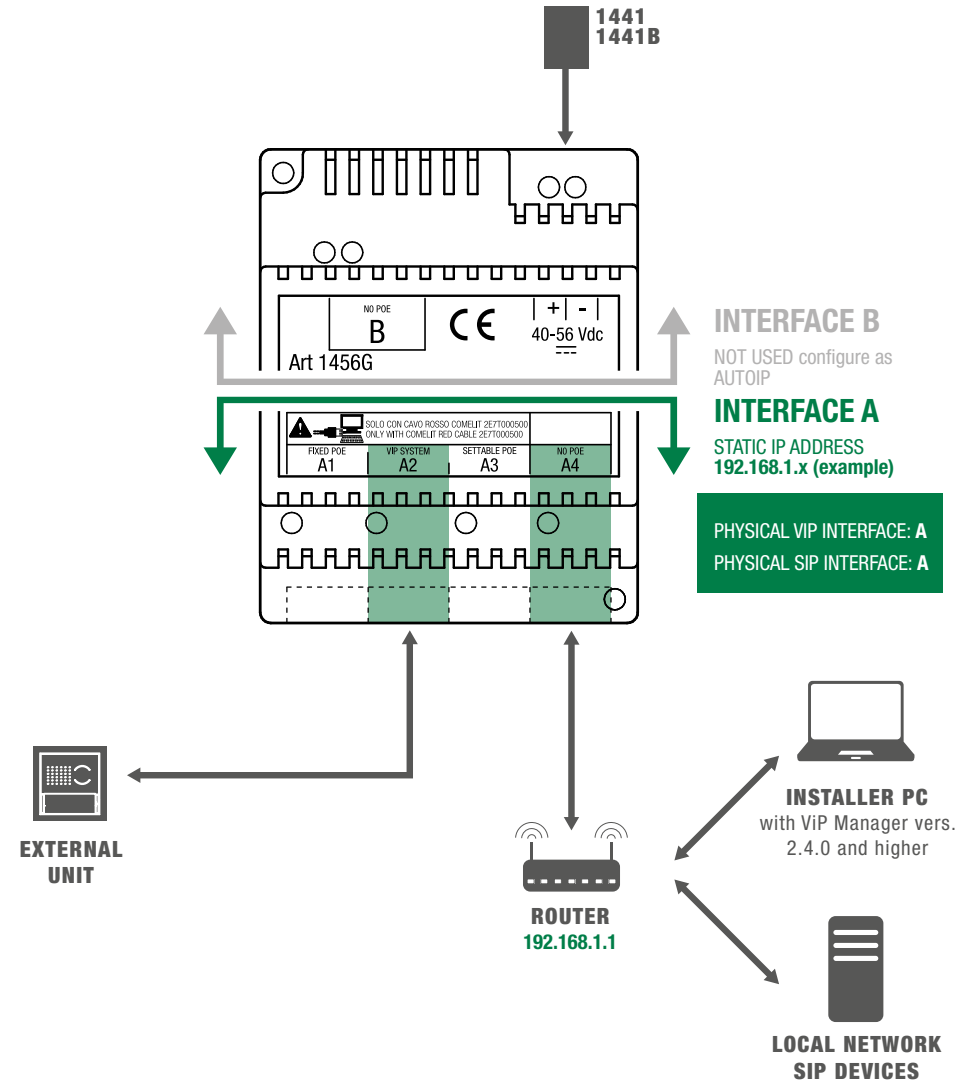
✓ This operation requires a PC loaded with the software ViP Manager version 2.4.0 or later (downloadable from the website **pro.comelitgroup.com**).

1) Connection

Article1456G has 2 network interfaces, A and B, labelled for easy identification, which can be configured separately to meet different system requirements.

▶ Depending on the type of system, connect the devices as shown in the following figures:

A) "VILLA" / "OFFICE" TYPE SYSTEM



All the devices connected to interface 'A' must belong to the same network.

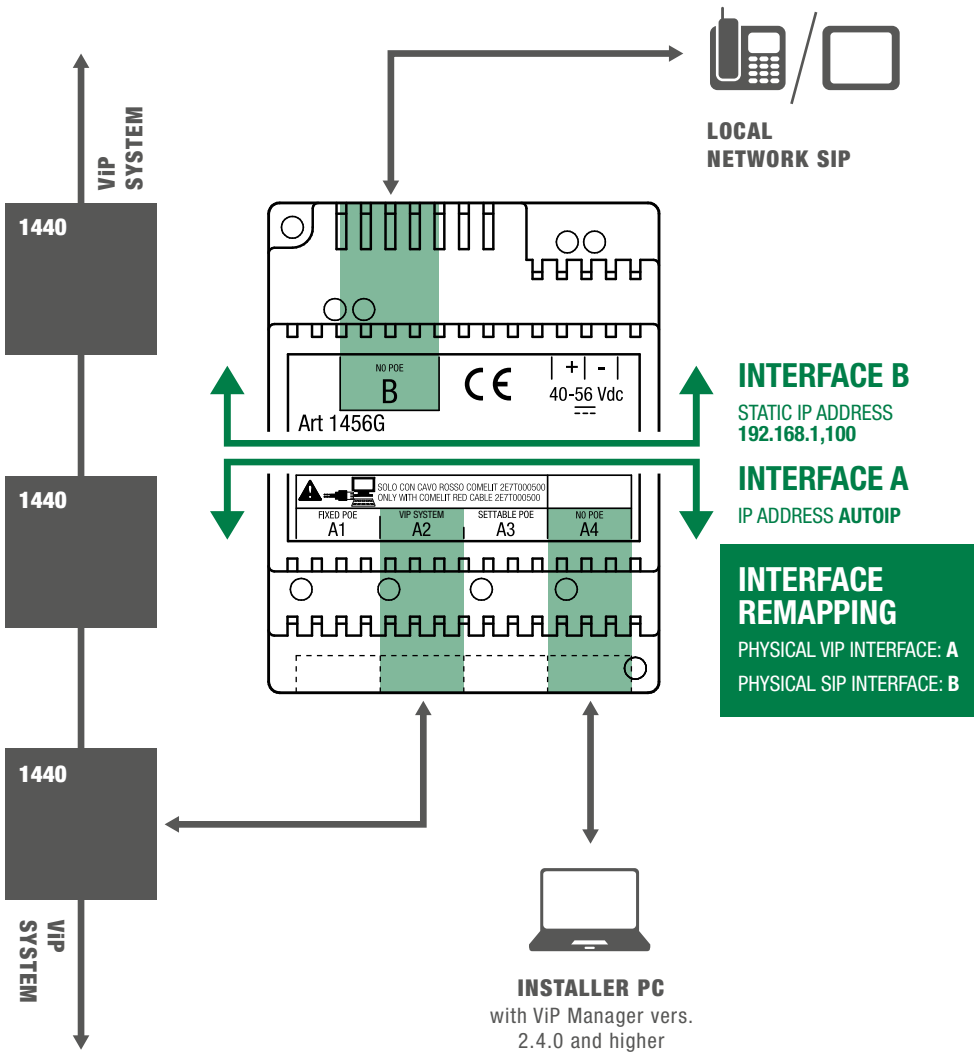
Every IP address must be UNIQUE!

If there are SIP devices in the system, always check with the switchboard manager that reserved SIP lines are available, as these are required for the system to function correctly.

Interface B (even when not used) must have a different network class to interface A: set interface B to Autoip.

DO NOT USE standard network cables for the connection between the PC (or router) and PoE outputs!

B) “RESIDENTIAL” TYPE SYSTEM



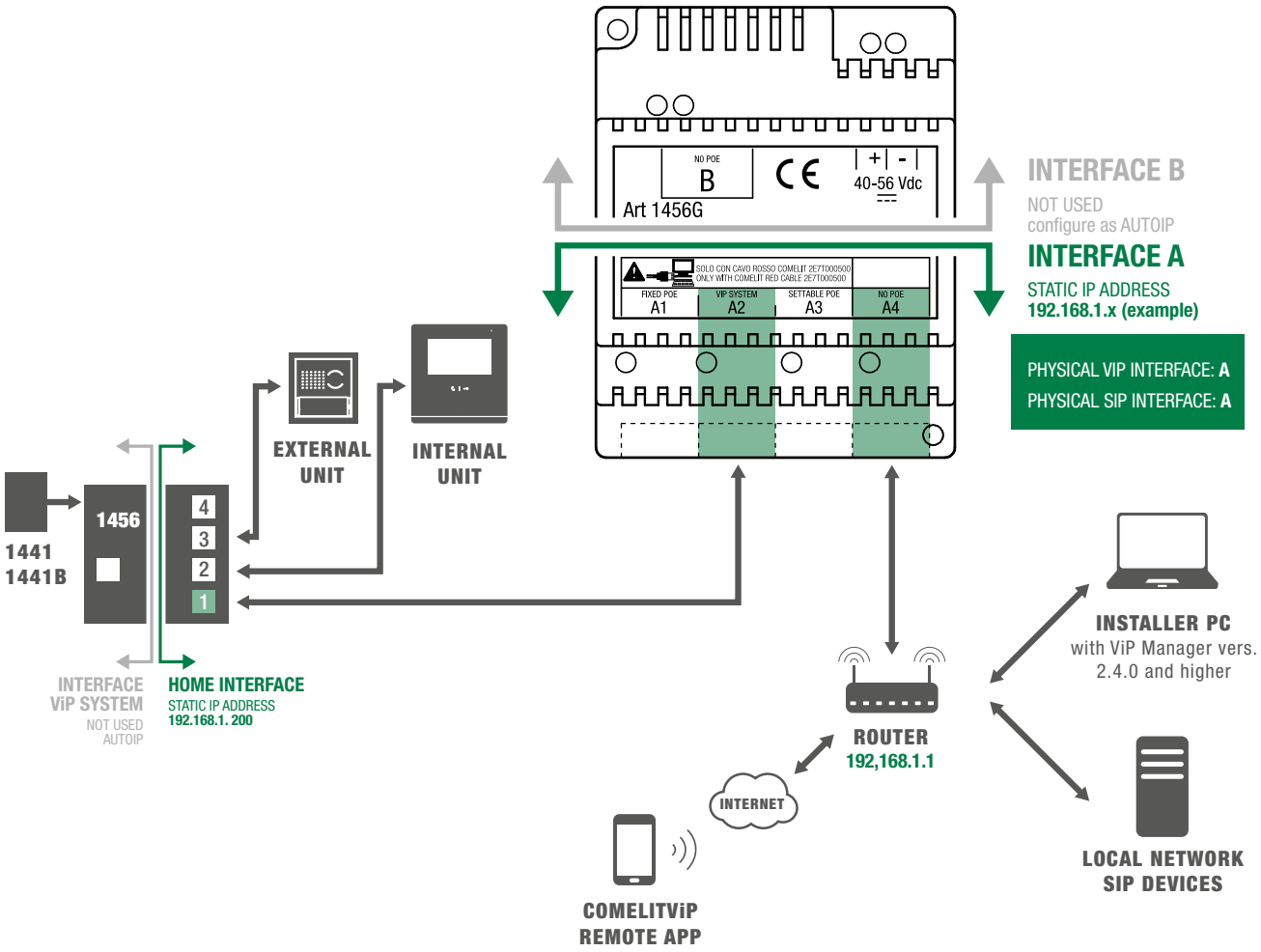
Configure INTERFACE A and INTERFACE B assigning different network classes! The addresses of the 2 interfaces must NOT belong to the same subnet.

Every IP address must be UNIQUE!

If there are SIP devices in the system, always check with the switchboard manager that reserved SIP lines are available, as these are required for the system to function correctly.

DO NOT USE standard network cables for the connection between the PC (or router) and PoE outputs!

C) “VILLA” / “OFFICE” TYPE SYSTEM + ART. 1456/1456S FOR APP USE



All the devices connected to interface ‘A’ must belong to the same network.

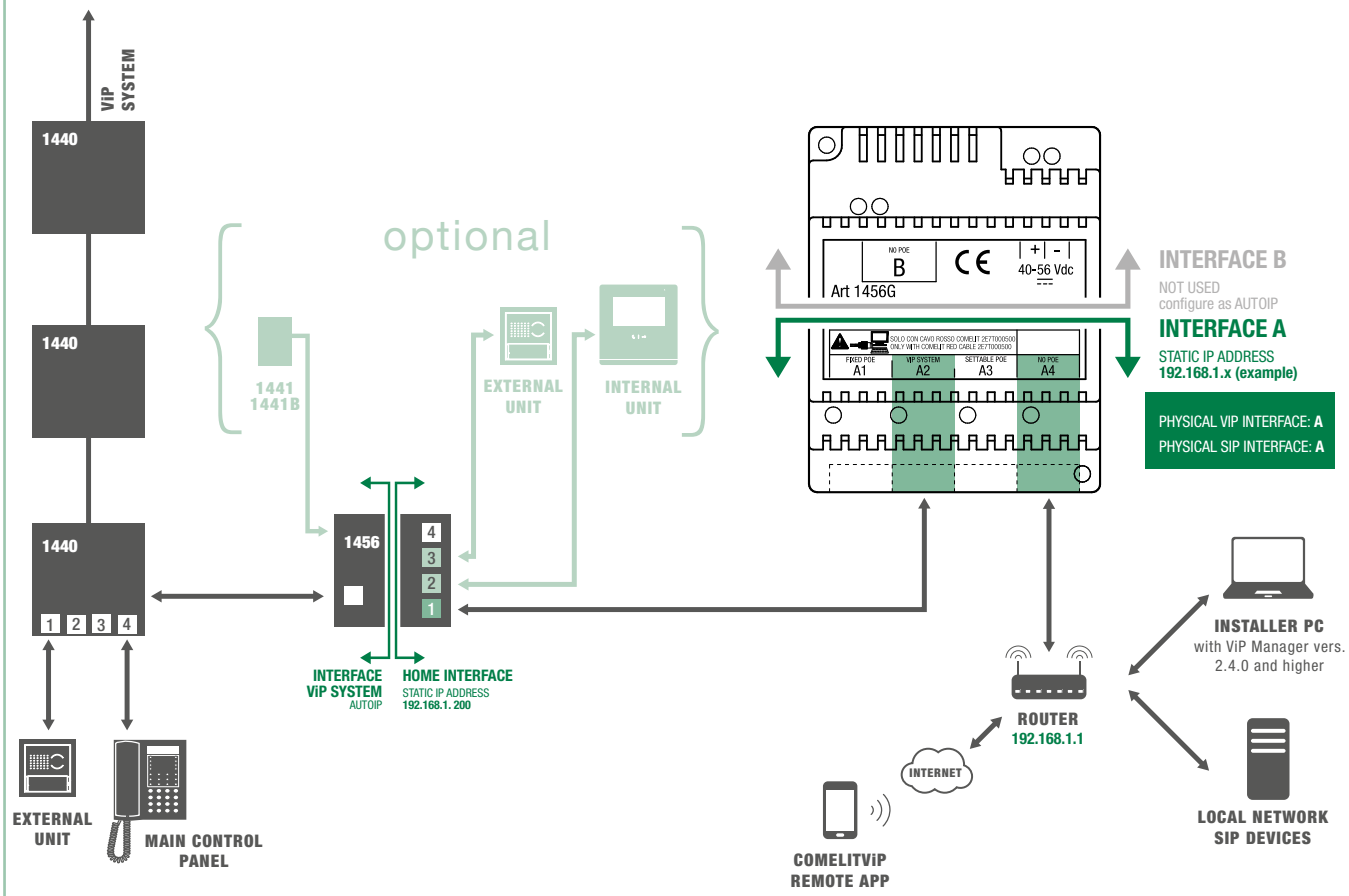
Every IP address must be UNIQUE!

If there are SIP devices in the system, always check with the switchboard manager that reserved SIP lines are available, as these are required for the system to function correctly.

Interface B (even when not used) must have a different network class to interface A: set interface B to Autoip.

DO NOT USE standard network cables for the connection between the PC (or router) and PoE outputs!

D) “RESIDENTIAL” TYPE SYSTEM + ART. 1456/1456S FOR APP USE



All the devices connected to interface ‘A’ must belong to the same network.

Every IP address must be UNIQUE!

If there are SIP devices in the system, always check with the switchboard manager that reserved SIP lines are available, as these are required for the system to function correctly.

Interface B (even when not used) must have a different network class to interface A: set interface B to Autoip.

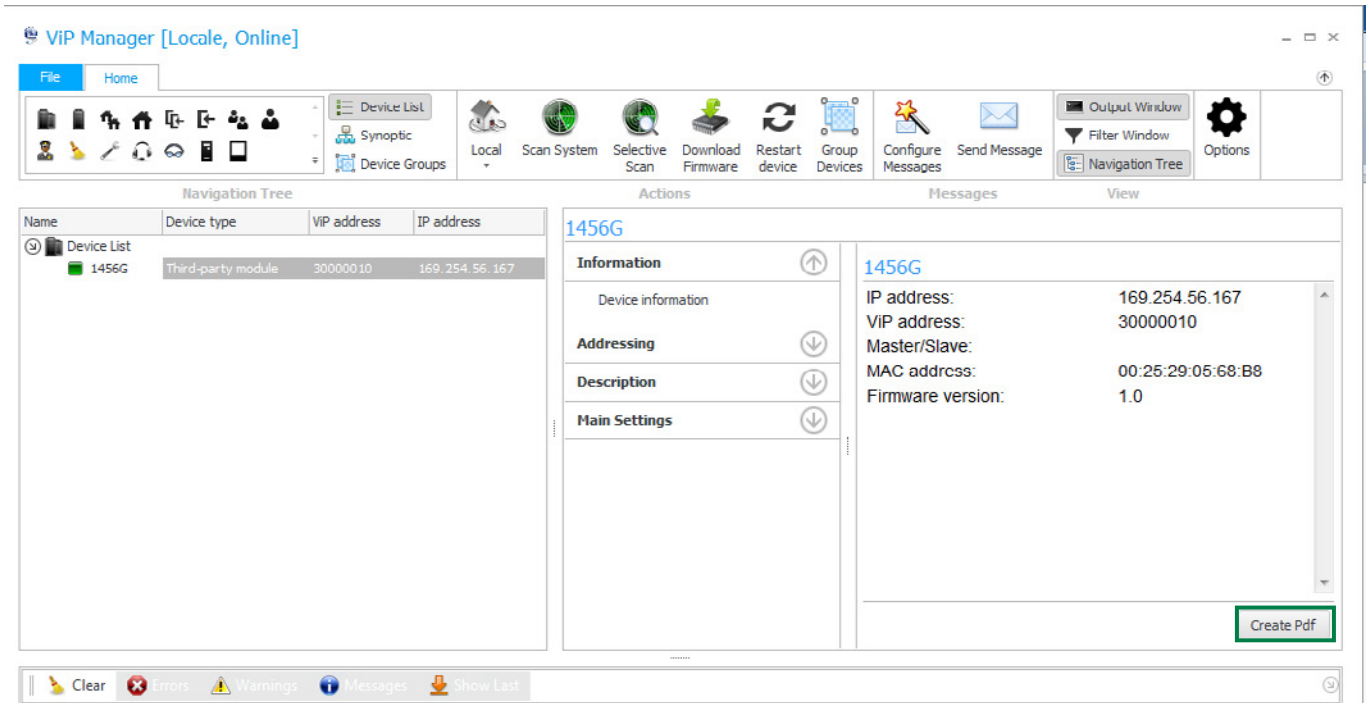
DO NOT USE standard network cables for the connection between the PC (or router) and PoE outputs!

2) Device description and addressing from ViP Manager

2.1 INFORMATION

The panel shows information about the module settings.

▶ Using the button on the bottom right of the screen, you can export the information screen in PDF format.



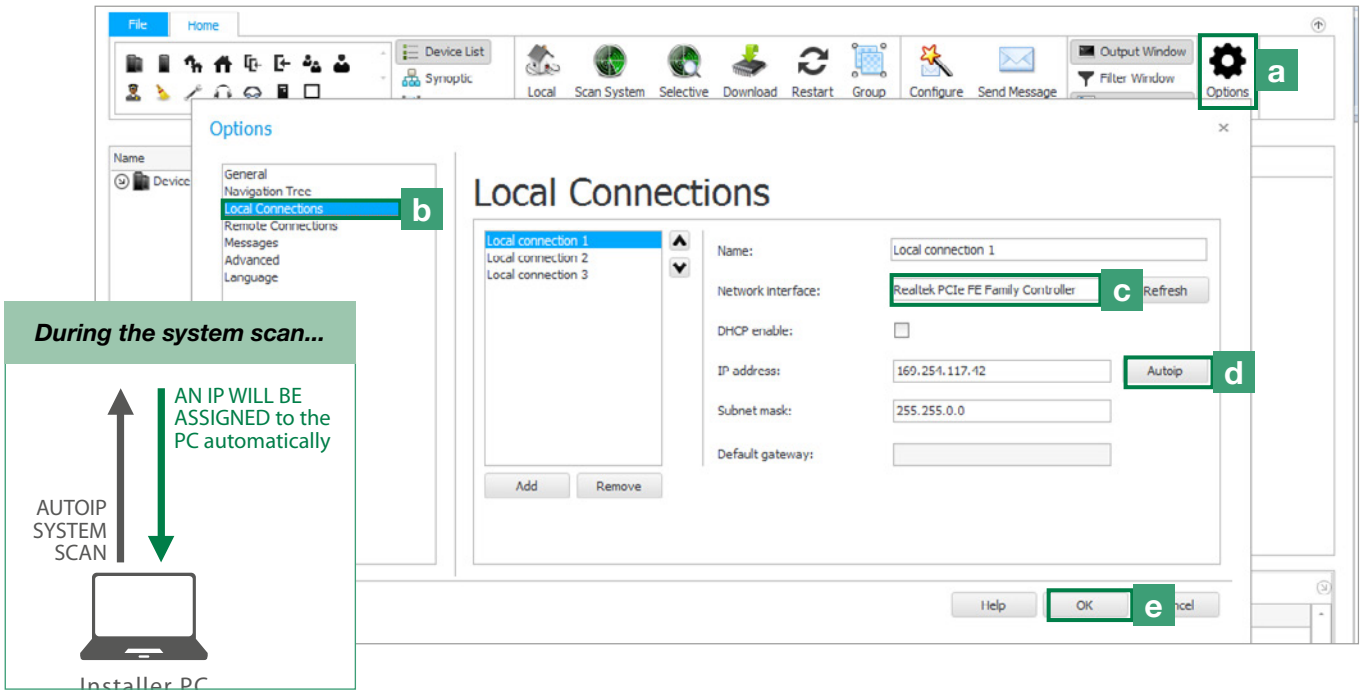
2.2 ADDRESSING

2.2.1 PERFORM AN AUTOIP SYSTEM SCAN AND ASSIGN A VIP ADDRESS

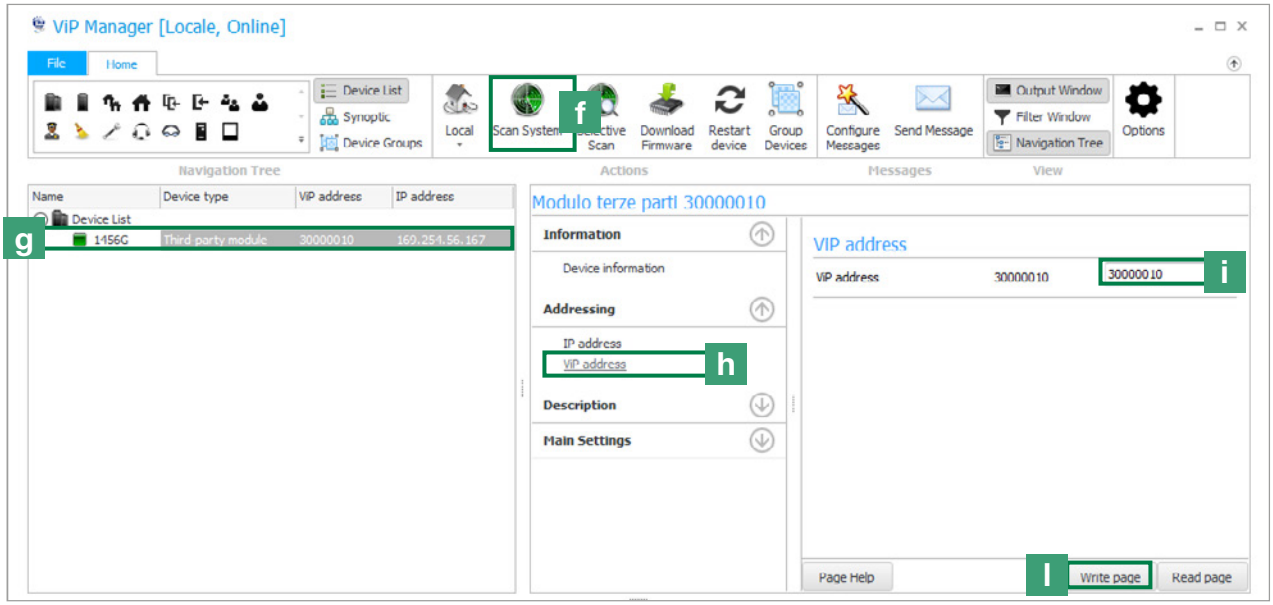
The following procedure describes how to perform an AUTOIP system scan

✓ with the PC connected to interface A of the device

1. From **Options [a]**, **Local connections [b]**, select **network interface [c]**, press **Autoip [d]** and confirm **[e]**



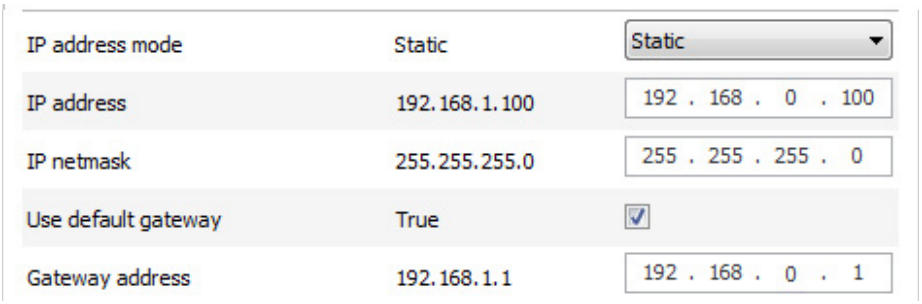
2. Launch the system scan by pressing Scan System **[f]**.
3. Select the device **1456G [g]**, select addressing/ViP address **[h]**, assign a unique ViP address to the device **[i]** and press Write page **[l]** to save the current settings.



2.2.2 ASSIGN A STATIC IP ADDRESS TO INTERFACE A AND B

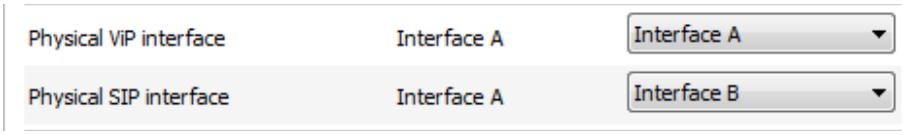
According to system requirements, interfaces 'A' and 'B' can be configured with different network settings to the default settings.

Interface A / Interface B



IP address mode	Select "**Static / Autoip / DHCP**" to assign the desired address mode to the interface being configured (A/B). ***For DHCP address mode, the system must be connected to a server with active DHCP function.***
IP Address ***(only to be configured if the address mode is "Static")***	Assign to the interface being configured (A/B) a static IP address that is compatible with the devices connected to the interface, for example, **IP: 192.168.0.100** ***the IP address must not already be in use. Interfaces A and B must NOT belong to the same network class.***
IP netmask ***(only to be configured if the address mode is "Static")***	Assign to the interface being configured (A/B) an IP netmask that is compatible with the devices connected to the interface, for example **netmask: 255.255.255.0** ***Interfaces A and B must NOT belong to the same network class.***
Use default gateway	Enable "Use default gateway" • if the interface is connected to a router (**Gateway address:** enter the address of the router) • to connect to a switchboard on another network (**Gateway address:** enter the address of the router) • if RTSP streaming is used (**Gateway address:** see page 21 for configuration)

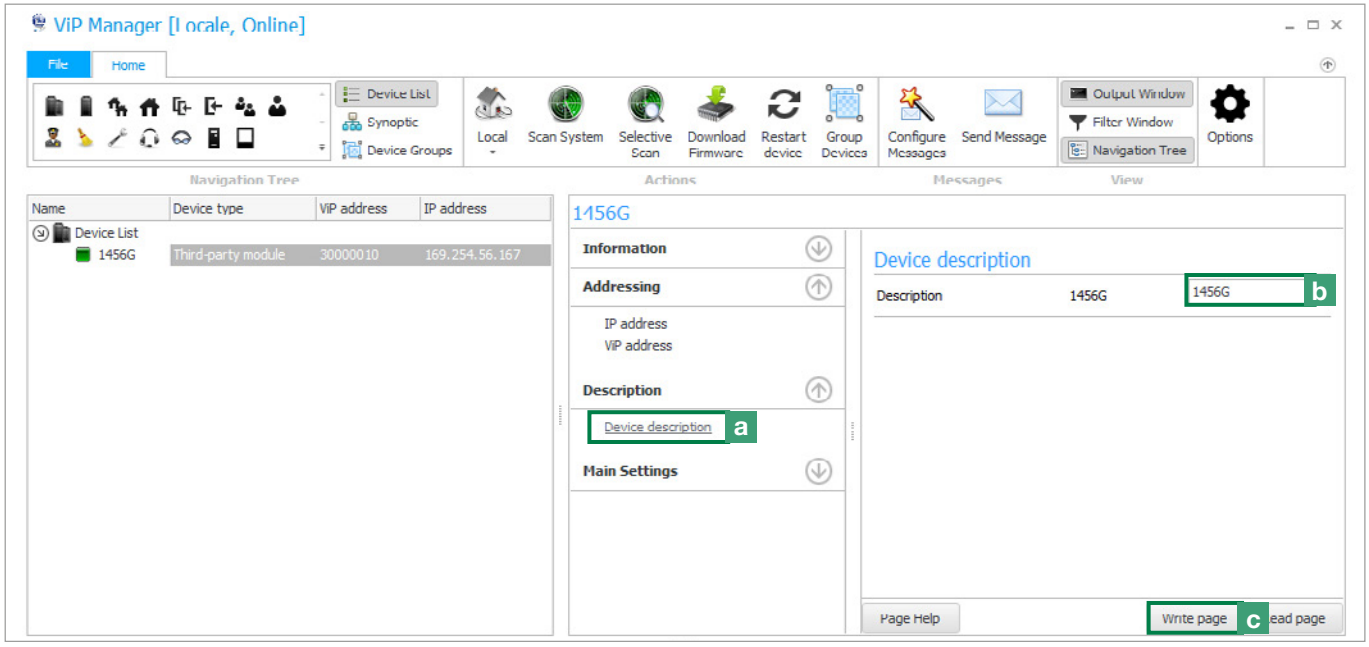
Interface remapping



Physical ViP interface	Select the interface to which the ViP devices are connected (default = A)
Physical SIP interface	Select the interface to which the SIP devices are connected (default = A)

2.3 DEVICE DESCRIPTION

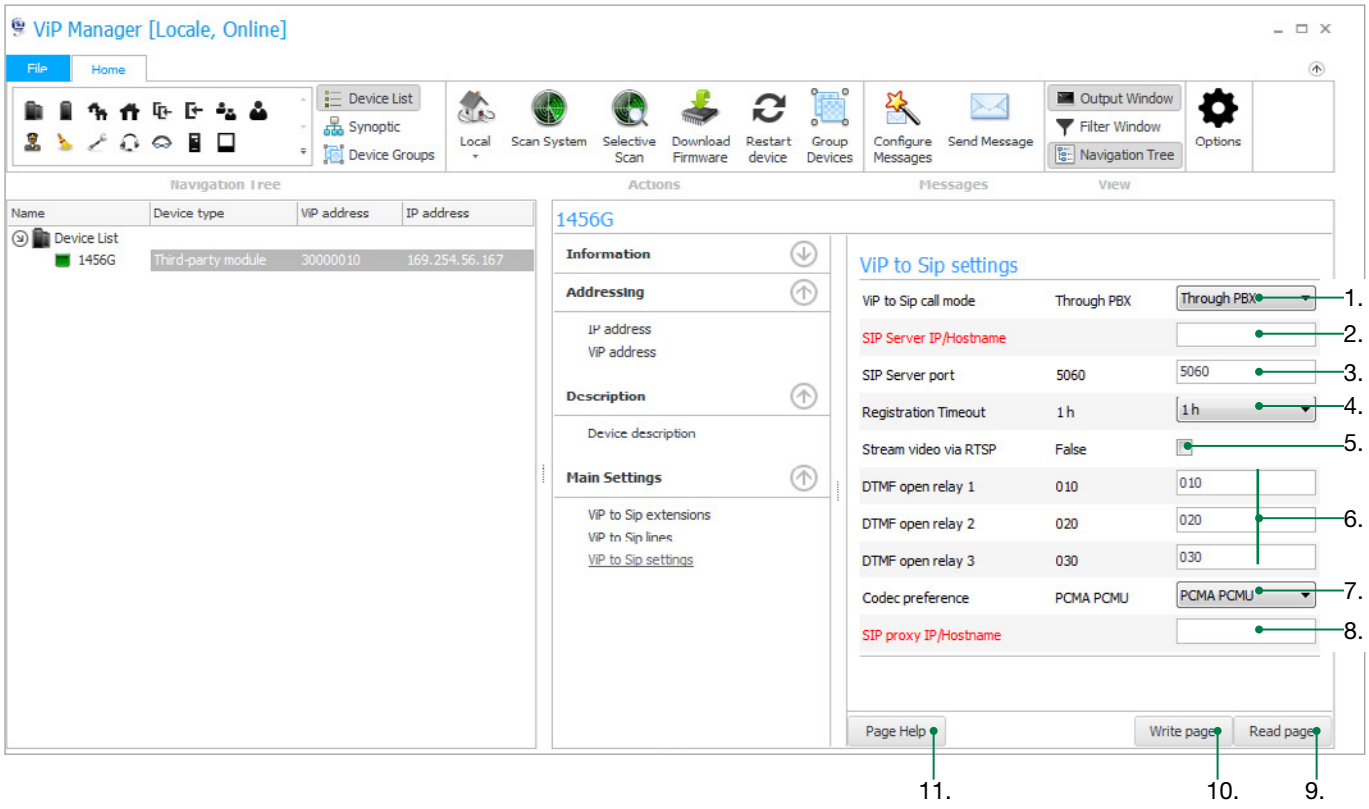
1. Select **Description/Device description [a]**, enter a description of the **device [b]** to facilitate its identification.
2. Press **"Write page" [c]** to save the current settings.



3) Configuration of Main Settings

3.1 VIP TO SIP SETTINGS

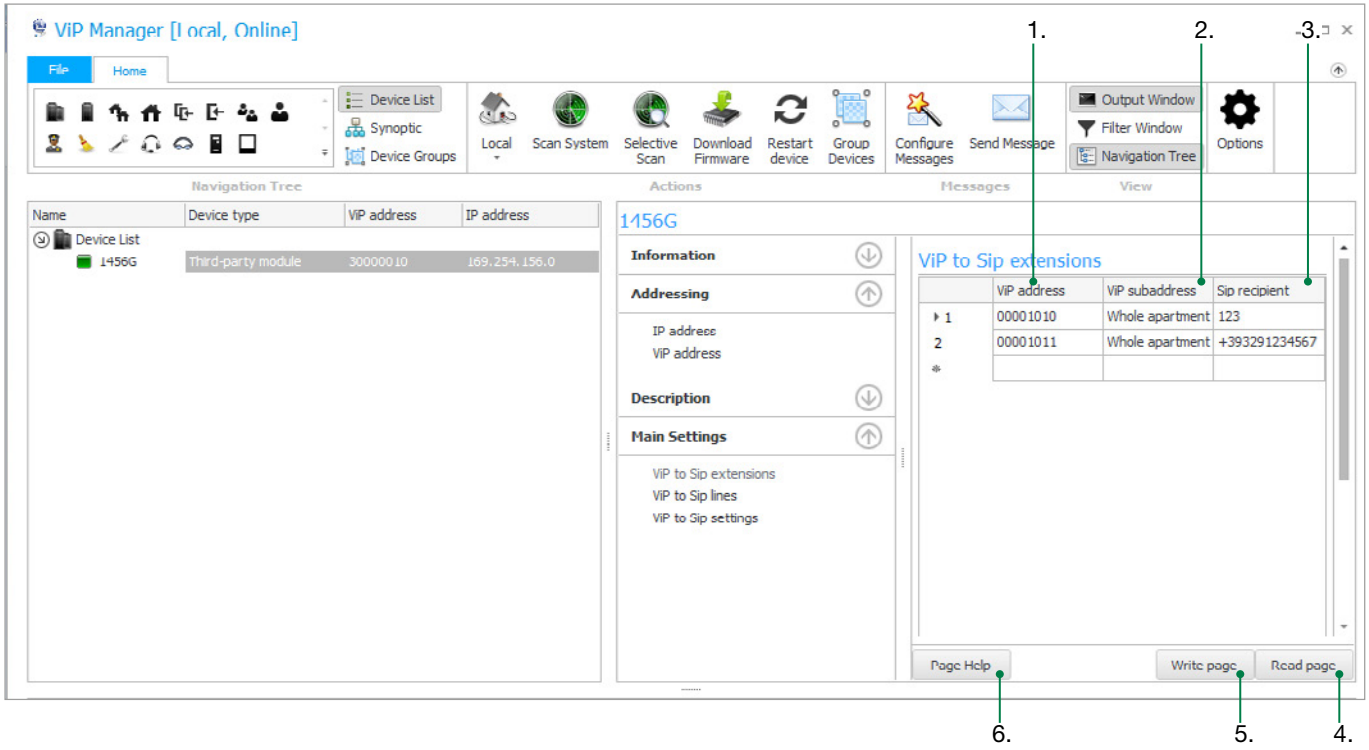
From this page you can configure the parameters required to ensure the 1456G module functions correctly in the system.



1. ViP TO SIP CALL MODE	Select 'through PBX' or 'direct' call mode according to the type of system. *through PBX:* if the 1456G communicates with SIP PBX server. *direct:* if there is no SIP PBX server and the 1456G makes direct calls to the SIP devices.
2. SIP SERVER IP/HOSTNAME	Enter the IP/Hostname of the SIP server (for 'through PBX' call mode only).
3. SIP SERVER PORT	Enter the UDP port used by the server (for 'through PBX' call mode only).
4. REGISTRATION TIMEOUT	SIP server registration timeout. Recommended value for Comelit system = 1 hour [default].
5. STREAM VIDEO VIA RTSP	Tick the box to activate the function (⚠ some third-party products may require this function).
6. DTMF OPEN RELAY 1/2/3	Sequence of keys to press (minimum 3, maximum 6 digits) to send a command to activate the relay from a telephone (default 010 / 020 / 030).
7. CODEC PREFERENCE	Select the SIP audio coding/decoding system to be used. Typically: *PCMA PCMU (default):* European systems. *PCMU:* USA systems.
8. SIP PROXY IP/HOSTNAME	Only enter this parameter when it is required by the SIP system.
9. READ PAGE	Press to read and display the settings saved in the device memory.
10. WRITE PAGE	Press to apply and save the settings to the device memory.
11. PAGE HELP	Press to access the manual for the device.

3.2 VIP TO SIP EXTENSIONS

From this page you can configure the ViP to SIP extensions, creating ViP recipient addresses each of which is matched to a corresponding SIP address.



1. ViP ADDRESS*	Enter the ViP recipient address (ViP address of the call button or ViP address to be keyed into the porter switchboard/directory. ***By default, the device allows up to 5 ViP extensions to be created.*** ***However additional licenses may be purchased in order to generate more extensions.***
2. ViP SUBADDRESS*	Select the ViP subaddress *Whole apartment (default):* select “whole apartment” if the SIP device is the only device called for that address. *Slave 1/15:* select “Slave 1/15” if there is a master device (ViP monitor or 1456 gateway) for that ViP address. ***Art. The 1456G cannot be configured as a master device for additional slave devices.***
3. SIP RECIPIENT	Enter the SIP recipient address of the call: *with a SIP switchboard:* this is the SIP address of the device/telephone to be called example SIP internal number: 123 example external number: +393291234567 (⚠ if the SIP switchboard allows external calls) 00001010 = 123 VIP ADDRESS SIP TELEPHONE *direct call:* SIP extension + @ + IP address of the SIP device to be called example: 077@192.168.1.13 00001010 = 077@192.168.1.13 VIP ADDRESS SIP DEVICE
4. READ PAGE	Press to read and display the settings saved in the device memory.
5. WRITE PAGE	Press to apply and save the settings to the device memory.
6. PAGE HELP	Press the button to access the manual for the device.

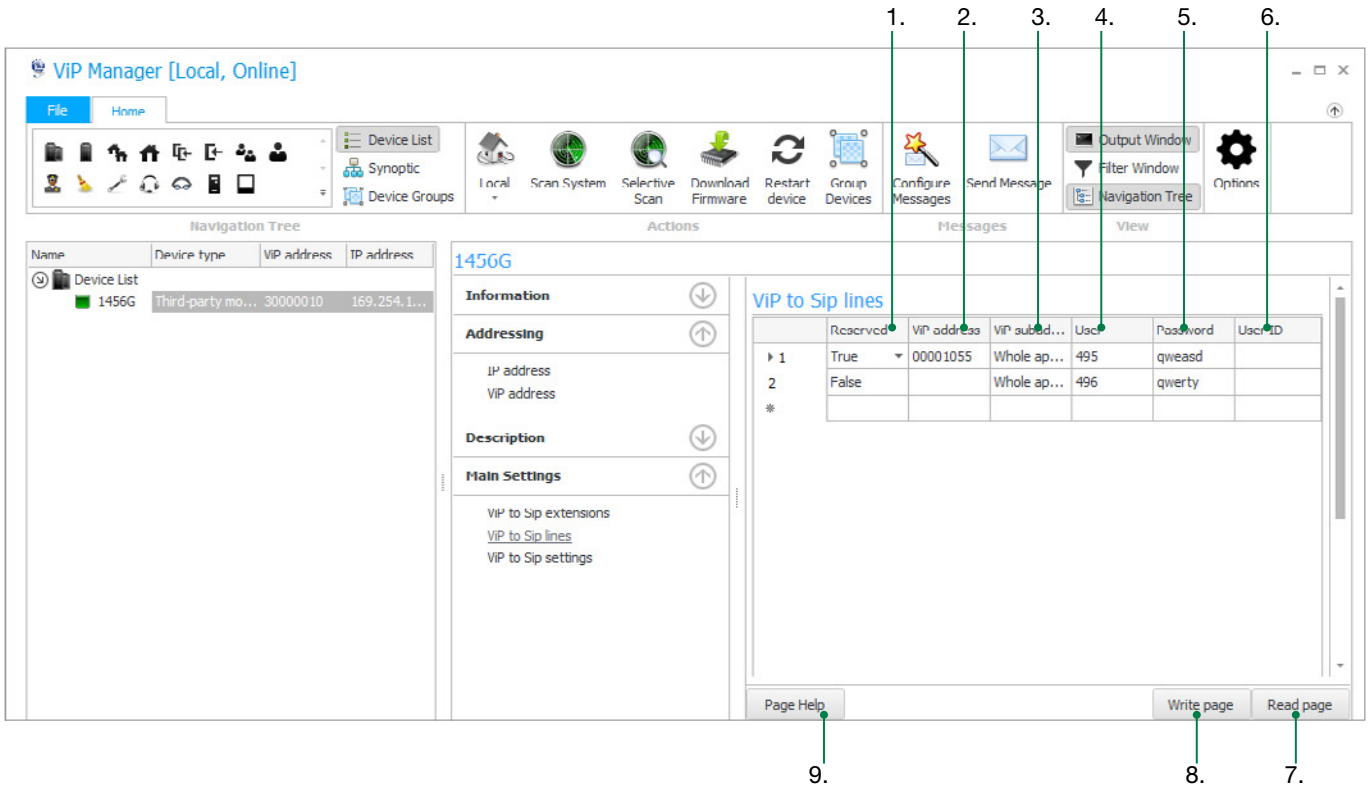
3.3 VIP TO SIP LINES

From this page you can configure the SIP lines used by the 1456G to generate SIP calls.

Each row corresponds to a SIP line.

A maximum of 15 SIP lines may be configured.

For 'through PBX' call mode: **the SIP lines used by the 1456G must be activated in the PBX (using the access credentials supplied by the PBX provider: user, password...). To use the 1456G, some SIP PBX servers may require activation of special SIP lines**



1. RESERVED	Select: *true:* select 'true' when a SIP line can only be used by one ViP device (for example, entrance panel, porter switchboard...). *false (default):* select 'false' if the line is shared by all the ViP devices in the system. ***The following functions can only be used with a reserved line:*** • ***call back/self-ignition*** • ***intercom*** • ***switchboard call*** • ***system caller recognition*** ***It is possible to use reserved lines and shared lines simultaneously.***
2. ViP ADDRESS	*For reserved lines only:* enter the ViP address of the caller device. *For shared lines:* leave this field blank.
3. ViP SUBADDRESS	This function is currently unavailable (leave "whole apartment").
4. USER	*For 'through PBX' call mode:* enter the user name supplied by the SIP provider. *For 'direct' call mode:* enter the number of SIP line that can be used with the SIP device called.
5. PASSWORD	*For 'through PBX' call mode:* enter the password supplied by the SIP provider. *For 'direct' call mode:* enter the password required by the SIP device, if any. ***If no password is required (for 'direct' call mode) enter "-".***
6. USER ID	*For 'through PBX' call mode:* enter this credential if requested by the PBX server. *For 'direct' call mode:* leave this field blank.

7. READ PAGE	Press to read and display the settings saved in the device memory.
8. WRITE PAGE	Press to apply and save the settings to the device memory.
9. PAGE HELP	Press to access the manual for the device.

EXAMPLES OF 'THROUGH PBX' CALL MODE:

- ***Configuration of a reserved line 495*** used by the ViP device 00001055 to call the internal SIP device 123 (corresponding to the ViP extension 00001010)
  - ▶ From the ViP device 00001055, press the pre-configured button to call the ViP address 00001010 to call SIP device123 via reserved line 495.
- ***Configuration of a shared line 496*** used by the ViP devices 00001056 / 00001057 to call the external SIP device +3291234567
  - ▶ From the ViP device 00001056 / 00001057, press the pre-configured button to call the ViP address 00001011 (or enter the ViP address 00001011 from the keypad) to call SIP device+3291234567, via shared line 496.

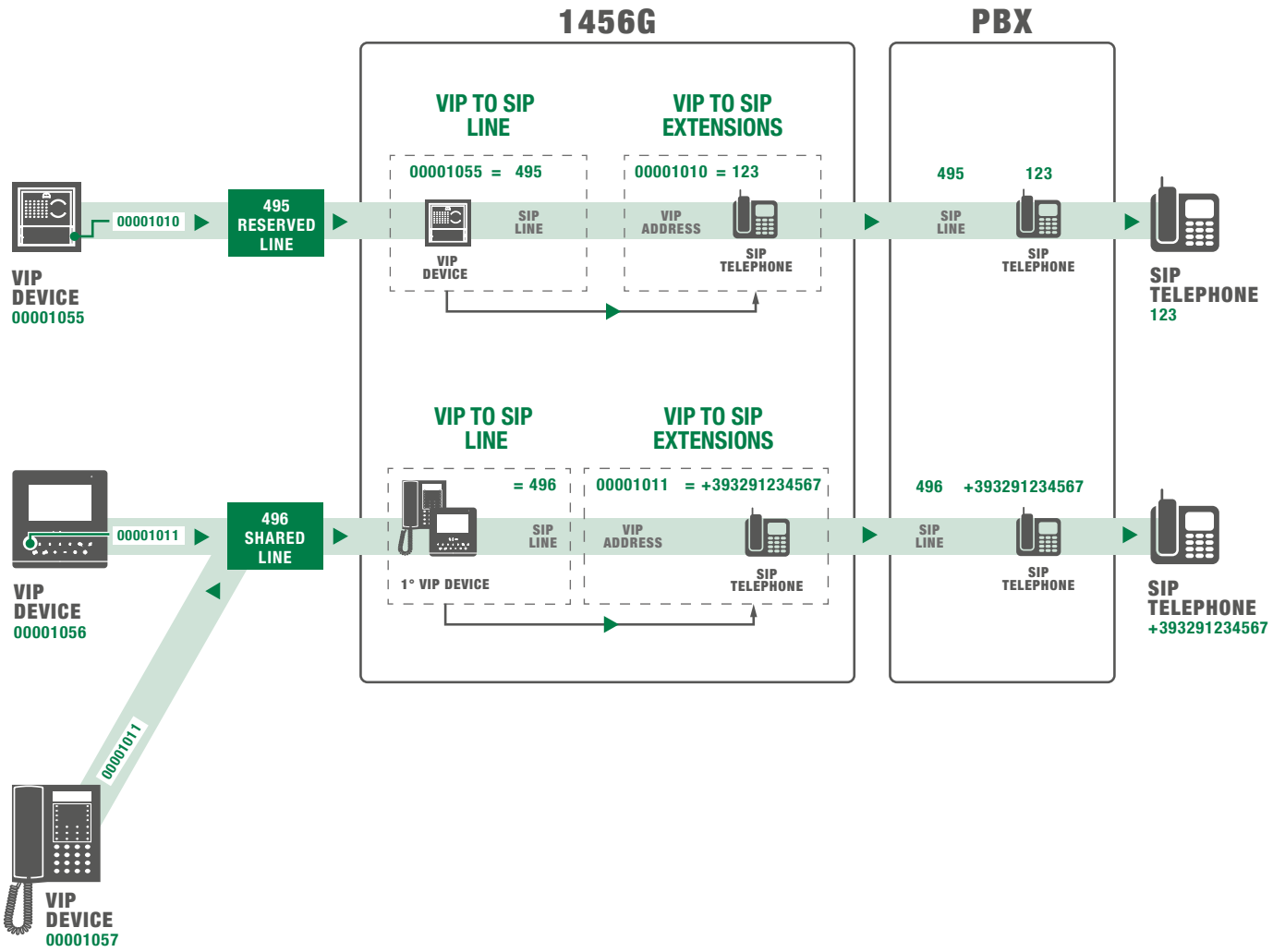
Shared line 496 may only be used by one ViP device at a time (00001056 or 00001057).

ViP to Sip lines

	Reserved	ViP address	ViP subad...	User	Password	User ID
1	True	00001055	Whole ap...	495	qweasd	
2	False		Whole ap...	496	qwerty	

ViP to Sip extensions

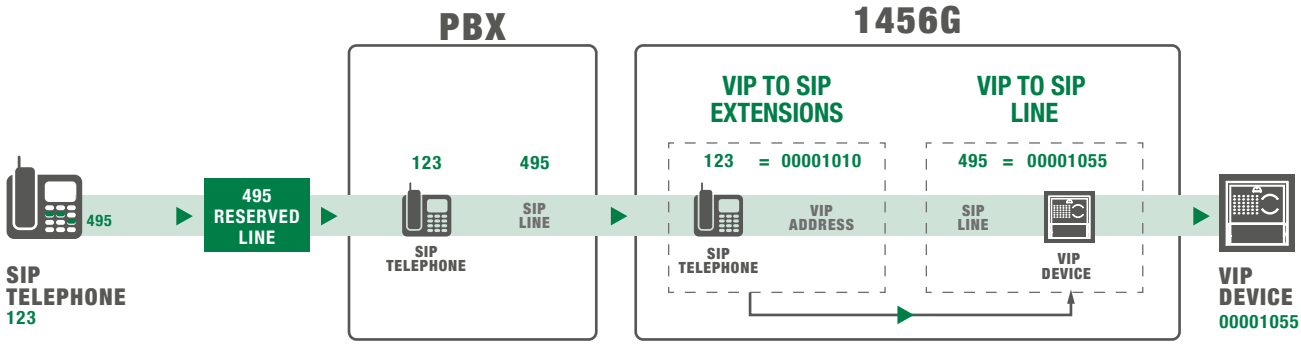
	ViP address	ViP subaddress	Sip recipient
1	00001010	Whole apartment	123
2	00001011	Whole apartment	+393291234567



It is only possible to call a ViP device from a SIP device via a reserved line.

Using a specific command, the SIP devices can call ViP devices associated with reserved SIP lines.

- From the SIP internal device 123 (corresponding to the ViP extension 00001010), key in the address of the reserved line 495 to perform self-ignition of the ViP device 00001055



EXAMPLES OF 'DIRECT' CALL MODE:

Using a specific command, the ViP devices can call SIP devices associated with ViP extensions.

*The correct syntax to use for configuration of the "**SIP recipient**" is :* **the SIP number @ IP address of the SIP device**

- *the SIP number:* the SIP number programmed on the SIP device (e.g.: 077)
- *IP address of the SIP device*: IP address programmed on the SIP device (e.g.: 192.168.1.13)

- ***Configuration of a reserved line 495*** used by the ViP device 00001055 to call the SIP device 077 with IP address 192.168.1.13 (corresponding to the ViP extension 00001010).
  - ▶ From the ViP device 00001055, press the pre-configured button to call the ViP address 00001010 to call SIP device 077 with IP address 192.168.1.13 via reserved line 495.
- ***Configuration of a reserved line 496*** used by the ViP device 00001056 to call the SIP device 077 with IP address 192.168.1.13 (corresponding to the ViP extension 00001010).
  - ▶ From the ViP device 00001056, key in the ViP address 00001010 to call SIP device 077 with IP address 192.168.1.13 via reserved line 496.
- ***Configuration of a shared line 497*** used by the ViP devices 00001057 / 00001058 to call the SIP device 078, with IP address 192.168.1.14.
  - ▶ From the ViP device 00001057 / 00001058, press the pre-configured button to call the ViP address 00001011 (or enter the ViP address 00001011 from the keypad) to call SIP device 078, with IP address 192.168.1.14, via shared line 497.

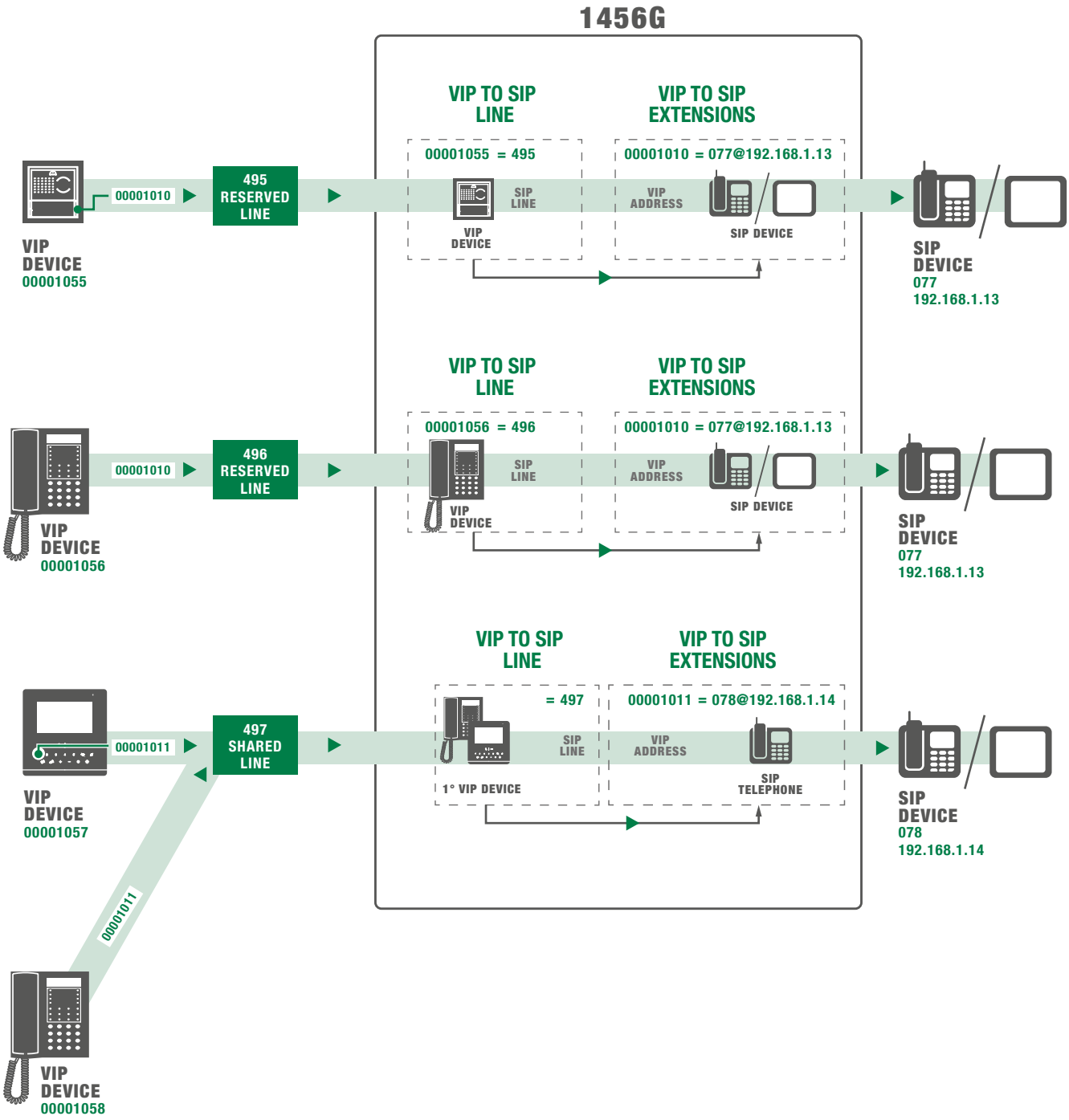
Shared line 497 may only be used by one ViP device at a time (00001057 or 00001058).

ViP to Sip lines

	Reserved	ViP address	ViP subad…	User	Password	User ID
▸ 1	True	00001055	Whole apa…	495	qweasd	
2	True	00001056	Whole apa…	496	qweasd	
3	False		Whole apa…	497	qweasd	
*						

ViP to Sip extensions

	ViP address	ViP subaddress	Sip recipient
▸ 1	00001010	Whole apartment	077@192.168.1.13
2	00001011	Whole apartment	078@192.168.1.14
*			


1456G
VIP TO SIP LINE
VIP TO SIP EXTENSIONS
00001055 = 495
00001010 = 077@192.168.1.13
00001010
495 RESERVED LINE
SIP LINE
VIP ADDRESS
VIP DEVICE
SIP DEVICE
VIP DEVICE 00001055
SIP DEVICE 077 192.168.1.13
VIP TO SIP LINE
VIP TO SIP EXTENSIONS
00001056 = 496
00001010 = 077@192.168.1.13
00001010
496 RESERVED LINE
SIP LINE
VIP ADDRESS
VIP DEVICE
SIP DEVICE
VIP DEVICE 00001056
SIP DEVICE 077 192.168.1.13
VIP TO SIP LINE
VIP TO SIP EXTENSIONS
= 497
00001011 = 078@192.168.1.14
00001011
497 SHARED LINE
SIP LINE
VIP ADDRESS
1° VIP DEVICE
SIP TELEPHONE
VIP DEVICE 00001057
SIP DEVICE 078 192.168.1.14
00001011
VIP DEVICE 00001058

Using a specific command, the SIP devices can call ViP devices associated with reserved SIP lines.

The correct syntax (to configure the address of the SIP device) is as follows:

sip://**SIP line username@1456G IP address: UDP port** (example: sip://495@192.168.1.100:5061**)**

- *SIP line username:* enter the username programmed for the reserved SIP line of the 1456G.
- *1456G IP address:* enter the IP address of the SIP interface of the device 1456G.
- *UDP Port:* enter the UDP port to be associated with the line in a progressive numerical sequence: associate port 5061 with line 1, port 5062 with line 2....

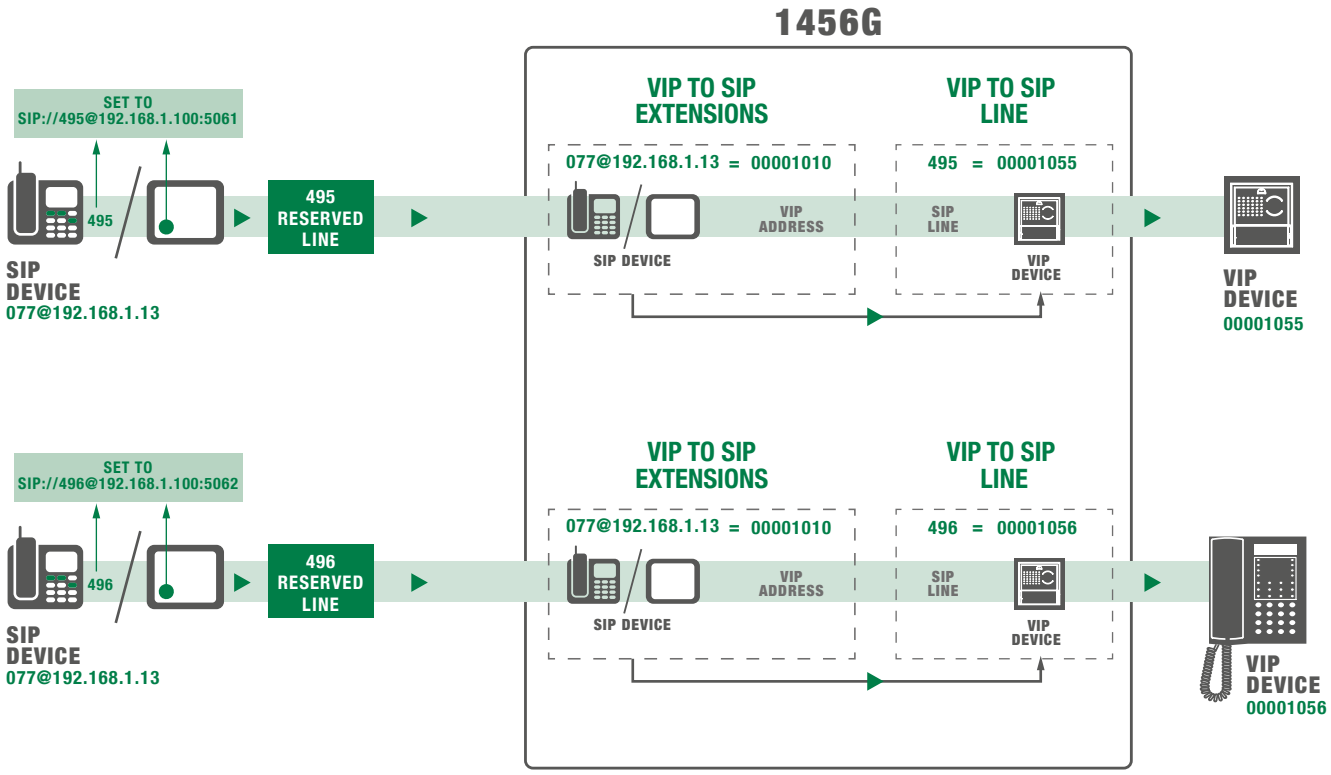
Row 1 › UDP: 5061

Row 2 › UDP: 5062

ViP to Sip lines

	Reserved	ViP address	ViP subad...	User	Password	User ID
1	True	00001055	Whole apa...	495	qweasd	
2	True	00001056	Whole apa...	496	qweasd	
3	False		Whole apa...	497	qweasd	

- From the SIP device 077, IP address 192.168.1.13 (corresponding to ViP extension 00001010), key in the number of the reserved SIP line 495 (configured as: sip://495@192.168.1.100:5061) to perform self-ignition of the ViP device 00001055
- From the SIP device 077, IP address 192.168.1.13 (corresponding to ViP extension 00001010), key in the number of the reserved SIP line 496 (configured as: sip://496@192.168.1.100:5062) to call the ViP device 00001056



Video control

Art. 1456G offers two video control modes:

- *SIP video standard*
- *RSTP streaming*

SIP video standard

✓ **supported codec:** H264 - baseline profile - 320X240 resolution

All devices that meet this standard can receive the video stream from the caller external unit.

In "SIP video standard" mode the video appears on recipient SIP devices only on answering the call (as does the audio).

RTSP streaming

✓ **supported codec:** H264 - baseline profile - 320X240 resolution

Art. 1456G makes the RTSP video stream of the caller entrance panel available over the networks that it manages.

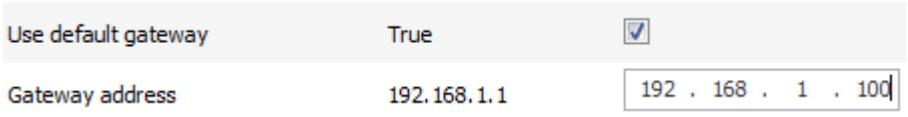
RTSP video streaming is available from the moment the call is made.

All the connected SIP devices can display this video stream using the correct URL.

Required settings for use of streaming mode

1. In the configuration page **"Main settings/ViP to SIP settings",** activate **"Stream video via RTSP".**

2. In the configuration page **"Addressing/IP address",** set the "Gateway address" to the IP address of the 1456G interface to which the SIP device is connected, for example 192.168.1.100.



3. In the settings of third-party SIP devices, use the specific URL in the following syntax:

   rtsp://1456G IP address:40554/stream0

   1456G IP address: IP address of the 1456G interface to which the SIP devices are connected.

   stream0: name of the channel associated with the ViP to SIP extension n°1 programmed in the 1456G. Subsequent extensions will be associated to progressively numbered streams.

Example:

Extension n°1 **rtsp://192.168.1.100:40554/stream0**

Extension n°2 **rtsp://192.168.1.100:40554/stream1**

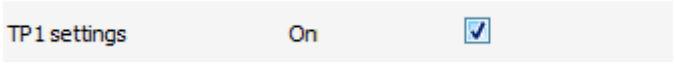
Row 1 › **stream0**

Row 2 › **stream1**

ViP to Sip extensions

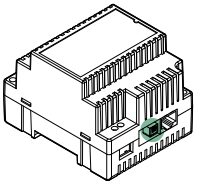
	ViP address	ViP subaddress	Sip recipient
▸ 1	00001010	Whole apartment	077@192.168.1.13
2	00001011	Whole apartment	078@192.168.1.14
*			

In the special settings of external units (4682HC), enable the flag "TP1 settings".



Reboot with predetermined network settings

The function 'reboot with predetermined network settings' allows you restart the device with the default network parameter settings, while keeping the other settings unchanged.



✓ With the dip switches in the default positions (OFF).

1. Disconnect the power supply to the device.

2. Set DIP 1 to ON

3. Power on the device.

4. Wait 20 - 40 seconds until the LEDs start flashing slowly and alternately (1 sec red / 1 sec green).

5. Return all the dip switches to OFF.

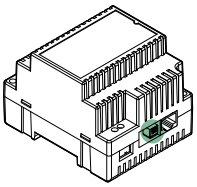
» The green LED will flash for 5 seconds.

» ***The device will start with the default network settings.***

6. At the next restart, the device will recover the saved **settings**.

Restore factory settings

This procedure allows you to restore all the factory parameter settings and to delete all the device configurations.



✓ With the dip switches in the default positions (OFF).

1. Disconnect the power supply to the device.

2. Set all the dip switches to ON.

3. Power on the device.

4. Wait 20 - 40 seconds, until the LEDs start flashing rapidly and alternately (0.1 sec red / 0.1 sec green).

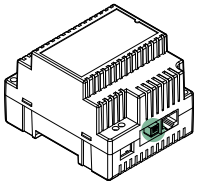
5. Return all the dip switches to OFF.

» The red LED will flash for 5 seconds.

» ***The device will reset all parameters to the factory settings and restart in the normal way.***

Recovery for firmware update (from v1.0.0 onwards)

This procedure allows you to reboot the 1456G in recovery for firmware update mode, in the event of a reset of corrupted firmware (e.g. device not visible after scan).



✓ With the dip switches in the default positions (OFF).

1. Disconnect the power supply to the device.

2. Set DIP1 to OFF and DIP2 to ON.

3. Power on the device.

4. Wait 20 to 40 seconds until the green LED starts to flash.

5. Perform a Autoip system scan on interface A (with the PC connected to port A4).

» The device will be identified in Vip manager by a purple icon.

6. Perform a Firmware update to reset the device.

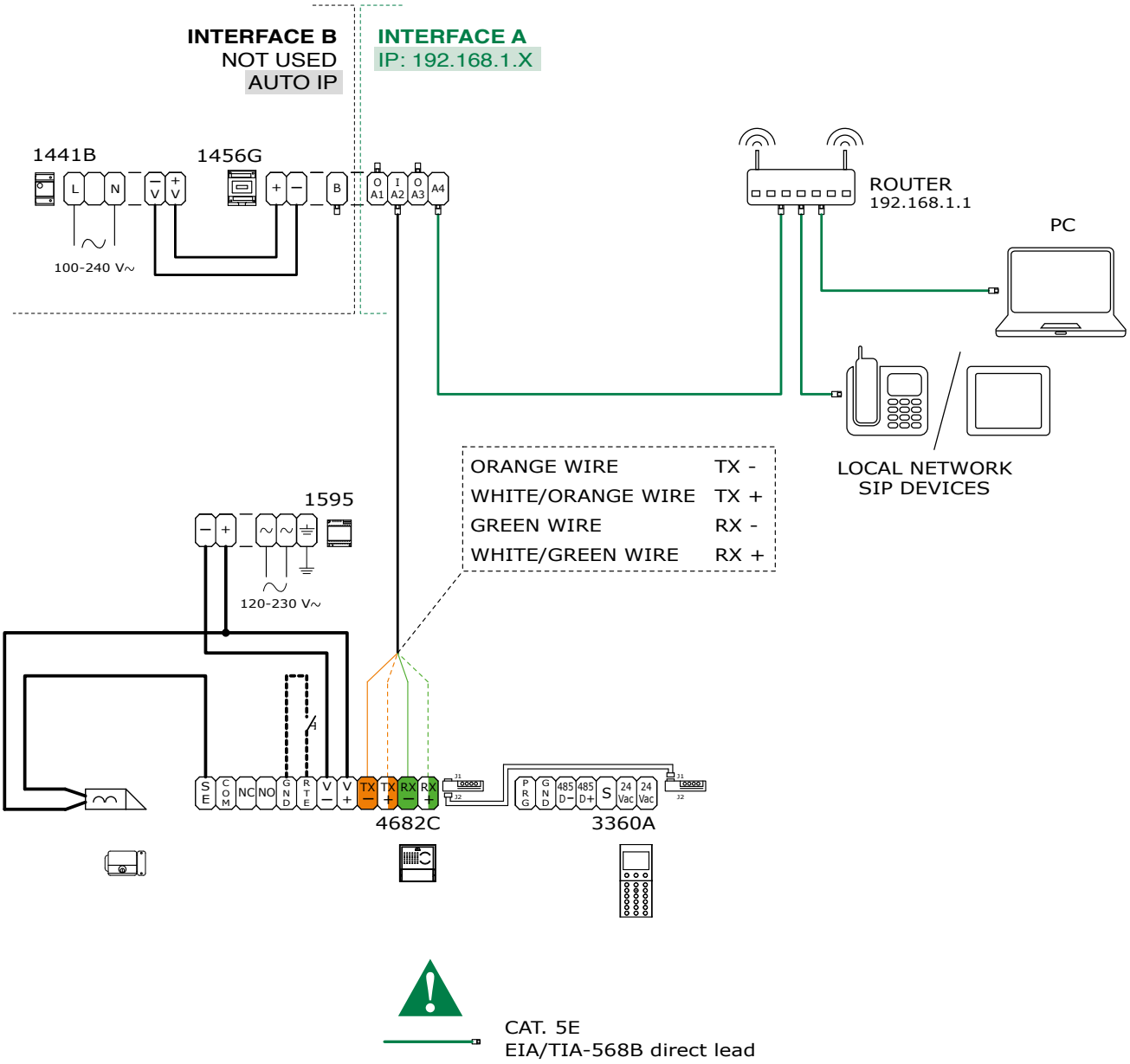
7. On completion of the update, turn all DIP switches to OFF.

8. Disconnect the power supply.

» ***On restarting the device,*** correct operation will be restored.

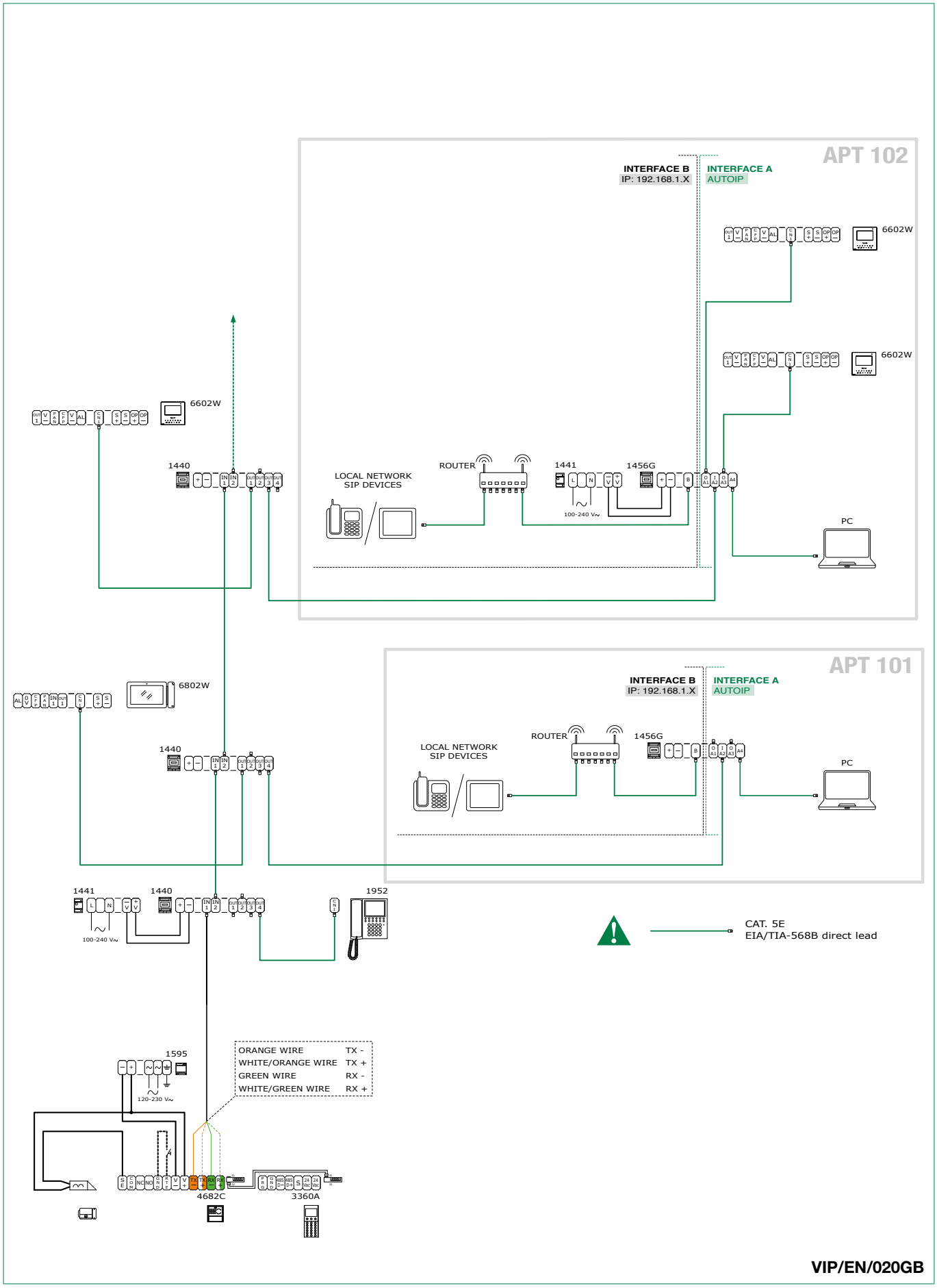
Wiring diagrams

“Villa” / “Office” type system



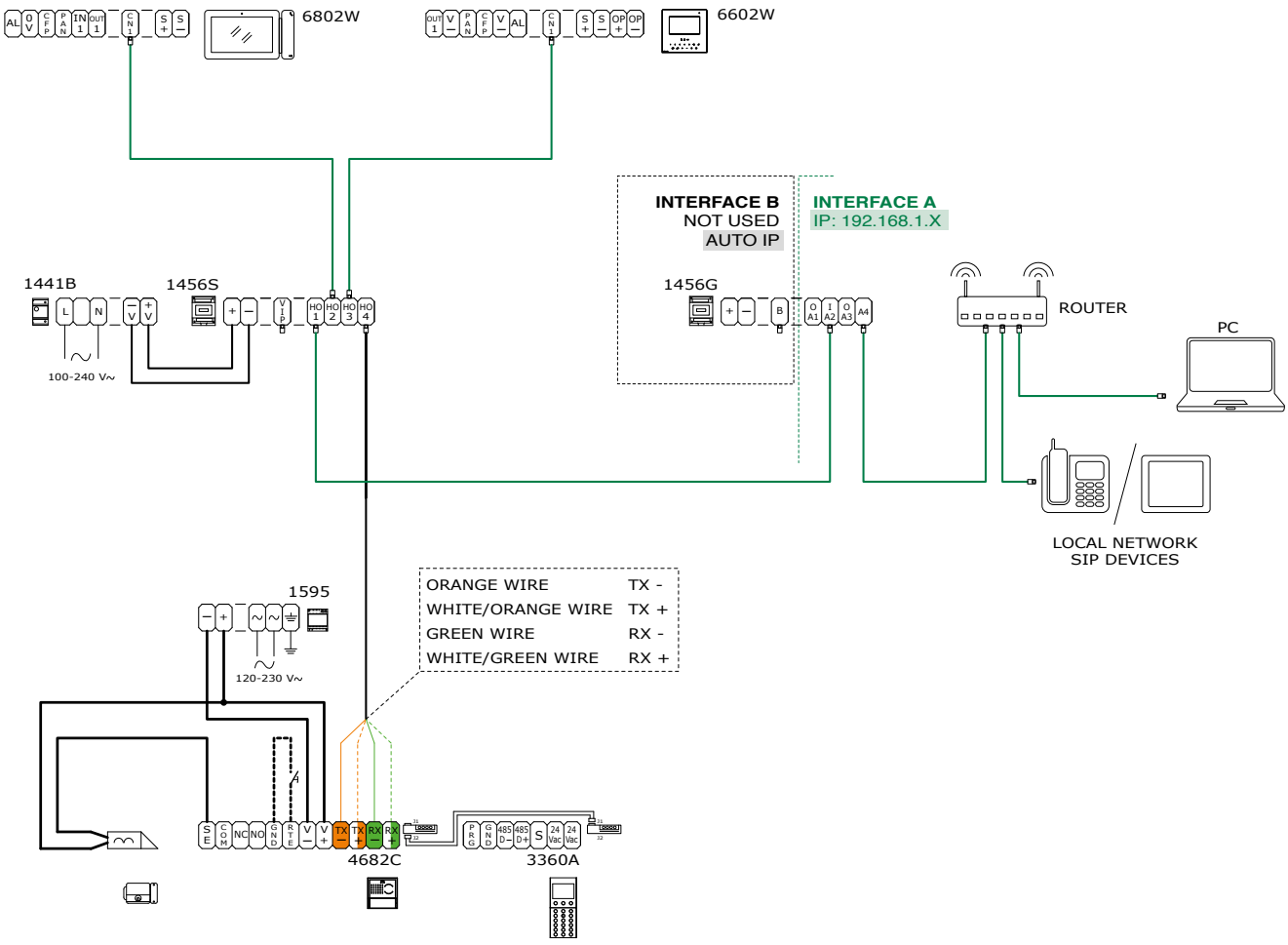
VIP/EN/020GA

“Residential” type system



VIP/EN/020GB

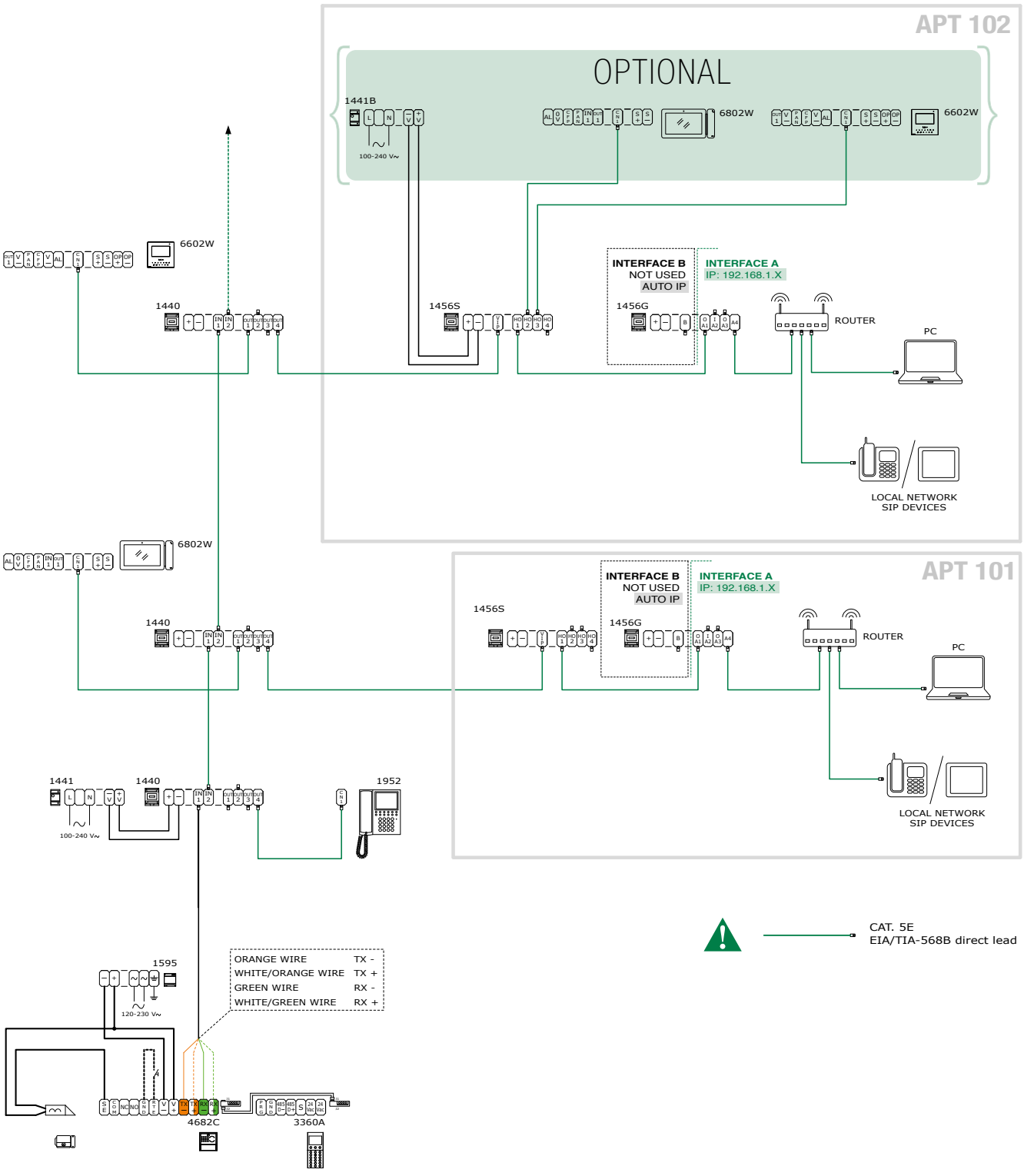
Villa” / “Office” type system + Art. 1456/1456S for App use



CAT. 5E
EIA/TIA-568B direct lead

VIP/EN/020GC

“Residential” type system + Art. 1456/1456S for App use



VIP/EN/020GD

Glossary*

- **Autoip:** *Automatic Private IP Addressing* (known as APIPA or Auto IP), is a method for automatically assigning IP addresses to the devices connected to the network.
- **Dynamic DNS:** *Dynamic DNS* is a technology that allows a DNS name to be permanently associated with the IP address of the same host, even if that address subsequently changes.
- **DHCP:** In telecommunications and information technology, *Dynamic Host Configuration Protocol* (DHCP) is an application layer network protocol that enables the devices or terminals of a local network to automatically receive on each request to an IP network i.e. the internet) the necessary IP configuration to establish a connection and operate on a wider network based on Internet Protocol, i.e. to interact with all the other subnets, exchanging data, provided that they are also integrated in the same way with the IP protocol.
- **Gateway:** a *gateway* is a network device that operates at network level and above of the ISO/OSI model. It's main function is to transport network data packets outside a local network (LAN) Gateway is a generic term for a service that sends data packets outside of the network; the hardware device that fulfils this task is usually a router. Simpler networks have just one gateway that sends all outbound traffic to the Internet network. More complex networks have several subnets, each of which refers to a gateway which routes data traffic to other subnets or redirects it to other gateways.
- **Dynamic IP address:** dynamic addresses are used to identify non-permanent devices in a LAN. A server in the LAN automatically dynamically assigns the address, selecting it a random from a preset range. You can select the range of addresses in accordance with the number of users by setting the netmask, i.e. by telling the DHCP server how many address bits can be assigned dynamically to each single client that accesses it. For example, if the netmask has the value 255.255.255.0 (where each block of numbers separated by a point denotes a group of 8 bits), only the last 8 bits can be assigned to the hosts.
- **Staticggg IP address:** static addresses are used to identify semi-permanent devices with a permanent IP address. Network servers, printers, etc. typically use this addressing method. Static addressing is generally used in preference to dynamic addressing for non permanent network devices if there is a limited number of hosts in the subnet and/or for security reasons, so that the actions of each host and the relative user can be kept under control.
- **Public IP address:** in telecommunications and information technology a *public IP address* is an IP address in the address range of the internet network that is unequivocally allocated and is potentially accessible from any other public IP address, and therefore can be used for addressing and routing via IP protocol.
- **PoE:** *Power over Ethernet or PoE* (the acronym) is a technique for powering equipment via the same cable as that used for Ethernet connection. It is very useful when there is no convenient electrical power source near the termination or when you wish to reduce the number of elements and wires; for example, an IP phone on a desk can be powered directly via the Ethernet cable in Power over Ethernet, thereby eliminating the need for a power supplier and its cable, making for a simpler, less cluttered installation. For the moment, these techniques are used mainly to power devices that consume only a little power, such as VoIP telephones, access points and webcams.
- **Port forwarding:** in computer networks, port forwarding is the operation that allows the transfer of data from one device to another via a specific communication port.. This technique can be used to allow an external user to reach a host with a private IP address (within a LAN) via a port of the corresponding public IP address. This operation requires a router capable of automatic translation of network addresses, or NAT.

***Sources**

Dynamic DNS. (2015, June 8). Wikipedia, L'enciclopedia libera. http://it.wikipedia.org/wiki/Dynamic_DNS

Dynamic Host Configuration Protocol. (2015, June 8). Wikipedia, L'enciclopedia libera. http://it.wikipedia.org/wiki/Dynamic_Host_Configuration_Protocol

Gateway (information technology). (2015, June 8). Wikipedia, L'enciclopedia libera. http://it.wikipedia.org/wiki/Gateway_(informatica)

IP Address. (2015, June 8). Wikipedia, L'enciclopedia libera. http://it.wikipedia.org/wiki/Indirizzo_IP

Public IP address (2015, June 8). Wikipedia, L'enciclopedia libera. http://it.wikipedia.org/wiki/Indirizzo_IP_pubblico

Power over Ethernet (2015, June 8). Wikipedia, L'enciclopedia libera. http://it.wikipedia.org/wiki/Power_over_Ethernet

Port forwarding. (2015, June 8). Wikipedia, The free encyclopedia. http://it.wikipedia.org/wiki/Power_over_Ethernet