ARGUS 162
Manual

Version: 2.01 / **EN**

Important note:
An ARGUS basic package contains at least one DSL interface (ADSL or VDSL), which includes a variety of functions and tests. All other interfaces and functions are available as options (see datasheet). Therefore, depending on the scope of function supplied, individual menu options may be hidden.

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1 Introduction

VDSL+ADSL combi tester with fibre optics or VDSL Bonding option

The combi tester for latest turbo internet: The ARGUS 162 combines the capabilities of a tester for day-to-day installation with those of a tester for high-speed interfaces, such as GPON (FTTH) or VDSL Bonding (G.bond: ITU-T G.998.2).
In addition, it is equipped with a powerful and versatile SFP slot (FTTx) and a copper-based Gigabit Ethernet interface which can, for example, provide a full ONT or xDSL modem simulation.
Furthermore, ARGUS 162 is available with an optional integrated ADSL interface (Annex A + B + J + L + M) and supports VDSL2 Vectoring (G.vector: ITU-T G.993.5) as well as all well-known handset functionalities for ISDN BRI S/T/U, PRI/E1 and POTS if needed.

Triple Play and Quality of Service (QoS)

HTTP and FTP downloads can be performed via Gigabit Ethernet and FTTx with speeds of multiple 100 Mbit/s. It is possible to subject these Ethernet and fibre accesses to the same practical stress tests as ADSL and VDSL interfaces. Such tests can be simply started and stopped at any time by the user, for example in the form of parallel triple-play tests. Those additional triple-play tests like data, VoIP and IPTV can also be activated by key later in the field, when required. The ARGUS 162 therefore not only simulates the terminal equipment such as VoIP phone, PC or TV set-top box (STB), but also identifies all the important quality parameters (QoS) such as the VoIP speech quality according to the MOS method (Mean Opinion Score). The multifunctional combi tester also performs various IP tests using the IPv6 protocol, which becomes more common, even in the dual-stack operation mode. Furthermore, the ARGUS 162 supports the setup of several virtual connections (VLANs, PPP connections).

Ethernet TDR and Copper tests

In order to measure loop lengths and identify incorrect wiring, the tester supports cabling tests (Ethernet TDR) and, on the last mile, copper tests (Cu tests) as well as a TDR (Time Domain Reflectometer) analysis. Also, unwanted interferers can be localized promptly by spectral analysis with the Line-Scope (up to 30 MHz). The compact ARGUS Copper Box can optionally measure all important electrical values of the local loop such as DC and AC voltage , DC current, isolation and loop resistance, capacitance or longitudinal balance (LCL: ITU-T O. 9) and near-end crosstalk (NEXT) between tip, ring and ground wire - all completely automated and in real time. The ARGUS Copper Box also provides the advantage that it can be combined with various ARGUS testers and only has to be connected in the field, when one really needs it.

Additional features

Without changing modules, it is possible to select the different interfaces via the intuitive menu and test them with the press of a single button. High user-friendliness is ensured by very short boot and changeover times. Alongside the ease of use is raised by the possibility to do detailed adjustments as well as by the use of the completely pre-configured profiles with a wide range of various settings and identifiers (e.g. PPP) for all the access types an operator offers. Its low weight and the user-friendly, manageable size make the ARGUS 162 an all-rounder, which lithium-ion battery pack ensures long operating times in the field.

Easy operation

The large 320 x 240 pixel colour display and an intuitive menu structure, among other things, guarantee user-friendly operation. A high-performance Li-Ion battery pack ensures long operating times in the field.

You can download free software updates to ARGUS from you PC at any time. Updates are available at www.argus.info/en/service/downloads.

Overview of key ARGUS functions:

xDSL interfaces (ADSL, ADSL2, ADSL2+, VDSL2)

- **Synchronisation with DSLAM (xTU-C) and determination of all relevant connection parameters and error counters**
- **Bridge, router and terminal-device modes, via IPv4 and IPv6**

Ethernet interfaces

- **Gigabit Ethernet test interface (10/100/1000 Base-T)**
- **Ethernet interfaces for VNC server (10/100 Base-T)**
- **Ethernet cabling tests**

SFP slot

- **SFP slot for fiber-based interfaces (Ethernet and FTTx)**

IP and ATM tests via xDSL and Ethernet

- **ATM Tests (only for ADSL)**
  - ATM-OAM ping, ATM-OAM cell loop, VPI/VCI scan
- **IP tests**
  - Ping and traceroute tests (BRAS information, PPP trace, VLAN), via IPv4 and IPv6
  - Download tests for measuring throughput (HTTP-download, FTP-up/download)
  - FTP server test, up/download from ARGUS to ARGUS
  - Parallel testing of multiple services (VoIP, IPTV,...)
- **VoIP test**
  - VoIP terminal device simulation, including acoustics (var. codecs), via IPv4 and IPv6
  - OK/FAIL assessment of VoIP speech quality (QoS) according to:
    - MOS_{CQE} (ITU-T P.800), E-model (ITU-T G.107)
    - PESQ (ITU-T P.862) in conjunction with PESQ server software
- **IPTV tests**
  - Stream request (STB mode), IPTV channel scan, IPTV passive
  - OK/FAIL assessment and display of quality parameters

ISDN functions (PRI/E1 see extra manual)

- U-interface (4B3T or 2B1Q) according to ANSI T1.601
- PRI/E1 interface according to ITU-T I.430/431 in TE and NT operation
- D-channel monitoring via BRI and PRI interface
- Testing of BRI and PRI fixed lines (E1, 2 Mbit/s)
- E1-BERT via all B-channels simultaneously (MegaBERT)
- Automatic service and service-feature tests, and much more.
- Assessment of ISDN speech quality directly on BRI or U-interface
  - PESQ (ITU-T P.862) + MOS_{LQO} in conjunction with PESQ server SW

POTS functions

- Fully functional integrated analogue handset (POTS)
- With DTMF and CLIP display, pulse dialling
- High-ohm 2-wire monitor with voltage measurement
- Assessment of analogue speech quality directly at POTS access
  - PESQ (ITU-T P.862) + MOS_{LQO} in conjunction with PESQ server SW

Copper test (Cu test) functions

- **R-measurement:** ARGUS continually measures resistance and displays the values in real time (loop resistance)
- **RC measurement:** Test of loop resistance or capacitance of open line (including calculation of line length)
- **Line Scope:** High-performance realtime Line Scope with display in time and frequency range (FFT) up to 30 MHz
- **TDR:** Time domain reflectometer to measure line lengths and locate faults
- **Copper Box:** expansion of the ARGUS copper test function, see ARGUS Copper Box manual

Local loop acceptance log

When connected to a PC via a USB port, ARGUS can be used to generate and print out a detailed measurement log on the PC using the software WINplus / WINanalyse.



Note:
Detailed explanations regarding Ethernet tests, PRI/E1, and Copper Box may be found in the separate documentation for the respective device.
You should receive these together with your equipment. You can also download the latest manuals at http://www.argus.info/en/service/downloads, or simply contact our Service Department:

intec Gesellschaft für Informationstechnik mbH
Rahmedestr. 90
D-58507 Lüdenscheid
Tel.: +49 (0) 2351 / 9070-0
Fax: +49 (0) 2351 / 9070-70
www.argus.info/en
support@argus.info

2 Safety information

ARGUS may only be operated using the accessories supplied with the device. The use of other accessories can result in faulty measurements or even damage to ARGUS and the connected equipment. Only use ARGUS according to the instructions contained in this accompanying document. Use in any other manner can cause harm to persons or destroy your ARGUS.



- Before connecting ARGUS to an access, make sure that no dangerous voltages or voltages for which ARGUS and its accessories are not specified are present. Also keep in mind that the voltage can change over the time that the device is connected.
- Use ARGUS only according to its intended purpose at all interfaces and local loops.
- Voltages over 50 V AC and 120 V DC can cause death.
- Never conduct measurements without the battery pack!
- ARGUS is not waterproof. Therefore, protect ARGUS against water penetration.
- Before replacing the battery pack, disconnect the power adapter and all measuring leads and power ARGUS down.
  ATTENTION: Never remove the battery pack during operation.
- Remove the power adapter from the mains socket as soon as ARGUS is switched off or no longer in use (e.g.after charging the battery pack)!
- ARGUS may only be used by trained personnel.
- ARGUS may only be operated using the power adapter supplied with the device.
- Only manufacturer-approved headsets may be connected to the headset socket; any other use of this socket (e.g. connection to a home entertainment system) is expressly prohibited.
- Only the Active Probe II, the ARGUS Copper Box and the other manufacturer-approved USB devices without mains connection may be connected to the USB host interface (USB-A). Any other use (e.g. connection to a PC) is expressly prohibited.
- If external USB devices are used on the USB-host interface (USB-A), no warranty is assumed for occurrences outside the mechanical wear of normal plug-in.
- In battery power mode, always cover the ARGUS power socket with the supplied rubber protective cap labelled "Power".
- Only use the SFP slot for SFP types explicitly approved by intec GmbH. Never insert other objects or SFP modules into the SFP slot.
- When the SFP slot is not in use, always make sure that it is sealed using the supplied protective cover.



- When using the SFP slot and SFP modules, always be sure to observe normal cleanliness.
- When using SFP modules, always be sure to observe the module manufacturer's safety information and use them only for their intended purpose.
- The most common SFP modules approved for ARGUS are class-1 laser products.
  Generally, the use of class-1 laser products does not require any special protection measures.
  However, for your own safety please note the following:
  - Always cover the ends of the glass fibers or the SFP module when disconnecting.
  - Always avoid direct eye contact with the emitted laser light. Vision aids and long exposure times can make even low light doses extremely dangerous.
  - The equipment may only be used by trained personnel.
- The electromagnetic compatibility (EMC) has been tested according to the regulations specified in our conformity declaration.
  ARGUS is a class A device. This device can cause radio interference in residential areas. In this case, the user may be required to implement appropriate measures.
- Active charging of the battery pack and automatic charging (on by default) may only be carried out in a temperature range of 0 °C to +40 °C.
- The device may not be used during thunderstorms.
- If ARGUS is operated under extreme conditions, it can be set to energy-saving mode to protect the device and the user; this can interrupt the running test and drop the connection.
  To ensure dependable extended operation of ARGUS, always make sure that it is optimally protected against high temperatures.
- The device may not be opened.
- Please observe the following safety and transport information when using the lithium-ion battery pack.
- Before starting a test or synchronising on an interface, determine how you want to supply power to ARGUS (battery pack or power adapter). The car adapter is only for charging the device. When ARGUS is connected to this adapter, you should not run any tests or synchronise on a DSL interface.

Return and environmentally compatible disposal

Currently applicable environmental legislation restricts the use of certain hazardous substances in electrical and electronic devices, particularly the concentration respectively use of lead (Pb), cadmium (Cd), mercury (Hg), hexavalent chromium [Cr(VI)], polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE).

We hereby affirm on the basis of the assurances, designations and documentation of our suppliers that all our ARGUS-brand measurement technology products are free of substances in concentrations, preparations or applications whose market release is prohibited pursuant to the applicable requirements of the RoHS Directive 2011/65/EU of the European Parliament and Council dated 8 June 2011. Our EAR registration number is: WEEE reg. no. DE 92829367.

Since October 2005, we have been marking all our measuring devices with this symbol, in compliance with WEEE 2002/96/EC and the corresponding German statute ElektroG:

( (DIN EN 50419).

In other words, ARGUS and its accessories, may not be disposed of as household waste. Please consult with our Service department with respect to the return of old devices.

2.1 Safety and transport information for the battery pack

Transport

The battery pack has been tested according to the UN directive(ST/SG/AC.10/11/Rev. 4, part III., subchapter 38.3). Protective functions have been implemented to guard against short-circuit, destruction and dangerous reverse currents. As the battery pack contains a lithium quantity below current thresholds, it is not subject to international regulations governing hazardous materials either as an individual part or mounted in ARGUS. When transporting multiple battery packs, however, you may also need to observe this safety information. Further information is available on request.



Failure to observe the following danger and warning information can impair the protective functions of the battery pack. This can cause extremely high voltages and currents which can in turn result in abnormal chemical reactions, acid leaks, overheating, smoke, explosion and/or fire. Additionally, failure to observe this information can negatively impact both the performance capacity and the performance duration.

Hazard information and warnings

1. Do not disassemble or short-circuit the battery pack.
2. Do not through the battery pack into fire or overheat it (> 60 °C).
3. The battery pack must not become wet or damp.
4. Active charging of the battery pack and automatic charging (on by default) may only be carried out in a temperature range of 0 °C to +40 °C.
   To maximise battery life, do not store the battery long-term at temperatures above +50 °C.
5. The battery pack may only be charged using the corresponding ARGUS device or an approved charger.
6. Do not puncture the battery pack with a sharp object.
7. Do not throw the battery pack or expose it to shocks.
8. Do not use battery packs that have become damaged or deformed.
9. The battery pack contacts have a specific polarity and may not be inserted in ARGUS or a charging device with reverse polarity.
10. Only connect the battery pack to the corresponding ARGUS or charger in the intended manner.
11. The battery pack may not be directly connected to electrical outputs such as power adapters, car adapters etc.
12. Only use the battery pack with ARGUS.
13. Do not attach, transport or store the battery pack together with metallic objects.
14. Do not expose the battery pack to electrostatic charges.
15. The battery pack may not be charged or discharged together with primary batteries or other battery packs.

16. If the battery pack fails to charge by the end of the charging time, it can no longer be recharged.
17. Do not expose the battery pack to excessive pressure.
18. If the battery pack emits odours or heat, becomes discoloured or deformed or otherwise appears different from normal during operation, charging or storage, immediately remove the battery pack from the device and never use it again.
19. In the event that acid leaks and comes in contact with eyes or skin, wash immediately with clean water. Do not rub. In both cases, seek medical attention immediately. Otherwise, permanent injury may occur.
20. Keep the battery pack away from children.
21. Read this manual and the corresponding safety information carefully before using the battery pack.
22. If odours, rust or other abnormalities are detected before the first use, contact intec GmbH to clarify the next steps.

3 General technical data

Device specifications

Dimensions/weight	**Inputs/outputs**
Height: 254 mm Width: 99 mm Depth: 73 mm Weight: approx. 880 g (1.94 lbs) (incl. battery pack)	- RJ-45 (BRI/PRI/E1) for BRI and PRI - RJ-45 (Line) for xDSL, POTS, U-interface and Copper tests - Ethernet 10/100/1000 Base-T - Ethernet 10/100 Base-T or USB-A socket, USB-host interface - SFP slot - USB-A socket, USB-host interface - USB-B socket, USB client interface - Headset input
Control panel 25 keys	
LCD display	**Temperature range**
LCD colour display with switchable background illumination 320 x 240 pixels	Temperature range for charging battery pack: 0 °C to +40 °C Operating temperature (in battery mode): -10 °C to +50 °C Operating temperature (with power/car adapter): 0 °C to +40 °C Storage temperature: -20 °C to +60 °C Humidity: up to 95 % rel. humidity, non-condensing
	Power supply Lithium ion battery pack with 7.2 V rated voltage (observe the safety information) or 12 V/1.5 A ARGUS power adapter
	Miscellaneous ARGUS user safety tested according to EN60950-1 RoHS conformity pursuant to the WEEE directive The electromagnetic compatibility (EMC) was tested according to the regulations specified in our declaration of conformity. CE marking ARGUS 162 complies with EC directives 2004/108/EC and 2009/C197/03. We will be happy to provide a detailed declaration of conformity on request

Supported standards

ADSL (line): ITU-T G.992.1, Annex A (ADSL) ITU-T G.992.2, Annex A (G.lite) ITU-T G.992.3, Annex A (ADSL2) ITU-T G.992.5, Annex A (ADSL2+) ITU-T G.992.1, Annex B (ADSL) ITU-T G.992.3, Annex B (ADSL2) ITU-T G.992.5, Annex B (ADSL2+) ITU-T G.992.5, Annex J (ADSL2+) ITU-T G.992.3, Annex L (RE-ADSL2 via analogue) ITU-T G.992.3, Annex L (RE-Narrow PSD ADSL2 via POTS) ITU-T G.992.3, Annex M (ADSL2) ITU-T G.992.5, Annex M (ADSL2+) ANSI T1.413	**ISDN-BRI/PRI (BRI/PRI/E1):** ITU-T I.430 ITU-T I.431 ITU-T G.821 ITU-T X.31 **ISDN U-interface (line):** ANSI T1.601
VDSL (line): ITU-T G.993.2 (VDSL2) ITU-T G.993.5, G.vector (Vectoring) ITU-T G.998.2. G.bond (Bonding) Profiles 8a, 8b, 8c, 8d, 12a, 12b, 17a, 30a ITU-T G.998.4 (G.INP, Retransmission)	**R/RC measurement (line):** Resistance test: - Accuracy for 20 Ω - 100 Ω: ±10 % - Accuracy for 100Ω - 100 kΩ: ±2 % Capacitance test: - Accuracy for 1 nF - 1 µF: ±5 %
Ethernet (LAN/SFP): IEEE 802.3 - 10 Base-T - 100 Base-T - 1000 Base-T - SFP (MSA) Autonegotiation Auto-MDI(X)	⚠ **Dielectric strength:** **Line:** DC: max. +200 V AC: max. +100 V_{pp} (Copper tests only) DC: max. +200 V (xDSL) DC: max. +130 V (for POTS) DC: max. +145 V (for U-interface) **BRI/PRI/E1** DC: max. +48 V DC voltage measurements: - Accuracy: ±2 %

4 Quick-start guide



Power key



- Switches on ARGUS
- Reactivation after power-down (adjustable, see page 343)
- Switches on display illumination (also possible with any other key). In battery mode, the display illumination switches off automatically after an interval that can be set in ARGUS (see page 343).
- Switches off ARGUS (key must be held down): after an adjustable interval (e.g. after 10 minutes), ARGUS automatically shuts down in battery mode (see page 349). When the power supply is attached, the ARGUS battery recharges automatically once the device is switched off (see page 349 Using the battery pack)

Enter key



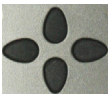
- Opens menu
- Switches to next display
- Starts/opens test
- Accepts setting

Back key



- Switches ARGUS back to the previous display without saving current entries, e.g. changes in a configuration parameter
- Cancels tests
- Exits graphic displays
- Switches to main menu after powering up

Cursor keys



- Browses display lines page by page (vertical cursor keys)
- Cursor movement within a display line (horizontal cursor keys)
- Within selection lists or statistics, the horizontal cursor keys can be used to jump to the end (right cursor key) or the beginning (left cursor key) of the displayed list
- Select a menu, a function or a test
- Set measuring ranges in copper test
- Move display cursor in graphic displays
- Select functions in graphic status screen

Telephony

ISDN and POTS



- Answers and hangs up
- Simplified single call: press the handset key twice (ISDN only)

xDSL (access mode xTU-R, xTU-R Router) and Ethernet

- Starts VoIP telephony

Level key



- Opens the graphic status screen
- BRI, PRI, U-interface access: starts single-layer measurement (level/ voltage)
- xDSL access: displays results
- Ethernet: opens results
- Start/stop function for realtime analyses (Line Scope / TDR)

Number block



- Entry of numerals 0 through 9, letters and special characters
- Direct function call, depending on the selected access (hot key), e.g. page 104 et seq.

Softkeys



- The function of the three softkeys depends on the respective situation. The currently assigned function appears in the bottom line of the display in the form of three blue fields with white letters, e.g.:
  <Menu>: opens main menu
  <Start>: establishes a connection or starts a test

- Other softkeys are described in the corresponding chapters of this manual.

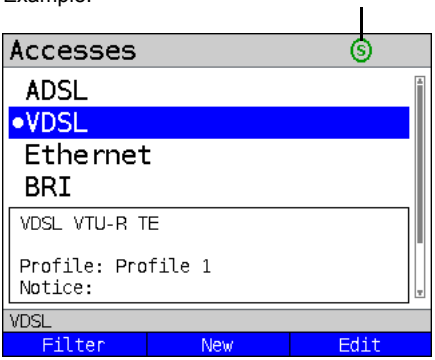
Shift key



In some menus, a green "S" in a green circle appears in the top line of the display.
In these menus, the softkeys are assigned two functions. The Shift key toggles the softkey assignment (see example page 173).

Example:

Press Shift to change the softkey assignment.



ARGUS is mainly controlled using the four cursor keys, the Enter key , the Back key , the Level key  and the three softkeys.
The bottom line of the display shows the current softkey assignments.

In the following pages of this manual, only the respective currently valid softkey function is displayed in angle brackets < >, e.g. **<Menu>**. The softkey <✓> performs the same function as the Enter key , the softkey <↓> has the same effect as the cursor key  on the ARGUS keypad.

Top connections



PWR
For external power adapter.
When the external power adapter is connected, ARGUS switches off the battery power supply. ARGUS recharges the battery automatically once it is switched off (see page 349).

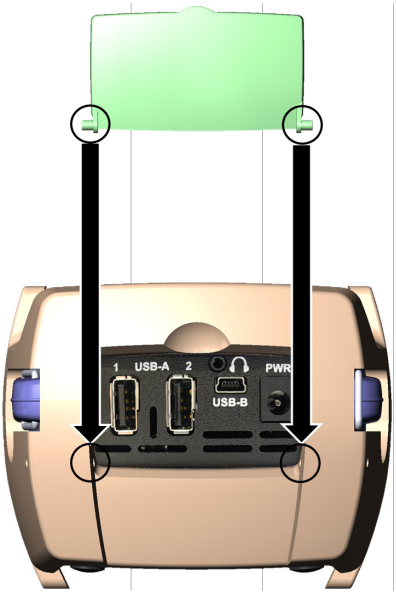
USB-A or USB-A 1/2
USB-host interface
(Active Probe II + Copper Box)

USB-B (mini-USB)
USB-client interface (PC connection)

Headset socket

ARGUS check regularly if there are any USB devices connected.

Using the ARGUS socket cover with the rubber protective sleeve



First fit the rubber protective sleeve, then insert the socket cover in the two recesses in the sleeve provided for that purpose.
The socket cover does not completely protect ARGUS against water or dirt penetration.

Open or remove the cover when using the device continuously over longer periods to prevent internal heat build-up.

Bottom connections

Yellow Link/Data LED:
signals physical connection with another Ethernet port

- LED steadily illuminated: connecting
- Flashing LED: transmitting/ receiving



The green Speed LED and yellow Link/ Data LED indicate transmission speed

- LED on: 10/100 Base-T

Green Speed LED indicates transmission speed

- LED on: 10/100/1000 Base-T

BRI/PRI/E1

Access BRI	Pin assignment: 3/6, 4/5
Access PRI	Pin assignment: 1/2, 7/8

Line

Access POTS	Pin assignment: 4/5
Access U-interface	Pin assignment: 4/5
Access xDSL	Pin assignment: 4/5
Access Copper	Pin assignment: 4/5

LAN

Connection to a PC network card.
Connection to the Ethernet interface of an xDSL modem, router (IAD) or hub/switch or another Ethernet interface (access: Ethernet).

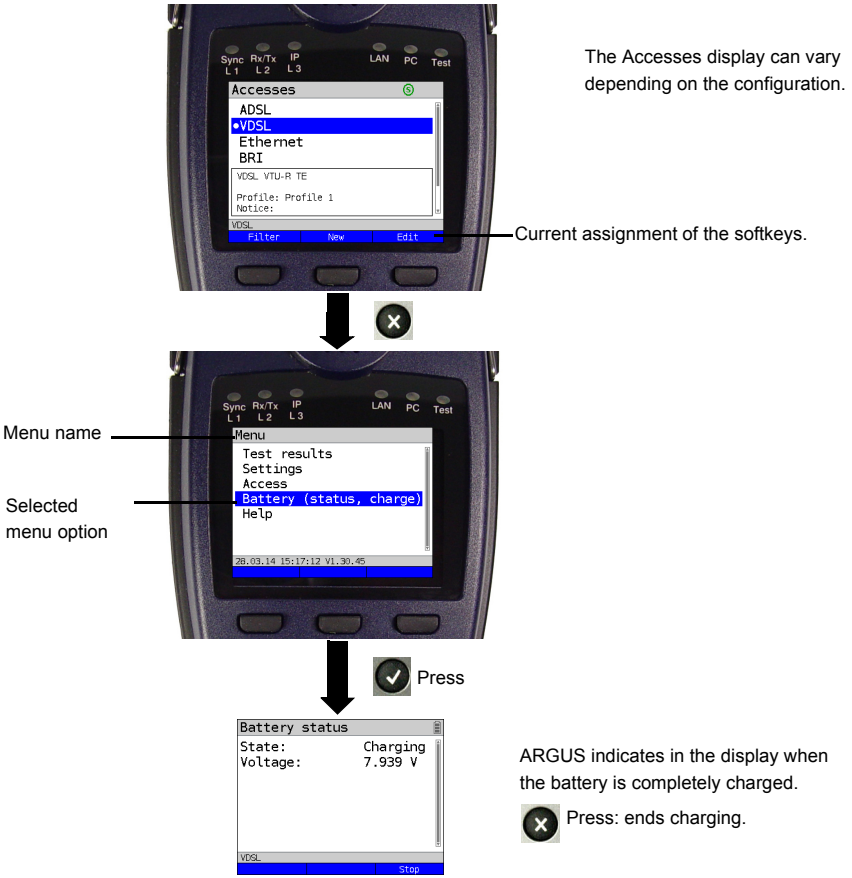
SFP

Connection of selected SFP modules from various manufacturers, for accessing fiber-based interfaces (Ethernet, FTTx).

Charging the battery in initial operation

The battery pack compartment is on the rear of the device. Attach the battery back by placing it against the retaining points at the top end and then screwing down the knurled screw. Use only the battery pack supplied with the device. Observe the safety information given on page 14. Now connect your (switched-off) ARGUS to the external power supply supplied with the device.

Switch on ARGUS using the key. The following display appears (you may first need to acknowledge warnings or messages with **<Continue>**):



You must first change the battery pack supplied with the device completely (see page 349 Using the battery pack) before full capacity is reached.

Power-saving mode



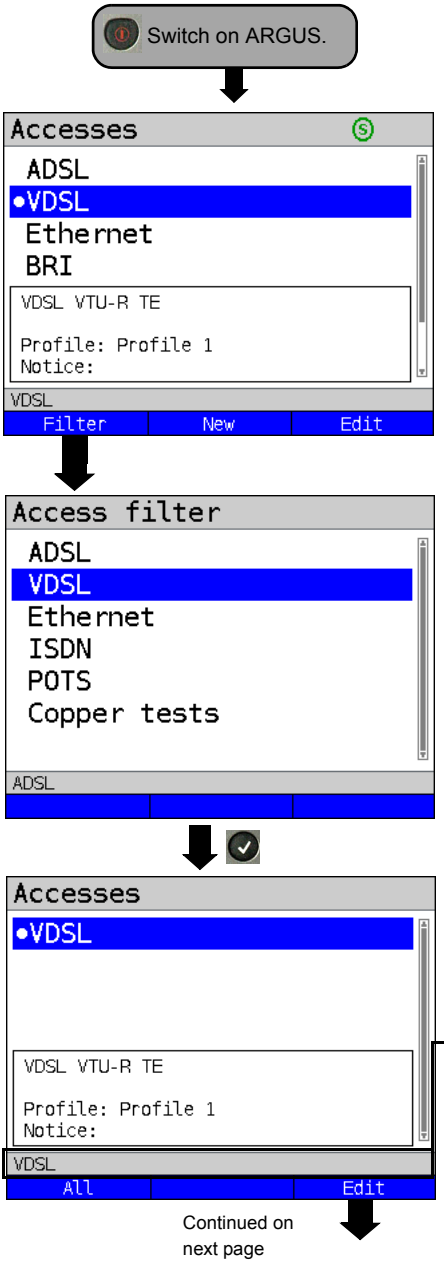
In battery mode, ARGUS automatically switches off after five minutes of no activity (interval adjustable, see page 343). ARGUS does not switch off during a test e.g. (Loopbox) or in trace mode.

The device can alternatively be operated using the supplied external adapter. When the adapter is connected, power supply via the battery is automatically switched off. ARGUS must always be operated with the battery, regardless of the power supply type. This ensures e.g. uninterrupted operation of the real-time clock.



Unplug the adapter from the mains as soon as ARGUS is switched off and no longer in use (battery charging).

5 Configuring accesses



After powering up, ARGUS displays all configured accesses (up to 100). By default, one access is preconfigured for every interface type (ADSL, VDSL, ...). The most recently used access is indicated on the display with ●.

ARGUS additionally displays a preview of the selected access settings, see also page 29. The preview window opens after 2 seconds.

<New>	Creates an access, see page 26, Fig. 2.
<Edit>	Edits an access, see page 26, Fig. 1.
Shift	Toggles softkey assignment, see page 31.
	Switches to main menu.

With the **<Filter>** softkey, ARGUS lets you filter all pre-configured accesses according to access type (ADSL, VDSL, ...) and displays this group.

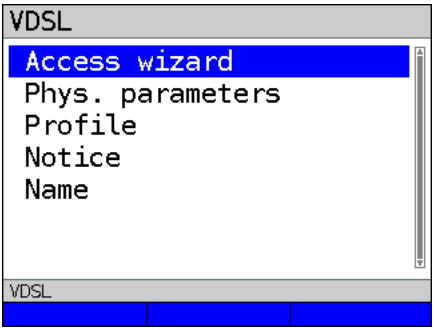
In this example, VDSL is selected.

All relevant accesses are displayed in which VDSL is specified in the configuration.

The status line (above the softkeys) continues to show the access that is "still" selected (in this example VDSL).

<All>	Display of all possible accesses, see Fig. 1.
<Edit>	Edits the selected access profile.

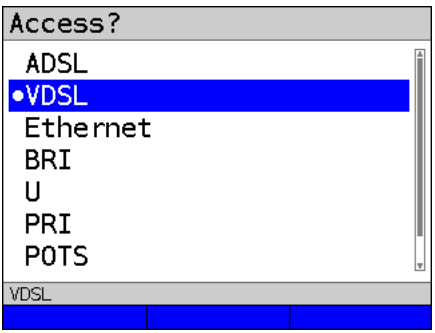
5.1 Access wizard



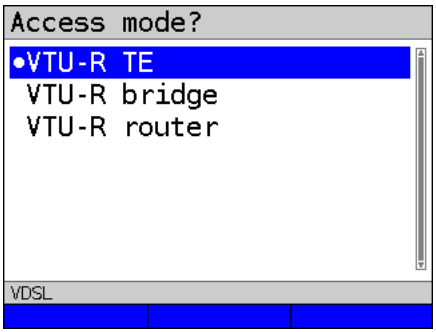
ARGUS switches to the "Accesses" main menu.

You can now configure the selected access, here VDSL, using the access wizard.

The query parameters of the access wizard depend on the selected access (ADSL, VDSL, ...), see page 29.



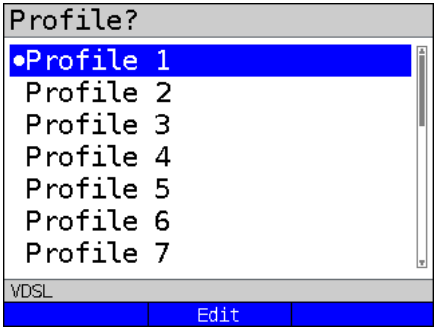
Selection of physical interface (here VDSL).
- For xDSL, see page 37.
- For Ethernet, see page 71.
- For BRI, see page 212.
- For POTS, see page 282.
- For Copper tests, see page 294.

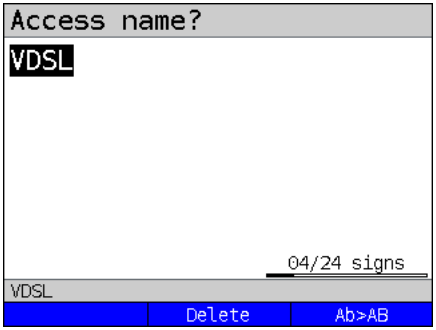


ARGUS switches directly to the access mode settings.

Selection of access mode (here VDSL VTU-R terminal) device).
- For xTU-R TE, see page 45.
- For xTU-R bridge, see page 67.
- For xTU-R router, see page 69.

Continued on next page



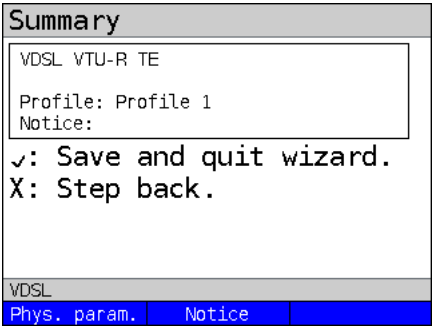


Continued on next page

You can now link your configured access settings with one of 20 profiles. These profiles link the access settings with the access and test parameters. You can define service, virtual line and other parameters.
The selected profile is highlighted in the display in blue. The default profile is indicated with a ● in the display.

Once you have selected the profile, ARGUS suggests an access name, based on the settings you made previously (here VDSL). You can enter up to 24 characters (in this example 04/24 characters).

<Delete>	Deletes access name.
	Clears mark and returns cursor keys to the start.
	Clears mark and returns cursor keys to the end.
<Ab>AB>	Entry begins with upper-case letters and continues in lower-case.
<AB>12>	Entry of upper-case letters.
<12>ab>	Entry of numbers.
<ab>AB>	Entry of lower-case letters.
	Entry of special characters, e.g. @, /, -, ., *, ?, %, =, &, ! etc.
	Entry of special characters e.g. _, :, +, # etc.



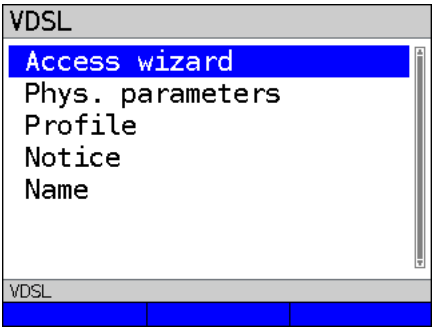
ARGUS displays a summary of the configuration.

<Phys. param.> Edits the physical parameters, see page 39.

<Notice> Entry of notices, see page 34.

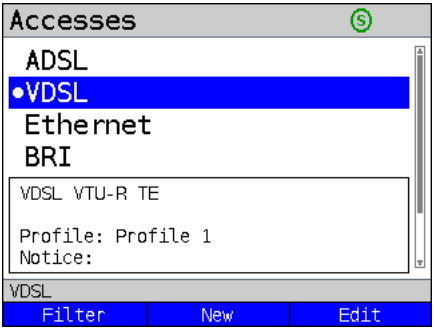
Save and exit the wizard.

Go back one level.



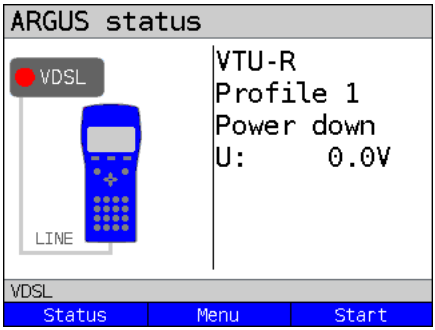
ARGUS returns to the editing overview of the selected access (here VDSL).
To configure the services or test parameters, select "Profile"; see also page 32.
You need to exit the access wizard before ARGUS can use the configured access.

1x Exit the access wizard.



Press OK to confirm the selected access, here VDSL.

Continued on next page



ARGUS switches to the ARGUS status display.

<Status>	Switches to status screen.
<Menu>	Switches to main menu.
<Start>	Starts the VDSL connection.

ARGUS access wizard

The access wizard prompts for different information depending on the access/interface. Each parameter queried depends on the respective previous parameters (from left to right).

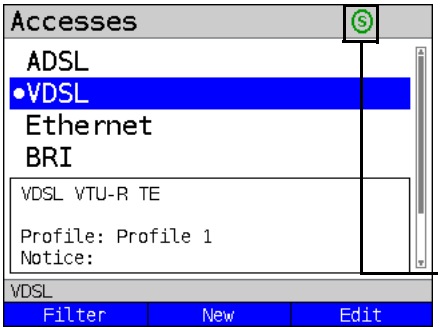
Access/ interface	Line	Mode	Access mode	L2 mode	Ethernet interface	Profile
ADSL	-	Annex A Annex B ...	ATU-R TE, ATU-R bridge, ATU-R router	-	LAN, SFP	Profile
VDSL	2 wire*3, 4 wire (P1+P2)*3	-	VTU-R TE, VTU-R bridge, VTU-R router	-	LAN, SFP	Profile
Ethernet	LAN, SFP	-	IP based*2, cable test	-	-	Profile
BRI	-	-	TE, NT, leased line, monitor	Auto.*1, P-P, P-MP	-	-
U-interface	-	-	TE, leased line	Auto.*1, P-P, P-MP	-	-
PRI	-	-	TE, NT, leased line, monitor	-	-	-
POTS	-	-	Terminal, monitor	-	-	-
Copper tests	-	-	-	-	-	-

*1 =only for BRI-TE, U-interface-TE *2 = only for LAN
*3 = only for VDSL Bondig option

For ADSL access, you are prompted for ADSL mode:

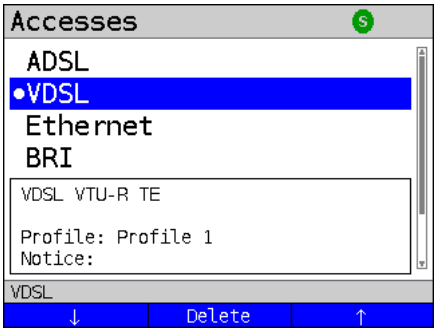
	Description
`ADSL mode`	Different ASDL modes can be set depending on the variant. The set ADSL mode must be compatible with the ATU-C (network side). When ADSL auto-modes "Annex A/M auto, Annex B/J auto, Annex A auto, Annex B auto and Annex M auto" are selected, ARGUS automatically detects and matches the configuration on DSLAM. Default: ***Annex A/M auto***

Sorting the accesses in the access overview



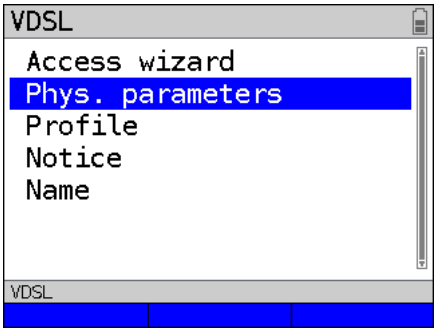
In order to keep frequently used accesses readily available, ARGUS allows you to arrange the configured accesses in any order.

Switches to softkey assignment.



<↓>	The selected access is moved down one place in the list.
<↑>	The selected access is moved up one place in the list.
<Delete>	Deletes the highlighted access.

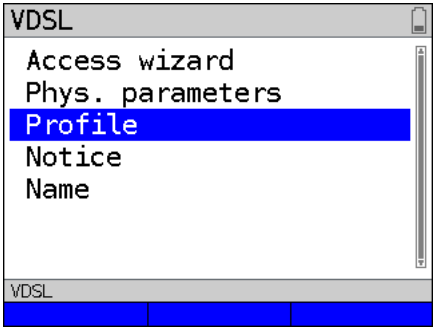
5.2 Phys. parameters



Edits the physical parameters of the selected access (here VDSL, see page 39).

The physical parameters can also be opened and edited directly when the access wizard is finished (see page 28 Fig. 1).

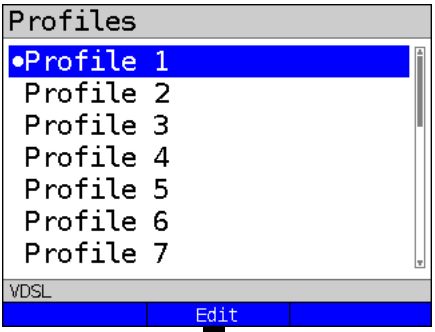
5.3 Profile



The preconfigured accesses can be linked to up to 20 profiles.
These profiles link the access settings with the access and test parameters. You can set various parameters here including those for service and virtual line.



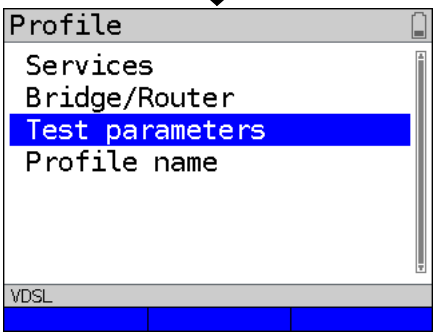
Select a profile.



ARGUS enables configuration of up to 20 profiles.



Select the profile you wish to edit. The selected profile appears in the display in blue. The default profile is indicated with a ● in the display.



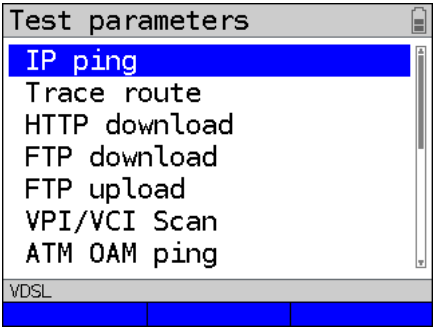


Select e.g. Services or Test parameters.

Services page 100 et seq.
Bridge/router, see page 43.
Profile name: Enter the name of the access, see page 27.



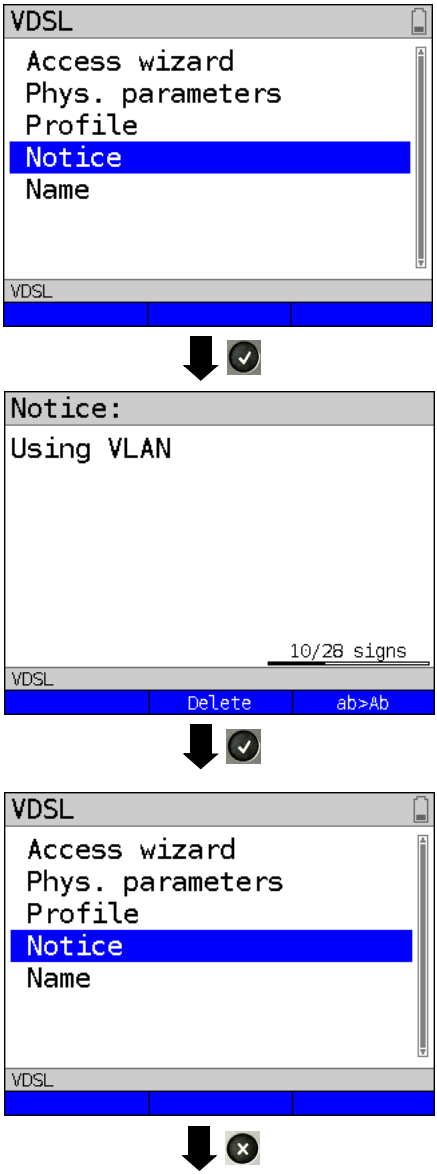
Continued on next page





Test parameter settings are described starting on page 106.

5.4 Notices



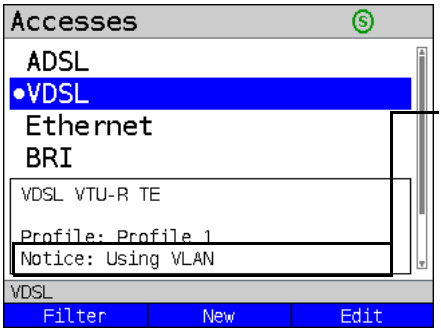
In the preview, ARGUS shows not only the selected access, the xDSL mode and the access mode but also a freely editable notice (see Fig. 1 page 28).
This note can be up to 28 characters long.

In this example, the note "Using VLAN" is selected.

<Delete>	Deletes notice.
	Clears mark and returns cursor keys to the start.
	Clears mark and returns cursor keys to the end.
<Ab>AB>	Entry begins with upper-case letters and continues in lower-case.
<AB>12>	Entry of upper-case letters.
<12>ab>	Entry of numbers.
<ab>AB>	Entry of lower-case letters.
	Entry of special characters, e.g. @, /, -, ., *, ?, %, =, &, ! etc.
	Entry of special characters such as _, :, +, # etc.

Press OK to save the entered notice.

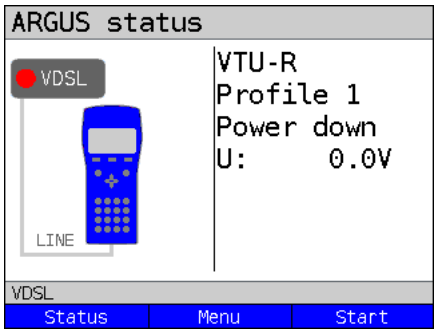
You can subsequently edit the access name as described for the access assistant, see page 27.



The saved notice is linked with the access and is displayed in the preview.
The preview appears approx. 2 seconds after the access is selected.

<Filter>	ARGUS switches to the Filter menu, see page 25.
<New>	Creates a new access.
<Edit>	Edits access.

Selects access
Switches to ARGUS status, see page 29.



<Status>	Switches to status screen
<Menu>	Switches to main menu.
<Start>	Starts the VDSL connection.

6 Physical layer

The physical layer (layer 1) is shown in the status screen (Fig. 2) with its own graphical element (here VDSL). The other elements in the status screen are initially only named. This is explained in more detail on page 79 (Virtual Lines) and page 100 (Services). The physical layers for the ADSL and Ethernet interfaces are presented in the same way as for VDSL. The selection of the VDSL access and the access mode VTU-R are directly adopted in the status screen. If the defaults are correct, layer 1 (synchronisation on VDSL) can be established directly on **<Start>**. The most important information such as voltage (U) and modem states (power down) are displayed in the layer-1 box (blue). To change the VDSL configuration directly, press **<Edit>**. To change the access type directly in the status screen (Fig. 2), press the softkey **<Access>** or the key combination  plus .

Fig. 1

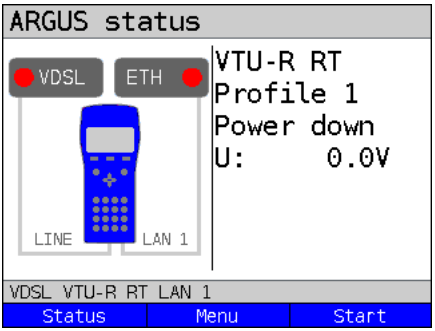
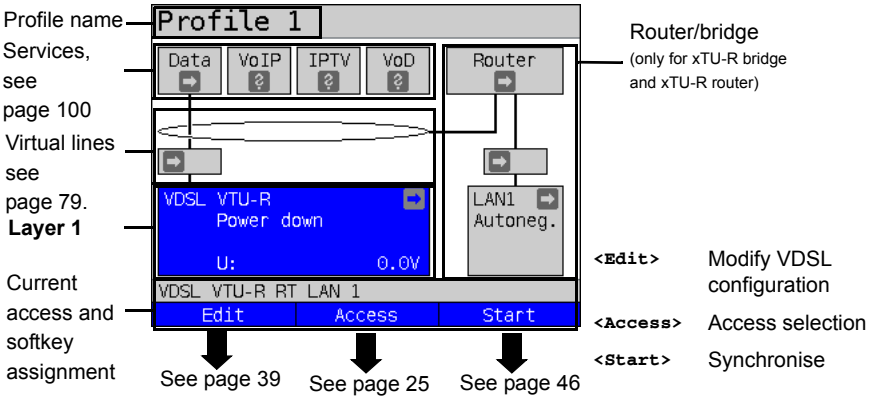


Fig. 2 (example VTU-R router):  Press Level key or **<Status>**



See page 102 for tests that can be run via layer 1.

7 Operation on xDSL accesses

ARGUS supports the following DSL interfaces: ADSL, VDSL

ARGUS supports the following access modes on xDSL accesses:

xTU-R	Terminal device mode (xDSL transceiver unit) see page 45. ARGUS is connected to the xDSL access (in front of or behind the splitter). ARGUS replaces the modem and PC.
xTU-R bridge	Bridge mode (xDSL transceiver unit bridge) see page 67. ARGUS is connected to the xDSL access and the PC. ARGUS replaces the xDSL modem.
xTU-R router	Router mode (xDSL transceiver unit router) see page 69. ARGUS is connected to the xDSL access and the PC. ARGUS replaces the xDSL modem and router.



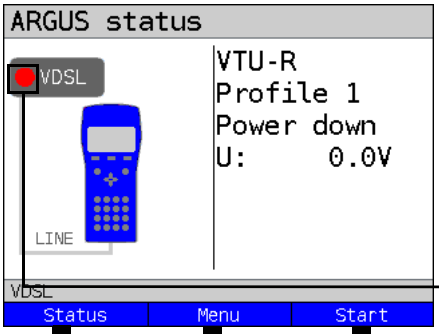
The individual DSL tests record and store data (e.g. traces of IP data). It is the user's responsibility to comply with the applicable legal requirements.



The line may not carry a DC voltage greater than 200 V DC and should be free of AC voltage components.

7.1 Configuring the xDSL interface

Status screen



Display (from top to bottom)

- Access mode (in this example: VTU-R)
- Previous profile (in this example: profile 1)
- Modem state (in this example: power down)
- DC voltage on the interface

VDSL test not yet started:

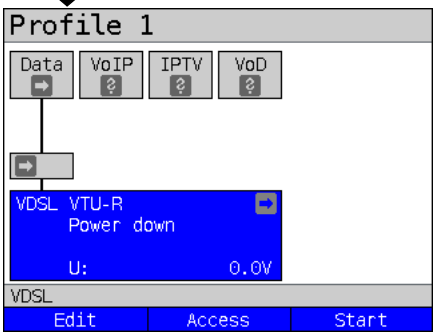
Meaning of LED image in display:

Red LED:	No test started
Yellow LED:	Test started
Green LED:	Connected
<Menu>	Switches to main menu, see menu tree
<Status>	Switches to status screen

see page 46

Main menu, see menu tree

Status screen:



ARGUS status screen:
Layer-1 box (blue in display) selected.

<Edit>	Opens settings

Note: accessing functions via number keys/key combinations
You can call important functions/tests directly using the keys of the ARGUS keypad. You can find an overview of these key combinations on page 102.

7.2 xDSL settings

ARGUS stores all relevant settings (e.g. set and limit values) for a test with the accesses. Only the relevant settings are applied, depending on the test situation. You can restore the default settings at any time (see page 347):

Setting	Description	
Phys. parameters:		
ADSL:		
Rated / treshold value	Setting Bitrate	Entry of the comparison value for the upstream and downstream ATM bitrate [kbit/s] using the number keys. ARGUS displays a large green "OK" in the ARGUS status screen if the current bitrate is above the set value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Default: ***d: 0*** and ***u: 0***
	CRC limit value	Sets the max. CRC (cyclic redundancy check) value. ARGUS displays a large green "OK" in the ARGUS status screen if the current value is below the set limit value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Range: 0 to 999,999,999 Default: ***far:*** * and ***near:*** * (*=off)
	FEC limit value	Determines the maximum FEC (forward error correction) value. ARGUS displays a large green "OK" in the ARGUS status screen if the current value is below the set limit value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Range: 0 to 999,999,999 Default: ***far:*** * and ***near:*** * (*=off)
	HEC limit value	Determines the maximum HEC (header error correction) value. ARGUS displays a large green "OK" in the ARGUS status screen if the current value is below the set limit value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Range: 0 to 999,999,999 Default: ***far:*** * and ***near:*** * (*=off)

INP/SNRM	Determines whether preference is to be given to INP (inpulse noise protection) or SNRM (signal-to-noise- ratio margin) when an ADSL connection is established. Default: ***Prefer DS SNRM***	
MAC address (line) **(not available using the access wizard)**		
	Display and selection of the line MAC addresses. The first two MAC addresses cannot be manually edited. 1. When the standard MAC address is selected, ARGUS uses its own MAC address. Default: ***Standard MAC address*** 2. When you select the dynamic MAC address, a different MAC address is used each time the device synchronises. 3. You can enter a third MAC address: Mark the line and then press **<Edit>**.	
	<Edit>	Entry of new MAC address. The address is entered in hexadecimal form using the number keys and key combinations: *1=A, *2=B,*3=C, *4=D, *5=E, *6=F and confirmed with  . No group MAC addresses may be used. Default: ***00:00:00:00:00:00***
		Accepting the address. The new address is temporarily saved, and is no longer available after powering down.
	Press one after another  and 	Display of ARGUS MAC addresses: Line, LAN, SFP, ETH, see also page 104 and following.
VDSL:		
Rated / treshold value	Setting bitrate	Entry of the comparison value for the upstream and downstream bitrate [kbit/s] using the number keys. ARGUS displays a large green "OK" in the ARGUS status screen if the current bitrate is above the set value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Default: ***d: 0*** and ***u: 0***

	CRC limit value	Sets the max. CRC (cyclic redundancy check) value. ARGUS displays a large green "OK" in the ARGUS status screen if the current value is below the set limit value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Range: 0 to 999,999,999 Default: ***far:*** ***** and ***near:*** ***** (*=off)
	FEC limit value	Determines the maximum FEC (forward error correction) value. ARGUS displays a large green "OK" in the ARGUS status screen if the current value is below the set limit value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Range: 0 to 999,999,999 Default: ***far:*** ***** and ***near:*** ***** (*=off)
Firmware[*1]	Selects the firmware (FW) in the VDSL chipset. You can choose between version A and version B. Further information is available on request. Default: ***A***	
Carrier set[*1]	The carrier set determines the carrier frequencies that ARGUS uses to signal to DSLAM that it is ready to synchronise (ITU G.997.1). The carrier generally specifies which sets are to be used. You can select the following sets with corresponding upstream tones (interval between tones 4.3125 kHz) in ARGUS: - A43, tones: 9, 17, 25 - B43, tones: 37, 45, 53 - V43, tones: 944, 972, 999 Default: **A43, *B43, V43*** When multiple sets are selected, ARGUS cyclically transmits the tones of the selected sets in parallel.	

Vectoring mode[*1]	Vectoring mode defines how ARGUS behaves when synchronising with DSLAM: - Non-vectoring (off) This is standard VDSL2 with non-vectoring-capable DSL access multiplexers (DSLAMs) and modems. However, it can also be used for mixed operation with non-vectoring-capable modems on vectoring-capable DSLAMs. In such a case, the simulated modem is throttled to the ADSL2+ bandwidth (max. 16 Mbit/s). - Vectoring-friendly: ARGUS simulates modems that are not fully vectoring-capable but which e.g. thanks to a firmware upgrade do not need to be throttled down to ADSL bandwidth because they cause only minor interference with the vectoring bundle, but are themselves susceptible to cross-talk of other pairs in close proximity. - Full vectoring Full vectoring operation requires vectoring-capable DSLAMs and modems. VDSL2 vectoring is supported when this technology is present at both ends of the bundle. Default: ***Full vectoring***
⚠	 When VDSL Vectoring or Retransmission (G.INP) are active, ARGUS shows in the status line a blue highlighted „V“ for Vectoring or „R“ for Retransmission.  When VDSL Vectoring or Retransmission (G.INP=) are unlocked but not active, ARGUS shows in the status line a grey highlighted „V“ for Vectoring and „R“ for Retransmission.
Retrans-mission (G.INP)	When retransmission (G.INP, G.998.4) is used, the downstream of VDSL2 links is protected against pulse noise on layer 1. Delays and packet losses are minimised; however, this increases the interleave delay for downstream. Default: ***off***
MAC address, see page 40.	

[*1] not for VDSL Bonding option

Profiles (<Edit> edit profiles)	
Bridge/router:	
Virtual line:	
IP version	Determines which IP version is to be used. IPv4: Internet Protocol version 4 acc. to RFC 791 IPv6: Internet Protocol version 6 acc. to RFC 2460 Dual: If IPv6 is available, this protocol is preferred; if not, ARGUS switches to IPv4. Default: ***IPv4***
IPv4	Definition of IP address assignment IP mode: Static IP: Fixed IP address DHCP server: Assignment of IP address by ARGUS Default: ***DHCP server*** Own IP Address: Range: Range 0.0.0.0. to 255.255.255.255 Default: ***192.168.10.1*** (assignment see RFC 3330) IP netmask: Range: Range 0.0.0.0. to 255.255.255.255 Default: ***255.255.255.0*** (assignment see RFC 3330) DHCP server: Settings for the DHCP server: - Starting and ending IP address Range: Range 0.0.0.0. to 255.255.255.255 Default: (assignment see RFC 3330) Start: ***192.168.10.30*** End: ***192.168.10.40*** Domain name - Duration of reservation for IP addresses Range: 1 - 99999 seconds Default: ***240***
Data log	Data log on or off This function must be set to "on" so that a trace file can be sent to the PC; see page 64. After terminating a virtual line (VL) via the corresponding service or the physical layer, ARGUS queries whether the trace file should be sent to the PC. The mini-USB port must also be connected to the PC. For example, when the data log is activated for VL 1, only VL 1 is recorded. When one VL is configured for multiple services and the data log is active, all data of this VL are recorded. Default: ***off***

Router:		
IPv4	NAT	NAT (network address translation) on or off. The NAT service automatically and transparently replaces address information (e.g. IP addresses of the LAN) with other address information (e.g. IP addresses of the WAN). Default: ***NAT on***
	SIP port	Port used for incoming SIP signalling. Range: 0 to 65535 Default: ***5060***
IPv6	Firewall	Determines whether ARGUS uses a firewall in router mode. Default: ***on***
	Discard prefix	Determines whether ARGUS rejects or uses the prefix. Default: ***on***
Bridge:		
VLAN handling	When VLAN tagging is used, a VLAN tag is attached to every outgoing Ethernet frame (from the WAN). The tag is removed from every incoming Ethernet frame. In transparent VLAN, the Ethernet frames are passed on unchanged. Default: ***Transparent***	
VLAN ID	Identifier for the VLAN to which the frame belongs. Every VLAN is assigned a unique number, the VLAN ID. A device that belongs to the VLAN with ID = 2 can communicate with every other device in the same VLAN but not with devices in other VLANs. Range: from 0 to 4095 Default: ***2***	

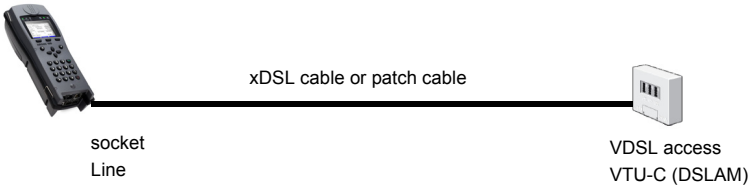
See chapter „ Virt. profile 1 to 20“ (see page 89) for further configurations.

7.3 ARGUS in access mode xTU-R

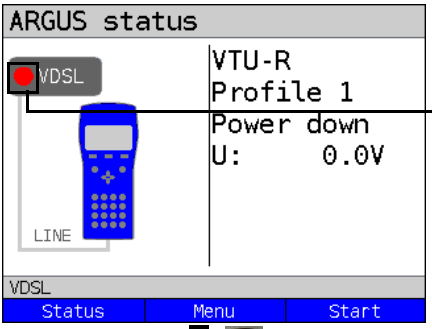
Determining the xDSL connection parameters using VDSL as an example (procedures also apply for ADSL connections)

ARGUS is connected directly to the VDSL access via the supplied xDSL lead and the ARGUS socket line (either in front of or behind the splitter). In this case, ARGUS replaces the modem and PC. ARGUS establishes a VDSL connection and determines all relevant VDSL connection parameters. ARGUS displays the VDSL connection parameters and, if desired, saves them when the link is disconnected.

Use only the patch cable supplied with the device.



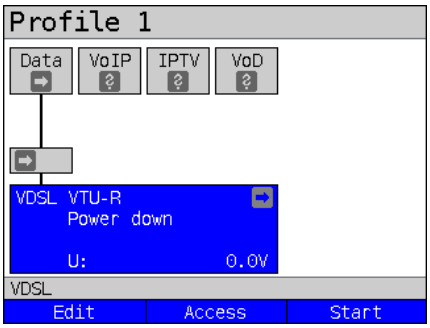
In this example, VDSL VTU-R mode is configured and selected as described in chapter „5 Configuring accesses“ (see page 25).



The VDSL test has not yet been started: red LED in the display!

Meaning of LED image in display:

Red LED:	no test started
Yellow LED:	test started
Green LED:	connected

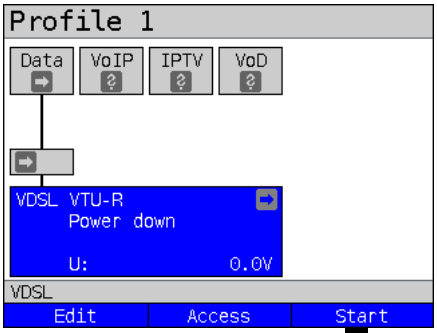


All further functions and procedures are explained using this status screen.

Establishing the xDSL connection using VDSL as an example

Profile configuration:

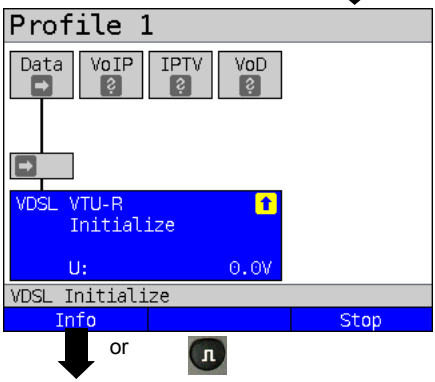
ARGUS uses the settings (see page 30) and limit values (see page 39) stored in the respective profile for establishing a VDSL connection.



ARGUS in status screen.

ARGUS uses the default profile (profile 1 in the example) to establish the VDSL connection.

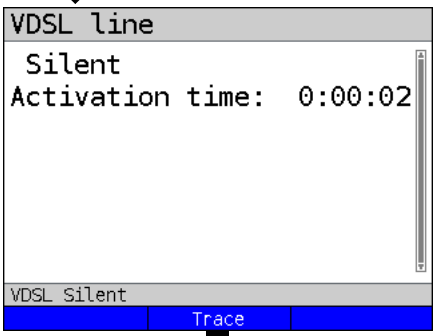
<Edit>	Edits the VDSL settings and MAC address.
<Access>	Selects a new access.



Establishing a VDSL connection

ARGUS synchronises with DSLAM (LED "Sync/L1" flashes, display shows element on yellow background).
ARGUS displays the current connection status (in this example "Initialize") in the layer-1 box (blue).

or

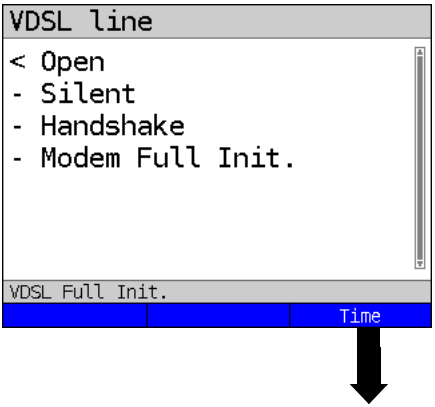


While connecting:

Display:

- Current connection status
- Time elapsed since start of synchronisation in h:min:s.

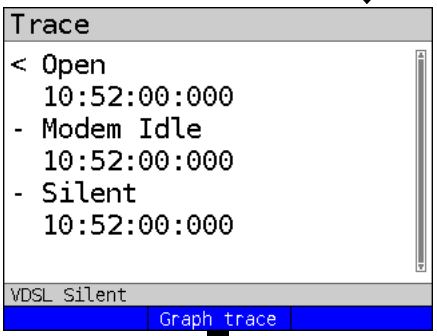
Continued on next page



Display of commands

- < = Command sent by ARGUS
- > = Command sent by DSLAM
- - = Connection status

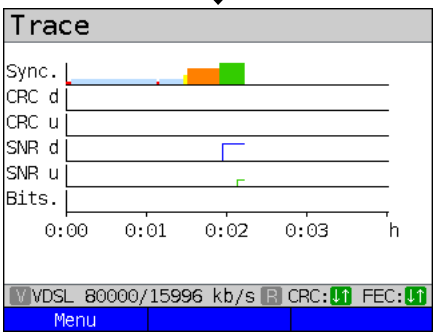
Display timestamp



ARGUS shows the time (internal clock, see page 340) at which the commands are received.

Switches to the previous display and the status screen.

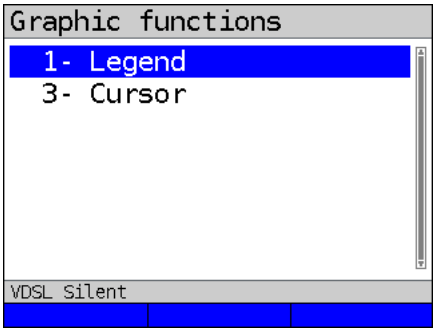
Display the graphical xDSL trace.



Display:

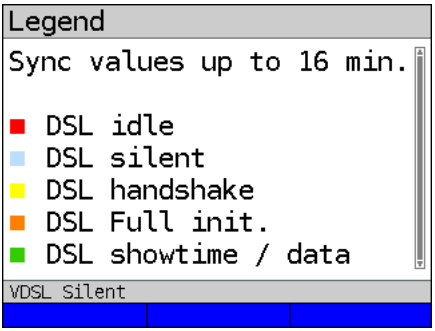
- Synchronising
- CRC error in downstream
- CRC error in upstream
- SNR error in downstream
- SNR error in upstream
- Bitswap events

See page 48 for an explanation of the colour code.



You can show and hide the label for the xDSL trace using the number key.

The function of the cursor is described on page 52.



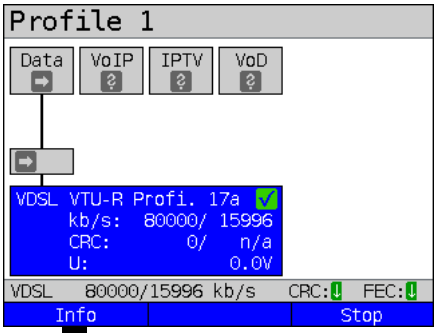
The colour code in the xDSL trace can be interpreted as follows.

Meaning of the modem states:

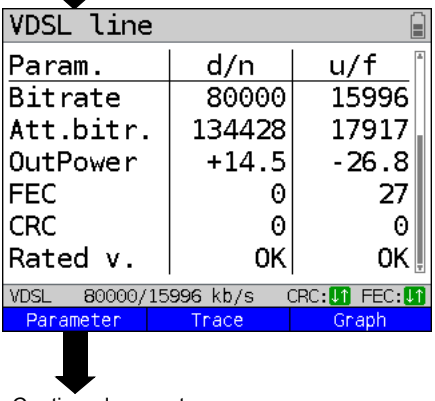
Colour	Short form	Explanation
red	DSL Idle	No-load
light blue	DSL Silent	ARGUS transmits handshake tones (silence on the DSLAM side).
yellow	DSL Handshake	A handshake (G.hs) signal from the remote station was detected.
orange	DSL Full init.	Start of the training phase following successful handshake.
green	DSL Showtime / Data	Showtime achieved. The TC sublayer is established. ARGUS is ready for operation.

Connected

As soon as the connection is established, (LED "Sync/L1" continuously illuminated and green tick mark in layer 1 box), ARGUS determines the VDSL connection parameters. After synchronising, ARGUS must remain connected to the VDSL access for at least 20 seconds. Only then can ARGUS save all VDSL connection parameters.



or



Continued on next page

ARGUS in status screen.

Display (layer-1 box)

- Access and access mode
- VDSL profile (ITU profiles: 8,12,17 or 30)
- d: Downstreamdata rate
  u: Upstream data rate
- Number of CRC errors in downstream/upstream
- DC voltage at interface

<Info> Displays the VDSL connection parameters.

<Stop> Disconnects the VDSL connection.

CRC: No CRC errors occurred in the final second.

FEC: In the final second, FEC errors occurred in both upstream and downstream. See page 49 for more information.

CRC: No upstream CRC errors occurred in the final second.

FEC: In the final second, FEC errors occurred in in downstream only. See page 49 for more information.

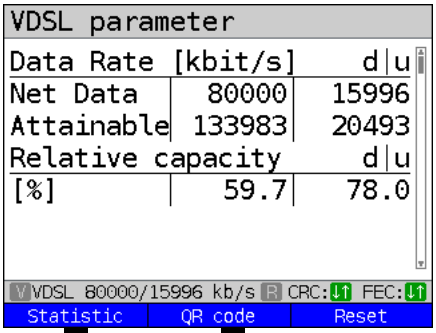
Display of VDSL connection parameters in overview:
- d/n: downstream/near
- u/f: upstream/far



Browse connection parameters

<Trace> Displays trace data, see page 47.

<Graph> Displays the graph, see page 51.



Displays the connection parameters in long form for downstream (d) and upstream (u), see table page 58.

n/a	not available
n/u	not used
n/r	not received

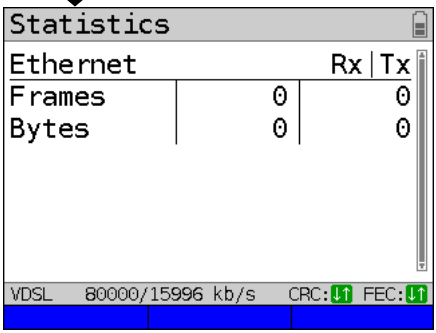


Browse parameter display

<Reset> Resets the error counters: FEC, CRC.



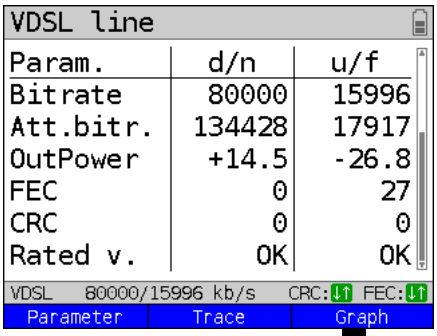
Display of xDSL parameters as QR code.

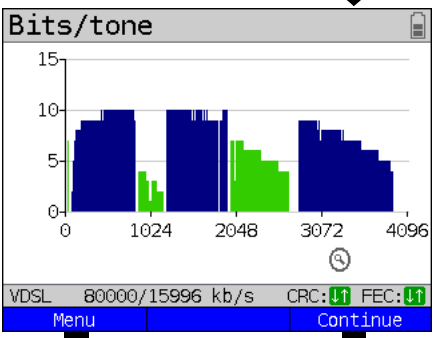


Display Ethernet statistics (VDSL):
ARGUS displays the received (Rx) and transmitted (Tx) Ethernet frames and bytes.

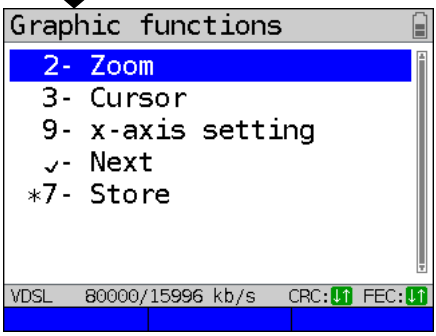
For ADSL, the following ATM statistics are displayed:
- Number of OAM cells
- Number of user-side VCCs
- Number of AAL5 PDUs
- Unmapped cells received (Rx)
- Unmapped VPI received (Rx)
- Unmapped VCI received (Rx)

Continued on next page





See page 55



Continued on next page

The following graphs and graph functions are only available for ADSL and VDSL.

Displays the bit distribution
i.e. transported bits per tone (channel)
Y-axis: bits
X-axis: tones (channels)
Line interference sources can be identified on the basis of the bit distribution
(e.g. due to HDB3, HDSL, RF, DPBO etc.).

ARGUS switches to the previous display.

<Continue> Switches to next graph.

Graph functions:
The graph functions such as zoom, cursor and setting of the x-axis enable detailed analysis of the graphs:

Exits the menu without changing.

You can also use this number key to toggle the zoom function within a graph.

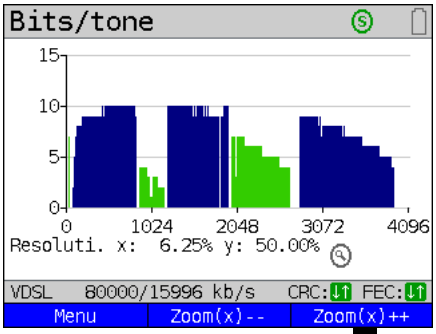
The function of the cursor is described on page 53.

Toggles the x-axis from tone to frequency is described on page 54.

Switches automatically to the next graph with the view and adopts all settings for this graph.

and

Saves the result without disconnecting the connection.

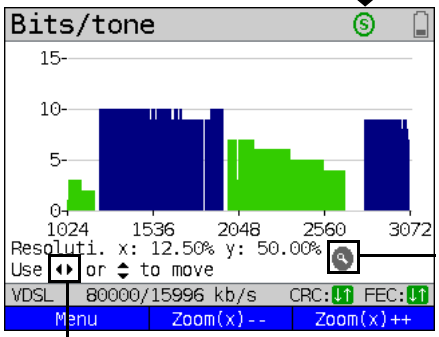


The magnifying glass shown in the display rests on a white background.

It has not yet been zoomed.

<Zoom(x)++> Magnifies the middle section of the graph (100%).

<Zoom(x)--> Reverses **<Zoom(x)++>** and resets magnification.

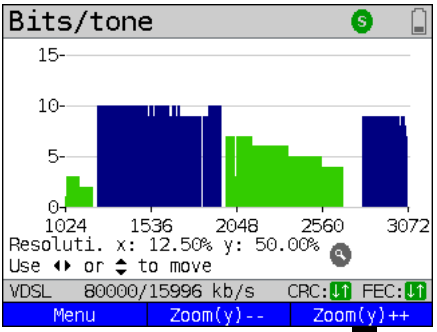


The magnifying glass shown in the display rests on a dark background, indicating that it has been zoomed.



Use the cursor keys to horizontally scroll through the zoomed range.







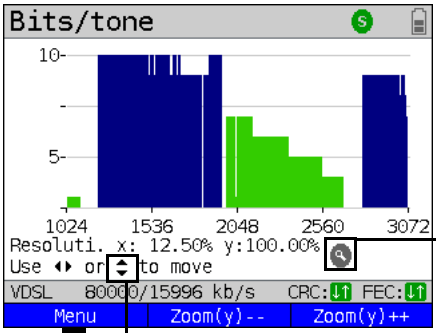
toggles the softkey assignment.

ARGUS switches from x-axis zoom to y-axis zoom

<Zoom(x)++> Magnifies the middle section of the graph (100%).

<Zoom(y)--> Reverses **<Zoom(y)++>** and resets magnification.

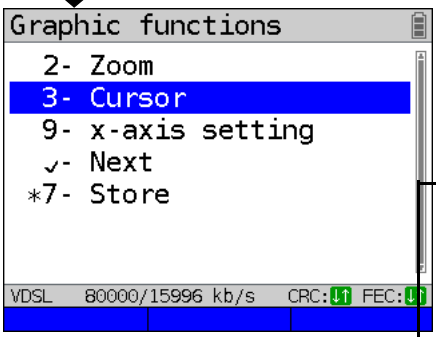
Continued on next page



The magnifying glass shown in the display rests on a dark background, indicating that it has been zoomed.



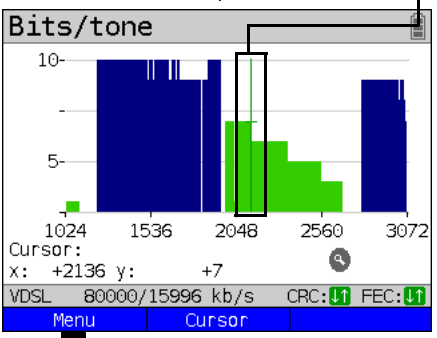
You can use the cursor keys to scroll vertically through the zoomed range.



The cursor functions enables precise determinations on the graphs.

When the Cursor function is started, a green cursor line appears in the middle of the graph.

<Cursor> You can toggle the cursor on and off as needed using the Cursor softkey after activating it in the menu.



The values of the graph for the position under the cursor are displayed in the graph as follows:

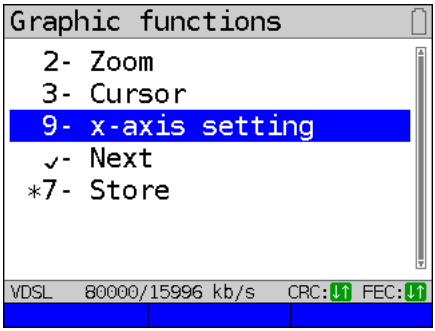
x: 2136. Tone

y: 7 bits

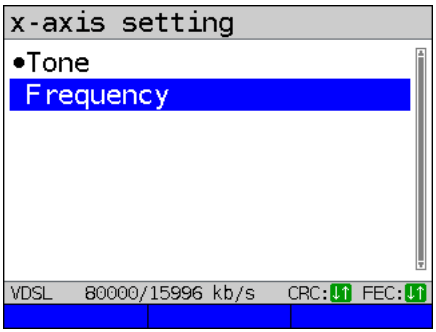


Use the left and right cursor keys to move the cursor to any point on the graph to measure it. Briefly pressing a cursor key causes the cursor to jump to by one position in the graph. When the cursor key is held down, the steps the cursor covers in the graph become progressively larger.

Continued on next page



By toggling the x-axis you can change its labelling from tone to frequency.

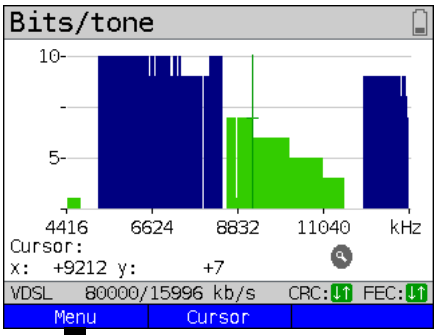


Available options:

Tone:	Displays the values of the x-axis as tones.
Frequency:	Displays the values of the x-axis as frequencies.

Direct setting of x-axis.

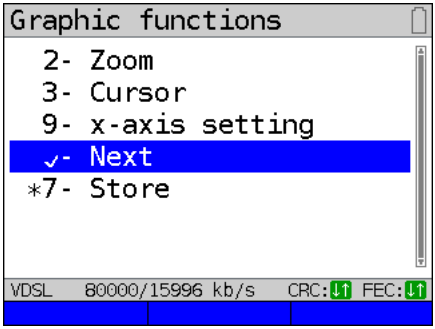




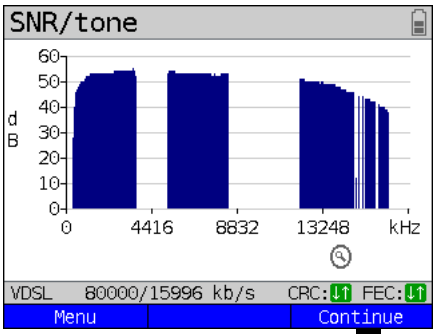
Continued on next page

You can use the left and right cursor to scroll through the range (in this example frequency).

The zoom function and the cursor function can also be combined.
However, the starting position of the cursor can vary. The graph functions can be used for all graphs.



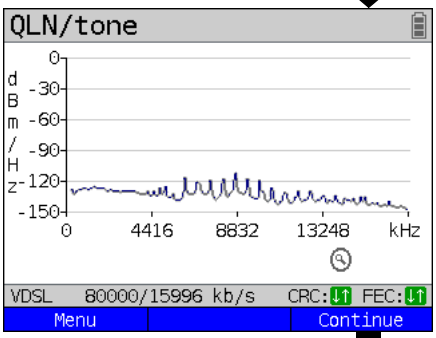
Additional result graphs



Display of signal-to-noise ratio (SNR) for each tone
y-axis: SNR in dB
x-axis: tones (channels)

This enables interference sources for individual tones (channels) to be detected, in this example downstream power backoff (DPBO).

<Menu> Opens the graph functions (see page 52).

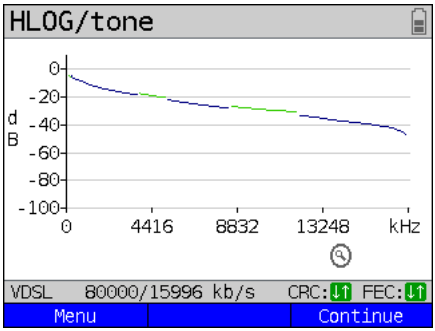


Display of quiet line noise (QLN) for each tone. The QLN represents the quiet line noise of the twisted pair as a function of the frequency.
y-axis: QLN in dBm/Hz
x-axis: tones (channels)

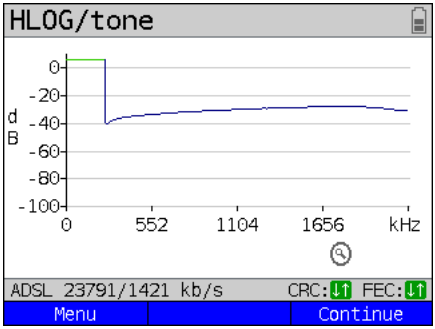
The QLN enables detection of narrow-band interference sources due to e.g. coupling of medium-wave emission sources or defective switching components. These interference sources are represented as narrow peaks. This example shows a line with interference from a power supply.

<Menu> Opens the graph functions (see page 52).

Continued on next page



Example: Mismatch + poor contact on ADSL



Displays the amplitude component of the transmission function (HLOG) for each tone. HLOG shows the attenuation of a connection as a function of the frequency.
Y-axis: Hlog in dB
X-axis: tones (channels)

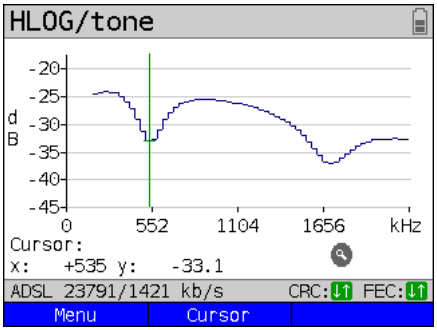
On a nominally functioning line, the values drop off as the frequency increases; this function is virtually horizontal on short lines. This example shows a short line.

In the HLOG graphs, a shift can occur in calculating the upstream and downstream values from DSLAM compared to the downstream values from ARGUS. It can also happen that DSLAMs do not transmit the HLOG upstream values or send falsified values.

DSL connections are often possible even though one of the two cores is high-ohm or even interrupted (only capacitive coupling). This results in dropped connections and data losses. Such problems can be due to oxidized lines, poor contacts in the telephone sockets, loose terminals or improperly insulated lines. In connections like this, lower frequencies are attenuated much more than higher frequencies. This is recognisable as an atypical relationship between upstream and downstream attenuation, as well as in the HLOG curve. In the event of a problem on one of the wires, the values for the low frequencies are often less than for the higher frequencies.

<Menu>	Opens the graph functions, see page 52.
<Continue>	ARGUS returns to the bits/tone graph.

Example: Bridge tap on ADSL

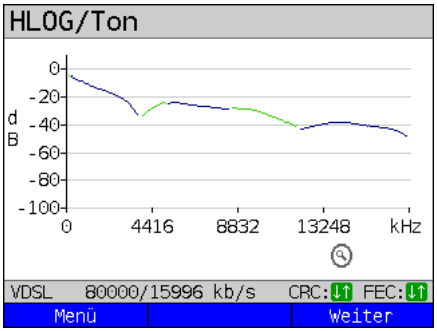


The example at left shows a sink. It can indicate a stub line (bridge tap).
With the rule of thumb:
L[m] = 50 / f [MHz],
you can estimate the length of a stub line if you know the frequency in MHz (in this example 0.535 MHz):

L [m] = 50 / 0,535 MHz = 93 m

There is a stub line approx. 93 m long.

Example: Bridge tap on VDSL



In this example, given a frequency of approx. 3.85 MHz, the stub line is approx. 13 m long.

ARGUS determines the following ADSL connection parameters:

ADSL connection parameters:	
Net data rate	Actually usable ATM bitrate in kbit/s.
Attainable data rate	Theoretically attainable ATM bitrate in kbit/s.
Relative capacity	Line capacity utilisation in percent.
Latency mode	ARGUS shows "interleaved" or "fast", depending on the DSLAM configuration.
Attenuation	Attenuation on a line over the entire length and bandwidth in dB. From a specific attenuation on, certain access types are no longer recommended. However, it is better to compare individually calculated attenuation values that are recommended for specific access types with the dB value in the HLOG graph, at 300 kHz (cursor).
Output power	Output power in dBm with reference to 1 mW.
SNR margin	Signal-to-noise ratio margin in dB. The SNR margin is a measure of how much additional noise the transmission can stand and still maintain a bit error rate (BER) of 10^{-7}. This value is considered a reserve against interference signals. Rule of thumb: The SNR margin in downstream should - doubled - be at least equal to or greater than the SNR margin in upstream.
Inpulse noise prot.	INP describes the quality of the protection against pulse interference. The number of consecutive DMT symbols that can be completely distorted without causing errors in higher layers.
Interleave delay	The delay (in ms) due to interleaving of data blocks.
FEC	Forward error correction Number of transmission errors corrected using the checkbytes of a codeword. f (far): Errors that the DSLAM detects and passes to ARGUS. n (near): Errors that ARGUS detects in the transmitted blocks.
CRC	Cyclic redundancy check The checksum of the superframes transmitted by the remote station does not agree with the locally calculated figure. Possible cause: line interference. f (far): Errors that the DSLAM detects and passes to ARGUS.

	n (near): Errors that ARGUS detects in the transmitted blocks.
HEC	Header error checksum Number of ATM cells with incorrect header checksums. f (far): Errors that DSLAM detects and passes to ARGUS. n (near): Errors that ARGUS detects in the transmitted blocks.
ES	Errored seconds Number of seconds containing one or more erroneous sync words and/or one or more CRC anomalies.
SES	Severely errored seconds Number of seconds containing one or more erroneous sync words or at least 50 CRC anomalies.
LOSS	Loss of signal seconds Shows the number of LOS errors in one second.
UAS	Unavailable seconds Number of seconds in which the ADSL link was unavailable. The connection is considered unavailable at 10 consecutive SESs at the latest. The 10 SESs are added to the time that the connection is unavailable. Once the connection is unavailable, it only becomes available when no SESs occur in 10 consecutive seconds. The 10 SES-free seconds are added to the time that the connection is unavailable.
Reset	Indicates how often the user resets the error counters using the **<Reset>** softkey.
Resync	Number of resyncs by ARGUS.
Bitswap events	Shows how much data is diverted from a faulty transmission channel (up- and downstream) to other channels.

Retranmission (G.INP)	This parameter shows whether retransmission is activated for down- and/or upstream in DSLAM. When retransmission is activated, faulty data transmission units (DTUs) caused by transmission problems are requested and transmitted again. The following additional parameters are shown when retransmission is activated: The blue R in the ARGUS status line signals that retransmission is activated in DSLAM. R = Retransmission configured or not active R = Retransmission active R = Retransmission working
Vendor far	ATU-C vendor.
Version	Vendor-specific information, contains the software version of the ATU-C side (DSLAM).
Vendor near	Manufacturer of the ARGUS chipset (ATU-R).
Version	Vendor-specific information, contains the software version of ARGUS.

ARGUS determines the following VDSL connection parameters

VDSL connection parameters:	
Net data rate	Actually usable ATM bitrate in kbit/s.
Attainable data rate	Theoretically attainable ATM bitrate in kbit/s.
Relative capacity	Line capacity utilisation in percent.
SNR margin	Signal-to-noise ratio in the bands used in dB. The SNR margin is a measure of how much additional noise the transmission can stand and still maintain a bit error rate (BER) of 10^{-7}. The value is considered a reserve against interference signals. Bands not used are indicated with n/u.
Loop attenuation	Attenuation on a line over the entire length and bandwidth in dB. From a specific attenuation on, certain access types are no longer recommended. However, it is better to compare individually calculated attenuation values that are recommended for specific access types with the dB value in the HLOG graph, at 1 MHz (cursor). Bands not used are indicated with n/u.

Signal attenuation	Attenuation of the signal in dB in the corresponding bands. Bands not used are indicated with n/u.
Output power	Output power in dBm with reference to 1 mW.
Interleave delay	The delay (in ms) due to interleaving of data blocks.
Inpulse noise prot.	INP describes the quality of the protection against pulse interference. The number of consecutive DMT symbols that can be completely distorted without causing errors in higher layers.
FEC	Forward error correction Number of transmission errors corrected using the checkbytes of a codeword. f (far): Errors that the DSLAM detects and passes to ARGUS. n (near): Errors that ARGUS detects in the transmitted blocks.
CRC	Cyclic Redundancy Check The checksum of the superframes transmitted by the remote station does not agree with the locally calculated figure. Possible causes: line interference. f (far): Errors that DSLAM detects and passes to ARGUS. n (near): Errors that ARGUS detects in the transmitted blocks.
ES	Errored seconds Number of seconds containing one or more erroneous sync words and/or one or more CRC anomalies.
SES	Severely errored seconds Number of seconds containing one or more erroneous sync words or at least 50 CRC anomalies.
LOSS	Loss of signal seconds Shows the number of LOS errors in one second.
UAS	Unavailable seconds Number of seconds in which the VDSL link was unavailable. The connection is considered unavailable at 10 consecutive SESs at the latest. The 10 SESs are added to the time that the connection is unavailable. Once the connection is unavailable, it only becomes available when no SESs occur in 10 consecutive seconds. The 10 SES-free seconds are added to the time that the connection is unavailable.
Reset	Indicates how often the user resets the error counters using the **<Reset>** softkey.
Resync	Number of resyncs by ARGUS.
Showtime no sync	Shows how often the connection status "showtime" was achieved without a long-term stable connection.

Bitswap events	Shows how much data is diverted from a faulty transmission channel (up- and downstream) to other channels.
Vectoring	The vectoring mode shows whether this remote station supports VDSL2 vectoring (ITU-T G.993.5). - Display shows "off" for non-vectoring. - ARGUS displays "Vectoring friendly" or "Full Vectoring" when vectoring is supported. See page 42 for more information.
SRA (Seamless rate adaption)	This parameter shows whether SRA is activated for down- and/ or upstream in DSLAM. Seamless rate adaption (SRA) is a seamless adaption of the data rate during a DSL connection. In SRA, the data rate is adapted depending on the SNR margin during a connection.
Retranmission (G.INP)	This parameter shows whether retransmission is activated for down- and/or upstream in DSLAM. When retransmission is activated, faulty data transmission units (DTUs) caused by transmission problems are requested and transmitted again. The following additional parameters are shown when retransmission is activated: The blue  in the ARGUS status line signals that retransmission is activated in DSLAM.  = Retransmission configured or not active  = Retransmission active  = Retransmission working
Data transmission units (DTU)	Retransmission is performed before the CRC mechanism. As long as the retransmission mechanism requests and and transmits the erroneous DTUs in corrected form, no CRC errors (data losses) occur.If the retransmission mechanism cannot correct faulty transmissions, e.g. due to sustained interference, CRC errors (data losses) occur. - Retransmi. Multiple retransmitted DTUs due to a transmission problem. Is also displayed in the overview page 49 as "Retransmi". - Corrected Successful retransmission of a DTU - Uncorret. Unsuccessful retransmission of a DTU

INP REIN	In ARGUS, interference immunity (DSLAM setting) is displayed with respect to REIN INP. This describes the quality of the protection against pulse interference. REIN (Repetitive electrical impulse noise) describes periodic interference pulses, usually caused by 230 V AC voltage from the supply mains. The value indicates the number of consecutive DMT symbols that can be completely distorted without causing errors in higher layers (1 DMT symbol = ~250 µs).
INP SHINE	In ARGUS, interference immunity (DSLAM setting) is displayed with respect to SHINE INP. This describes the quality of the protection against pulse interference.SHINE (single high impulse noise event) describes random, unpredictable, non-periodic interference pulses. The value indicates the number of consecutive DMT symbols that can be completely distorted without causing errors in higher layers (1 DMT symbol = ~250 µs)).
ETR	The expected throughput rate (ETR) in kBit/s is the minimum data rate that can be provided through complete error correction through retransmission.
Elec.length@1MHz	Indication of the electrical length for a frequency of 1 MHz in dB. R: VTU-R side C: VTU-C side
Vendor far	VTU-C vendor.
Version	Vendor-specific information, contains the software version of the VTU-C side (DSLAM).
Vendor near	Manufacturer of the ARGUS chipset (VTU-R).
Version	Vendor-specific information, contains the software version of ARGUS.

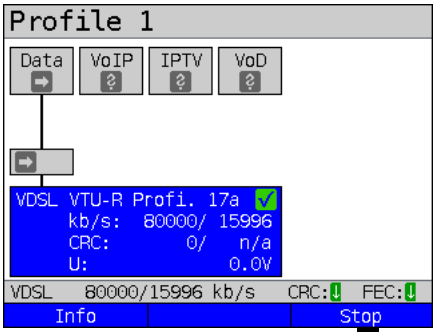
System information for transmission to the ADSL/VDSL remote station



When a modem is synchronised with a DSLAM, the vendor and device type of the modem is generally displayed in the control system of the DSLAM. For ADSL and VDSL, this occurs according to ITU-T G.997.1. When an ARGUS device synchronises with a DSLAM, the latter reports to the control system the following information, depending on the DSLAM.

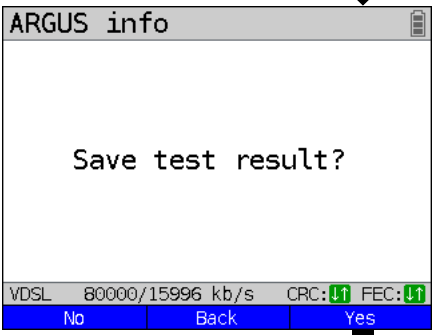
Information	Display in DSLAM	Meaning
System vendor ID	0x04, 0x00 (hex)	Country code: Germany
	INGE or 0x49, 0x4E, 0x47, 0x45 (hex)	Provider code: intec Germany
	0x20, 1x00 (hex)	System FW version: 2.01.0
Version number	R2.01.00 U_	Device FW version: 2.01.0
Serial number	ARGUS162-9999-R2.01.0D_	Device type: ARGUS 162 / device serial number 9999

Disconnecting the xDSL connection and saving the results



ARGUS in status screen.

Disconnecting the VDSL connection.



<No>	Results are rejected.
<Back>	Results are not saved. ARGUS returns to the status display.
<Yes>	Saving the result.



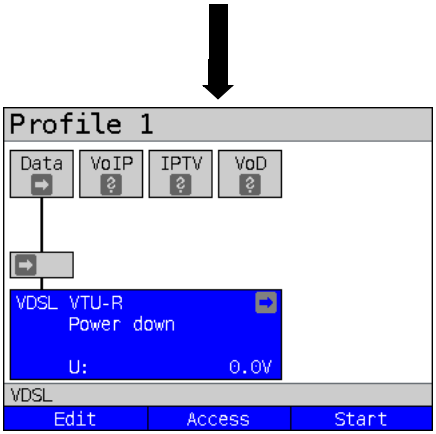
ARGUS saves the VDSL connection parameters together with the trace data in the first free slot. You can enter a user-definable name when saving (see page 332).
Default: New result.

If all slots are occupied, you need to manually select a slot to overwrite.



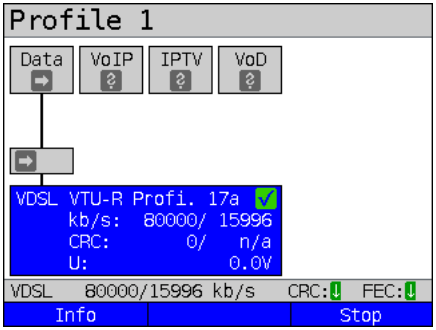
Saving the result

Continued on next page



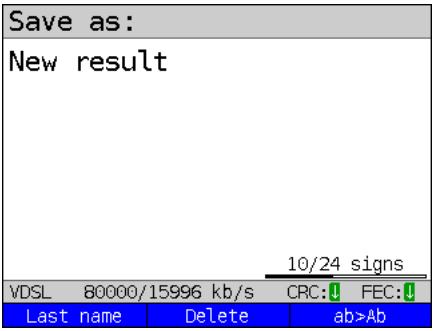
After saving, ARGUS returns to the status display or ARGUS status.
You can initialise a new sync attempt directly using **<Start>.**

Saving the results without disconnecting the xDSL connection



ARGUS in status screen.

and Saves the result without disconnecting the connections.

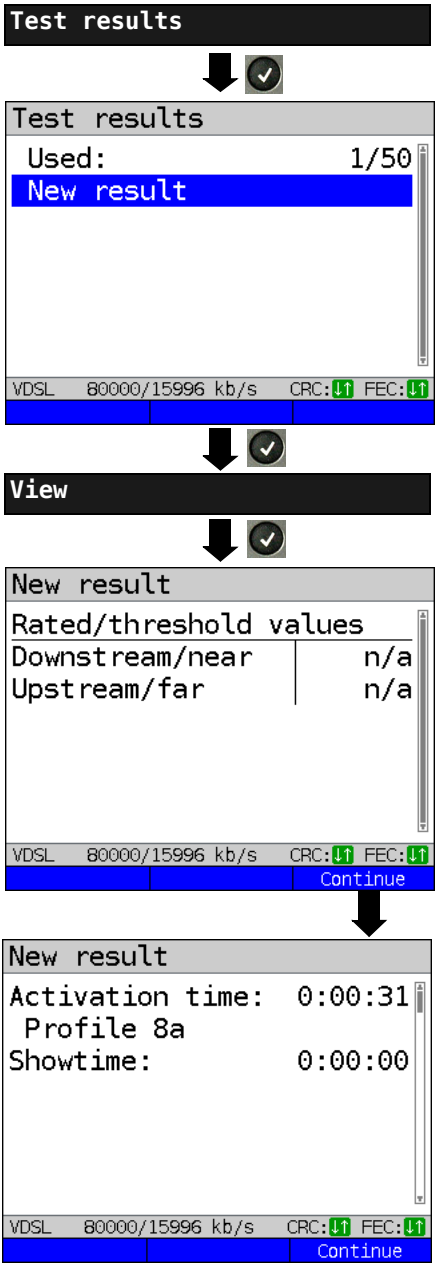


ARGUS automatically suggests a save name.

<Last name>	The last name used is suggested.
<Delete>	Deletes the suggestion.
<Ab>AB>	Entry of upper- and lower-case letters and @, /, -, .

Results accepted with the storage name shown.

Displaying stored test results



ARGUS in Main Menu

In ARGUS status, press **<Menu>**.

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

Marked the stored test result.

Displays the test results:
ARGUS shows whether the downstream and upstream values are within the limits.

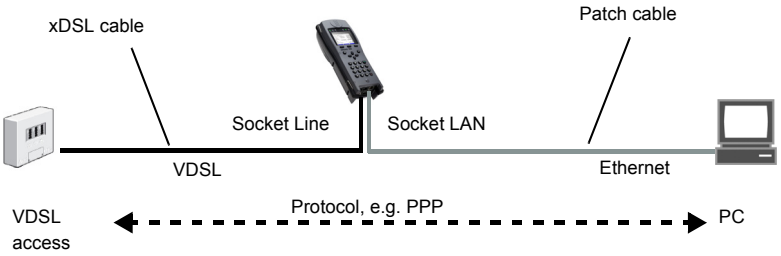
Browse VDSL connection parameters.

<Continue> Displays the signal-to-noise ratio per tone (SNR/tone), QLN/tone, HLOG/tone and the trace data.

Exits results.

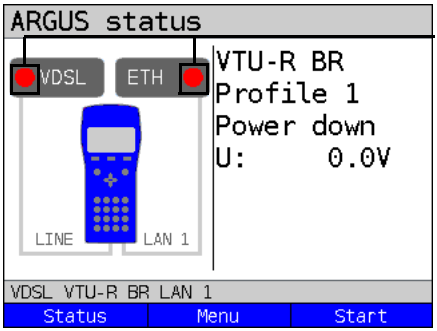
7.4 ARGUS in access mode xTU-R bridge

Connect ARGUS to the PC using the patch cable and to the VDSL access using the xDSL cable. In bridge mode, ARGUS acts as a VDSL modem, i.e. ARGUS passively hands on all packets from the Ethernet to VDSL (and vice versa). In this case, the PC is responsible for establishing the connection.



ARGUS in access mode xTU-R bridge

In this example, VDSL VTU-R bridge mode is configured and selected as described in chapter „5 Configuring accesses“ (see page 25).



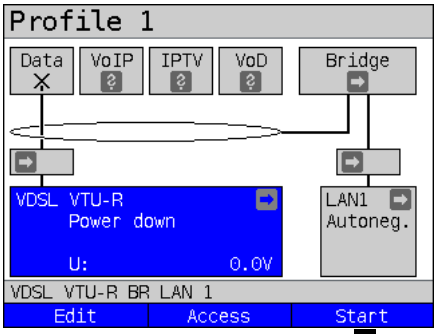
Test not yet started:
red LED in display

Meaning of LED image in display:

Red LED:	no test started
Yellow LED:	test started
Green LED:	connected

Display:

- Access mode
- Default profile, see page 39
- Current status
- DC voltage at interface

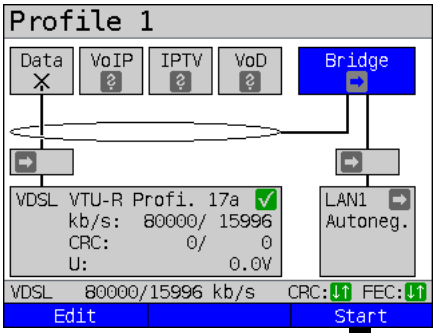


Establishing a VDSL connection

<Edit>	VDSL settings.
<Access>	Edits an access.
<Start>	Starts VDSL.



Switch to bridge mode using the cursor keys, see page 80.

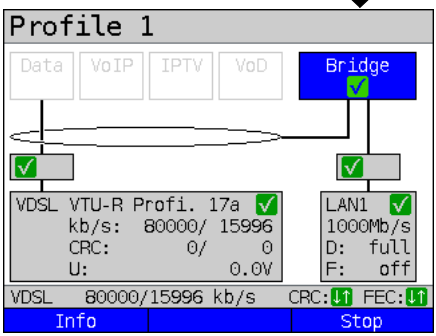


The VDSL connection is established (green tick mark in layer-1 box).

<Edit> Bridge/router parameter settings.

Establishing the VDSL bridge

The bridge can also be activated directly. If layer 1 has not yet been established, this is automatically started as well.



<Stop> Deactivates bridge mode.

<Info> Displays the activity of bridge mode.

When the ADSL physical layer is active, you can run the following tests using the softkey **<Test>**, see page 102.



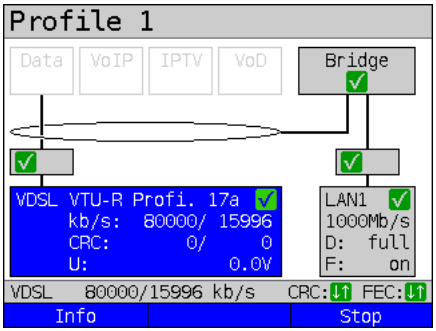
No tests are available when bridge mode is active.



Displays the connection parameters.



Switches to the layer-1 box and other elements, see page 80 for explanation.

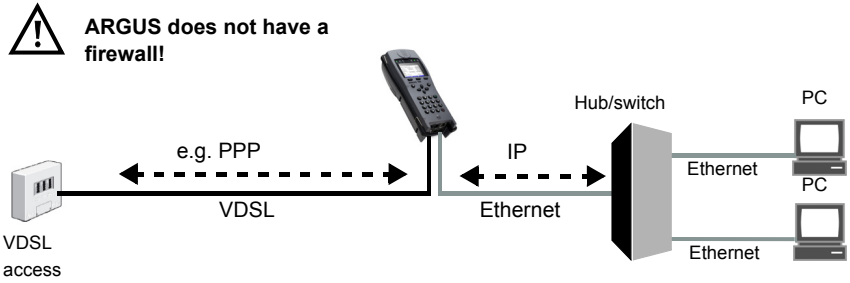


<Info> or  Displays the VDSL connection parameters, see page 49.

<Stop> Disconnects the VDSL connection and automatically deactivates the bridge.

7.5 ARGUS in access mode xTU-R router

Connect ARGUS to the PC using the patch cable and to the VDSL access using the xDSL cable.
In router mode, ARGUS replaces both the modem and the router, so that multiple PCs can access a network connection (via a hub/switch). The IP addresses of the network are either issued statically or ARGUS is designated the DHCP server and assigns IP addresses to the connected PCs.

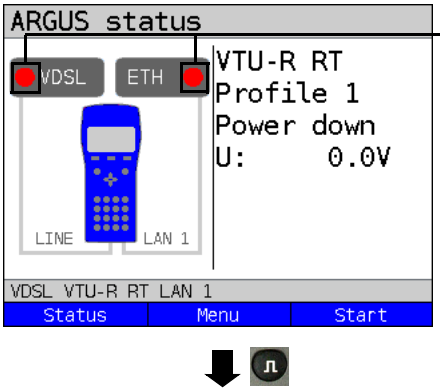


Bridge/router settings, see page 43.

xDSL settings, see page 39 and following.

Settings in access mode xTU-R bridge

In this example, VDSL VTU-R router mode is configured and selected as described in chapter „5 Configuring accesses“ (see page 25).

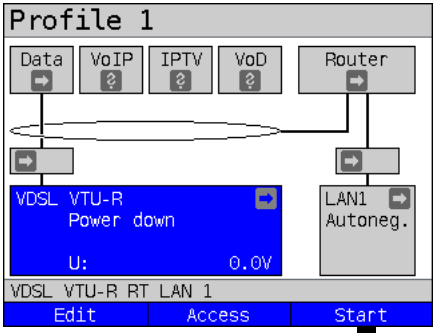


Test not yet started:
red LED in display
Meaning of LED image in display:

Red LED:	no test started
Yellow LED:	test started
Green LED:	connected

Display:

- Access mode
- Default profile (profile 1)
- Current status
- DC voltage at interface



<Edit> VDSL settings.

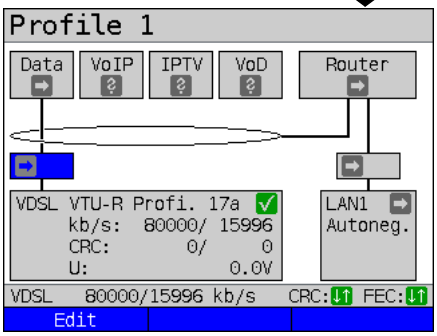
<Access> Edits an access.

<Start> Starts VDSL.



Switch to router mode using the cursor keys, see page 80.

Establishing the VDSL connection



When the ADSL physical layer is active, you can run the following tests using the softkey **<Test>**, see page 102.

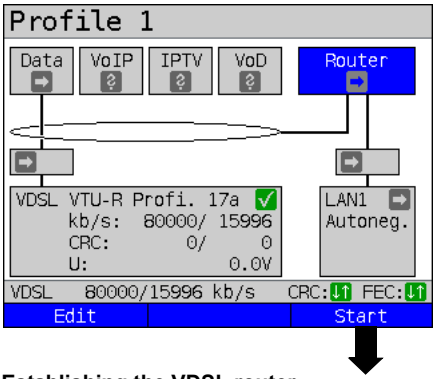
No tests are available when router mode is active.

Virtual line selected.

<Edit> Edits the parameters, see chapter „9 Virtual lines (VL)“ (see page 79).



Switch to Router using the cursor keys, see page 80.



Router selected.

The router can also be activated directly. If layer 1 has not yet been established, this is automatically started as well.

<Edit> Bridge/router parameter settings, see page 43.

Establishing the VDSL router.
The VDSL connection is active.

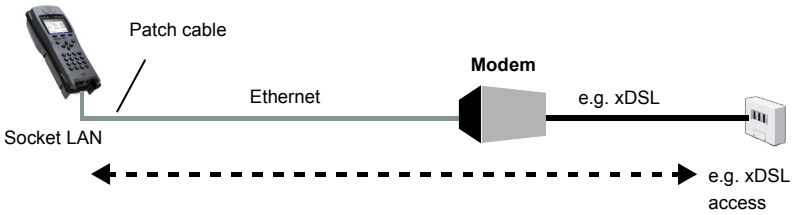
See page 67 for bridge mode display and operation.

8 Operation with Ethernet accesses

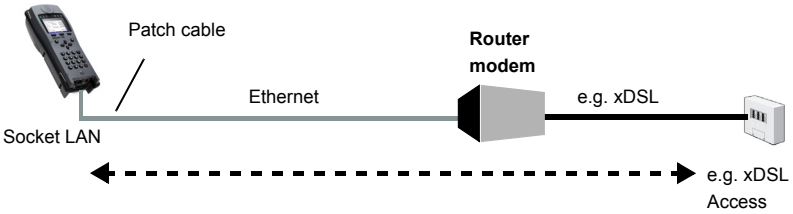
ARGUS supports the following access modes in Ethernet operation:

The individual tests acquire and store data. It is the user's responsibility to comply with the applicable legal requirements.

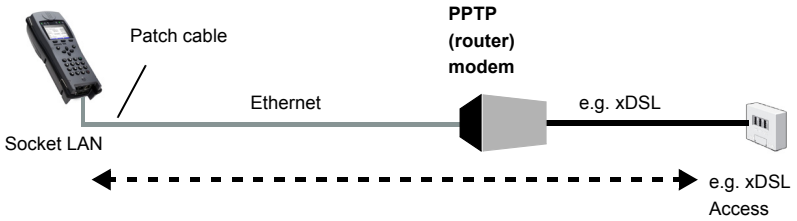
Connecting to a modem:



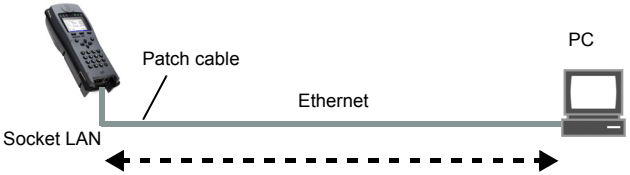
Connecting to a router modem:



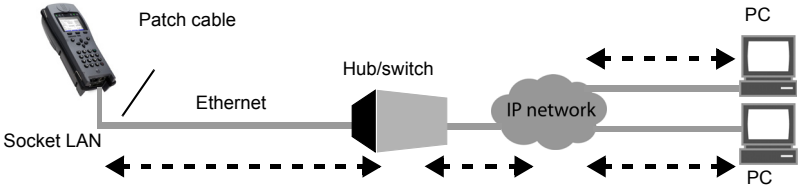
Connecting to a PPTP router modem:



Connecting to a PC via IP



Connecting to an IP network:



8.1 Configuring the Ethernet interface

Please refer to chapter „5 Configuring accesses“ (see page 25) for instructions on configuring the Ethernet interface.

Note: accessing functions via number keys/key combinations
You can call important functions/tests directly using the keys of the ARGUS keypad. You can find an overview of these key combinations on page 102.

Note:
The Ethernet cable tests (including Ethernet-TDR) are described in chapter „23 Ethernet cable tests“ (see page 323).

8.2 Ethernet settings

You can modify the Ethernet settings as described for VDSL, see page 39.

Setting	Description
Preconfigured accesses	
Phys. parameters:	
Ethernet:	
Autonego-tiation	Switches on or off When autonegotiation is switched on, network cards can automatically detect the correct transmission speed and duplex method of the Ethernet port to which they are connected and configure themselves accordingly. In Ethernet, autonegotiation is based on layer 1 of the OSI model (according to IEEE standard 802.3u). Default: ***on*** To set this to **off**, see the following section, page 73.
MAC address, see page 40.	

See chapter „Virt. profile 1 to 20“ page 89 for further configurations.

Autonegotiation/Ethernet link parameters

Ethernet link autonegotiation is supported by default!

Setting: autonegotiation "on"

When negotiating the link parameters, ARGUS informs the remote station that the following is supported (these settings are fixed and cannot be configured):

- 10, 100 or 1000 Mbit/s
- Half or full duplex
- Flow control on/off (for on: symmetric and asymmetric pause)

Manually configuring the Ethernet link parameters

Setting: autonegotiation "off"

When autonegotiation is deactivated, the speed, duplex and flow control ("pause" method) can be configured in the profile (see page 73).

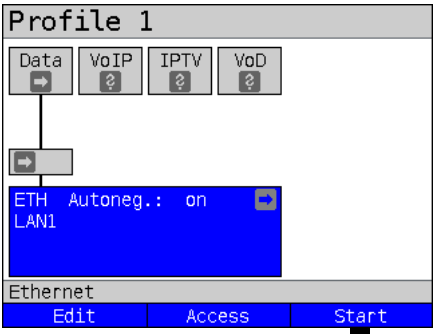
- 10, 100 or 1000 Mbit/s, default: ***100 Mbit/s***
- Half or full duplex, default: ***full***
- Flow control on/off ("Flow control off" is only useful in full duplex mode)
  Default: ***on***



Unilateral autonegotiation

When a terminal device with autonegotiation "on" encounters a device without autonegotiation, no information is transmitted by the remote station. Even without autonegotiation, the speed is determined using the pulse method/idle pattern (parallel detection). In this case, the terminal device with autodetection generally drops back to half duplex (duplex mismatch possible), which can result in a duplex mode conflict with "poor throughput".

8.3 Establishing an Ethernet connection



ARGUS in the status screen.

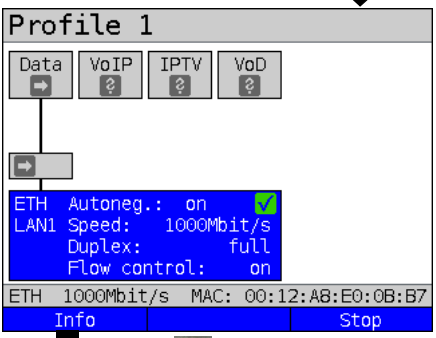
ARGUS uses the default profile (profile 1 in the example) to establish an Ethernet connection.

The test has not yet started!

Meaning of the arrow in the layer-1 box

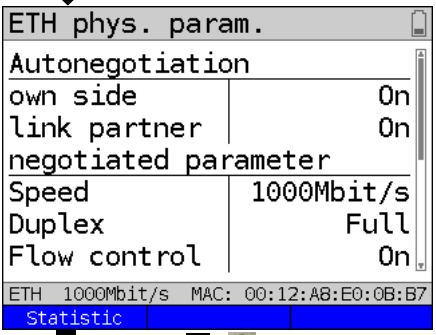
Gray arrow	no test started
Yellow arrow	test started
Green check mark	connected

Establishing an Ethernet connection



<Info>	Displays Ethernet connection parameters.
<Stop>	Stops the Ethernet connection.

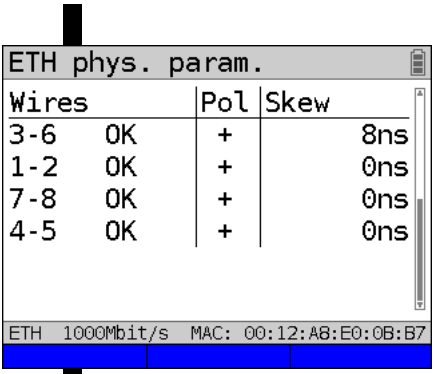
or



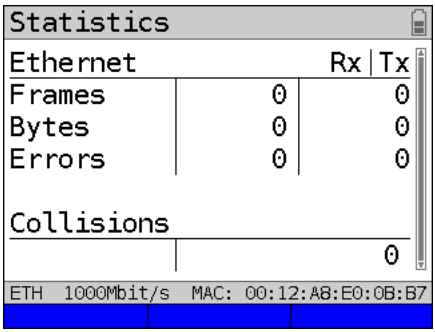
Display:

- Autonegotiation setting
- Autoneg. at remote station
- Negotiated speed
- Type of duplex mode
- Flow control setting

<Statistic>	Opens Ethernet statistics



s. **<Statistic>** page 74



Displays polling and offset between wires

- Wire allocation

Left column	ARGUS wire allocation
Right column	ARGUS wire allocation after autonegotiation with remote terminal. When the display shows "OK", the remote station has inverted the wire allocation.

- Polling
- Skew in ns

Statistic display

- Received (Rx) and transmitted (Tx) internet frames
- Received (Rx) and transmitted (Tx) bytes
- Number of errors on the receiver (Rx) and transmitter (Tx) side
- Number of collisions

Disconnecting from the Ethernet connection and saving the results

You can disconnect and save the results from an Ethernet connection as described for VDSL, see page 64.

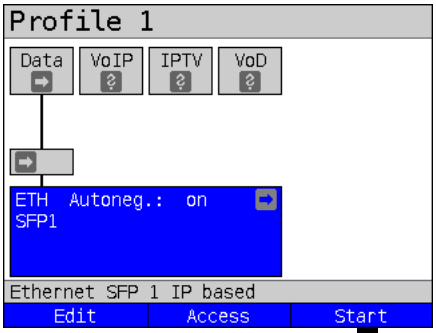
Saving the results without disconnecting from the Ethernet connection

You can save your results for an Ethernet connection without disconnecting in the same way as for VDSL, see page 65.

8.4 DDM test (SFF 8472)

With the Digital Diagnostic Mode (DDM) test according to SFF 8472, ARGUS detects various optical and electrical line parameters, such as link speed, transmission level or the remote station currently in use.

Starting the DDM test (access mode: Ethernet SFP)

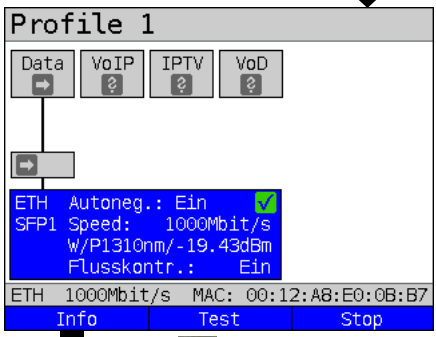


ARGUS in status screen.

The profile shown in the display (profile 1 in this example) is used for the DDM test.

<Start> Activates Ethernet.

It is not necessary to establish a link with the remote station.

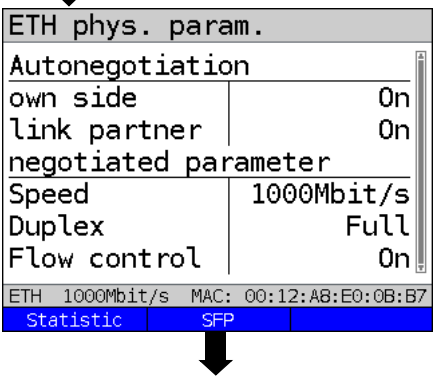


<Info> Displays Ethernet connection parameters.

<Test> Displays the available tests.

<Stop> Stops the Ethernet connection.

or

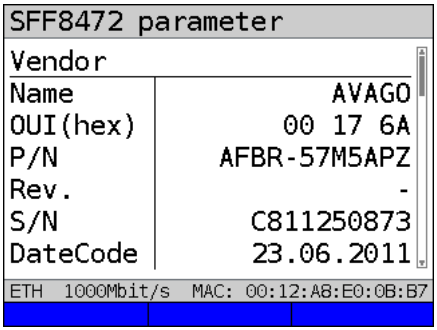


Display:

- Autonegotiation setting
- Autoneg. at other end
- Negotiated speed
- Type of duplex mode
- Flow control setting

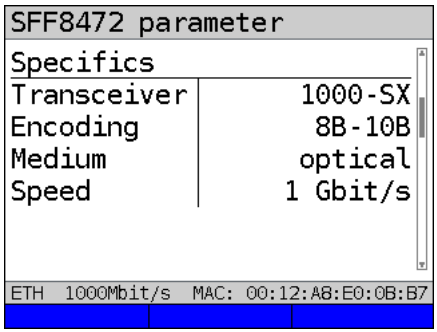
<Statistic> Opens Ethernet statistics.

Continued on next page



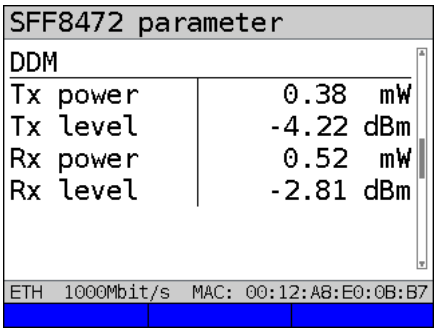
Display:
Displays system information on the SFP mode used

- SFP module used
- Name of manufacturer
- Manufacturer number (OUI)
- Part number
- Revision
- Serial number (S/N)
- Date of manufacture



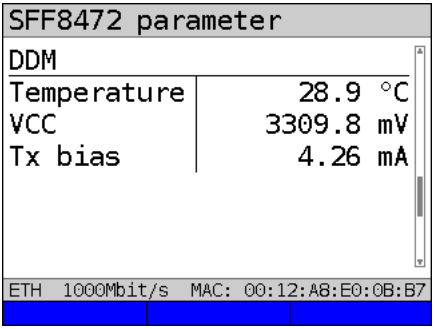
Display:
Display of access-specific information such as

- Wavelength (where appropriate)
- SFP type (transmitter) used
- Coding used
- Transmission type used (optical or electrical)
- Link speed



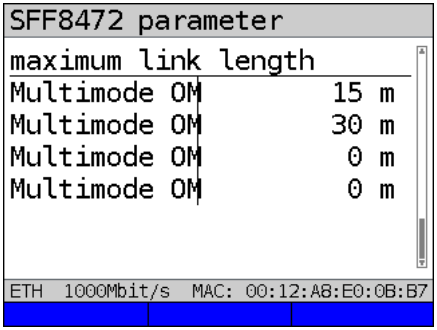
Display:
Display of diagnostic parameters (power meter)

- Received (Rx) and transmitted (Tx) power in mW
- Received (Rx) and transmitted (Tx) level in dBm



Display:
Display of measured connection parameters

- Temperature in °C
- Supply voltage in mV
- Transmit quiescent current in mA in operation



Display:
Displays the maximum possible line lengths in m

- Copper or single-mode glass fibers or for
- Multimode glass fibers in omni-modes 1 through 4

Disconnecting the Ethernet connection and saving the results

You can disconnect and save the results from an Ethernet connection as described for VDSL, see page 64.

Saving the results without disconnecting the Ethernet connection

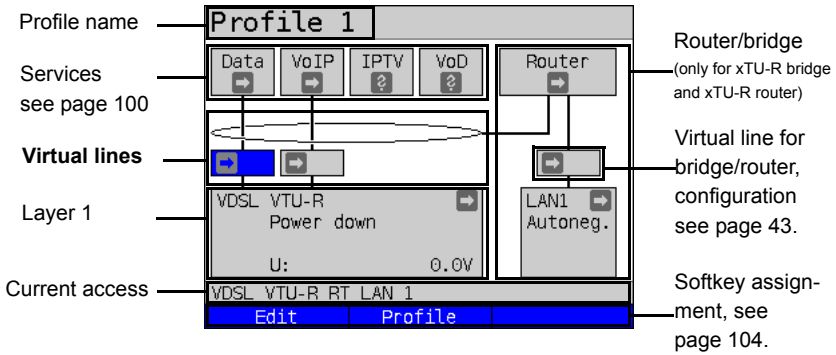
You can save your results for an Ethernet connection without disconnecting in the same way as for VDSL, see page 65.

9 Virtual lines (VL)

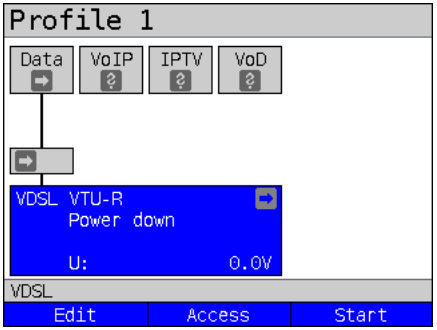
Virtual lines (VL) compile the configurations of layer 2 and layer 3 into profiles, called the VL profiles. These profiles contain e.g. information on protocols, VPI/VCIs, VLANs and PPP data (stored in their own subordinate PPP profiles). Virtual lines can be used to conduct tests across multiple VPI/VCIs or VLANs and across different protocols.
ARGUS allows you to define up to 20 such VL profiles. In a VL profile, you can edit e.g. the protocol configuration. The VL profiles can be assigned to one or more services independently of the state of the physical layer (layer 1).
Thus, a data test (e.g. IP ping and a VoIP test (e.g. VoIP call) can be performed on a single active access without having to re-establish layer 1 (DSL, Ethernet) in spite of differing protocols.

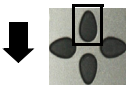
9.1 Virtual lines in the status screen

The virtual lines in the status screen are explained using the access VDSL VTU-R router:

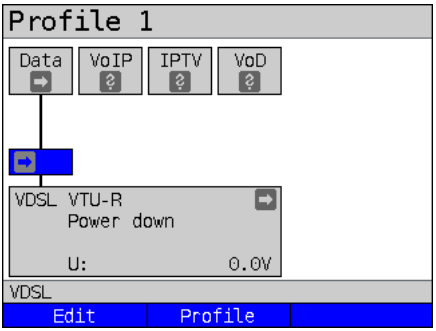


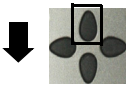
The status screen is divided into three levels that can be individually selected using the cursor keys of the ARGUS keypad.
The status screen is described in greater detail using three display examples.



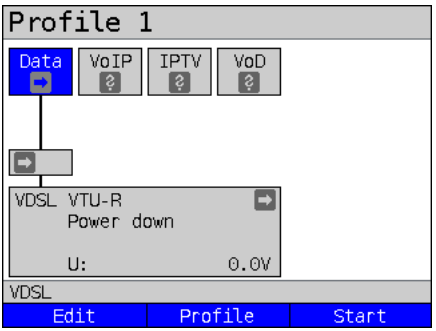


Cursor up





Cursor up



Level 1: physical layer (see page 36)

<Edit>	Configures physical layer.
<Access>	Selects access.
<Start>	Establishes physical layer of the selected access.

Level 2: virtual lines

<Edit>	Configures virtual line, see page 84.

The following configuration options are shown:
- Protocol (IP, PPP, PPTP)
- ATM, see page 89
- VLAN, see page 90
- PPP (PPP profiles)
- PPTP, see page 91
- IP version (IPv4, IPv6, dual)
- IPv4, see page 92
- Data log (for this VL)
- Profile name, see page 94

<Profile>	Configures the profile.

Level 3: services (see page 100)

<Edit>	Assigns a VL to a service and configures it.
<Profile>	Configures the profile.
<Start>	Starts the service.

The virtual line and the physical layer start automatically when you press the softkey **<Start>**.

Depending on the state of the physical layer, the virtual lines or the services, ARGUS displays a variety of symbols in the status screen.

 This service has not yet been assigned to a virtual line.

 This service, VL or physical layer is idle.

 This service is not available (bridge mode only).

 Preparing activation of physical layer, VL or service.

 Activating the physical layer, VL or service.

 Physical layer, VL or service deactivated due to an unexpected occurrence.

 Deactivating.

 Synchronisation achieved (physical layer) or a VL or service was activated successfully without errors.

 A test is currently running in this service.

 An error occurred here. Reset with **<Reset>** to continue with the VL/service.

9.2 Virtual line profiles (VL profiles)

The various profile types are explained below:

Profiles (1 - 20), see page 32:

- Under the services, these contain the assignments for the services Data, VoIP, IPTV and VoD.
- In addition to the services, the settings for the bridge/router and the test parameters can be found here as well.
- Every profile can be assigned an individual profile name.

VL profiles (virtual lines 1 - 20)

- These contain the layer 2/3 settings.
- VL profiles are assigned to services.
- One VL can be assigned to multiple services.
- The VL profiles can be assigned to PPP profiles.

PPP profiles (1 - 20)

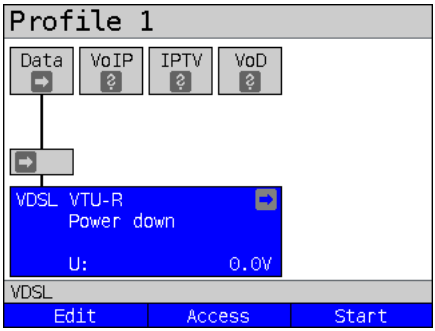
- These contain all relevant data for dialling.
- PPP profiles are assigned to VL profiles.
- One PPP profile can be assigned to multiple VL profiles.

Relationships between profile types

When all configurations are reset (see page 347), a VL profile (1-20) is only assigned to the service data in each profile (1-20). One PPP profile is assigned to each VL profile (1-20). All other services (such as VoIP, IPTV and VoD) are initially not assigned a VL profile or a PPP profile.

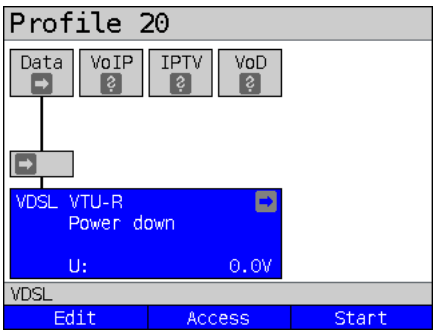
The assignment further VL and PPP profiles to services is described starting on page 84.

Default configuration:



Profile 1

Service Data	=>	VL profile 1	=>	PPP profile 1
Service VoIP		...		...
Service IPTV		...		...
Service VoD		...		...



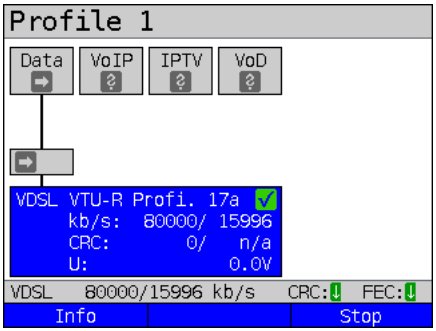
Profile 20

Service data	=>	VL profile 20	=>	PPP profile 20
Service VoIP		...		...
Service IPTV		...		...
Service VoD		...		...

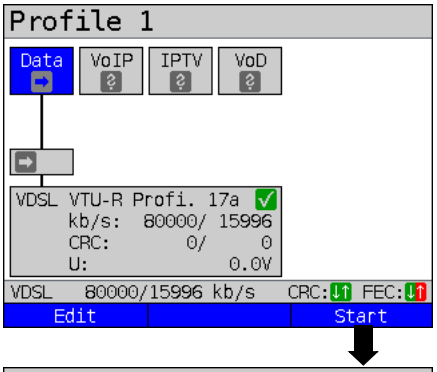
9.3 Activating a virtual line

A service or test must be started in order to activate a virtual line. To enable a test to be started, a service must be configured, and a virtual line assigned to it. In this example, the service Data is configured and assigned ot a virtual line.

9.3.1 Starting a service



The VDSL access is active.



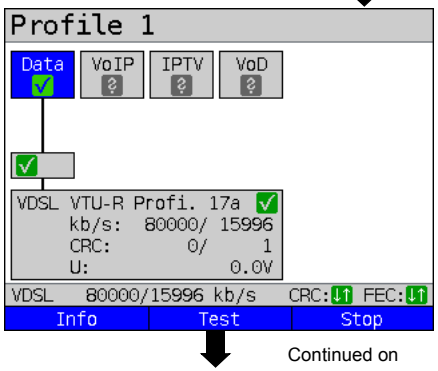


Use the cursor keys to switch from the layer-1 box over the virtual line to the service Data.



If the physical layer is not yet active, this is started automatically with the service or test.

<Start> Starts the service.



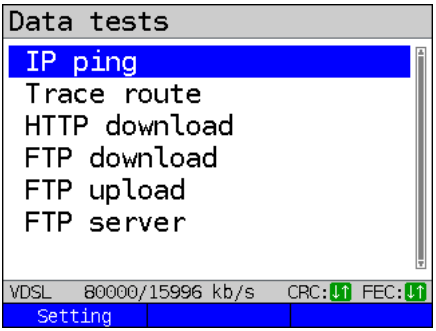
The physical layer (VDSL), the virtual line and the service Data are now active. This is indicated by a green check mark.

<Info> Displays information on the service Data (e.g. duration of activity).

<Stop> Stops the service Data.

See page 100 for explanations of the services.

Continued on next page

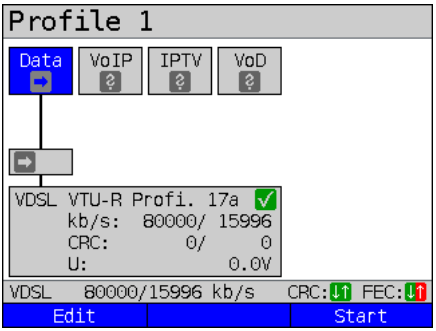


The tests that can be run using the service Data are displayed.

<Setting> Configures the respective test (in this example IP ping). A detailed description is provided in the chapter Test, see page 118.

9.3.2 Assigning additional virtual lines

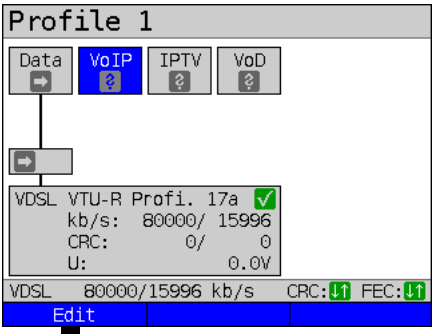
ARGUS can use multiple services concurrently (e.g. Data and VoIP) via a single virtual line. In this example, VDSL is active. The service Data is selected. The following explains how multiple services can be connected via a single virtual line.



⚠ To configure a virtual line (in this example for the service Data) for other services, you must first stop the service.
The physical layer remains active.

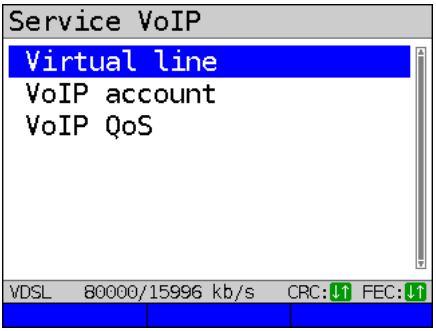


Using the cursor keys, select the service VoIP.

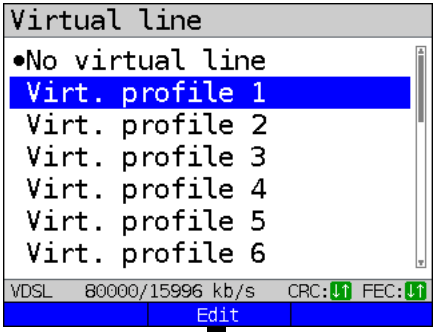


Continued on next page

<Edit> Opens the configuration of the selected service (in this example VoIP).



Select "Virtual line"





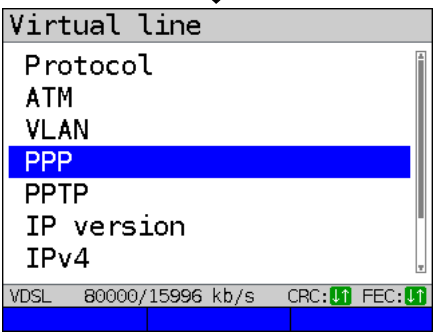
Select the virtual profile you wish to edit. The selected profile is highlighted in blue in the display.



Elements not available are grayed out, for instance when they are currently active.

<Edit> The configuration options are described starting on page 89.

Edit the selected VL profile.



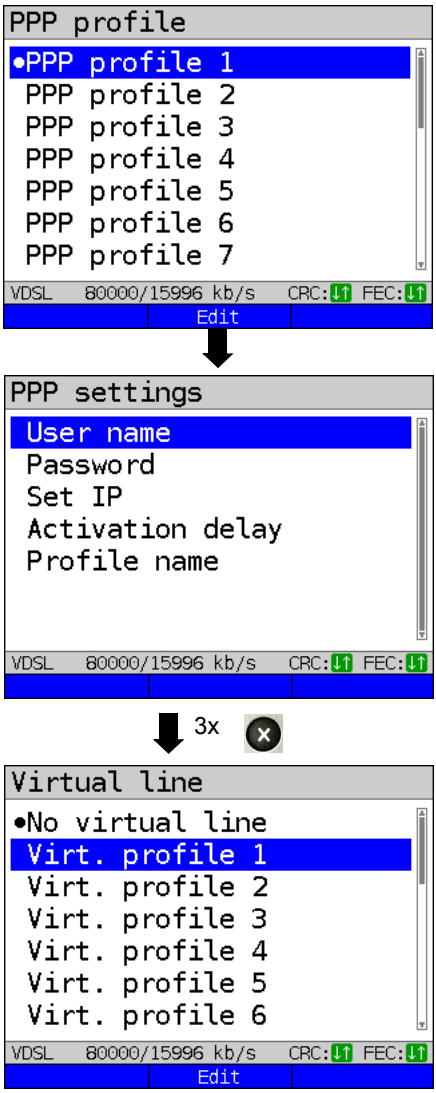


e.g. select PPP

The configuration options are described starting on page 89.

Opens PPP profile selection

Continued on next page



Continued on next page



e.g. select PPP profile 1

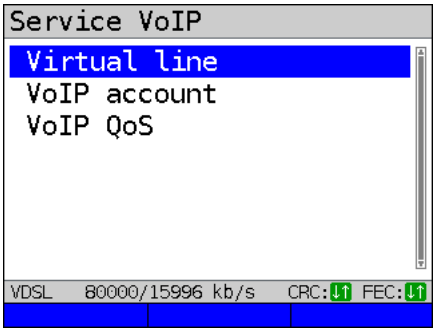
Up to 20 PPP profiles can be configured.

<Edit> Edits the selected PPP profile, see page 89.

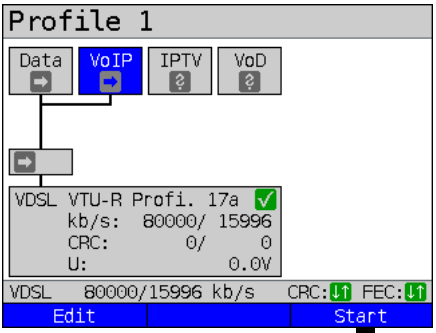
The configuration options are described starting on page 89.



The desired profile has not yet been selected.

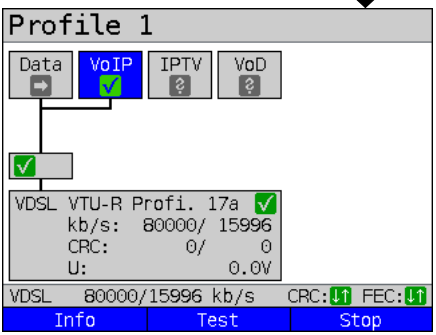


ARGUS switches to the status screen or the Settings menu (depending on whether you accessed the profiles using the main menu or the status screen).



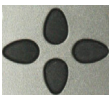
The services Data and VoIP are now connected to the physical layer (VDSL access) via a virtual line.

<Start> Starts the service VoIP.

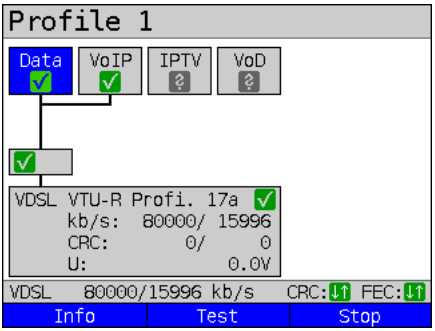


The service VoIP is now active.
You can now run a variety of tests via the service VoIP.

In the next step, you can now activate a further service.



Select Data using the cursor keys and press **<Start>** to activate the service.

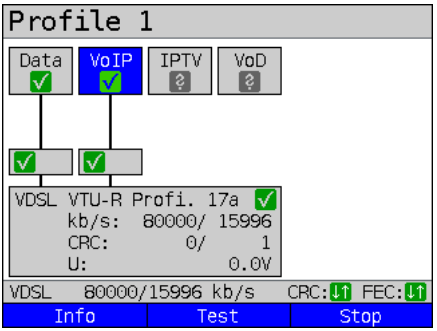


The services Data and VoIP are active.
You can now run a variety of tests via the services Data and VoIP.

The display and operation for IPTV and VoD (video on demand) are the same as for VoIP.

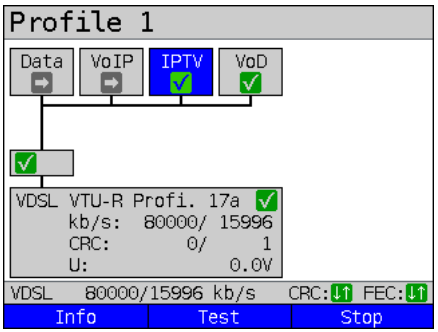
Further examples of different virtual line assignments:

Example 1:



One virtual line is connected with the service Data and another with the service VoIP.
The virtual line for VoIP can thus be used for different protocol data than the virtual line for Data.

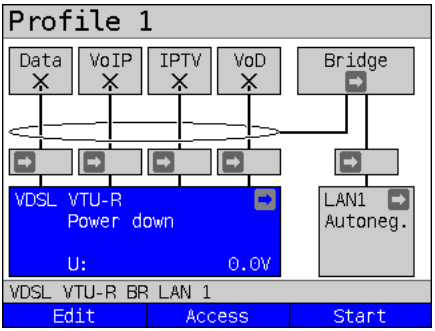
Example 2:



One virtual line was configured for the services Data, VoIP, IPTV und VoD.
In this example, the services IPTV and VoD are active.

Up to four virtual lines can be established for the service IPTV. However, ARGUS only displays these as a single composite virtual line.
A detailed description is provided in the chapter IPTV, see page 168.

Example 3:



In this example, each service was assigned a virtual line.
As ARGUS is in bridge mode, these services cannot be executed.

9.4 Virtual line settings

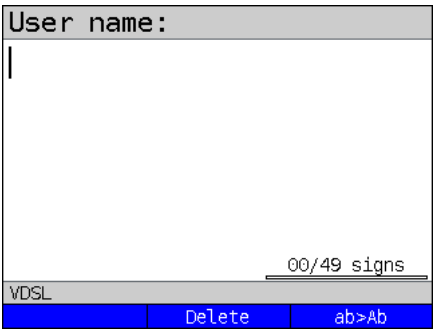
Setting	Description
Virt. profile 1 to 20	
Protocol	Selection of transmission profile that ARGUS uses for the test (e.g. for the IP tests). Default: ***PPP***

Protocol	ATM:	Interfaces:		
	ATM with ETH	**ADSL**	**VDSL**	**ETH**
IP	no	EoA	IP	
IP	no	IPoA		
PPP	yes	PPPoE	PPPoE	
PPP	no	PPPoA		
PPTP	-	-	-	PPTP

You can choose between the protocol "ATM with Ethernet" or "ATM without Ethernet" using the ATM menu option.

ATM:	Settings for asynchronous transfer mode	
VPI/VCI	VPI:	Enter the virtual path identifier
	VCI:	Enter the virtual channel identifier
		Ranges VPI: 0 to 255, VCI: 32 to 65535
		Default: ***VPI: 1*** and ***VCI: 32***
Encapsulation	Encapsulation of the transmitted packets: LLC or VC-MUX Default: ***LLC***	

ATM with Ethernet	Determines whether Ethernet is used via ATM or not, see table above. Options: - No (PPPoA, IPoA) - Yes (PPPoE, EoA) Default: ***yes (PPPoE, EoA)***	
VLAN	VLAN (Virtual Local Area Network)	
VLAN	VLAN mode	Determines whether VLAN may be used. Up to two VLANs can be used concurrently. Default: ***no VLAN***
	VLAN 1, VLAN 2	
	ID:	Identifier for the VLAN to which the frame belongs. Every VLAN is assigned a unique number, the VLAN ID. A device that belongs to the VLAN with ID = 2 can communicate with every other device in the same VLAN but not with devices in other VLANs. Range: from 0 to 4095 Default: ***2***
		The IDs 0, 1 and 4095 are reserved for management purposes and should preferably not be used.
	Priority	User priority information: One of eight (3-bit) priorities can be specified for each frame. This makes it possible e.g. to give priority to transmitting speech data while treating HTTP data with lower priority. Range: 0 to 7 Default: ***0***
	TPID:	Tag Protocol Identifier The TPID is a 16-bit sub-field within the 4-byte VLAN data field. This field contains the tag information defined by IEEE 802.1q. Default: VLAN 1: ***8100 hexadecimal*** VLAN 2: ***88A8 hexadecimal***
	Note:	When using two VLANS with layer 3 (IP) or layer 4, both are to be set to 8100.

PPP profile:	PPP configuration (Point-to Point Protocol) **<Edit>** Edits PPP profile
User name  	Entry of the user name assigned by the carrier: The user name is entered using the number keys. Pressing the right softkey changes the meaning and thus influences the input via the number keys (letters (upper and lower case) and numbers).
Password	Entry of a password (max. 4o characters) assigned by the carrier; see "User name" for an explanation. During entry, the characters of the password are visible until Enter is pressed once. The characters are subsequently only displayed encrypted with "*".
Set IP	When "yes" is set, the IP address defined under IP/own IP address (see below) is used for connecting. Default: ***no***
Current delay	Once a PPP connection has been established, the test is only started after the preset delay time has elapsed. Range: 2 - 10 seconds Default: ***2***
Profile name	Enter the name of the PPP profile.
PPTP:	PPP settings (Point-to-Point Tunnelling Protocol)
	Own server IP address Range 0.0.0.0. to 255.255.255.255 Default: ***0.0.0.0***

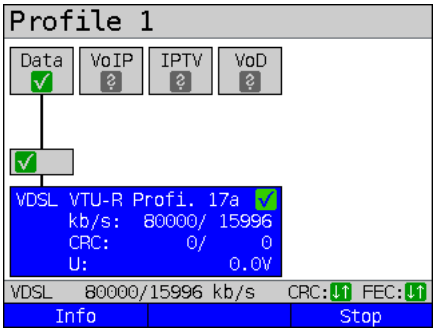
IP version:	Internet Protocol version
	Determines which IP version is to be used. IPv4: Internet Protocol version 4 acc. to RFC 791 IPv6: Internet Protocol version 6 acc. to RFC 2460 Dual: If IPv6 is available, this protocol is preferred for a test.If not, ARGUS switches automatically to IPv4. Default: ***IPv4***
IPv4:	Internet Protocol version 4 configuration
IP mode	Definition of IP address assignment Static IP: Fixed IP address DHCP client: Assignment of IP address by server (remote side) DHCP server: Assignment of IP address by ARGUS DHCP auto: ARGUS checks for the presence of a DHCP server in the network. If a server is present, it assigns the IP address; if not, ARGUS does this. Default: ***DHCP client***
Own IP address	Own ARGUS IP address Range: Range 0.0.0.0. to 255.255.255.255 Default: ***0.0.0.0*** (assignment see RFC 3330)
IP netmask	IP netmask Range: Range 0.0.0.0. to 255.255.255.255 Default: ***255.255.255.0*** (assignment see RFC 3330)
Gateway IP	Gateway IP address Range: Range 0.0.0.0. to 255.255.255.255 Default: ***0.0.0.0*** (assignment see RFC 3330)
DNS server	DNS server 1 DNS server 2 Entry of DNS server IP address (DNS = Domain Name System) Range: Range 0.0.0.0. to 255.255.255.255 Default: ***0.0.0.0*** (assignment see RFC 3330)
DHCP client	DHCP timeout: Range: 1 - 9999 seconds Default: ***20***

	DHCP Vendor ID: - Format: choose format: ASCII or hexadecimal ASCII data: Entry of DHCP vendor ID in ASCII format Default: ***ARGUS***, for details see "User name", page 91 - HEX data: entry of DHCP vendor ID in hexadecimal format, see MAC address page 73
	DHCP vendor info: - Format: choose format: ASCII or hexadecimal - ASCII data: Entry of DHCP vendor information in ASCII format, default: ***ARGUS***, for details see "User name", page 91 - HEX data: entry of DHCP vendor information in hexadecimal format, see MAC address page 73
	DHCP user class information - Format: choose format: ASCII or hexadecimal - ASCII data: entry of DHCP user class info in ASCII format Default: ***ARGUS***, for details see "User name", page 91 - HEX data: entry of DHCP user class information in hexadecimal format, see MAC address page 73
	DHCP user-defined option (generate a custom DHCP option) - Option number Range: 0 to 255 Default: ***255 = off*** - Format: choose format: ASCII or hexadecimal - ASCII data: entry of DHCP user-defined option in ASCII format Default: ***ARGUS***, for details see "User name", page 91 - HEX data Entry of DHCP user-defined option in hexadecimal format, see MAC address page 73
DHCP server	Settings for the DHCP server: - Starting and ending IP address Range: Range 0.0.0.0. to 255.255.255.255 Default: (assignment see RFC 3330) Start: ***192.168.10.30*** End: ***192.168.10.40*** - Domain name, see "User name" page 91 for details - Duration of reservation for IP addresses Range: 1 - 99999 seconds Default: ***240***

Data log	Data log on or off This function must be set to "on" so that a trace file can be sent to the PC; see page 64. After terminating a VL via the corresponding service or the physical layer, ARGUS queries whether the trace file should be sent to the PC. For example, when the data log is activated for VL 1, only VL 1 is recorded. When one VL is configured for multiple services and the data log is active, all data of this VL are recorded. Default: ***off***
Profile name	Enter the name of the VL profile. Enter the name as for the access name, see page 27.

9.5 Displaying protocol statistics

Depending on the access mode and the protocol, ARGUS displays BRAS, IP, PPP, ATM or Ethernet statistics.



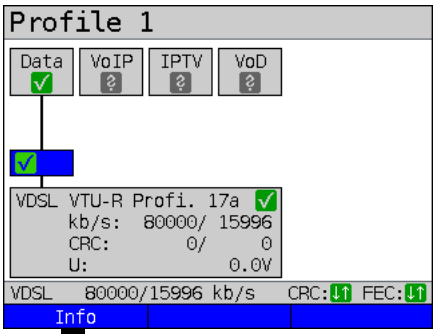
The physical layer, virtual line and service data are active.

<Info> Displays DSL results.

<Stop> Deactivates physical layer, VL and Data service.



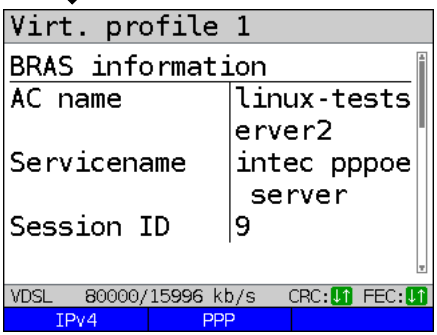
Switch to the virtual line (VL) using the cursor keys.



Press one after another


and


Display of ARGUS MAC addresses:
Line, LAN, SFP, ETH, see also page 104 and following.

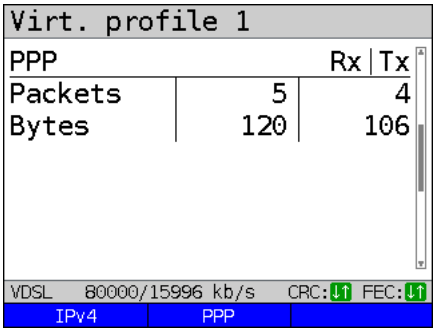


BRAS information:
For PPP protocol only, ARGUS displays the Broadband Access Server (BRAS) information:
- AC (access server): name of server
- Service name name of service

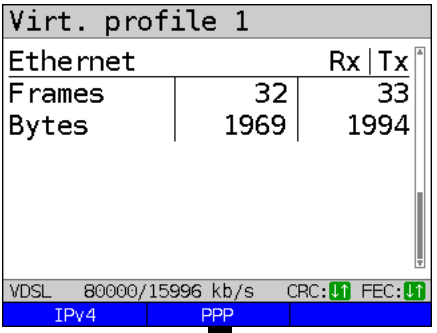
<IPv4> Displays the configuration assigned by the server.



Continued on next page

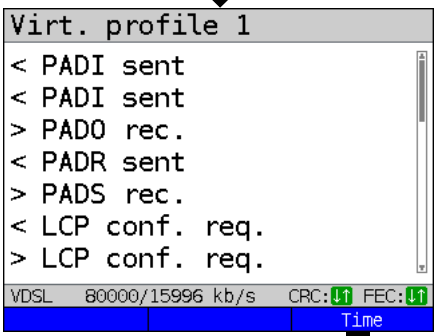


PPP information:
ARGUS displays the received (Rx) and transmitted (Tx) PPP packets and the bytes.



Ethernet:
ARGUS displays the received (Rx) and transmitted (Tx) Ethernet frames, bytes and errors.

<PPP> The softkey **<PPP>** opens a PPP trace, which displays the PPP login process.



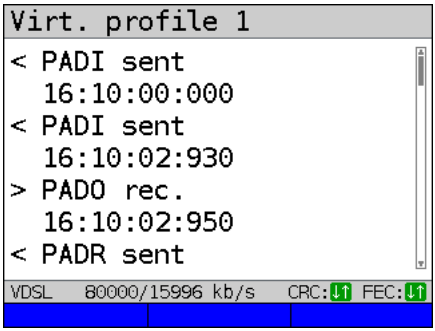
Command display

< = Command sent by ARGUS

> = Command sent by DSLAM

<Time> The **<Time>** softkey assigns the individual messages to times according to the ARGUS system clock.

Continued on next page

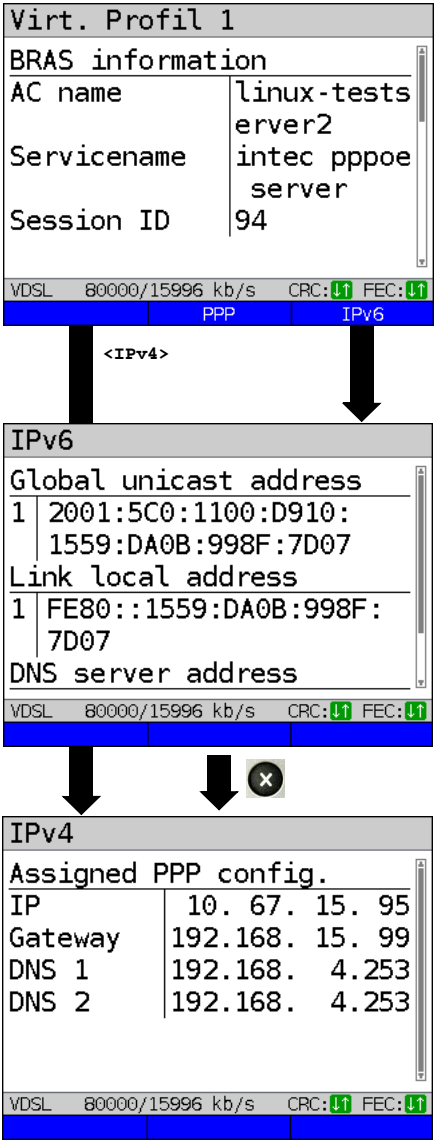


- PADI:
  PPPoE Active Discovery Initiation
- PADO:
  PPPoE Active Discovery Offer
- PADR:
  PPPoE Active Discovery Request
- PADS:
  PPPoE Active Discovery Session Confirmation
- PADT:
  PPPoE Active Discovery Termination
- IPv6 CP:
  IPv6 Control Protocol
- LCP:
  Link Control Protocol
- IPCP:
  Internet Protocol Control Protocol
- PAP:
  Password Authentication Protocol

Table:

ack.	= acknowledge
auth.	= authentication
conf.	= configuration
nak.	= not acknowledge
prot.	= protocol
rec.	= received
rep.	= reply
req.	= request
rej.	= rejected

IP version-dependent



In this example IPv6:

<IPv6>	IPv6 information is displayed.
<IPv4>	IPv4 information is displayed.

Assigned configuration:
ARGUS displays the IP configuration assigned by the server:
- Global Unicast Address
- Link Local Address

Use the cursor keys to display further information.

Exits results.

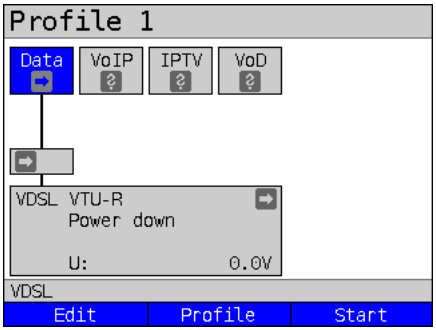
Assigned configuration:
ARGUS displays the IP configuration assigned by the server:
- Received IP address
- Gateway IP address
- Available DNS servers

Exits results.

10 Services

The status screen (see explanation page 79) shows four services.
Each service can be used to conduct an entire suite of IP tests (see list below). It is also possible to start and stop each service independently of the others.

Example screen with the possible services



<Edit>	Assigns the service a VL profile and configures the service.
<Profile>	Configures the profile.
<Start>	Activates the service. If virtual lines and the physical layer are not active, they are also automatically started as well.

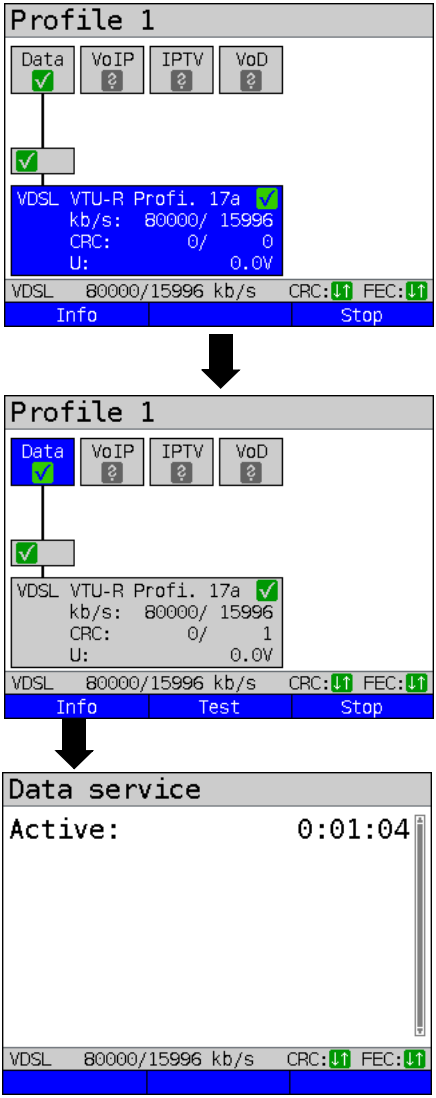
The meaning of the symbols, s. page 81.

Once a service is activated, a variety of tests can be started using **<Test>**.

Services:			
Data ✓	VoIP ✓	IPTV ✓	VoD ✓
- IP ping - Traceroute - HTTP download - FTP download - FTP upload - FTP server	- IP ping - Traceroute - VoIP call - VoIP wait - VoIP PESQ test	- IP ping - Traceroute - IPTV - IPTV scan - IPTV passive	- IP ping - Traceroute - Video on demand

Possible tests that can be executed using the various services.

10.1 Displaying service statistics



ARGUS in the status screen.
The physical layer, VL and service are active.



Switch to a service (in this example Data) using the cursor keys.

<Info> Displays the duration of activity of the selected service.



In the service VoIP, the VoIP call parameters are displayed here, see page 161.



Exit the display and return to the status screen.

11 Overview of tests andhotkey assignment

Overview of tests

Display of possible tests at the xDSL and Ethernet interface:

Interface Test	**ATU-R VTU-R**	**AUT-R BR VTU-R BR**	**ATU-R RT VTU-R RT**	**Ethernet**
Loop see page 106	**-**	**-**	**-**	**x**
VPI/VCI scan see page 112	**x***1	**x***1	**x***1	**-**
ATM-OAM ping see page 115	**x***1	**x***1	**x***1	**-**
IP ping see page 118	**x**	**-**	**x**	**x**
Traceroute see page 124	**x**	**-**	**x**	**x**
HTTP download see page 128	**x**	**-**	**x**	**x**
FTP download see page 133	**x**	**-**	**x**	**x**
FTP upload see page 137	**x**	**-**	**x**	**x**
FTP server see page 141	**x**	**-**	**x**	**x**
VoIP call/wait see page 148	**x**	**-**	**x**	**x**
IPTV see page 168	**x**	**-**	**x**	**x**
IPTV scan see page 183	**x**	**-**	**x**	**x**
IPTV passive see page 190	**-**	**x**	**x**	**x**
VoD see page 194	**x**	**x**	**x***1	**x**
PESQ see page 288	**x**	**-**	**x**	**x**

*1 = not for VDSL

A virtual line must be configured first before ARGUS can execute these texts (exceptions: VPI/VCI scan, ATM-OAM ping, loop). Configuration is described in the chapter "Virtual line", see page 79.

Graphic functions:
After running the xDSL interface or a test, you can use the following graphic functions in the result displays:

Hotkey	**xDSL trace**	**ADSL/ VDSL**	**Line Scope**	**TDR**
Number key 1	Legend	-	-	-
Number key 2	-	Zoom	Zoom	Zoom
Number key 3	Cursor	Cursor	Cursor	Cursor
Number key 4	-	-	Measuring range	Measuring range
Number key 5	-	-	Total power	Pulse width/ height
Number key 6	-	-	-	Wire type/VoP
Number key 7	-	-	Probe	-
Number key 8	-	-	Symmetry	-
Number key 9	-	Setting of x-axis	Time/FFT	-
Number key 0	-	-	Peak hold	-
Number key #	-	-	100 Ohm input resistance	-
	-	Continue	-	-
	-	-	Start/stop	Start/stop
Press one after another  and 	-	Store	-	-

Hotkey assignment

You can call important functions/tests directly using the keys of the ARGUS keypad. Depending on the selected access type (xDSL and Ethernet in this example), different hotkeys can be used:

Hotkey	**Service**	**ADSL**	**VDSL**	**Ethernet**
Number key 0	ARGUS status	x	x	x
Number key 1	Hotkey help	x	x	x
Number key 2	VPI/VCI scan	x	-	-
Number key 3	IP ping	x	x	x
Number key 4	Traceroute	x	x	x
Number key 5	HTTP download	x	x	x
Number key 6	Test status	x	x	x
Number key 7	FTP download	x	x	x
Number key 9	IPTV	x	x	x
	Status screen	x	x	x
	VoIP call	x	x	x
Press one after another  and 	Shortcut to access selection menu.	x	x	x
Press one after another  and 	Displays ARGUS-specific information such as ARGUS type, SW version, S/N, own MAC addresses, SW options and more.	x	x	x
Press one after another  and 	Restores the saved test settings, see page 346.	x	x	x
Press one after another  and 	Resets all settings to the factory default, see page 347.	x	x	x
Press one after another  and 	ARGUS saves the current measurement without stopping it. ARGUS automatically suggests a name.	x	x	x

Depending on the selected access type (ISDN, POTS and Copper tests in this example), different hotkeys can be used:

Hotkey	Service	BRI S/T	BRI U	PRI	POTS	Cu tests Status
Number key 0	ARGUS status	x	x	x	x	x
Number key 1	Hotkey help	x	x	x	x	x
Number key 2	Start services test (not for fixed lines)	x	x	x	-	-
Number key 3	Test service features (not for fixed lines)	x	x	x	-	-
Number key 4	Starts an automatic test.	x	x	x	-	-
Number key 5	Sends test results to PC	x	x	x	x	x
Number key 6	Opens Test Manager	x	x	x	-	-
Number key 7	Opens saved numbers	x	x	x	x	-
Number key 9	Starts BERT	x	x	x	-	-
	Level measurement	x	x	L1 Status	x	-
	Connect	x	x	x	x	-
Press one after another  and 	Shortcut to access selection menu.	x	x	x	x	x
Press one after another  and 	Displays ARGUS-specific information, see page 104.	x	x	x	x	x
Press one after another  and 	Restores the saved test settings, see page 346.	x	x	x	x	x
Press one after another  and 	Resets all settings to the factory default, see page 347.	x	x	x	x	x
Press one after another  and 	Opens Test Manager.	x	x	x	-	-
Press one after another  and 	ARGUS saves the current measurement without stopping it. ARGUS automatically suggests a name.	x	x	x	x	x

12 Loop

A loop can be created only on Ethernet.
In a loop, all incoming Ethernet frames on layer 1 (L1) are returned to the sender unchanged.
In a loop on layer 2 (L2) of the OSI model, ARGUS swaps the source MAC address for the destination MAC address and then returns all Ethernet frames.

The loop requires the following parameters:

Protocol-independent parameters
The opening of test parameters is described in the chapter "Configuring accesses", see page 32.

Setting	Description
Test parameter:	
Loop	
Layer	This setting determines what layer of the OSI model the loop runs on. - L1: all incoming Ethernet frames on a loop on layer 1 (L1) are returned to the sender unaltered. - L2: on a loop on layer 2 of the OSI model, ARGUS exchanges the source MAC address with the destination MAC address and returns all incoming Ethernet frames. - L3: on a loop on layer 3 (L3) of the OSI model, ARGUS exchanges the destination and own IP address as well as the MAC addresses and then returns all incoming Ethernet frames. Default: ***L2***
Layer 2	**MAC mode** You can use the loop MAC mode to determine what gets looped. - For own MAC only (promiscuous mode off) L1: only packets for the own MAC address and broadcast packets are looped. L2: only packets for the own MAC address are looped. Broadcasts are rejected. L3: only packets for the own MAC address and own IP address are looped. Broadcasts are rejected. - Loop everything (promiscuous mode on) L1: all packets (including broadcast) are looped. L2: all packets - except broadcasts - are looped. Broadcasts are rejected. L3: all packets for which the IP address has been recognised are looped. Default: ***for own MAC only***

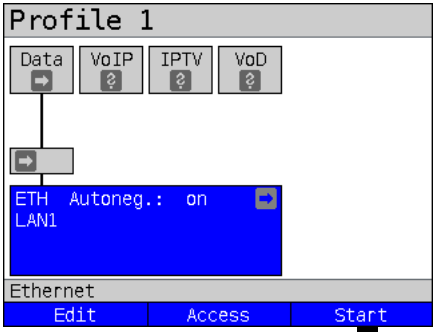
VLAN	VLAN (Virtual Local Area Network)		
VLAN mode	Determines whether VLAN may be used. Up to two VLANs can be used concurrently. Default: ***no VLAN***		
VLAN 1	ID	Identifier for the VLAN to which the frame belongs. Every VLAN is assigned a unique number, the VLAN ID. A device that belongs to the VLAN with ID = 2 can communicate with every other device in the same VLAN but not with devices in other VLANs. Range: from 0 to 4095 Default: ***2***	
		The IDs 0, 1 and 4095 are reserved for management purposes and should preferably not be used.	
	Priority	User priority information: One of eight (3-bit) priorities can be specified for each frame. This makes it possible e.g. to give priority to transmitting speech data while treating HTTP data with lower priority. Range: 0 to 7 Default: ***0***	
	TPID	8100 Hex	The VLAN TPID 8100 hex is a 16-bit field that identifies frames according to IEEE 802.1Q (VLAN-tagged frame). It also makes it possible to use all network paths actively according to IEEE 802.aq (shortest path bridging, SPB).
		88A8 Hex	VLAN TPID 88A8 supports provider bridging according to IEEE 802.ad. It also makes it possible to use all network paths actively according to IEEE 802.aq (shortest path bridging, SPB).
		Default: ***8100 Hex***	

	VLAN 2	ID		Identifier for the VLAN to which the frame belongs. Every VLAN is assigned a unique number, the VLAN ID. A device that belongs to the VLAN with ID = 2 can communicate with every other device in the same VLAN but not with devices in other VLANs. Range: from 0 to 4095 Default: ***2***
				The IDs 0, 1 and 4095 are reserved for management purposes and should preferably not be used.
		Priority		User priority information: One of eight (3-bit) priorities can be specified for each frame. This makes it possible e.g. to give priority to transmitting speech data while treating HTTP data with lower priority. Range: 0 to 7 Default: ***0***
		TPID	8100 Hex	The VLAN TPID 8100 hex is a 16-bit field that identifies frames according to IEEE 802.1Q (VLAN-tagged frame). It also makes it possible to use all network paths actively according to IEEE 802.aq (shortest path bridging, SPB).
			88A8 Hex	VLAN TPID 88A8 supports provider bridging according to IEEE 802.ad. It also makes it possible to use all network paths actively according to IEEE 802.aq (shortest path bridging, SPB). Default: ***88A8 Hex***
Layer 3	IP-mode	For IP address assignment, this determines whether a static IP address is to be used or whether a server (remote station) issues the IP address (DHCP client). Default: ***Static IP***		
	Own IP address	Own ARGUS IP address Range: Range 0.0.0.0. to 255.255.255.255 Default: ***0.0.0.0*** (assignment see RFC 3330)		

Notes for the use of VLANs

	Contains received Ethernet packets		
Loop - VLAN mode	no VLAN	one VLAN	two VLANs
No VLAN	x	x	x
VLAN 1	-	ARGUS loops when the VLAN IDs and TPIDs contained in Ethernet packets agree with the VLAN 1 settings.	ARGUS loops when the first VLAN ID (also called outer or service ID) and TPID contained in Ethernet packets agree with the VLAN 1 settings.
VLAN 1 & 2	-	-	ARGUS loops when the first VLAN ID (also called outer or service ID) and TPID contained in Ethernet packets agree with the VLAN 2 settings and the second VLAN ID (also called the inner or customer ID) and TPID agree with the VLAN 1 settings.
- = ARGUS does not loop. x = ARGUS loops regardless of whether the received Ethernet packets contain VLANs.			

Starting the loop (access mode: Ethernet)

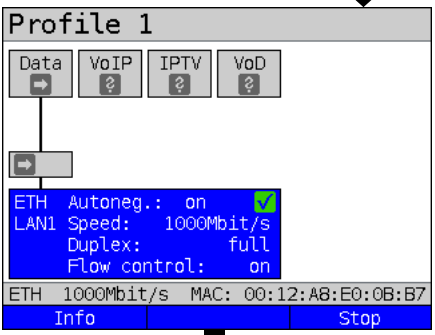


ARGUS in status screen.

Establishing the Ethernet connection

The profile shown in the display (profile 1 in this example) is used for the loop.

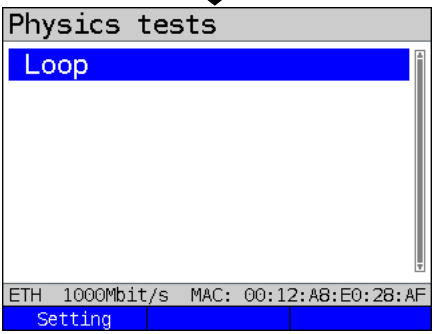
<Start> Activates Ethernet.



<Info> Displays Ethernet connection parameters.

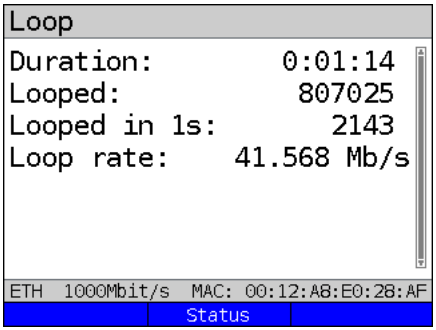
<Test> Displays the available tests.

<Stop> Stops Ethernet connection.



<Setting> Changes loop parameters, see page 106.

Continued on next page





The loop is started:

Duration	Current duration of test
Looped	Number of packets looped so far
Looped in 1s	Number of packets looped in the current second
Loop rate	Displays the current data rate per second.
MAC address	Own MAC address of looping device (e.g. for entry in the traffic generator).
<Status>	Displays status screen without ending the test.
Duration	Overall duration of test.
Looped	Number of looped packets.
avg.	Number of looped packets per second.
<Status>	Display of status screen.

Saving the results

You can save the results for the loop test in the same way as for VDSL, see page 64.

13 ATM tests

The following ATM tests can only be performed on an ADSL interface. Other interfaces such as VDSL or Ethernet are not based on ATM.

13.1 VPI/VCI scan

In VPI/VCI scan, ARGUS checks which VPI/VCI combinations are active on the test access. ARGUS transmits a test packet for all possible VPI/VCI and waits for a response packet.

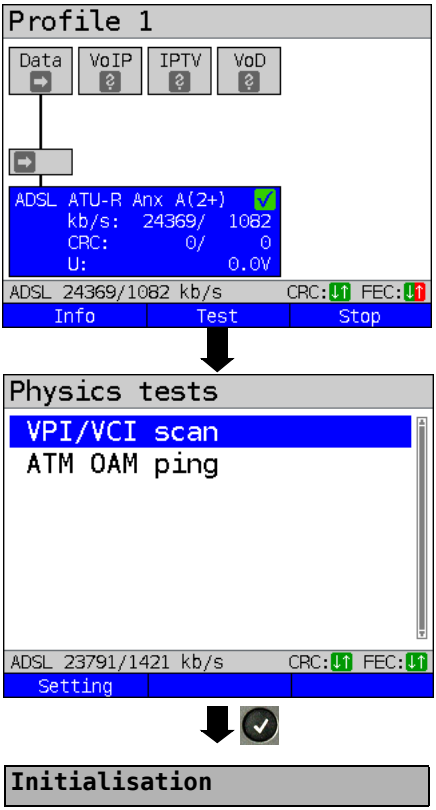
The following parameters must be saved in the profile for the VPI/VCI scan (when the xDSL connection is already established, the connection parameters, e.g. ADSL mode and target value, are locked).

Protocol-independent parameters:

The opening of test parameters is described in the chapter "Configuring accesses", see page 32.

Setting	Description
Test parameters:	
VPI/VCI scan:	
VPI	Virtual path identifier: VPI range that the ARGUS VPI/VCI scan tests. Range: 0 to 255 Default: ***0 to 8***
VCI	Virtual channel identifier: VCI range that the ARGUS VPI/VCI scan tests. Range: 32 to 65535 Default: ***32 to 48***
Number of scans	Number of scans. Range: 0 to 99 Default: ***2***
Timeout	Maximum wait time for the response from the ATM network node to the test packet sent by ARGUS. Range: 0.1 - 9.9 seconds Default: ***0.5 seconds***

Start VPI/VCI scan



ARGUS in the status screen.

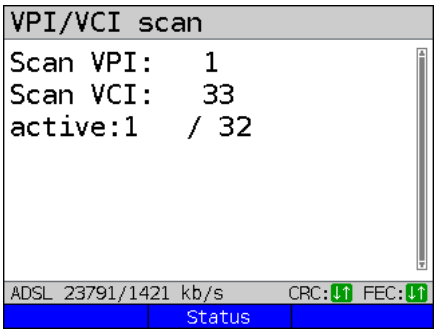
The ADSL ATU-R example shown in this example is active.

<Info>	Displays ADSL connection parameters.
<Test>	Displays the available tests.
<Stop>	Stops the ADSL connection.

<Setting>	ARGUS displays the test parameters for the VPI/VCI scan, see page 112.

The VPI/VCI scan starts automatically.

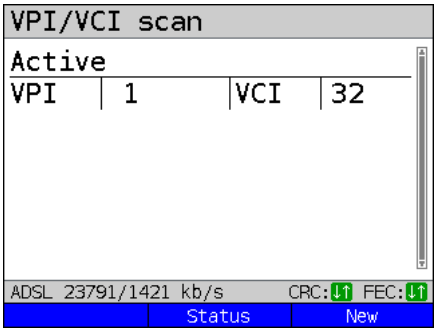
VPI/VCI scan



ARGUS displays the VPI/VCI combination currently being tested and the most recently detected active VPI/VCI combination (in this example: 1/32).

<Status>	Displays status screen without ending the test; see above.
	Cancels test.

VPI/VCI scan result



When the VPI/VCI is finished, ARGUS displays the VPI/VCI combinations active on the test connection.

<Status>	Display of status screen.
<New>	Start new VPI/VCI scan.



Exits results.



For saving results, see IP ping page 123.

13.2 ATM-OAM ping

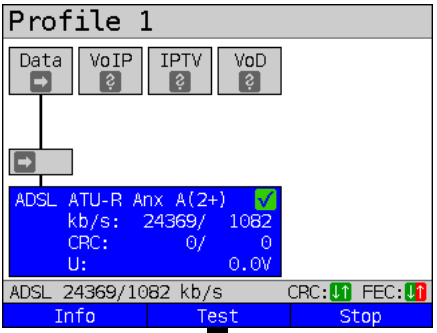
With an ATM-OAM ping, ARGUS checks the availability of individual ATM nodes or the availability of an ATM partial network. OAM stands for Operation, Administration and Maintenance and is used to monitor ATM data transmission.
The following parameters must be saved in the profile for the ATM-OAM ping (when the ADSL connection is already established, the connection parameters, e.g. ADSL mode and target value, are locked):

Protocol-independent parameters:

The opening of test parameters is described in the chapter "Configuring accesses", see page 32.

Setting	Description
Test parameters:	
ATM-OAM ping	
VPI/VCI	Entry of the VPI and VCI for the ATM-OAM ping. Range: VPI: 0 to 255, VCI: 32 to 65535 Default: ***VPI: 1, VCI: 32***
Number of pings	Number of test packets sent by ARGUS. When 0 is set ARGUS sends continuously until the ATM-OAM ping is halted manually. Range: 1 to 99999 Default: ***3***
Timeout	Maximum wait time for the response from the ATM network node to the test packet sent by ARGUS. Range: 0.1 - 9.9 seconds Default: ***1 second***
OAM cell type	F5 loopback segm.: the first ATM node of the virtual channel responds to the loopback cell. F5 loopback ete: the end point of the virtual channel responds to the loopback cell. Default: ***F5 loopback ete***

Start ATM-OAM ping



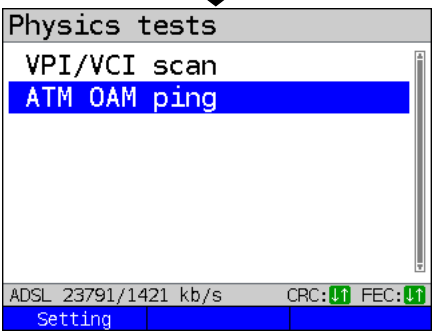
ARGUS in the status screen.

The ADSL ATU-R example set in this example is active.

<Info> Displays ADSL connection parameters.

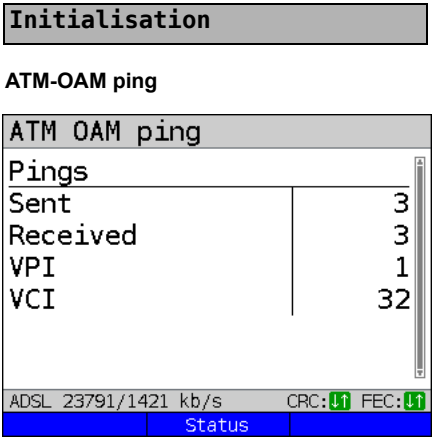
<Test> Displays the available tests.

<Stop> Stops the ADSL connection.



<Setting> ARGUS displays the test parameters for the ATM-OAM ping, see page 115.

The ATM-OAM ping starts automatically.



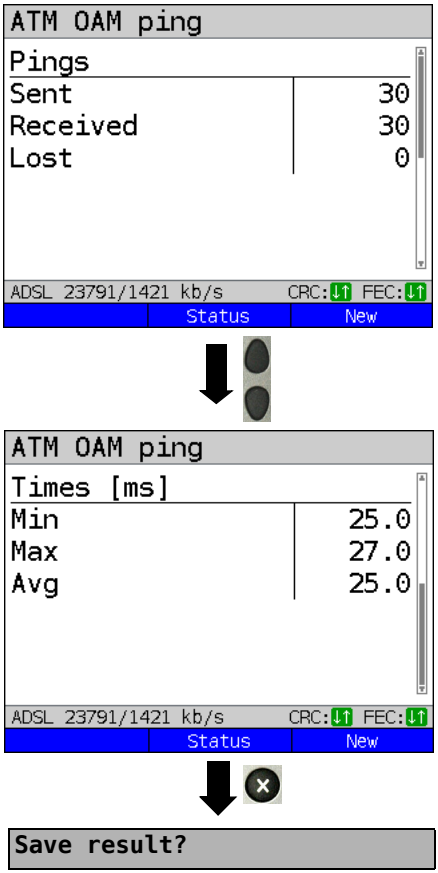
ARGUS displays the current number of sent test packets, the current number of response packets and the VPI/VCI on which the ping was executed.

<Status> Displays status screen without ending the test; see above.

Cancels test.

ATM-OAM ping

ATM-OAM ping result



At the end of the ATM-OAM ping, ARGUS automatically displays the result; for the setting "infinite" the test must be cancelled manually.

- Number of packets sent
- Number of packets received
- Number of packets lost
- Minimum packet response time
- Maximum packet response time
- Average packet response time

<Status> Display of status screen.

<New> Start new ATM-OAM ping.

For saving results, see IP ping page 123.

14 IP tests

14.1 IP ping

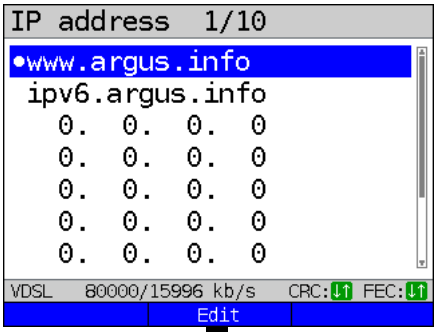
In IP ping, ARGUS tests whether a connection exists via Ethernet or xDSL using a DSLAM and whether the ATM/IP network to the internet service provider (ISP) or another computer or server address is possible. ARGUS sends a test packet to a specified IP address (remote station) and waits for a response packet. On the basis of the received response packet, is it possible to draw conclusions as to the availability and delay of the ATM/IP network. It is also possible to measure the maximum data packet size of the path.

The IP ping the following parameters:

Protocol-independent parameters

The opening of test parameters is described in the chapter "Configuring accesses", see page 32.

Setting	Description
Test parameters:	
IP ping:	
IP address	Address of remote station. ARGUS can store up to 10 IP addresses. The stored IP addresses are available in all profiles.



ARGUS displays the ten available slots for IP addresses. Mark the line with the IP address you wish to edit using the cursor keys (in this example the first slot is marked (1/10)).

<Edit> Edits the selected IP address.

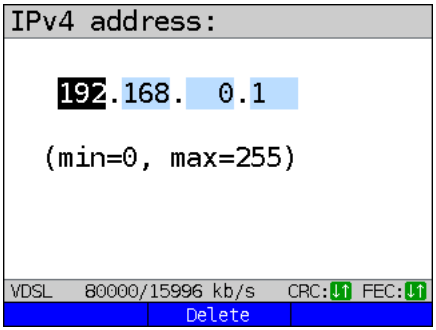


The address can be saved in the form of an IPv4 number, IPv6 number or a name.
Default: ***www.argus.info***

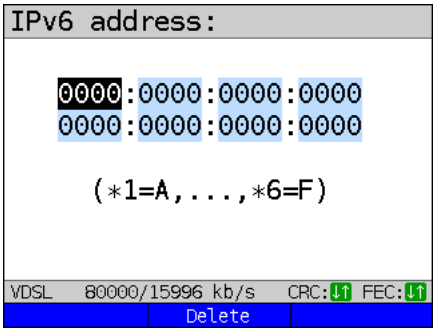
Continued on next page



IP address as IPv4 number



IP address as IPv6 number



You can use square brackets to include port information with IPv6 addresses in "IP address as name".

Enter the IPv4 or IPv6 address as a number. The editable area is highlighted in blue. Enter the address using the number keys.

<Delete> Deletes the place in front of the cursor.



When entering an IPv6 address, the letters A-F are available using these key combinations.



Adopts the marked IP address as the default.

Toggle entry using the softkey (right softkey changes the meaning when pressed). Enters the address as name, see user name page 91.

<Ab>AB> Entry begins with upper-case letters and continues in lower-case.

<AB>12> Entry of upper-case letters.

<12>ab> Numerical entry.

<ab>AB> Entry of lower-case letters.



Entry of special characters, e.g. @, /, -, . or _, :, ~, +, ...

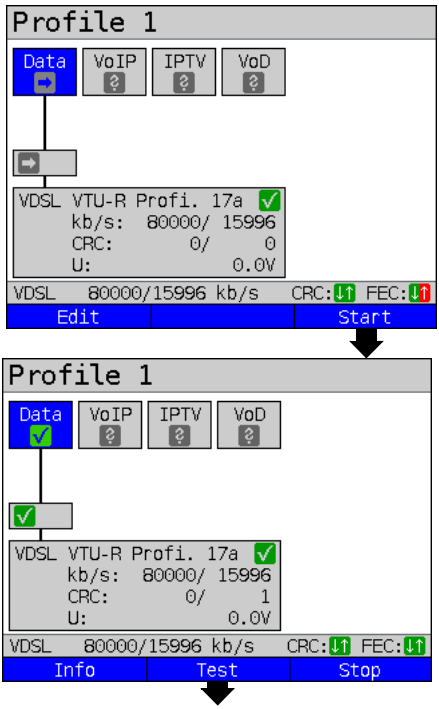


Moves the cursor in the display line

Number of pings	Enter the number of pings that ARGUS sends to the IP address. When 0 is set ARGUS sends continuously until the test is cancelled manually. Range: 1 to 99999 Default: ***10***
Pause	Defines a pause between two test packets. Range: 0.1 - 9.9 seconds Default: ***1 second***
Packet size	Sets the size of the test packet. You can determine the maximum packet size and the response time as as function of size by varying the packet size. Range: 36 to 55,555 bytes Default: ***84 bytes***

Fragmentation	Sets the fragmentation Default: ***on***	
	on	Test packets may be fragmented into multiple packets depending on the network (or router).
	off	Fragmentation prohibited, i.e. the test packets may be rejected by the network (or routers) (ARGUS does not receive a response packet).
	auto	ARGUS determines the maximum packet size of the path to the destination address (path MTU) and fragments the test packets so that the packets are transmitted with minimum delay (no fragmentation by the network/router necessary).

Starting IP ping (example access mode VTU-R, already active):



Establishing the service

The profile shown in the display (profile 1 in this example) is used for the IP ping.

<Edit> A virtual line is allocated to the service Data.

If no xDSL or Ethernet connection is established, ARGUS automatically connects at this point using the default profile (see page 46).

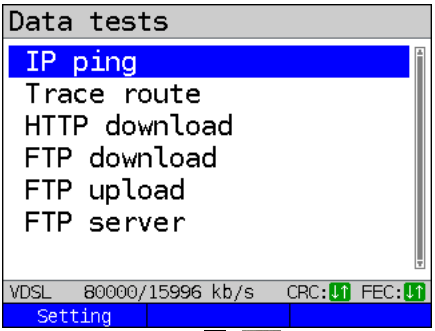
The service Data and the VDSL connection are active.

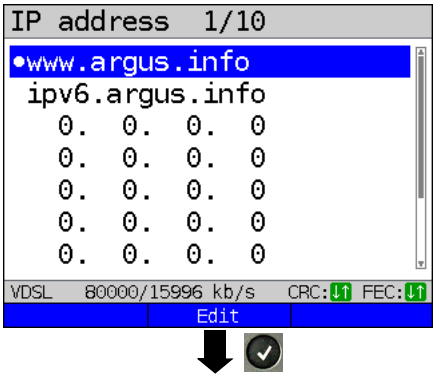
<Info> Duration of activation.

<Test> Opens test selection.

<Stop> Deactivates the service.

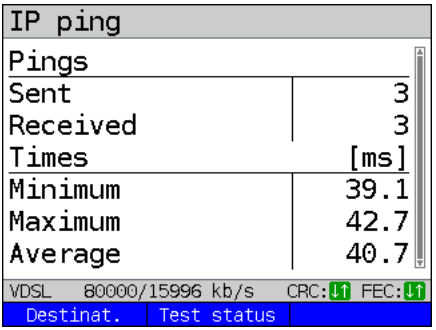
Continued on next page





Initialisation

IP ping





e.g. select IP ping

<Setting> Changes IP ping parameters, see page 118.

ARGUS displays the addresses stored in the protocol.



Select the address for the ping; the default is indicated with ●.

<Edit> Edits the address, see page 118.



In this example a ping test is conducted with IP version IPv4. Use with IPv6 is analogous.

The IP ping starts automatically.

Display during the IP ping test:

- Number of test packets sent
- Number of response packets
- Minimum time in ms
- Maximum time in ms
- Average time in ms

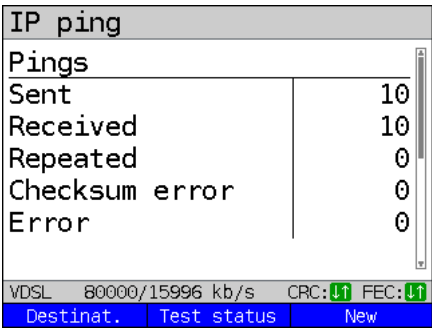
<Destination address> Display of URL and IP address.

<Test status> Displays test status without ending the test or starting a new test, see page 202.



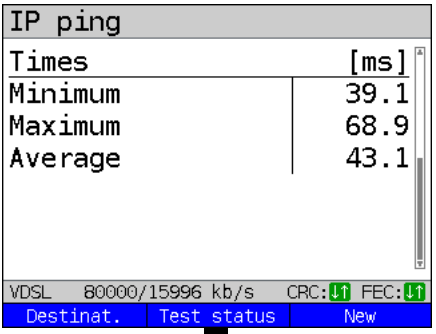
Cancels test
ARGUS displays the test results acquired up to this point and offers you the option of saving them (automatic prompt); see page 123.

IP ping result

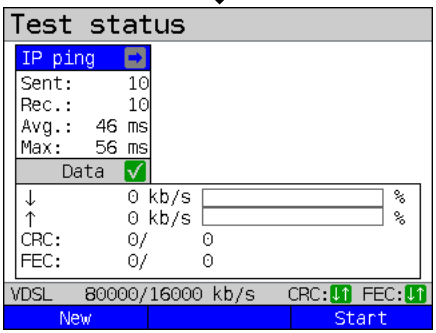


ARGUS displays the results when the test is finished:

- Number of packets sent
- Number of packets received
- Number of packets repeated
- Checksum errors
- Number of packets received with error
- Minimum packet response time in ms
- Maximum packet response time in ms
- Average packet response time in ms



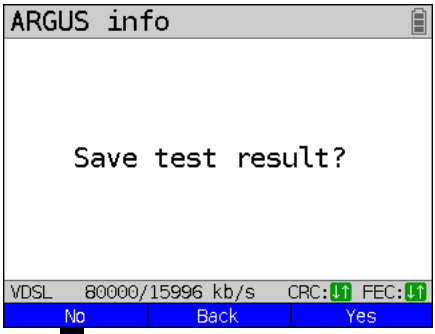
<Destination address>	Displays the URL and the IP address.
<Test status>	Displays test status without ending the test or starting a new test, see page 202.
<New>	Starts a new IP ping test.



Display of test status:
You can observe the running test or start a new test here, see page 202.

<New>	Selects a new single test.
<Start>	Starts a new IP ping test.

2x Continued on next page

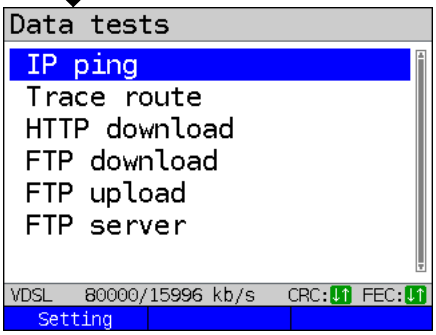


<Yes> ARGUS saves the result of the IP ping test to the first free storage slot in internal memory (see page 332).

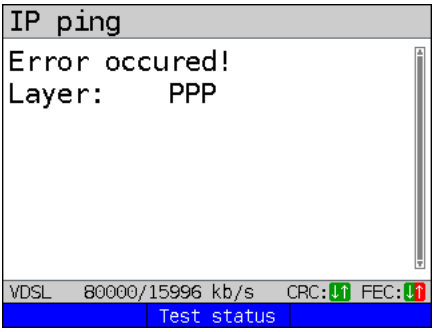
<Back> ARGUS returns to the test result without saving results.

<No> ARGUS returns to the last selection menu without saving results.

Sends trace file to PC, see page 94



A new test can be started as needed. The xDSL link and the service are still connected (the connection can be disconnected in the status screen with **<Stop>**).



Error messages in IP ping
ARGUS displays an error message as soon as an error occurs.

<Test status> Display of status screen.

For a description of error messages, see the Appendix, page 366 ff.

14.2 Traceroute

In IP traceroute, ARGUS sends test packets and displays all hops and their response times on the way to the destination address. This data enables precise localisation of possible delays in the network.
The following parameters must be saved in the profile for the IP traceroute:

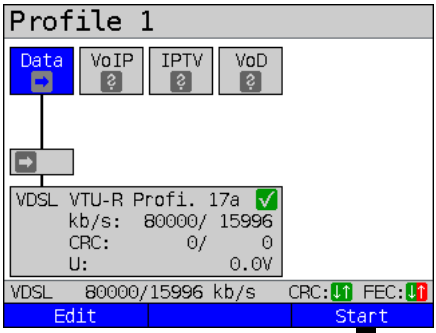
Protocol-independent parameters:

The opening of test parameters is described in the chapter "Configuring accesses", see page 32.

Setting	Description
Test parameters:	
Traceroute:	
IP address	The IP address of a destination node can be entered as either an IP number or a name (URL), see IP ping/IP address for instructions, page 119. Default: ***www.argus.info***
Maximum hops	Maximum number of hops over which the path to the destination address node is tracked. Range: 1 to 25 Default: ***25***
Probes	Number of attempts to address a network node. Range: 1 to 10 Default: ***3***
Timeout	Maximum wait time for the response of a network node. Range: 0.05 - 9.9 seconds Default: ***3 seconds***

Starting traceroute

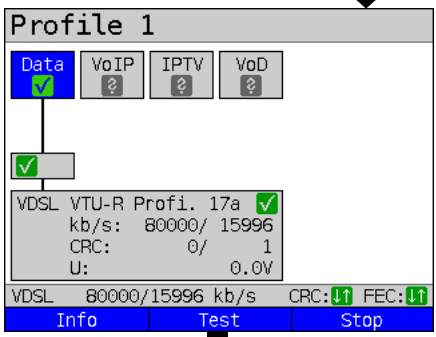
(Example: access mode VTU-R, already active)



Connecting the service.

The profile shown in the display (profile 1 in this example) is used for the traceroute test.

<Edit> A virtual line is assigned to the service Data.



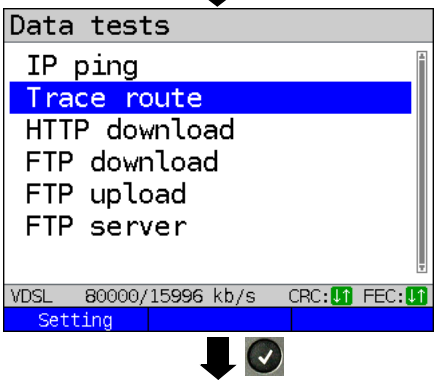
If no xDSL or Ethernet connection is established, ARGUS automatically connects at this point using the default profile (see page 46).

The service Data and the VDSL connection are active.

<Info> Duration of activation.

<Test> Opens test selection.

<Stop> Deactivates the service.

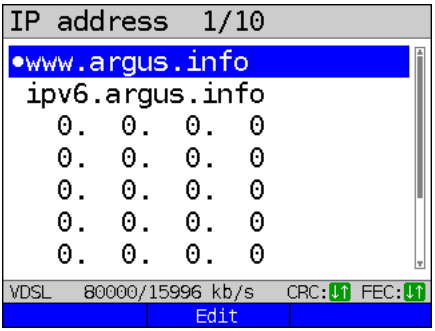




e.g. select Trace route

<Setting> Changes traceroute parameters, see page 124.

Continued on next page



ARGUS displays the IP addresses or URLs saved in the protocol.

Select the address for the traceroute test; the default is indicated with ●.

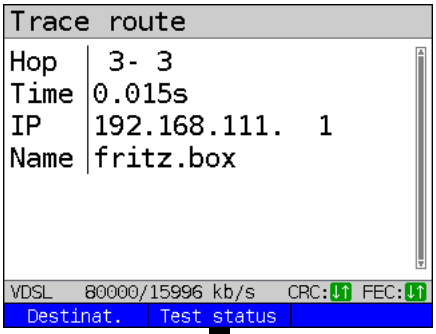
<Edit> Edits the address,
see page 118 for instructions.

In this example a traceroute test is conducted with IP version IPv4. Use with IPv6 is analogous.

The traceroute test starts automatically.

Initialisation

Traceroute



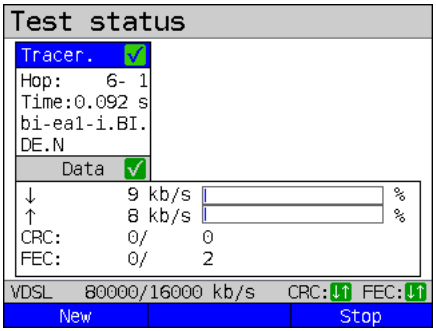
Display during the traceroute test:

- Current hop and attempt ("probe"), in this example:
  3 - 3: i.e. 3 hops and 3rd attempt.
- Response time of hop for current attempt (0.015 seconds).
- IP address of current hop, in this example 192.168.111.1 with name where applicable.

<Destinat.> Display of URL and IP address.

<Test status> Displays test status without ending the test or starting a new test, see page 202.

Cancels test
Displays the test results up to this point, with possibility of saving (automatic prompt).

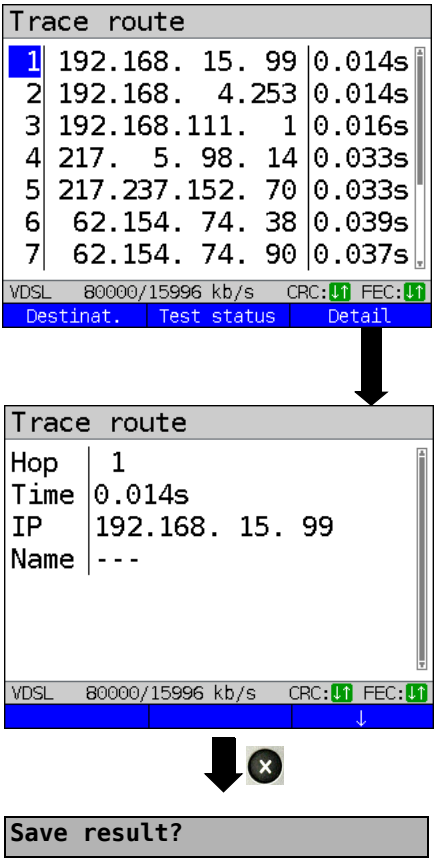


Display of test status:
You can observe the running test or start a new test here, see page 202.

<New> Selects a new single test.

<Stop> Stops the traceroute test.

Traceroute result



Display after end of traceroute:

- All hops and their response times are displayed.

<Detail> Displays the name of the IP address of the hop (if possible). The details of the hop at the top of the list are displayed (in this example hop 1).

<↓> Switches to next hop, in this example hop 2.

<↑> Switches to previous hop.

Exits results.

Saves the traceroute results (see also IP ping, page 123).
Sends trace file to PC, see page 94.

14.3 HTTP download

In HTTP download, ARGUS downloads the data of a website or file. ARGUS displays the current "net download rate", the usable data of the IP packets, and following conclusion of HTTP download the average speed (for multiple download attempts).
The following parameters must be saved in the profile for the HTTP download:



It is not possible to obtain meaningful speed values for download tests with a duration of less than 10 seconds; therefore you should download as large a file as you can (depending on the access speed). If the duration of the test is less than 10 seconds, ARGUS does not display any data rate or time.

Protocol-independent parameters:

The opening of test parameters is described in the chapter "Configuring accesses", see page 32.

Setting	Description
Test parameters:	
HTTP download:	
Server profile:	You can create up to 10 user-defined server profiles that can be used for HTTP and FTP download and FTP upload. The profiles contain all parameters for HTTP and FTP download and FTP upload.
Server address	Entry of server address or URL of the server from which ARGUS downloads the file. For upload test: entry of upload destination address (server address) to which ARGUS sends the file. See page 118 for information on using the softkeys.
Download file name	Name of the file with the data that ARGUS downloads for tests (HTTP download and FTP download). Observe the notes for www alias addresses! (see page 129). If a specific port is required please enter it into the server address. See page 118 for information on using the softkeys.
Upload file name	Entry of the file name under which the file sent to the server in the FTP upload test is stored. Default: ***file***
Upload file size	Sets the size of the file that ARGUS sends in FTP upload. Range: 0 to 1000 Mbyte Default: ***100 MByte***

User name	Name of the user for the (FTTP, HTP) file server. See page 118 for instructions
Password	Password entry for the (FTTP, HTP) file server (max. 40 characters). See page 118 for instructions
Number	Number of times ARGUS downloads the file in the download test. For upload test: number of times ARGUS uploads the file in the upload test. "Zero" means infinite: the test continues until stopped manually. Range: 0 to 9,999 bytes (0=infinite) Default: ***3***
No. parall. down.	Number of packets into which the requested download is fragmented and simultaneously downloaded (see page 129). Range: 1 to 10 Default: ***3***
Profile name	Enters a name for the profile.



If a www alias address is entered as the "Source/destination address", ARGUS downloads "only" the HTML page in HTML download. ARGUS does not evaluate the HTML code, so that any link to a "real" www address is not considered. In this case, ARGUS does not indicate an error, as the HTML page of the specified "Source/destination address" was loaded without error.



When entering the "Source" address (server address and download file name), be sure to observe the correct capitalisation; otherwise ARGUS will return error 301 (Moved Permanently) or 404 (Not Found).

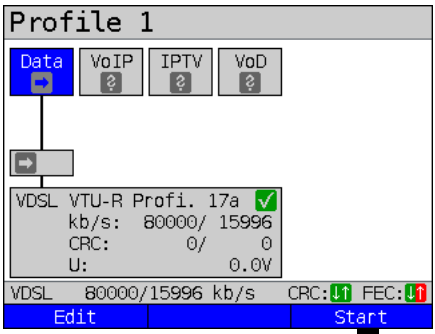


When requesting multiple download components, ARGUS may reduce the number of downloads depending on the server support, which can cause deviations from the set parameters. This can occur e.g. as soon as the size of the requested file is unknown.



If the download file name exceeds the maximum permissible length, you can work around this limit by fragmenting the address and additionally using the "Server" field.
The server name may be up to 80 characters long, the file name 60 characters long.

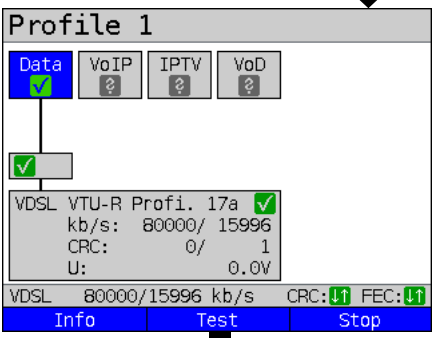
Starting HTTP download (example: access mode VTU-R, already active)



Connecting the service.

The profile shown in the display (profile 1 in this example) is used for HTTP download.

<Edit> A virtual line is added to the service Data.

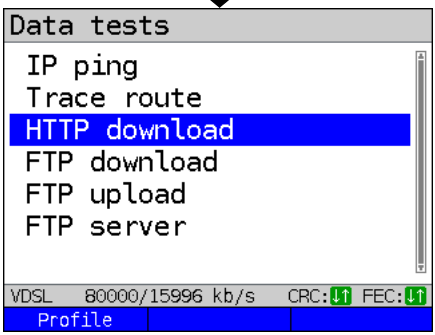


If no connection is established, ARGUS automatically connects at this point using the default profile (see page 46).

<Info> Duration of activation.

<Test> Opens test selection.

<Stop> Deactivates the service.



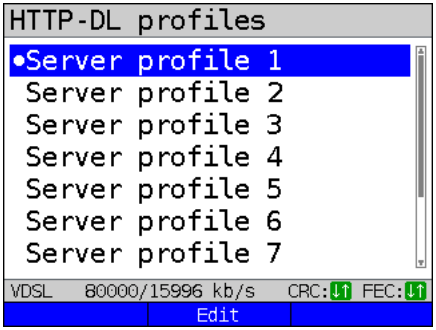


e.g. select HTTP download

<Profile> Displays the available HTTP download profiles.

Continued on next page





Mark the server profile:
(default is indicated with ●).

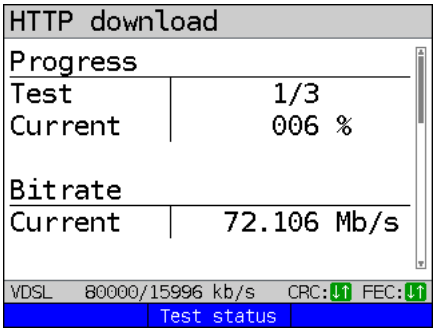
The server profiles are also used for FTP download and FTP upload.

<Edit> Edits the marked profile, see page 128 for changes to the individual settings.



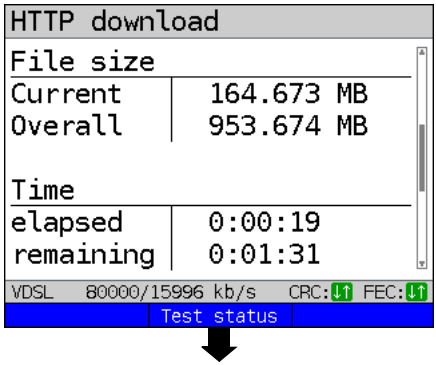
HTTP download starts automatically.

HTTP download



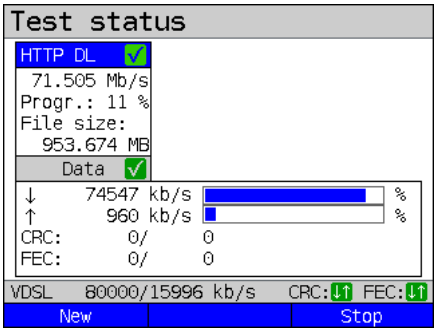
Display during HTTP download:

- Current download/total number of downloads, in this example the first download attempt out of three (1/3) is displayed.
- Data already transferred (in this example 6 %).
- Current net average download rate (in this example 72,106 Mbit/s).
- Bytes transferred so far (in this example 164,673 MB).
- Size of file to be downloaded (in this example 953,674 MB).
- Transfer time so far in h:min:s.
- Remaining transfer time in h:min:s.
- Number of parallel downloads.



<Test status> Displays test status without ending the test or starting a new test, see page 202.

Cancels test.

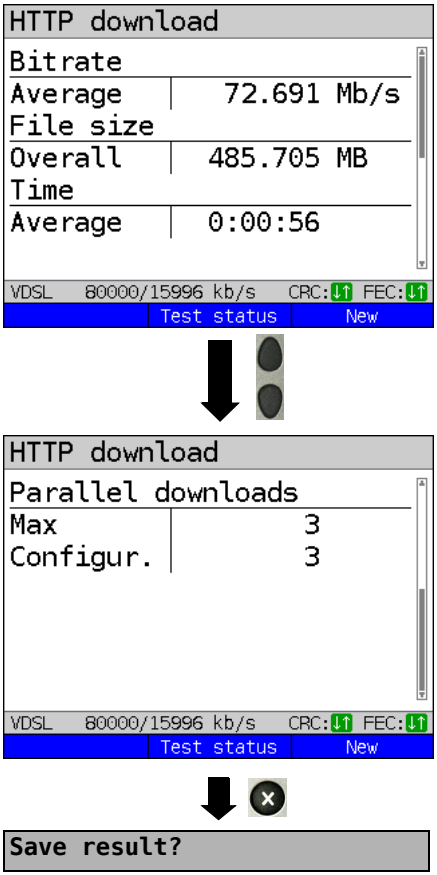


Display of test status:
You can observe the running test or start a new test here, see page 202.

<New> Selects a new single test.

<Stop> Stops HTTP download test.

HTTP download result



<Test status> Displays test status without ending the test or starting a new test, see page 202.

<New> Starts a new HTTP download.

Display of results:

- Calculated average speed of all downloads (in this example 72,691 Mbit/s).
- Transferred file size (in this example 485,750 MB).
- Average time required for a download in h:min:s.
- Maximum parallel downloads.
- Configured parallel downloads.

Exits results.

Saves HTTP download result, see page 122.
Sends trace file to PC, see page 94

14.4 FTP download

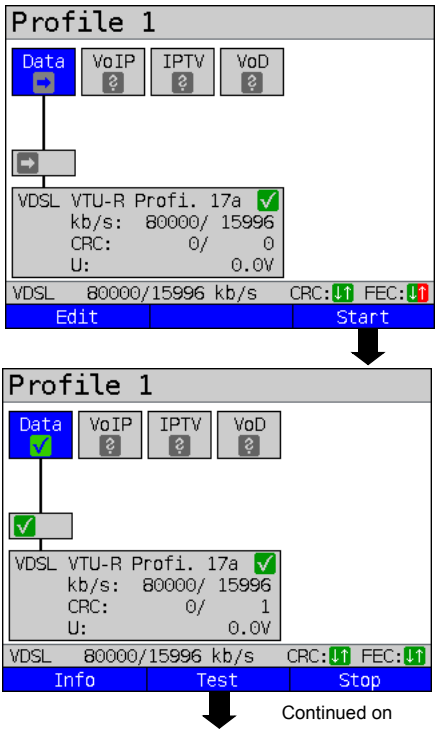
In FTP download, ARGUS downloads data in the form of a file. ARGUS displays the current net download rate, the usable data of the IP packets, and following conclusion of test the average speed (for multiple download attempts).

No meaningful evaluations are possible for download tests with a duration of less than 10 seconds. Therefore, the download file should be as large as possible (depending on the access speed). If the duration of the test is less than 10 seconds, ARGUS does not display any data rate or time.

Protocol-independent parameters:

The opening of test parameters is described in the chapter "Configuring accesses", see page 32. See page 128 HTTP download for an explanation of the test parameters.

Starting FTP download (example: access mode VTU-R, already active)



Connecting the service.

The profile shown in the display (profile 1 in this example) is used for FTP download.

<Edit> A virtual line is added to the service Data.

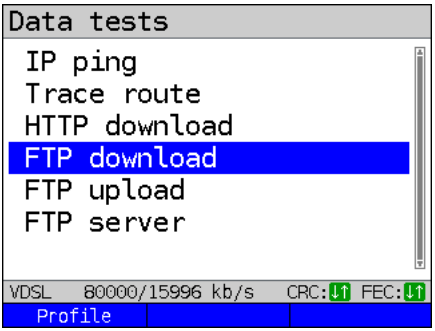
If no connection is established, ARGUS automatically connects at this point using the default profile (see page 46).

<Info> Duration of activation.

<Test> Opens test selection.

<Stop> Deactivates the service.

Continued on next page

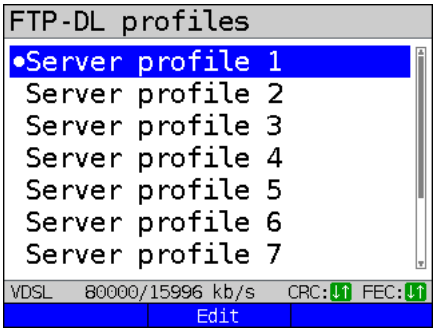




e.g. FTP download

<Profile> Displays the available FTP download profiles.





Mark the server profile (default is indicated with ●).

The server profiles are also used for HTTP download and FTP upload.

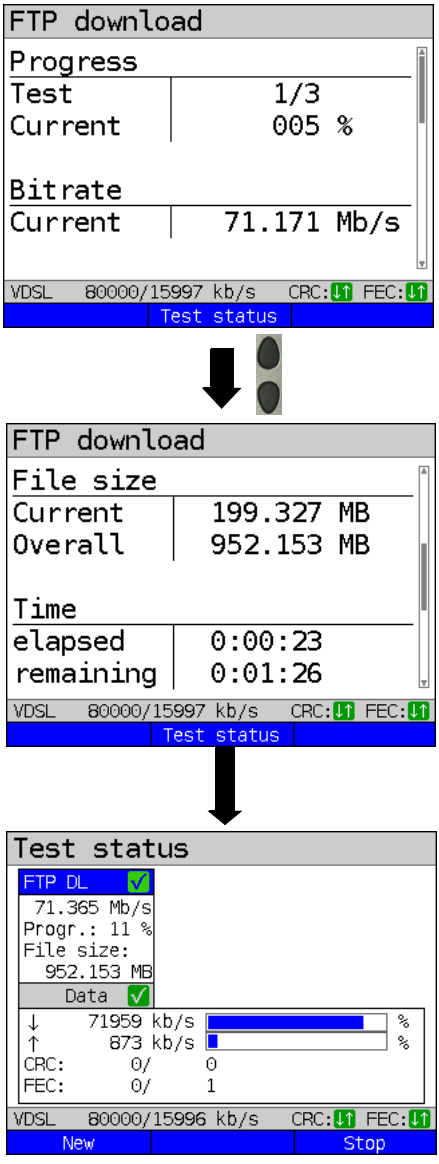
<Edit> Edits the marked profile, see page 128 for changes to the individual parameters.





FTP download starts automatically.

FTP download



Display during FTP download:

- Current download/total number of downloads, in this example the first download out of three (1/3) is displayed.
- Data transferred so far (in this example 5 %).
- Current net average download rate (in this example 71,171 Mbit/s).
- Bytes transferred so far (in this example 199,327 MB).
- Total download file size (in this example 952,153 MB).
- Duration of test so far (in h:min:s).
- Remaining transfer time.
- Number of parallel downloads.

<Test status> Displays test status without ending the test or starting a new test, see page 202.

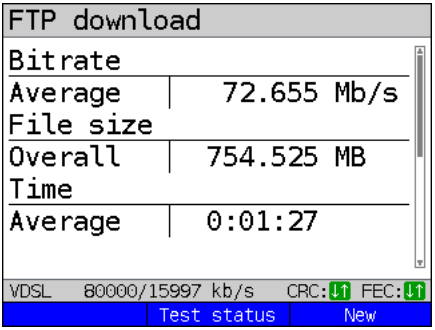
Cancels test.

Display of test status:
You can observe the running test or start a new test here, see page 202.

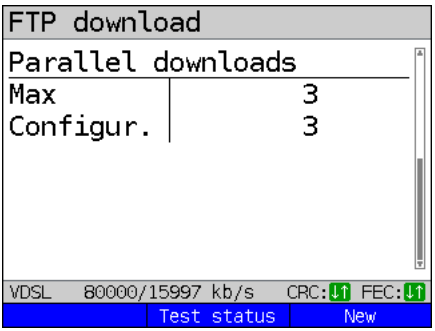
<New> Selects a new single test.

<Stop> Stops FTP download test.

FTP download result











<Test status> Display of test status.

<New> Starts a new FTP download.

Display after end of FTP download:

- Calculated average speed of all downloads (in this example 72,655 Mbit/s).
- Transferred file size (in this example 754,525 MB).
- Average time required for a download in h:min:s.
- Maximum parallel downloads.
- Configured parallel downloads.

Exits results.

For saving results, see IP ping page 122.
Sends trace file to PC, see page 94.

14.5 FTP upload

In FTP upload, ARGUS sends the data of a file to a server. Among other information, ARGUS displays the current net upload rate, the usable data of the IP packets, and following conclusion of test the average net speed (for multiple download attempts).

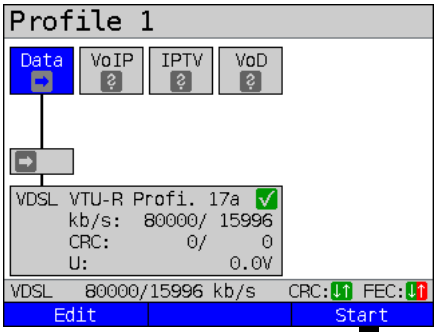


No meaningful evaluations are possible for upload tests with a duration of less than 10 seconds. Therefore, the upload file should be as large as possible (depending on the access speed). If the duration of the test is less than 10 seconds, ARGUS does not display any data rate or time.

Protocol-independent parameters:

The opening of test parameters is described in the chapter "Configuring accesses", see page 32. See page 128 HTTP download for an explanation of the test parameters.

Starting FTP upload (example: access mode VTU-R, already active)

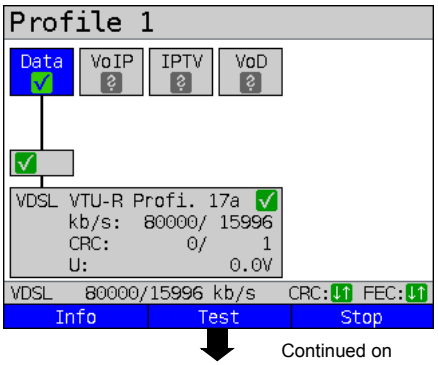


Connecting the service.

The profile shown in the display (in this example profile 1) is used for FTP upload.

<Edit> A virtual line is assigned to the service Data.

If no connection is established, ARGUS automatically connects at this point using the default profile (see page 46).

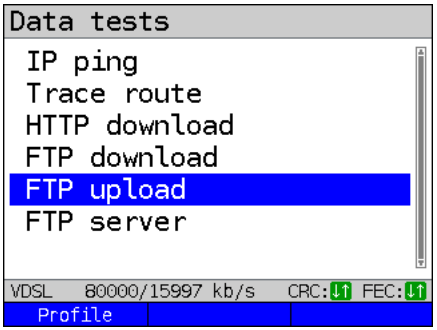


<Info> Duration of activation.

<Test> Opens test selection.

<Stop> Deactivates the service.

Continued on next page



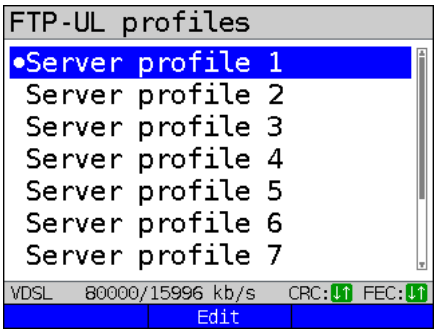


e.g. FTP upload

<Profile> Displays the available FTP upload profiles.



Mark the server profile
(default is indicated with ●).



The server profiles are also used for HTTP download and FTP download.

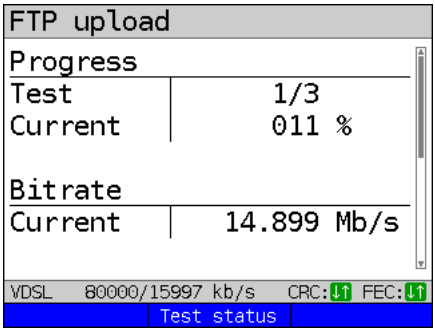
<Edit> Edits the marked profile, see page 128 for changes to the individual parameters.



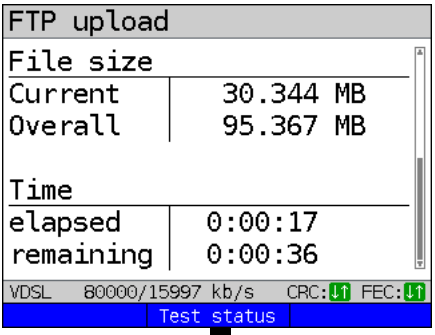


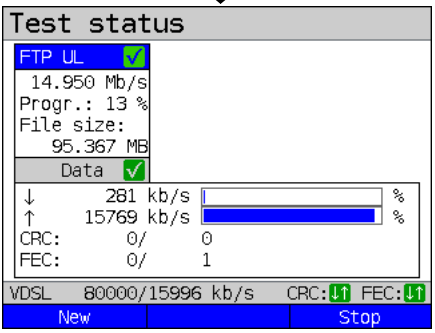
FTP upload starts automatically.

FTP upload









Display during FTP upload:

- Current upload/total number of uploads, in this example the first upload out of three (1/3) is displayed.
- Data already transferred (in this example 11 %).
- Current net upload rate (in this example 14,899 Mbit/s).
- Bytes transferred so far (in this example 30,344 MB).
- Overall file size (in this example 90,367 MB).
- Current upload time in h:min:s.
- Remaining transfer time.

<Test status> Displays test status without ending the test or starting a new test, see page 202.

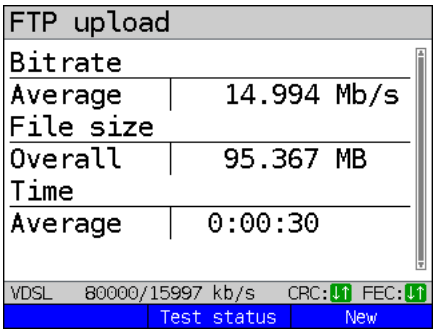
Cancels test.

Display of test status:
You can observe the running test or start a new test here, see page 202.

<New> Selects a new single test.

<Stop> Stops FTP upload test.

FTP upload result



Display of results

<Test status> Display of test status.

<New> Starts a new FTP upload test.



Save result?

For information on saving results, see IP ping page 122.
Sends trace file to PC, see page 94.

14.6 FTP server

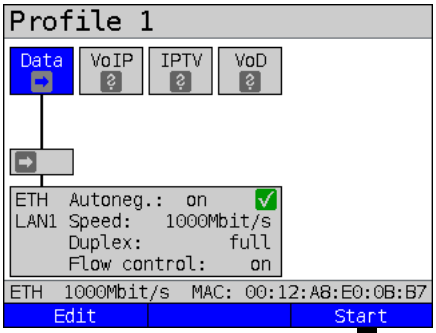
In FTP server mode, ARGUS behaves like a server for FTP requests. In this mode, ARGUS serves FTP download and FTP upload requests.
These requests can be sent from a second terminal device (e.g. another ARGUS unit) via an xDSL or Ethernet access.
This makes it possible to test end-to-end throughput and determine the maximum possible data rate for this access.

In the following, the throughput test is explained using the Ethernet interface as an example. This example uses two ARGUS units. One serves as the FTP server while another requests the FTP download.

ARGUS 1 - FTP server

No settings need to be configured on the ARGUS used as the FTP server. The FTP server test just needs to be started on the selected interface.

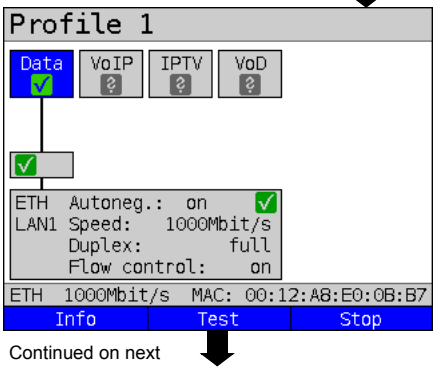
Starting FTP server (example: Ethernet, already active)



Connecting the service.

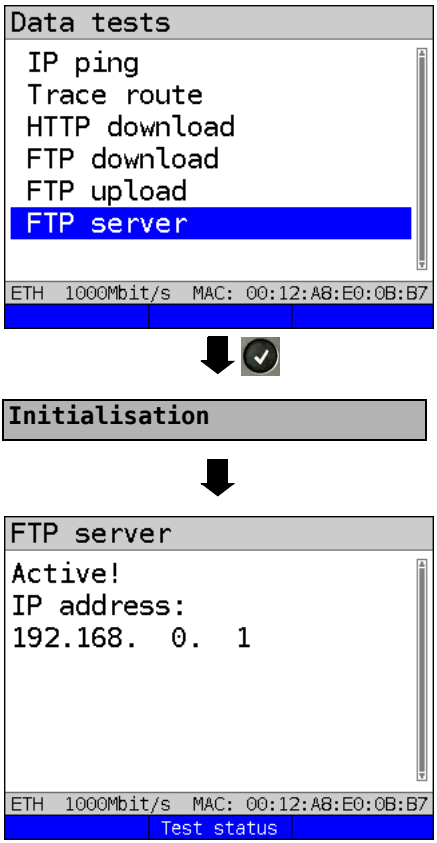
The profile shown in the display (profile 1 in this example) is used for the FTP server.

<Edit> A virtual line is assigned to the service Data.



If no connection is established, ARGUS automatically connects at this point using the default profile (see page 46).

Continued on next page





e.g. FTP server

ARGUS uses the IP address configured under "own IP address" as the destination address (server) for the second ARGUS unit.

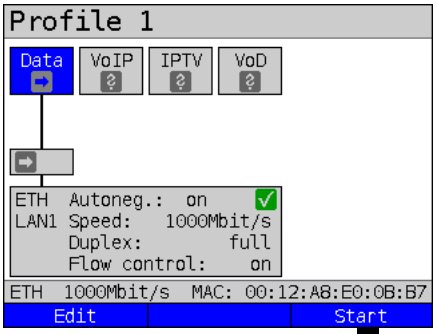
<Test status>	Displays test status without ending the test or starting a new test, see page 202.

ARGUS 1 now waits for an FTP request from a second terminal device (in this example the second) ARGUS).
The IP mode in this example is "static", the default IP netmask configuration is used.

ARGUS 2 - FTP down/upload

In principle, you can adopt the same configuration for the ARGUS unit sending the FTP request (FTP download in this example) as in an FTP download test.
The netmask and IP address (IP mode: static) should match the settings on ARGUS 1.

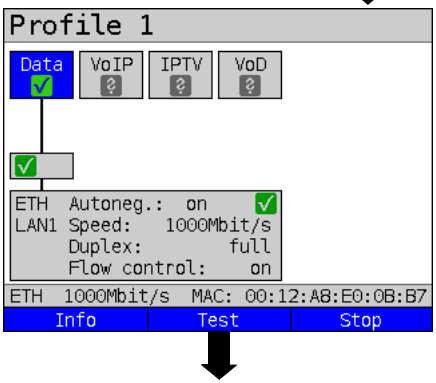
Starting FTP download:



Connecting the service.

The profile shown in the display (profile 1 in this example) is used for the FTP server.

<Edit> A virtual line is assigned to the service Data.



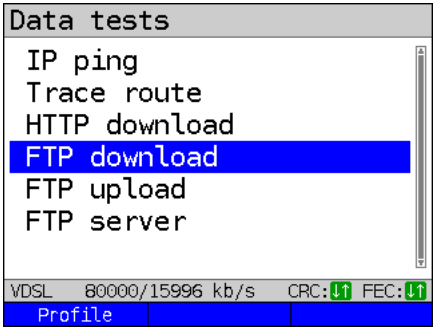
If no connection is established, ARGUS automatically connects at this point using the default profile (see page 46).

<Info> Duration of activation.

<Test> Opens test selection.

<Stop> Deactivates the service.

Continued on next page

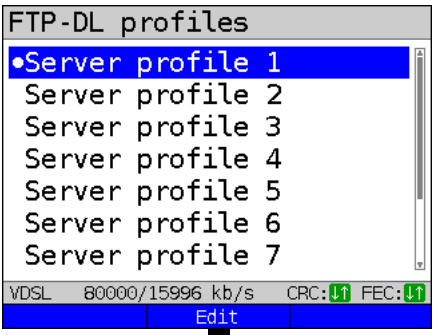


Test selection



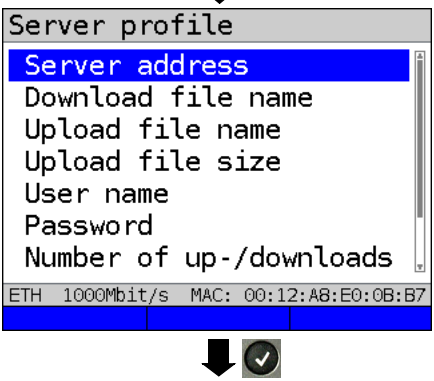
e.g. FTP download

<Profile> Edits FTP parameters, see page 128.



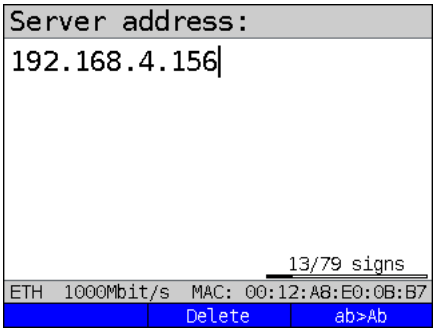
Mark the server profile (default is indicated with ●).

<Edit> Edits the marked profile, see page 128 for changes to the individual parameters.



See page 128 HTTP download for an explanation of the test parameters.

Continued on next page



Enter the address of ARGUS 1 in the server profile of ARGUS 2 as the server IP address, see page 142.

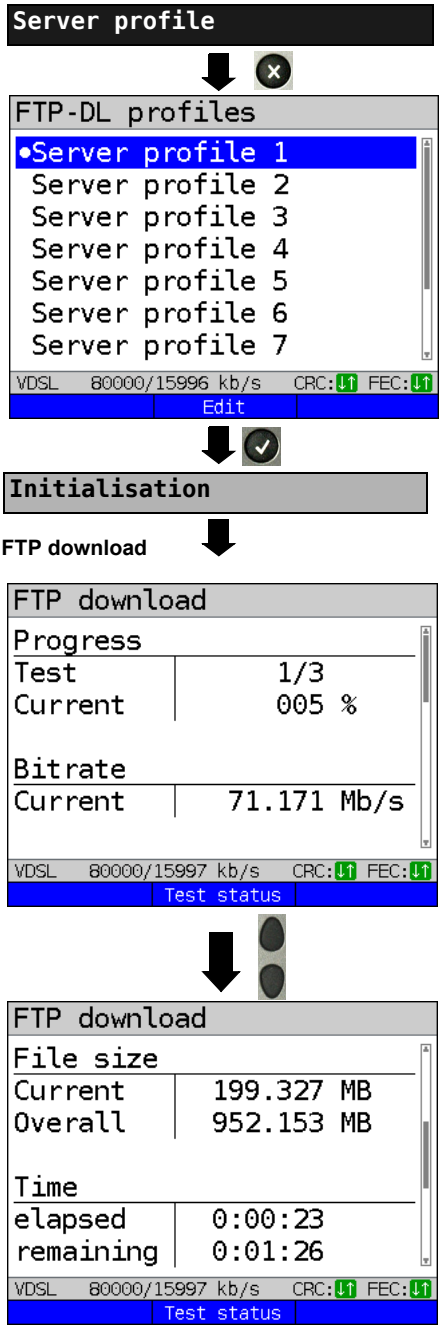
<Delete>	Deletes the place in front of the cursor.
<12>AB>	see page 91.

Download file name



In this case too the download file name is the size of file to be downloaded. The file size is specified in bytes.
Download file name: 1,000,000,000 results in a file size of: 1 GB.

No meaningful evaluations are possible for download tests with a duration of less than 10 seconds. Therefore, the upload file should be as large as possible (depending on the access speed). If the duration of the test is less than 10 seconds, ARGUS does not display any data rate or time.



<Edit> Edits the marked profile, see page 128 for changes to the individual parameters.

FTP download starts automatically.

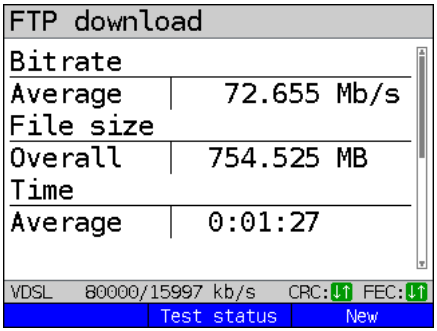
Display during FTP download:

- Current download/total number of downloads, in this example the first download out of three (1/3) is displayed.
- Data already transferred (in this example 5 %).
- Current net average download rate (in this example 71,171 Mbit/s).
- Bytes transferred so far (in this example 199,327 MB).
- Total download file size (in this example 952,153 GB).
- Current upload time in h:min:s.
- Remaining transfer time.
- Number of parallel downloads.

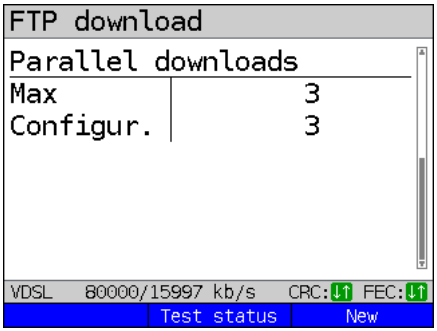
<Test status> Displays the test status without ending the test.

Cancels test.

FTP download result











<Test status> Display of test status.

<New> Starts a new FTP download.

Display after end of FTP download:

- Calculated average speed of all downloads (in this example 72,655 Mbit/s).
- Transferred file size (in this example 754,525 MB).
- Average time required for a download in h:min:s.
- Maximum parallel downloads.
- Configured parallel downloads.

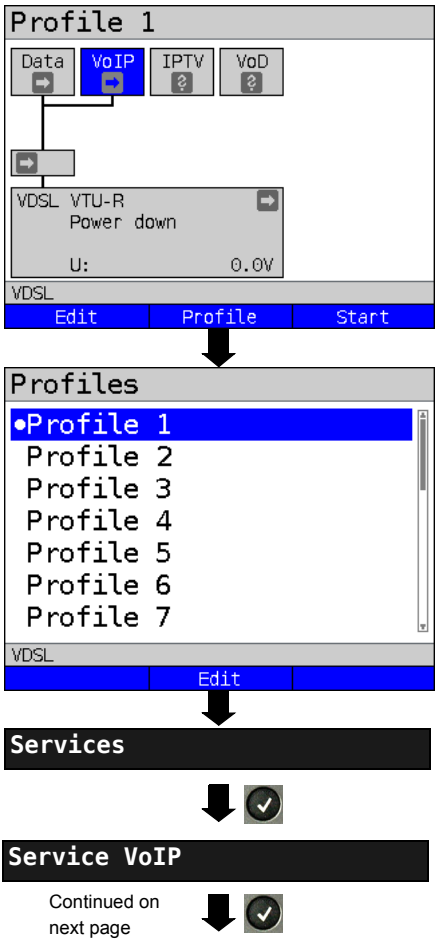
Exits results display.

For saving results, see IP ping page 122.
Sends trace file to PC, see page 94.

15 VoIP tests

ARGUS operates as a VoIP terminal device with active acoustics, enabling voice links. Session Initiation Protocol (SIP) is available as a VoIP signalling protocol. Calls can be established both with and without registrar/proxy. ARGUS can be used to establish VoIP connections (DSL telephony) via xDSL and Ethernet. To assess voice quality, ARGUS determines and displays the MOS/R-factor and the RTP datastream.
You can configure threeVoIP "accounts" (profiles):

Protocol-independent parameters:



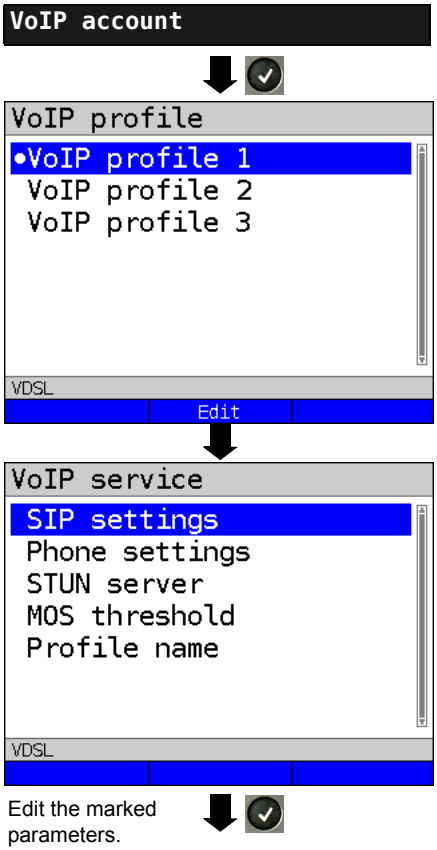
Continued on next page

ARGUS in status screen.

<Edit>	A virtual line is assigned to the service VoIP.
<Profile>	See page 32 for profile settings.
<Start>	Starts the service.

Select the profile you wish to edit. The selected profile appears in the display in blue. The default profile is indicated with a ● in the display. ARGUS adopts the parameters from the default profiles for establishing the Ethernet or xDSL connection and conducting the VoIP test.

ARGUS uses the marked profile as the default profile and switches to the menu Settings.



Edit the marked parameters.

A total of three user-defined VoIP profiles are available.

<Edit> Edits the VoIP profile.

Edits the marked profile.

Setting	Description	
VoIP account settings:		
VoIP:	You can create a total of three VoIP profiles. **<Edit>** Activates the profile you wish to edit.	
SIP	User name	User name for registrar, see page 91 for instructions.
	Password	Password for the registrar, see page 91 for instructions.
	Authentication	Additional xTU-R password for legitimate authentication. See page 91 for instructions
	Caller ID	Optional entry of a user-definable text which then appears in the display of the called party in place of the caller's originating number. See page 91 for information on using the softkeys.
	Registrar Server	Use registrar: select yes or no If an internet telephony service provider (ITSP) is used (in this case you dial a normal telephone number), a registrar must be used as well. If a VoIP telephone is dialled directly, e.g. via the IP address or SIP URL, no registrar is needed. You can edit and use an IPv4 or IPv6 address as well as a name for the registrar server. The address is edited in the same way as for the IP ping test, see page 118. Default: ***no***
	Outbound proxy/ SBC	Use proxy (SBC = session border controller) Determines whether an outbound proxy is to be used. Default: ***no*** Outbound proxy/SBC: address of proxy server. The outbound proxy/SBC is configured in the same way as for the IP ping test, see page 118. Outbound proxy/SBC port: port of proxy server. Range: 0 to 65535 Default: ***5060***

SIP trunk	Use trunk	SIP trunk makes it possible to manage multiple different numbers, each with its own extensions, using a single access account. Default: ***no***
	CLIR	The setting CLIR (calling line identification restriction) can be used to suppress the originating caller ID. Default: ***no***
	Own trunk number	The trunk number is a telephone number with no extension. Default: ***4923519070***
	Direct dial-in (DDI)	DDI enables the desired access to be dialled directly. You can edit the extension using <Edit> (up to 4 characters). Default: ***0***
TCP fallback	For a data stream with large packets, ARGUS attempts to use the TCP protocol instead of UDP. Default: ***no***	
TLS	The TLS (transport layer security) protocol, formerly SSL (secure sockets layer), is a hybrid encryption protocol for secure data transmission. Default: ***no***	
SIP domain	Configuration of the domain name for the "from" field in the SIP message (when using an ITSP).	
Listen port	Port used for incoming SIP signalling. Range: 0 to 65535 Default: ***5060***	
Remote port	Port used at the remote station: When a registrar is used (see "registrar server" setting on page 150), entry of the port number of the registrar/ proxy server, otherwise entry of the port number at the remote station. Range: 0 to 65535 Default: ***5060***	
User agent	ID string/terminal device type is transmitted to the called party. Default: ***Argus162***	

	Qualify	Determines whether the availability of the proxy service is to be continuously verified. Default: ***no***
	Reg. expire	Determines the period of validity of registration with the registrar. Range: 10 - 6000 seconds Default: ***3600 seconds***
	Retry-after	Following a failed registration, the standard calls for a 100 second delay before attempting to register again (standard). When "ignore" is set, registration is repeated in increasing intervals (1 second several times, then 2 s, 4s, etc.). Default: ***standard***
	Cancel current regist.	The current registration is cancelled at the registrar. If this is set to "yes", exclusive registration of ARGUS at the registrar server. Otherwise inclusion in the list of existing registration. Default: ***yes***
Telephone Configuration	RTP port range	SIP signalling and RTP data are transmitted via different ports. The port range used can be adjusted for RTP, e.g. to match a router. Range: 0 to 65535 Default: Start: ***10000*** End: ***20000***
	Silence detection	When this setting is "on", ARGUS does not transmit voice packets during pauses in speech. However, this can cause problems in port assignment behind a NAT router. When the setting "not used" is selected, the feature "silence detection" is not communicated to the remote station. However, it remains set. Default: ***off***

Telephone configuration (continued)	Jitter buffer	Determines whether the size of the jitter buffer is static or adaptive. Default: ***static*** static: Entry of a static jitter buffer size. Range: 20 to 200 ms nominal: ***60 ms*** adaptive: Entry of the minimum (min) and maximum (max) jitter buffer size and the initial value (init). Range: 20 to 600 ms Default: min: ***60 ms*** init: ***60 ms*** max: ***120 ms***
	Codecs	Prepares a list of the speech codecs to be used. For multiple codecs, the order determines the priority.  Switches to softkey assignment. **<↓>** The selected codec is moved down one place in the list. **<↑>** The selected codec is moved up one place in the list. **<Insert>** A display with the available voice codecs opens. A voice codec marked with  in this selection menu is inserted in the voice codec list (via the voice codec marked in the list). **<Delete>** Deletes the marked codec from the list.  Adopts the codec priorities.

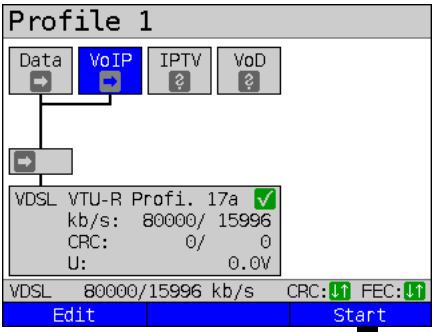
<table>
<tr><td>Telephone configura-tion
(continued)</td><td>DTMF settings</td><td>Dual-tone multi-frequency (DTMF) is a multifrequency dialling method.
Mode: Sets DTMF mode
You can choose between "Automatic", "SIP info", "RFC 2833" and "Inband".
Default: Automatic
Duration: Sets the VoIP DTMF timer
Range: 40 to 1000 ms.
Up to 200 ms in steps of 10, up to 300 ms in steps of 20, up to 1000 ms in steps of 100.
Default: 80 ms
 Increases or decreases the VoIP DTMF duration.</td></tr>
<tr><td rowspan="2">STUN server</td><td>Use STUN</td><td>Use STUN: select yes or no
If a NAT router is located between ARGUS and the nearest remote station (gateway), STUN must be used so that ARGUS can determine under which IP address the remote station sees ARGUS. Default: no</td></tr>
<tr><td>STUN server</td><td>STUN server: address of a STUN server, which must be in the same network (on the same level) as the remote station.</td></tr>
<tr><td>Rated/tre-shold value</td><td>MOS rates value</td><td>Entry of MOS setting:
The mean opinion score (MOS) assesses the quality of voice data. The MOS quality scale ranges from 5 (excellent) to 1 (bad). On the basis of the set MOS value, ARGUS rates the current VoIP voice link as "OK" (current MOS value achieves MOS setting) or "FAIL".
Range: 1.0 to 5.0
Default: 4.0
<table>
<tr><td>value</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>Voice quality</td><td>excellent</td><td>good</td><td>fair</td><td>poor</td><td>bad</td></tr>
</table>
The MOS value here is stated as MOS_{CQE} (conversational quality estimated). The use of a specific codec has a significant influence on this.</td></tr>
<tr><td></td><td>Jitter treshold</td><td>Determines the treshold for the jitter.
Range: 0 to 200 ms
Default: * (off)</td></tr>
</table>

	RTP loss treshold	Determines the treshold for the RTP loss treshold. Range: 0 to 100 % Default: **** (off)***
Profile name	Enter/modify name of edited VoIP profile.	

VoIP QoS (Quality of Service)		
Layer 3 DiffServ	Differentiated services: Classification/prioritisation of IP packets (L3)	
RTP (ToS/DSCP)	ToS	Type of service Field for setting the priority in the IP header of the usable data (RTP), see page 119 for further details. Range: 0 to 0xFF Default: ***18***
	DSCP	Differentiated services codepoint Field for setting the priority in the DS field (6 bits) of the usable data (RTP), see page 119 for further details. Range: 0 to 0x3F Default: ***00***
SIP (ToS/DSCP)	ToS	Type of service Field for setting the priority in the IP header of SIP data (signalling), see page 119 for further details. Range: 0 to 0xFF Default: ***18***
	DCSP	Differentiated services codepoint Field for setting the priority in the DS field (6 bits) of the SIP data (signalling), see page 119 for further details. Range: 0 to 0x3F Default: ***00***
Layer 2 VLAN Prio	The VLAN prioritisation on layer 2 is an extension of the Ethernet header.	
RTP VLAN Prio	VLAN prioritisation of usable data (RTP) Range: 0 to 7 Default: ***0***	
SIP VLAN Prio	VLAN prioritisation of SIP data (signalling) Range: 0 to 7 Default: ***0***	

15.1 Starting VoIP telephony

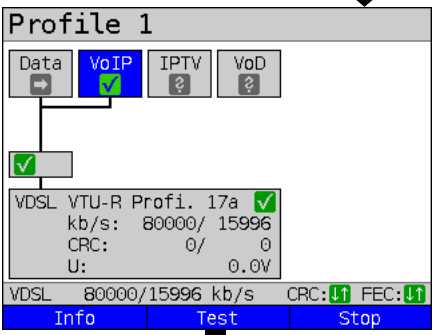
(Example: VDSL access, already active)



Connecting the service.

The profile selected for xDSL connection (in this example profile 1) is also used for VoIP telephony.

<Edit> Edits the default virtual line profile.

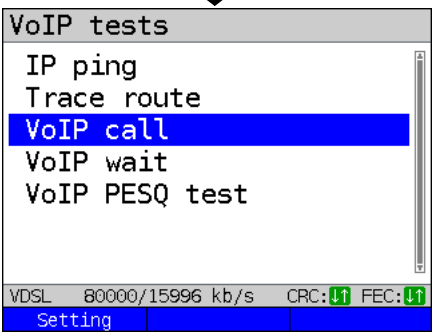


If no xDSL or Ethernet connection is established, ARGUS automatically connects at this point using the default profile (see page 46).

<Info> Duration of activation, page 161.

<Test> Opens test selection.

<Stop> Deactivates the service.

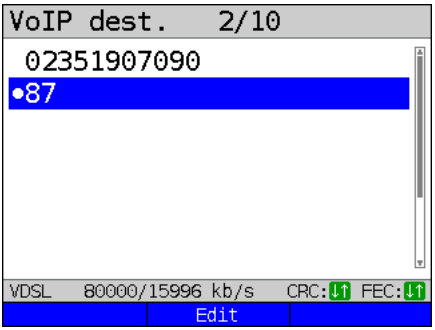




e.g. select VoIP call

Continued on next page





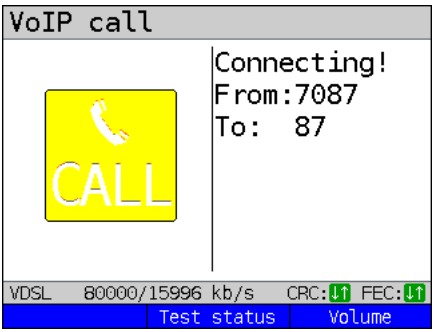
Mark the VoIP destination (default is indicated with ●).

Scroll down with the cursor, mark a blank line and add a new VoIP destination using **<Edit>**.

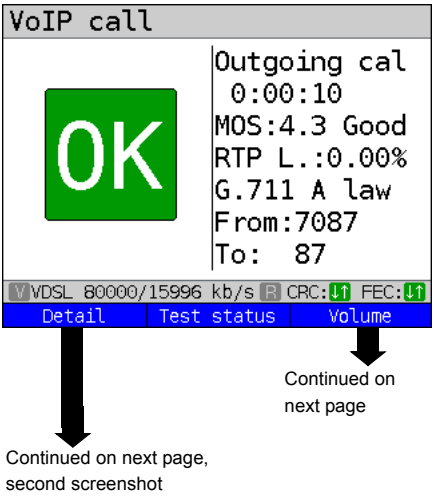
<Edit>	Edits the VoIP destination number.

Initialisation

Connecting

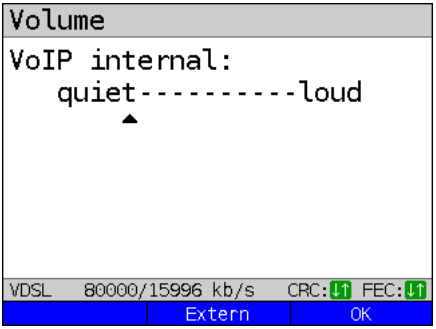


ARGUS displays "own number" (from: 7087) and the number of the called subscriber (to: 87). The called subscriber has not yet accepted the call: display shows "Connecting!" and yellow CALL symbol.



The called subscriber has taken the call ("Connected!"): ARGUS determines the MOS value and displays whether the set MOS voice quality value (see page 154) is reached ("OK" or "FAIL"). ARGUS also displays the classification of the MOS value according to ITU-T P.800 (in this example "good"), the duration of the connection and the currently used voice codec (in this example G.711 A law, see page 153) are also displayed.

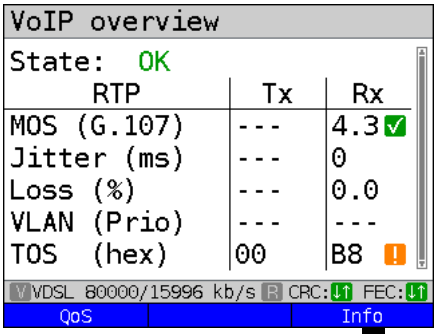
<Detail>	Displays the VoIP parameters.
<Test status>	Displays test status without ending the test or starting a new test, see page 202.
<Volume>	Opens volume control.



Volume control settings:

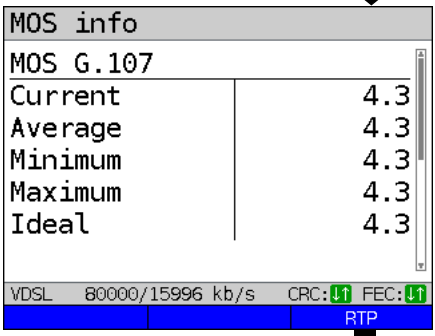
<External>	Headset mode
<Internal>	Earpiece mode
<OK>	Adopts settings

<Detail>



VoIP overview display (for transmitted and received packets including assessment)

- Status of MOS value (FAR-MOS/MOS)
- Jitter in ms
- RTP loss rate
- VLAN (prio) in hexadecimal
- TOS (hex) in hexadecimal

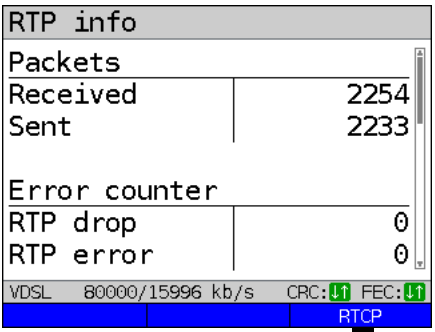


Displays MOS information:

- Current MOS
- Average MOS
- Min./max. MOS value
- Ideal MOS (possible MOS without interference, codec-dependent)
- Current and average R-factor according to ITU-T G.107

Back to previous display.

Continued on next page

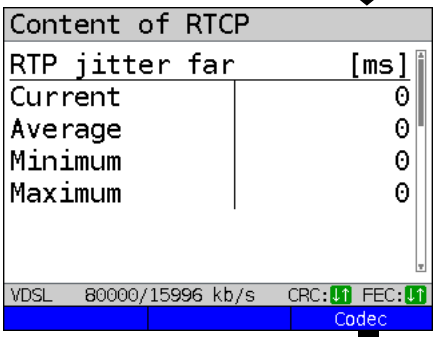


Display of further VoIP results:

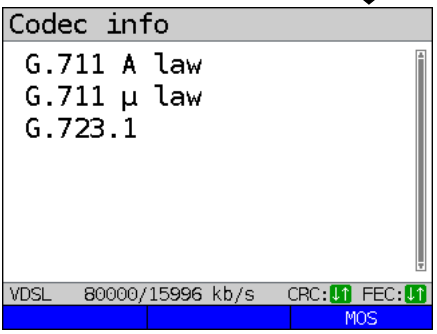
Packet statistics:

- Received packets (Rx)
- Transmitted packets (Tx)
- Error counter:
  RTP drop
  RTP error
- RTP jitter Rx:
  Current jitter
  Average jitter
  Minimum jitter
  Maximum jitter
- Lost RTP packets (Rx)
  Total, current, average, min. and max.

Back to display "Outgoing call"



RTCP content
Displays the statistics returned by the remote station.
- Current jitter of remote station Rx (far)
- Average jitter at remote station
- Maximum and minimum jitter of remote station
- Lost RTP packets at remote station Rx (far): total, current, average, min. and max.
- Delay calculated from transmission time of RTCP packets (network delay): current, average, min., max.



If the message "no data" appears, that means that the remote station does not support RTCP.

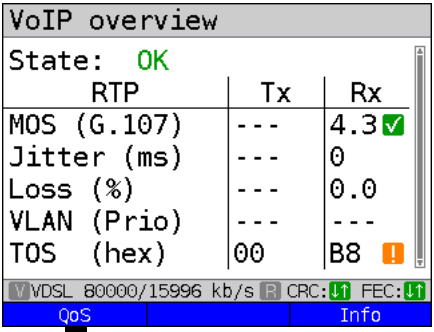
ARGUS displays the available codecs of the remote station.

Continue to display "Outgoing call"

<MOS> Back to display "MOS info", ring navigation

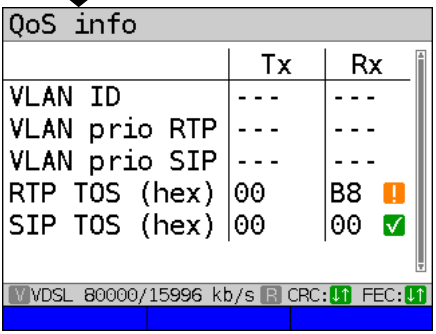
Continued on next page

Return to status screen without ending the test.



VoIP overview display (for transmitted and received packets including assessment)

- Status of MOS value (FAR-MOS/MOS)
- Jitter in ms
- RTP loss rate
- VLAN (prio) in hexadecimal
- TOS (hex) in hexadecimal

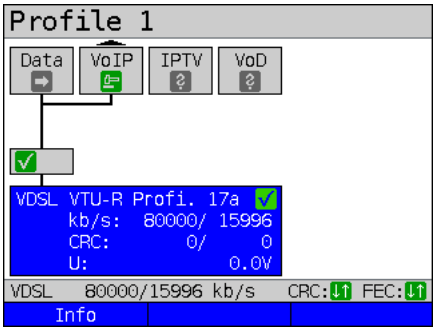


VoIP overview display (for transmitted and received packets including assessment)

- VLAN ID
- VLAN prio RIP
- VLAN prio SIP
- RTP TOS in hexadecimal
- RTP TOS in hexadecimal



Back to the status screen without stopping the test.

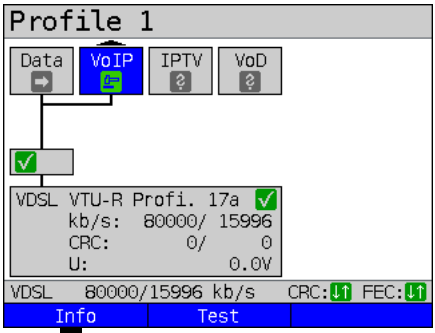


ARGUS in status screen.
Another test is still running using the service VoIP (indicated by the green hammer symbol).



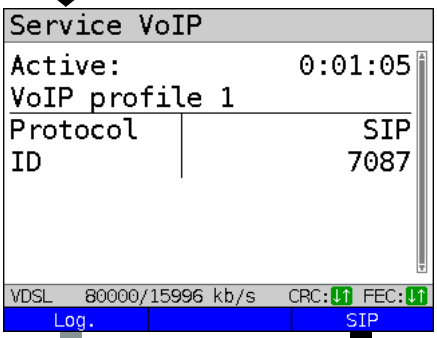
Using the cursor keys, select the service VoIP.

Continued on next page



<Test> Displays the overview of results.

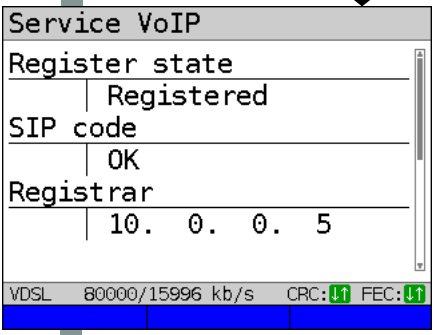
<Info> or  Displays the VoIP calling parameters.



ARGUS displays the duration of the active VoIP service, the protocol used and the user name.

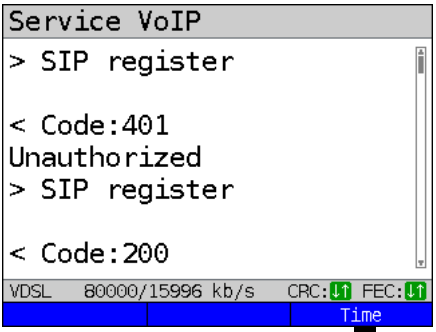
<SIP> Display of registration details: status codes, registrar IP, registrar used, outbound proxy/ SBC and URI used and more.

<Log.> Displays the VoIP service SIP commands, see page 162.



Before, during and after the connection, ARGUS displays the registration details. The setting "Use register" must be set to "yes".

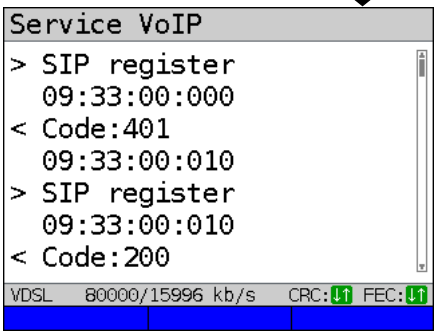
Continued on next page



ARGUS displays the SIP commands in the service VoIP.

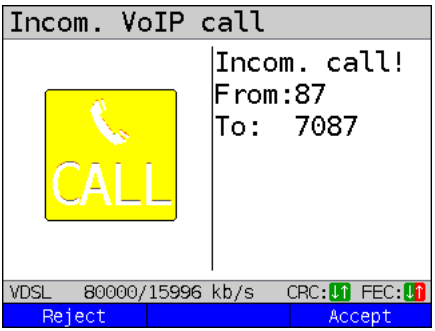
For more information ((s. chapter I) VoIP SIP status codes page 373).

<Time> Puts a timestamp on all events.



The timestamp uses the ARGUS-internal system time, see page 340.

Incoming call:



ARGUS can be called while the service VoIP is active. An incoming call is indicated by the yellow CALL symbol. The call can be accepted or refused.
For automatic call acceptance, you need to start the specific test "VoIP wait", see page 166.

<Reject> Refuses the call.
Switches to status screen.

<Accept> Accepts the call.
Switches to ARGUS status.

Overview of VoIP results

During/after registration:

	Display /description
SIP log	Log showing the exchanged SIP methods and status codes.
Register status	In the "Register status" result screen, ARGUS displays all important registration and registrar information.

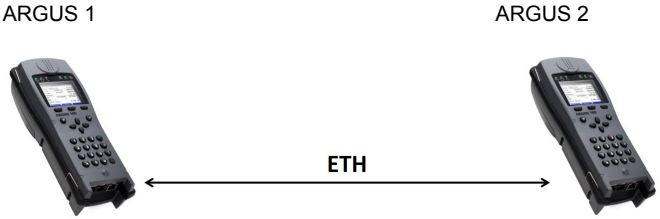
During call/connection:

	Display/ Description
MOS value, voice codec	Current **MOS value**, currently used **voice** codec.
SIP log:	Log showing the exchanged SIP methods and status codes.
INFO: MOS results:	**Threshold:** indicates whether the preconfigured MOS threshold is complied with. **P.800:** Evaluation according to ITU-T P.800 **MOS value:** current/average/min./max. **R-factor:** current/average/min./max.
INFO: RTP results	**RTP packets:** received/sent **RTP drop:** received packets rejected by the jitter buffer. **RTP error:** received but defective RTP packets. **RTP jitter Rx:**current/average/min./max. *(Calculated according to RFC 3550 per sec.)* **RTP packet loss Rx:**current/average/minimum/ maximum in percent **RTP packet loss total:** *(RTP packets not received)*
INFO: RTCP results: *(The contents of the RTCP packets are displayed, provided this is supported by the remote side!)*	**IP jitter remote side:** current/average/minimum/maximum **RTP packet loss remote side:** current/average/ minimum/maximum in percent **RTP packet loss remote side Total** **Network delay:**current/average/maximum/minimum *(calculated on the basis or RTCP packets)*

15.1.1 VoIP back-to-back

ARGUS permits a VoIP call to a second terminal device, e.g. another ARGUS unit. To enable calling, both ARGUS instruments must be configured as follows:

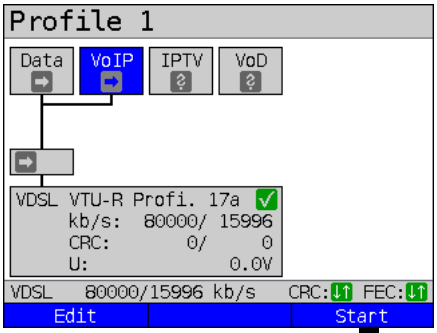
	ARGUS 1	ARGUS 2
Access, s. page 25	Ethernet IP based	
Protocol, s. page 91	IP	
IP version, s. page 92	IPv4	
IP mode, s. page 92	Static	
Own IP address, s. page 92	In example 10.0.0.1	In example 10.0.0.2



Now enter the IP address of ARGUS 2 in ARGUS 1 as the target telephone number to initiate a VoIP call. The IP address of ARGUS 1 must be entered as the target telephone number in ARGUS 2. The call is connected just as for VoIP-call/VoIP-wait, see page 156.

15.2 VoIP wait

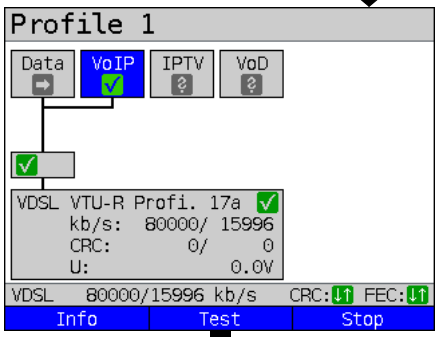
In the test "VoIP wait", ARGUS behaves like a VoIP telephone.
The VoIP call (see page 150) and the VoIP wait parameters must be configured for the VoIP wait test.



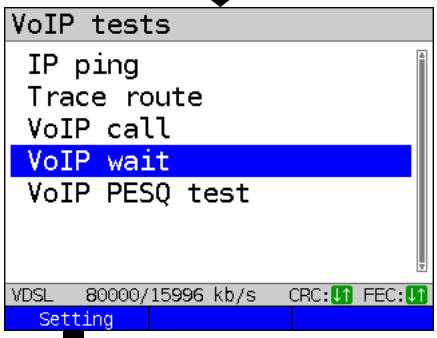
Connecting the service.

The profile selected for xDSL connection (in this example profile 1) is also used for VoIP wait.

<Edit> Edits the default virtual line profile.

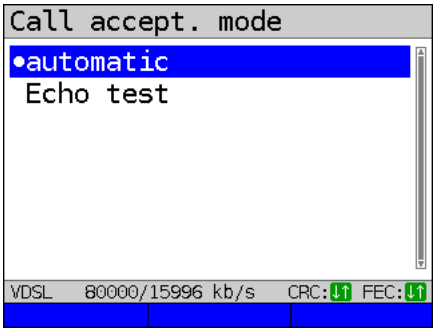


If no xDSL or Ethernet connection is established, ARGUS automatically connects at this point using the default profile (see page 46).



<Setting> Opens call acceptance mode for VoIP wait.

Continued on next page



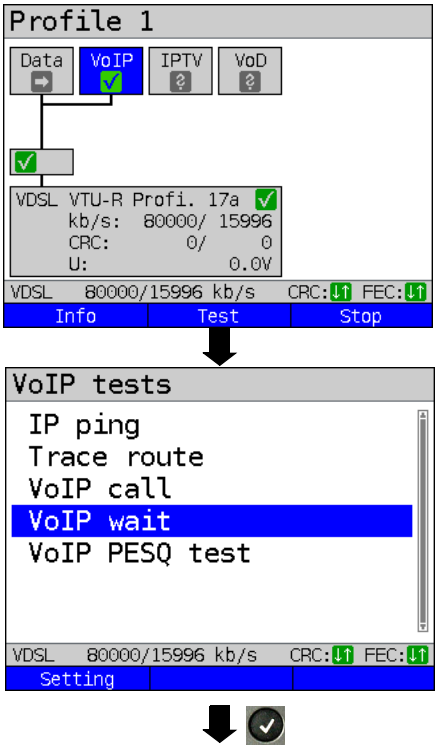
The test VoIP wait offers the following configuration options:

- Automatic
- Echo test

Default: ***Automatic***

ARGUS uses the user name entered under SIP parameters (see page 150) as its own number.

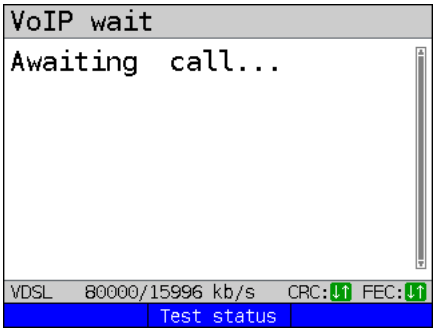
Start VoIP wait



The service VoIP and the VDSL access are active.

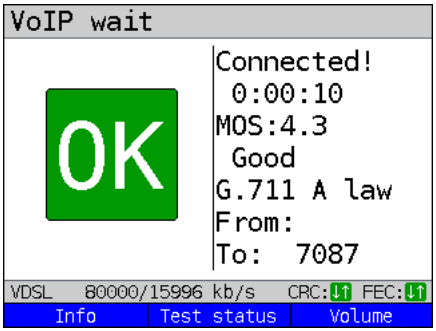
Select VoIP wait

Continued on next page



ARGUS waits for a VoIP call.

<Test status> Switches to test status, see page 157.



ARGUS accepts the call automatically (see setting page 166).

The connection parameters are the same as for VoIP call and are explained on page 157 and following.

Connecting:

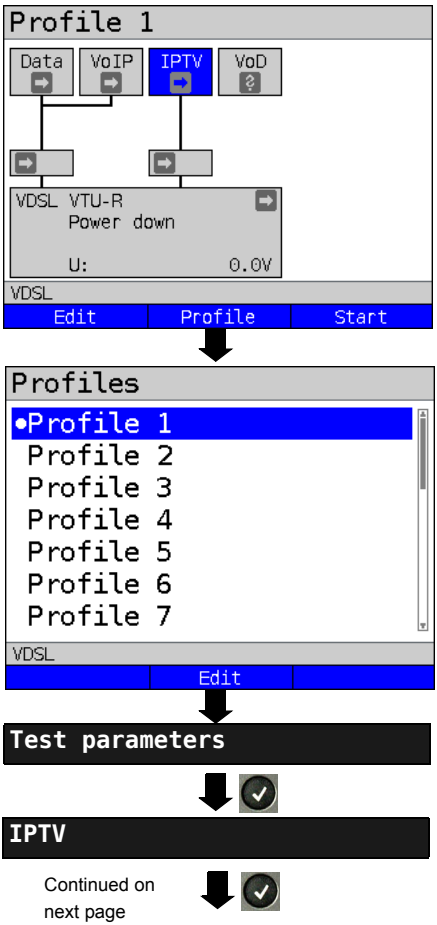
The connection is established as for IP ping. However, pressing "Cancel" initially only disconnects (if a connection existed). ARGUS remains registered with the registrar (service VoIP active) and remains available for the caller (an incoming call can be refused or accepted). Deactivate the service VoIP to terminate registration. However, the established access remains active.

16 IPTV tests

16.1 IPTV

ARGUS requests a datastream from a server (depending on the access type, ARGUS replaces the set-top box (STB) or modem plus STB) and checks the regularity of the incoming packets, packet loss and the switch-on/switch-over time of the program. You can configure three user-defined IPTV profiles (where the xDSL or Ethernet connection is already established, the connection parameters, e.g. the target value, are locked):

Protocol-independent parameters



Continued on next page

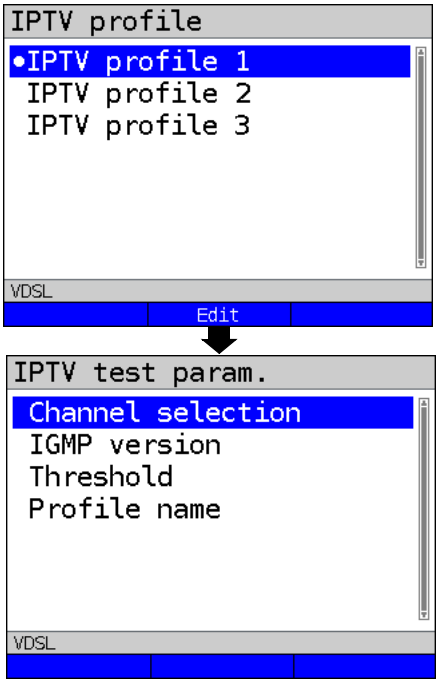
ARGUS in status screen.

The IPTV-STB emulation is realised using the service IPTV.
The following example illustrates the procedure and its special features.

<Edit>	Assign virtual lines to the service IPTV.
<Profile>	See page 32 for profile settings.
<Start>	Starts the service.

Select the profile you wish to edit. The selected profile appears in the display in blue. The default profile is indicated with a ● in the display. ARGUS adopts the parameters from the preset profiles for establishing the Ethernet or xDSL connection and conducting the IPTV test.

ARGUS uses the marked profile as the preset profile and switches to the menu Settings.



A total of three user-defined IPTV profiles are available.

Edits the marked IPTV profile.

Edits and modifies the marked parameters

Setting	Description
Test parameters:	
IPTV:	You can create a total of three IPTV profiles. **<Edit>** Activates the profile you wish to edit.
Channel selection	The channel list can be used and edited in all profiles. You can store up to 250 channels. Using the software WINplus/WINanalyse you can also create a configuration conveniently using the PC and load it to ARGUS. Selecting the TV channels for the IPTV test. **<Edit>** Edits channel
Multicast IP	Specifies the multicast IP. Range: Range 0.0.0.0. to 255.255.255.255 Default: ***224.0.0.0***

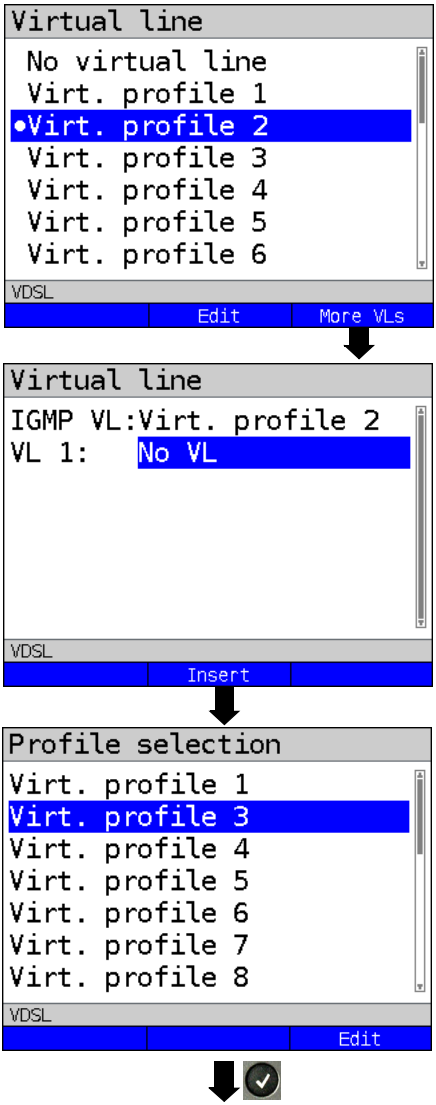
Port	Specification of port. Range: 0 to 65535 Default: ***0***
TV station	Enters a TV station name for the IPTV channel.
IGMP version	Version of the management protocol for joining/quitting a multicast group. Range: 2 to 3 Default: ***3***
Tresholds	Establishes the limit values for the IPTV test. When these values are exceeded during the IPTV test, the display shows the test result "FAIL", otherwise "OK". Specifying "*" deactivates the respective limit value check.
IGMP latency	Sets the limit values for the latency (switch-on delay of the program). Range: 0 to 25,000 ms Default: ***500 ms***
Sync error	Establishes the limit values for the sync error. Range: 0 to 10,000 Default: ***0***
PCR jitter	Establishes the limit values for PCR jitter. 0 to 2000 ms Default: ***100 ms***
Error indication	Establishes the limit values for error indication. Range: 0 to 10,000 Default: ***0***
CC error	Establishes the limit values for CC errors. Range: 0 to 10,000 Default: ***0***
CC error rate	Establishes the limit values for the CC error rate. Range: 0.00 % to 100.00 % Default: ***0.00 %***
Audio bytes	Sets the target value for audio bytes. When the measurement falls below this threshold during the IPTV test, the display shows the test result "FAIL", otherwise "OK". Range: 0 to 6,553,600 Default: ***0***

Video bytes	Sets the target value for video bytes. When the measurement falls below this threshold during the IPTV test, the display shows the test result "FAIL", otherwise "OK". Range: 0 to 6,553,600 Default: ***0***
RTP jitter	Establishes the limit values for RTP jitter. Range: 0 to 2000 ms Default: ***100 ms***
RTP sequence errors	Establishes the limit values for sequence errors. Range: 0 to 10,000 Default: ***0***
Current RTP loss rate	Establishes the limit values for the current RTP loss rate. Range: 0.00 % to 100.00 % Default: ***0.00 %***
Total RTP loss rate	Sets the limit values for the RTP loss rate for the entire test. Range: 0.00 % to 100.00 % Default: ***5.00 %***
Profile name	Enters a name for the IPTV profile. See page 27 for details.

16.1.1 Multiple virtual lines

ARGUS can use up to 4 virtual lines for the service IPTV. The IGMP virtual lines are used for transmission of the IGMP protocol and virtual lines 1-3 for receiving the video/audio streams.

Overview: selected virtual line profiles

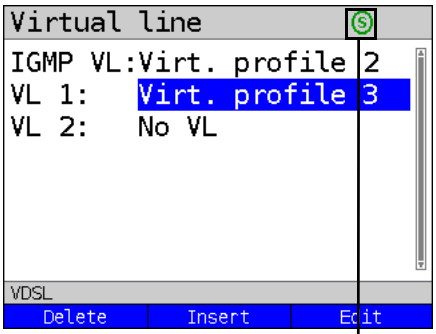


<Edit> Edits the selected virt. profile (in this example virt. profile 2), see page 85.

<More VLs> Opens virtual line selection for the service IPTV.

<Insert> Inserts further virtual profiles.

Adds selected VL profile for the service IPTV.



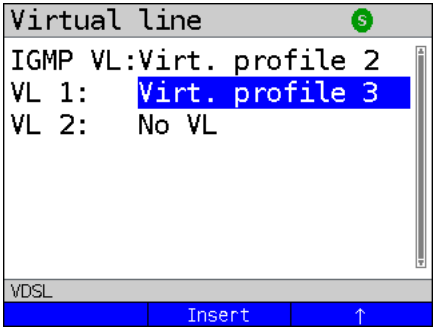
<Delete> Deletes the selected virt. profile (in this example profile 3) from the selection list.

<Insert> Inserts a further virtual profile.

<Edit> Deletes the selected virt. profile (in this example profile 3), see page 85.



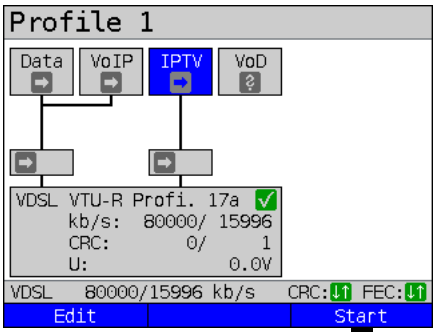
Switches to softkey assignment.



<↓> The marked profile is moved down one place in the list.

<↑> The marked profile is moved up one place in the list.

Starting IPTV

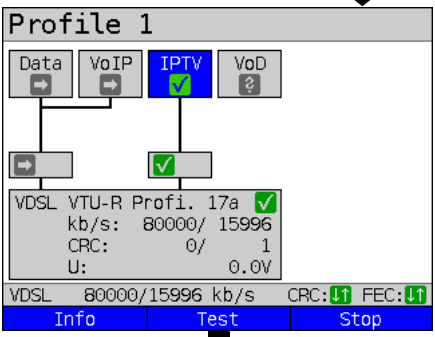


Connecting the service.

The profile selected for xDSL connection (in this example profile 1) is also used for IPTV.

<Edit> Assigns a virtual line is assigned to the service IPTV or edits it.

Activating the service IPTV.

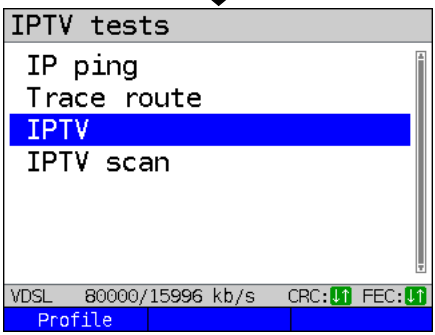


If no xDSL connection is established, ARGUS automatically connects at this point using the default profile (see page 46).

<Info> Duration of activation.

<Test> Opens test selection.

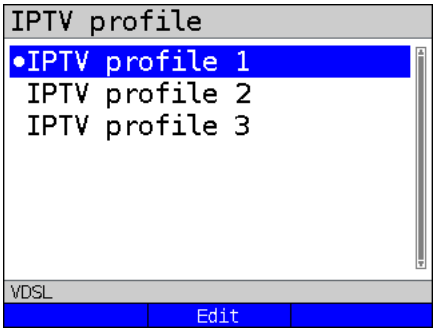
<Stop> Deactivates the service.



<Profile> Displays the IPTV profiles, see page 169.

Continued on next page





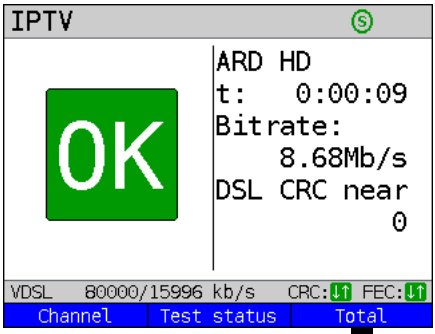
Marks the IPTV profile
(default is indicated with ●).

<Edit> Edits the marked profile, see page 169 for changes to the individual parameters.



The IPTV test starts automatically.

IPTV test



During the test, ARGUS displays the selected IPTV channel, the duration of the test and the current bitrate. If the set limits are exceeded, the IPTV test shows "FAIL" in the display, otherwise "OK".
ARGUS displays "FAIL" until the values fall below the threshold again.

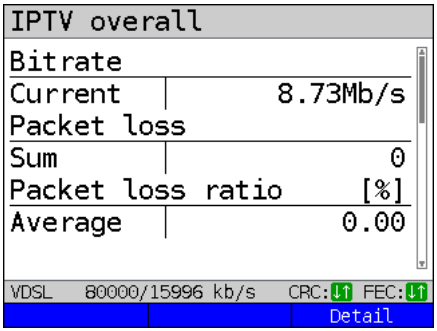
<Channel> Selects a new channel.

<Test status> Displays test status without ending the test or starting a new test, see page 202.

<Total> Displays all IPTV statistics.

Cancels test.

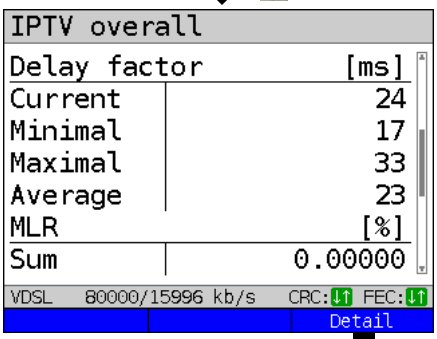
Continued on next page



Display:

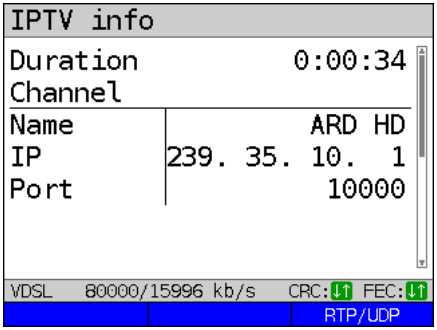
- Current bitrate
- Number of packets lost during the test
- Display of packet loss rate in percent

<Detail> Switches to the IPTV details.



Display (MDI according to RFC 4445):

- Displays the current delay factor in ms
- Displays the minimum delay factor in ms
- Displays the maximum delay factor in ms
- Displays the average delay factor in ms
- Displays the media loss rate (MLR) in percent



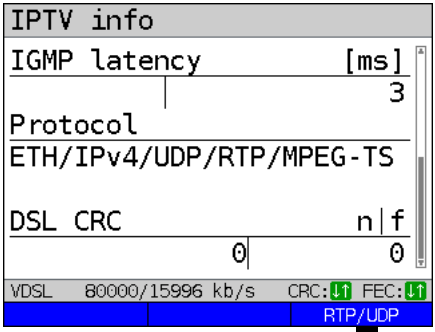
Display:

- Duration of test
- Displays the name of the selected broadcaster
- Display of broadcaster's IP address
- Display of broadcaster's port
- Display of IGMP latency (switch-on time of program) in ms

<RTP/UDP> Switches to RTP/UDP details, see page 177.

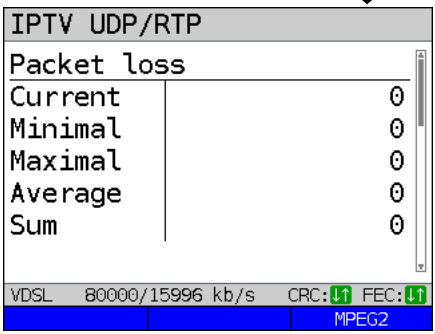


Continued on next page



Display

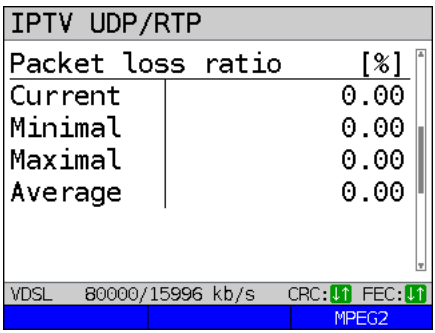
- Display the IGMP latency
- Display the selected IPTV protocol
- Display of DSL-CRC error counter (not for Ethernet), see page 58



Display:

- Display of current packet losses
- Display of minimum packet losses
- Display of maximum packet losses
- Display of average packet losses
- Number of packets lost during the test

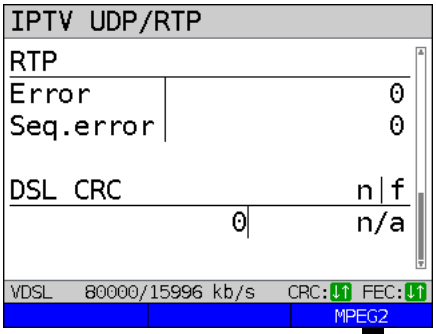
<MPEG2> Switches to MPEG2 details, see page 178.



Display:

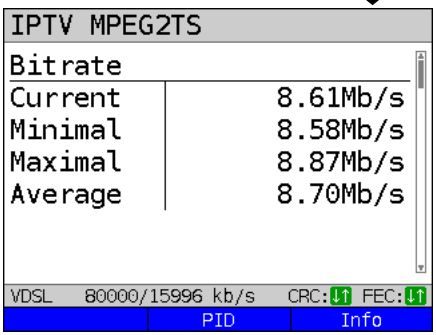
- Display of current packet loss rate
- Display of minimum packet loss rate
- Display of maximum packet loss rate
- Display of average packet loss rate

Continued on next page



Display:

- Display of RTP errors
- Display of RTP sequence errors
- Display of DSL CRC error (n/f)

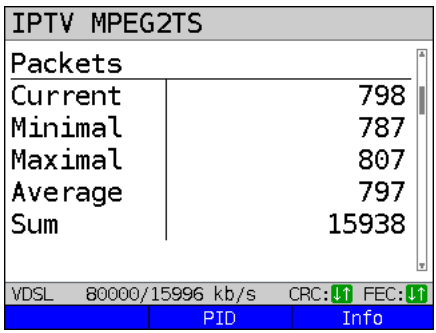


Display:

- Display of current MPEG bitrate
- Display of minimum MPEG bitrate
- Display of maximum MPEG bitrate
- Display of average MPEG bitrate

<PID> Switches to PID details, see page 180.

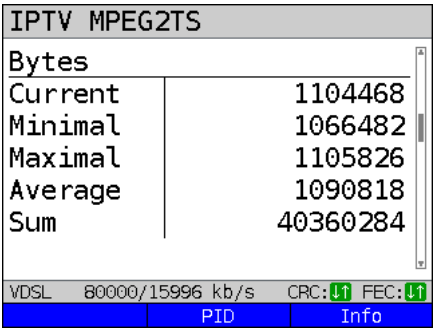
<Info> Switches to IPTV info, see page 176.



Display:

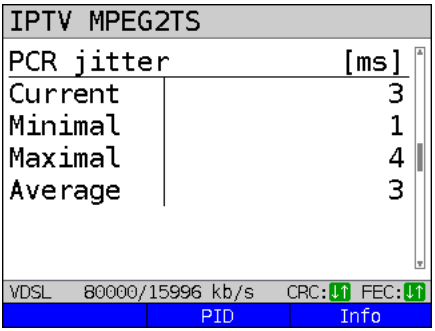
- Display of current MPEG packets
- Display of minimum MPEG packets
- Display of maximum MPEG packets
- Display of average MPEG packets
- Display of total MPEG packets

Continued on next page



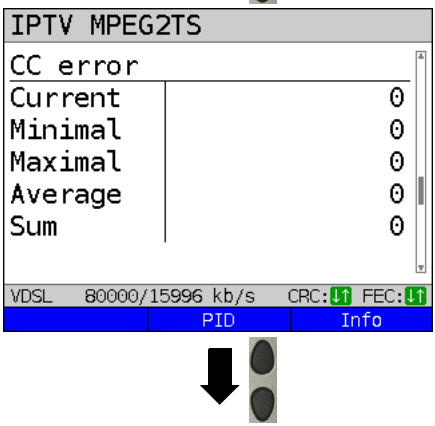
Display:

- Display of current bytes
- Display of minimum bytes
- Display of maximum bytes
- Display of average bytes
- Display of total bytes



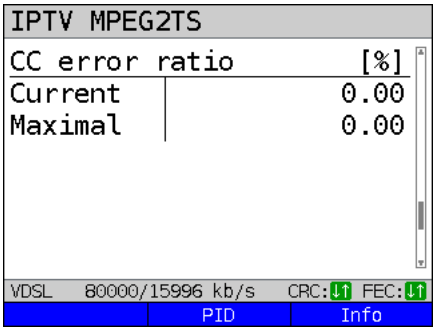
Display:

- Current PCR jitter in ms
- Minimum PCR jitter in ms
- Maximum PCR jitter in ms
- Average PCR jitter in ms



Display:

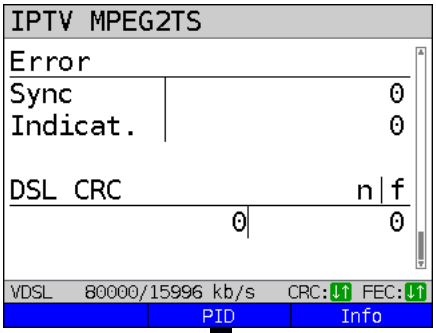
- Number of current CC errors
- Number of minimum CC errors
- Number of maximum CC errors
- Number of average CC errors
- Sum of CC errors



Display:

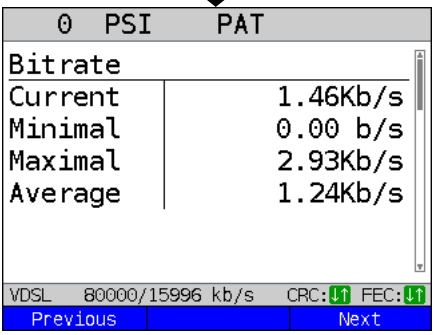
- Number of current CC error rate
- Number of maximum CC error rate





Display:

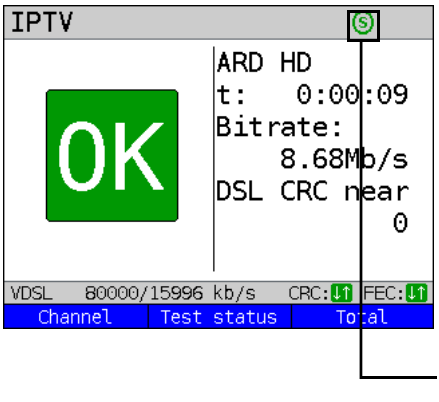
- Display of error sync
- Display of error indication
- Display of DSL CRC error (n/f)



Display of codecs and PIDs
Packet identifiers (PIDs) identify the audio, video and PCR components of each program.

<Previous>	Switches to previous overview.
<Next>	Switches to next overview.

3x 

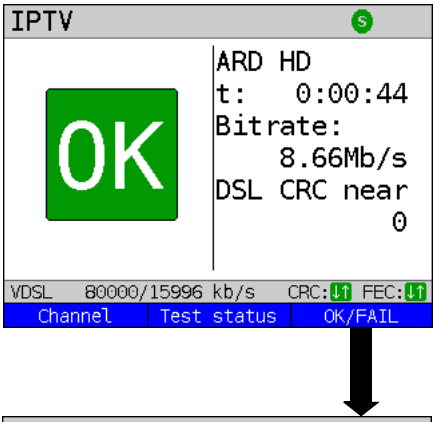


<Channel> Selects a new channel.

<Test status> Displays test status without ending the test or starting a new test, see page 202.

Cancels test.

Toggles softkey assignment.

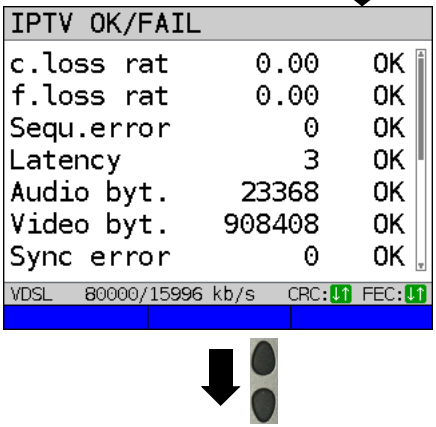


<Channel> Selects a new channel.

The IPTV test runs until a new channel is selected.

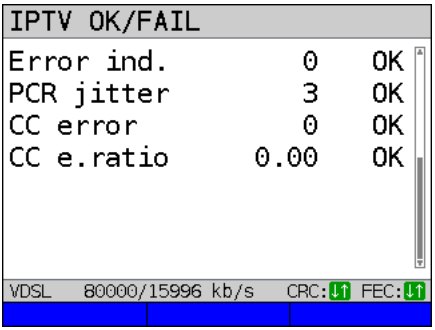
<Test status> Displays test status without ending the test or starting a new test, see page 202.

<OK/FAIL> OK/FAIL overview of the IPTV test.



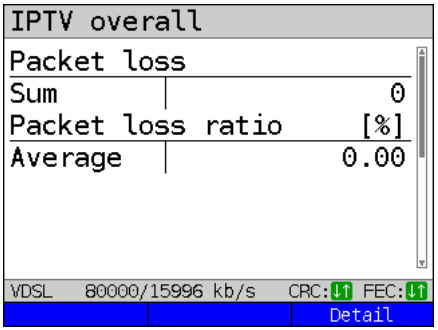
Display:

- Current loss rate in %
- Total loss rate in %
- Sequence errors
- Latency (in ms)
- Audio bytes (in Byte)
- Video bytes (in Byte)
- Sync error
- Error indication
- PCR jitter (in ms)
- CC error
- CC error rate (in %)



Stop IPTV test.

IPTV result

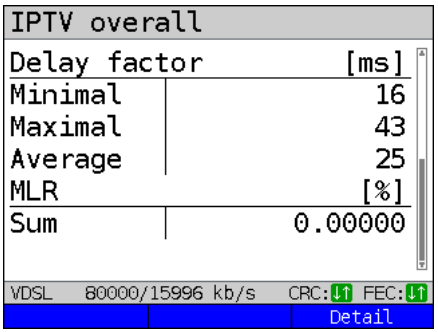


Displays how many packets were lost during the IPTV test and how high the loss rate is.

Display of further information:

- Minimum delay factor
- Maximum delay factor
- Average delay factor
- Media loss rate (MLR) during the test

<Detail> Displays IPTV test detail information, see page 176 and following.



Exits results.

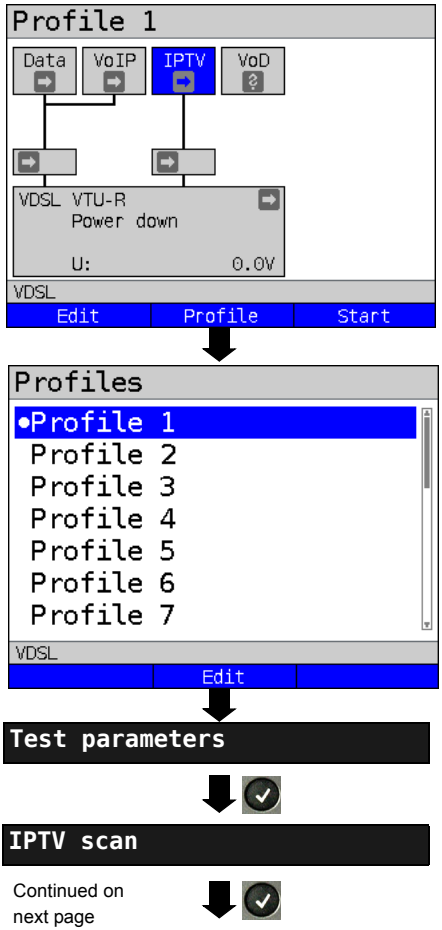
For saving results, see IP ping page 123.
Sends trace file to PC, see page 94.



16.2 IPTV scan

ARGUS checks the availability of TV channels. Additionally, ARGUS displays the switchover time between TV channels.
You can create three user-defined scan profiles. The following settings must be saved in the profile for the IPTV scan (when the xDSL or Ethernet connection is already established, the connection parameters, e.g. target value, are locked):

Protocol-independent parameters:



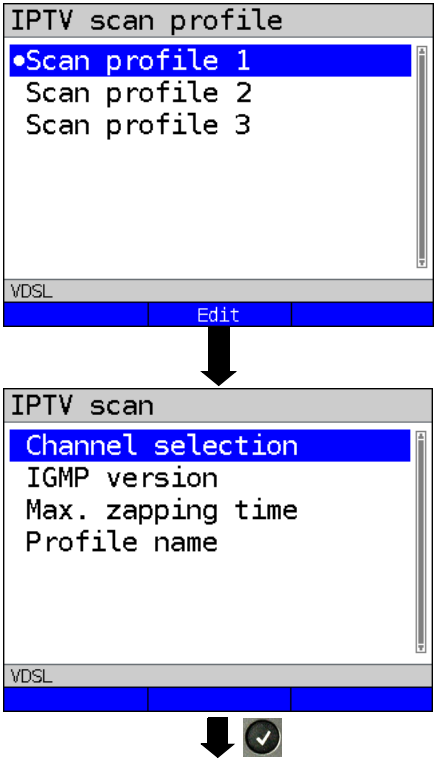
Continued on next page

ARGUS in status screen.

<Edit>	Assign virtual lines to the service IPTV.
<Profile>	See page 32 for profile settings.
<Start>	Starts the service.

Select the profile you wish to edit. The selected profile appears in the display in blue. The default profile is indicated with a ● in the display. ARGUS adopts the parameters from the default profiles for establishing the Ethernet or xDSL connection and conducting the IPTV scan.

ARGUS uses the marked profile as the default profile and switches to the menu Settings.



A total of three user-defined scan profiles are available.

Edits the scan marked profile.

Edits and modifies the marked parameters

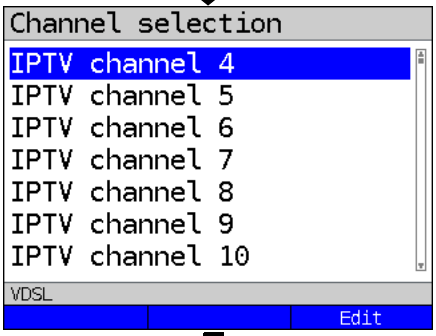
IPTV scan settings

Setting	Description
Test parameters:	
IPTV scan	You can create a total of three scan profiles. **<Edit>**Activates the profile you wish to edit.
Channel selection	The channels list can be used and edited in all profiles. You can store up to 250 channels. Using the software WINplus/WINanalyse you can also create a configuration conveniently using the PC and load it to ARGUS. Selecting the TV channels for the IPTV scan:



ARGUS initially displays the TV channels already selected in the set order that was tested for the IPTV scan. If no channels have been selected yet, the list is empty. The list slots can be filled one after another. You can select up to 250 channels.

<Insert> Opens the list with the available channels.





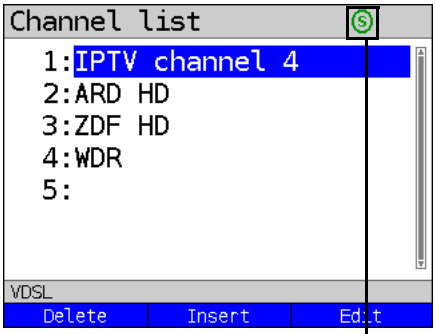
Marks the channel
Channels already selected do not appear in the channel list (see channel selection display).

<Edit>

Edits the marked channel, see page 169 and following.
- Enter (multicast IP and port number) of TV channel.
- Enter any alias name for the TV channel (e.g. name of broadcaster).



Continued on next page



Add the marked TV channel (in this example IPTV channel 4), then add the next channel (in this example IPTV channel 5).
Once at least two channels have been added to the list, you can change their position in the list using the following softkeys.

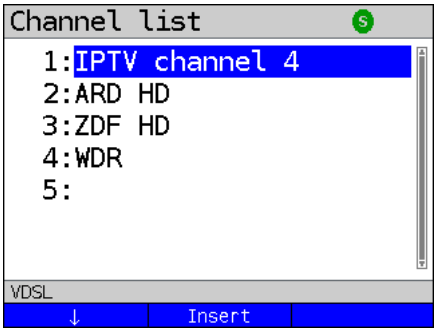
<Delete> Deletes the marked TV channel from the list.

<Insert> Opens the channel list with the available channels.

Toggles softkey assignment.

Continued on next page





<↓> The selected channel is moved down one place in the list.

<↑> The selected channel is moved up one place in the list.

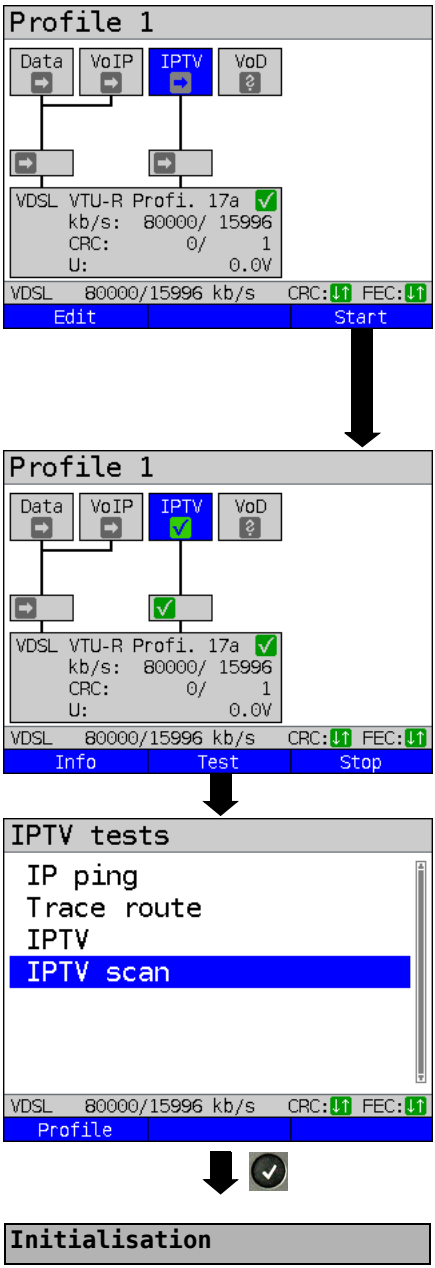


Accepts the channel selection in the order shown.

IGMP version	Version of the management protocol for joining/quitting a multicast group (for broadcast TV only). Range: 2 to 3 Default: ***3***

Max. switch-over time	Entry of max. switchover time (IPTV timeout): This is the time between the request and receipt of an IPTV channel. If the measured timeout exceeds the value set here, ARGUS rates this test as "FAIL". Range: 1 - 25 seconds Default: ***5 seconds***
Profile name	Entry of a name for the IPTV scan profile, see page 27 for details.

Starting the IPTV scan



Connecting the service.

The profile selected for xDSL connection (in this example profile 1) is also used for IPTV.

<Edit> Assigns a virtual line to the service IPTV or edits it.

Activating the service IPTV.

If no xDSL connection is established, ARGUS automatically connects at this point using the default profile (see page 46).

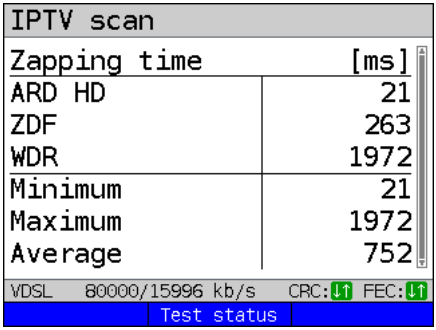
<Info> Duration of activation.

<Test> Opens test selection.

<Stop> Deactivates the service.

<Profile> Displays the IPTV scan profiles, see page 184.

IPTV scan



The IPTV scan starts automatically.

Displays the time needed to switch between channels. If a TV channel cannot be received within the set interval, ARGUS displays "FAIL".

<Test status> Displays test status without ending the test or starting a new test, see page 202.



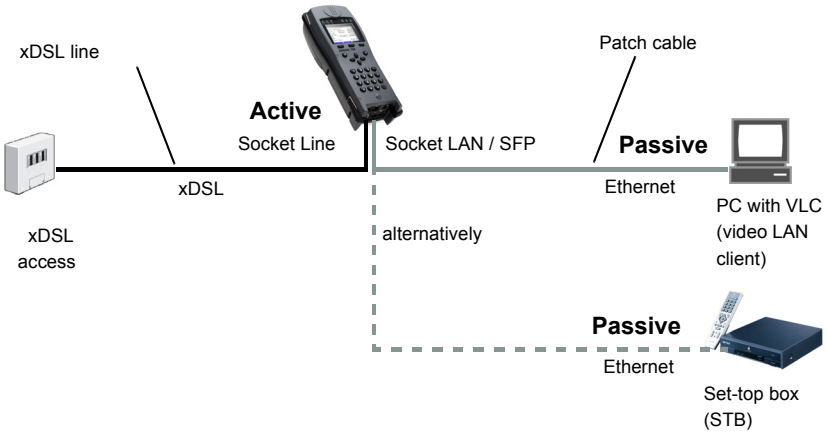
Exits results display.



For saving results, see IP ping page 123.
Sends trace file to PC, see page 94.

16.3 IPTV passive

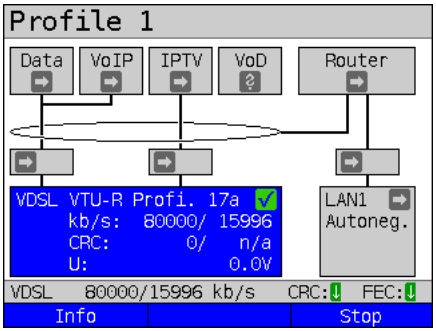
ARGUS listens for transmitted TV channels without requesting a channel. ARGUS lists the TV channels it detects in a list of multicast IPs and/or channel names.



A second ARGUS in STB mode can be connected in place of a PC or STB.

See page 168 and following for protocol-independent parameters and test parameters for IPTV passive.

Starting IPTV passive



Connecting the service.

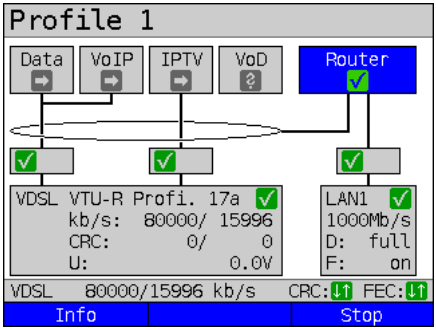
The profile selected for xDSL connection (in this example profile 1) is also used for IPTV passive.

IPTV passive can also be run in bridge mode. However, the bridge must be activated first.

Select the router using the cursor and start the test.



Router mode is started.



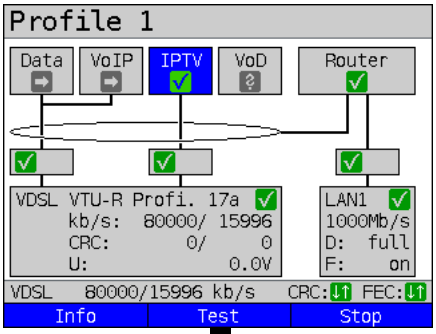
<Info> The duration of router activity is displayed.

<Stop> Stops router mode.

Select the service IPTV using the cursor and activate it.

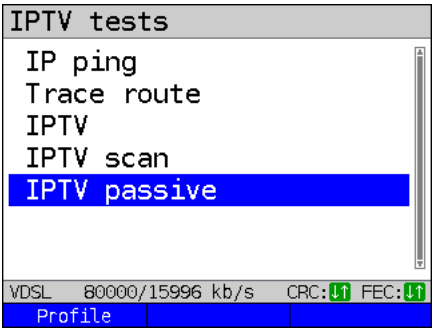


The service IPTV and the router mode are active and the VDSL access is synchronous.

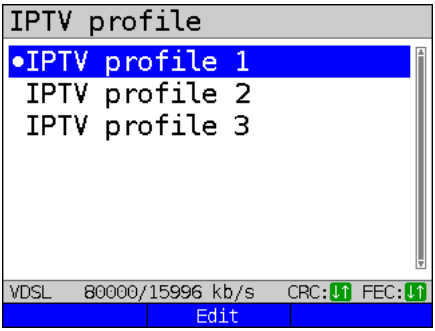


To access the softkey **<Test>** in bridge mode, switch to the bridge box and activate it.
The services are not available in bridge mode.

Continued on next page



<Profile> Displays the IPTV passive settings, see page 169.

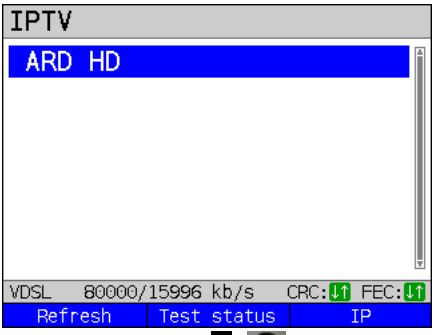


Marks the IPTV profile (default is indicated with ●).

<Edit> Edits the marked profile, see page 169 for changes to the individual parameters.



ARGUS automatically checks whether IPTV streams are available and displays these.



In this example, one possible stream is displayed.

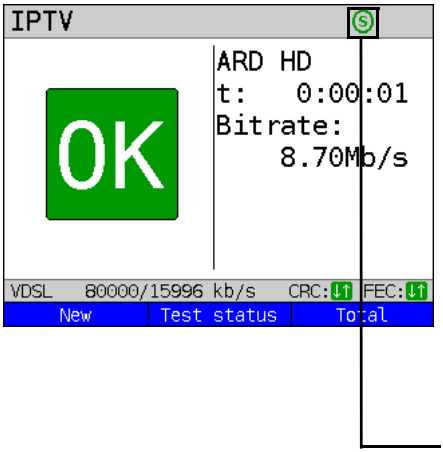
<Refresh> Updates the channel list.

<Test status> Displays test status without ending the test or starting a new test, see page 202.

<IP> Displays the multicast IP of the selected channel.

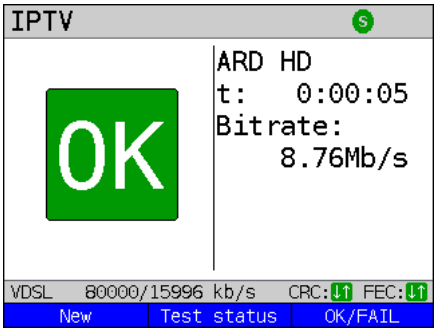


Continued on next page



During the test, ARGUS displays the selected IPTV channel, the duration of the test and the current bitrate. If the set limits are exceeded, the IPTV test shows "FAIL" in the display, otherwise "OK".
ARGUS displays "FAIL" until the values fall below the threshold again.

<New>	Starts a new IPTV test or selects another available channel, see page 192.
<Test status>	Displays test status without ending the test or starting a new test, see page 202.
Shift	Toggles softkey assignment.
<OK/FAIL>	OK/FAIL overview of the IPTV test, see page 181.
	Cancels test.

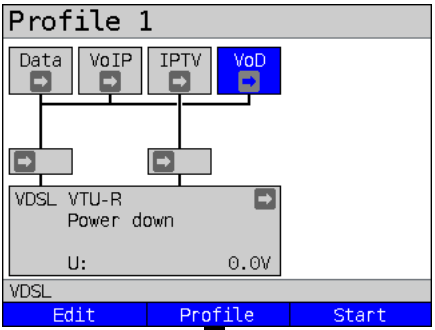


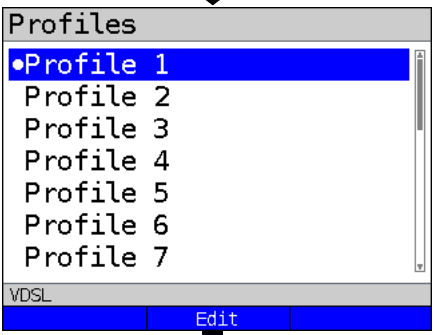
The IPTV result statistics are explained starting on page 176.

16.4 Video on demand (VoD)

In VoD mode, ARGUS requests a datastream from a VoD server. Depending on the access type, ARGUS replaces the STB or the modem and the STB.
VoD services are often provided using RTSP, as this control protocol additionally supports control functions. However, ARGUS also supports the protocols FTP, HTTP and MMS where needed. During the test, ARGUS monitors the regularity of the incoming packets, the loss of packets, packet and PCR jitter and other possible errors.
Depending on the preset limit values, ARGUS performs an OK/FAIL assessment and shows important metadata regarding the received VoD stream.
You can configure three user-defined VoD profiles (where the xDSL connection is already established, the connection parameters, e.g. the target value, are locked):

Protocol-independent parameters:









Continued on next page

ARGUS in status screen.

The VoD test is performed using the service of that name.
The following example illustrates the procedure and its special features.

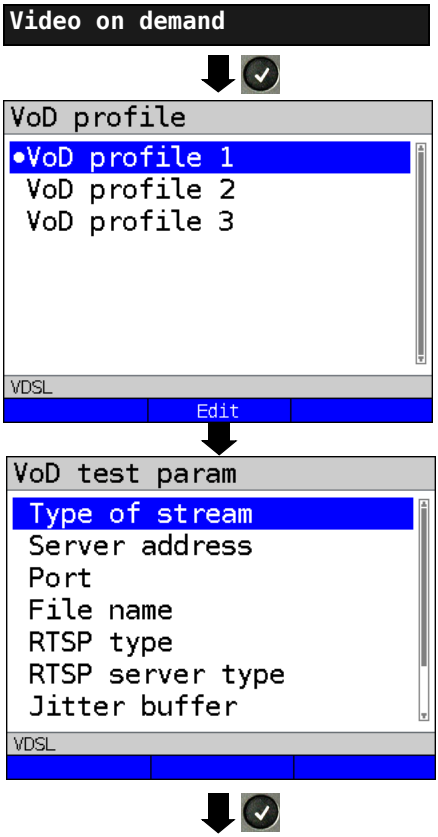
<Edit>	A virtual line is assigned to the service VoD.
<Profile>	See page 32 for profile settings.
<Start>	Starts the service.



Select the profile you wish to edit. The selected profile appears in the display in blue. The default profile is indicated with a ● in the display. ARGUS adopts the parameters from the default profiles for establishing the Ethernet or xDSL connection and conducting the VoD test.



ARGUS uses the marked profile as the default profile and switches to the menu Settings.



A total of three user-defined VoD profiles are available.

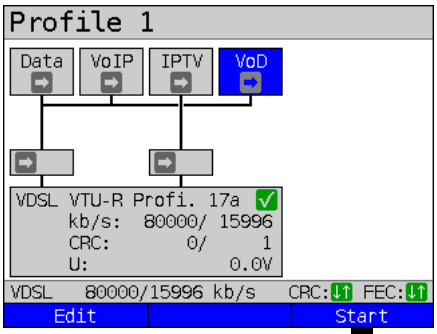
Edits the scan marked VoD profile.

Edits and modifies the marked parameters

Setting	Description
Test parameters:	
VoD:	You can create a total of three VoD profiles. **<Edit>**Activates the profile you wish to edit.
Type of stream	Select the type of stream. You can select one of the following types: RTSP, HTTP, FTP, MMS Default: ***RTSP***
Server address	Enter the server address from which the stream is to be downloaded. Enter the address using the number keys. Toggle entry using the softkey (meaning of right softkey changes when pressed), see page 119.

Port	Specification of port . Range: 0 to 65535 Default: ***0***
File name	Name of the file to be downloaded from the server, see page 119 for information on using the softkeys.
RTSP type	Type of control protocol: TCP or UDP. Default: ***TCP***
RTSP server type	If the remote station is a standard-compliant VoD server, always set the field "RTSP server type" to "standard". If the remote station uses proprietary features, you can use a different setting (e.g. Kasenna). Default: ***Standard***
Jitter buffer	Size of jitter buffer. Ideally, enter the value from the upstream STB. Range: 0 to 5000 ms Default: ***300 ms***
Treshold values	Sets the limit values for PCR jitter and continuity error (assessment of picture quality). When these values are exceeded during the IPTV test, the display shows the test result "FAIL", otherwise "OK". PCR jitter: - Range: 0 to 10,000 ms - Default: ***8 ms*** Continuity error: - Range: 0.0 - 100 percent. - Default: ***0.1 %***
Profile name	Enter a name for the VoD profile. See page 27 for details.

Starting VoD

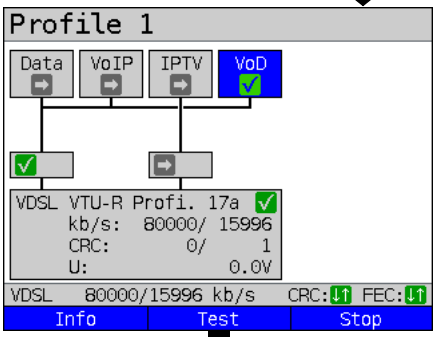


Connecting the service.

The profile selected for xDSL connection (in this example profile 1) is also used for VoD.

<Edit> Assigns a virtual line to the service VoD or edits it.

Start the service VoD.

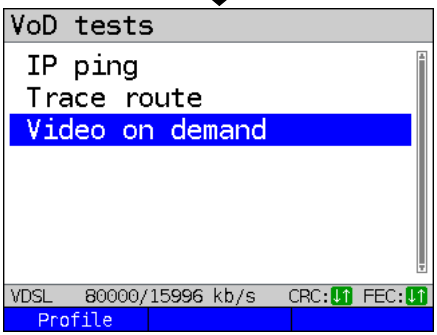


If no xDSL connection is established, ARGUS automatically connects at this point using the default profile (see page 46).

<Info> Duration of activation.

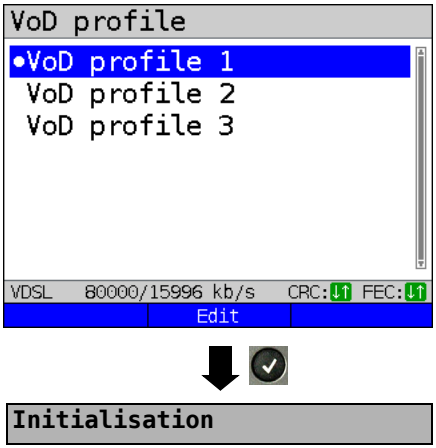
<Test> Opens test selection.

<Stop> Deactivates the service.



<Profile> Displays the VoD profiles, see page 195.

Continued on next page

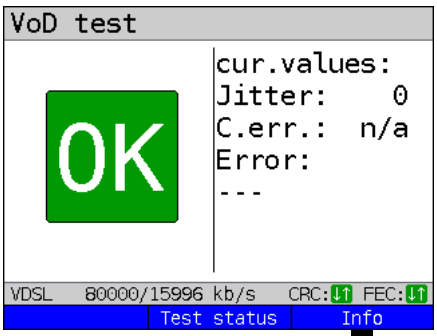


Marks the VoD profile
(default is indicated with ●).

<Edit> Edits the marked profile, see page 169 for changes to the individual parameters.

The VoD test starts automatically.

VoD test



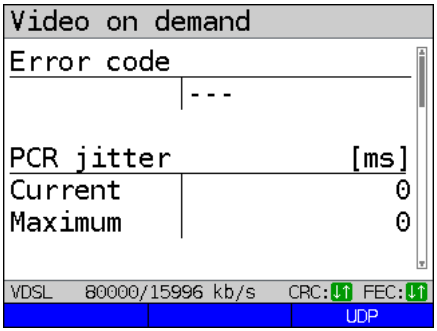
During the test, ARGUS displays the current PCR jitter and the continuity errors. If the set limits are exceeded, the VoD test shows "FAIL" in the display, otherwise "OK".
ARGUS displays "FAIL" until the values fall below the threshold again.

<Test status> Displays test status without ending the test or starting a new test, see page 202.

<Info> Displays the video on demand test statistics.

Cancels test.

Continued on next page

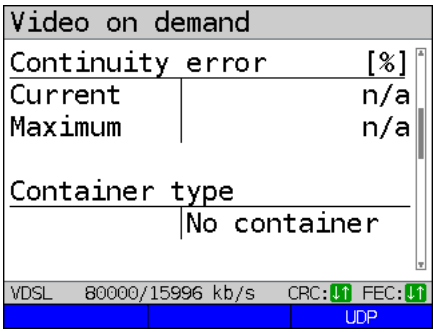


Display:

- Displays the current error status
- Displays the current and maximum PCR jitter

<UDP> Switches to UDP information, see page 200.

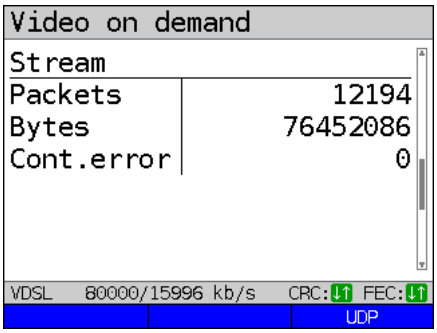




Display:

- Displays the current and maximum continuity error in %
- Display of container type



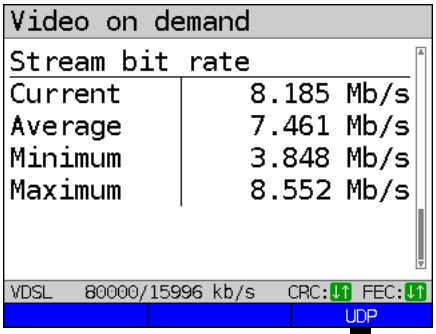


Display:

- Display of stream packets
- Display of stream bytes
- Display of stream cont. errors

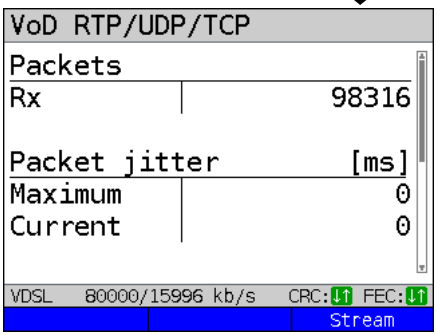


Continued on next page



Display:

- Current stream bitrate
- Average stream bitrate
- Minimum stream bitrate
- Maximum stream bitrate

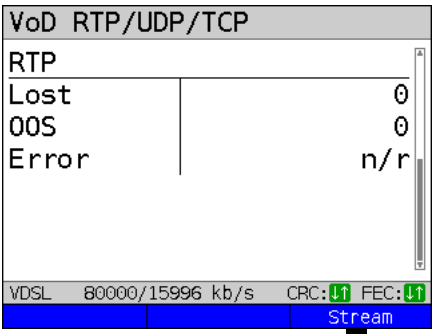


Display:

- Received packets
- Maximum packet jitter
- Current packet jitter

<Stream> Switches to stream information, see page 201.

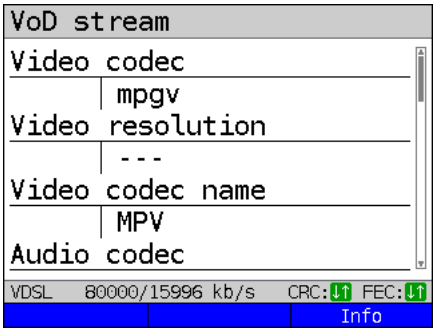




Display:

- Lost RTP packets
- OSS RTP packets
- Nummber of errored RTP packets

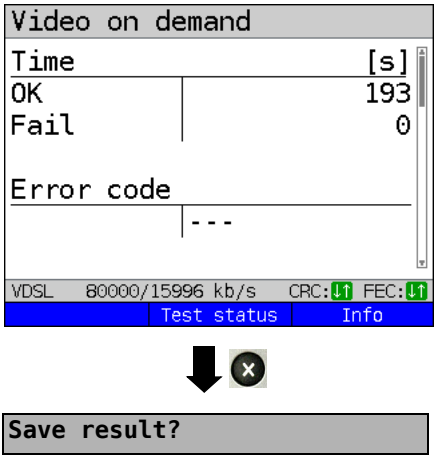
Continued on next page



Display:

- Video codec
- Video resolution
- Video codec name
- Audio codec
- Audio channels
- Audio sampling rate
- Audio bits/sample
- Audio bitrate
- Audio codec name
- Audio codec desc.
- Total runtime
- Author (general)
- Title
- Author (meta)
- Copyright

VoD result



Displays the duration of the test, the result OK or FAIL, and the error status.

The further test results are described starting on page 199.

Exits results.

For saving results, see IP ping page 123.
Sends trace file to PC, see page 94.

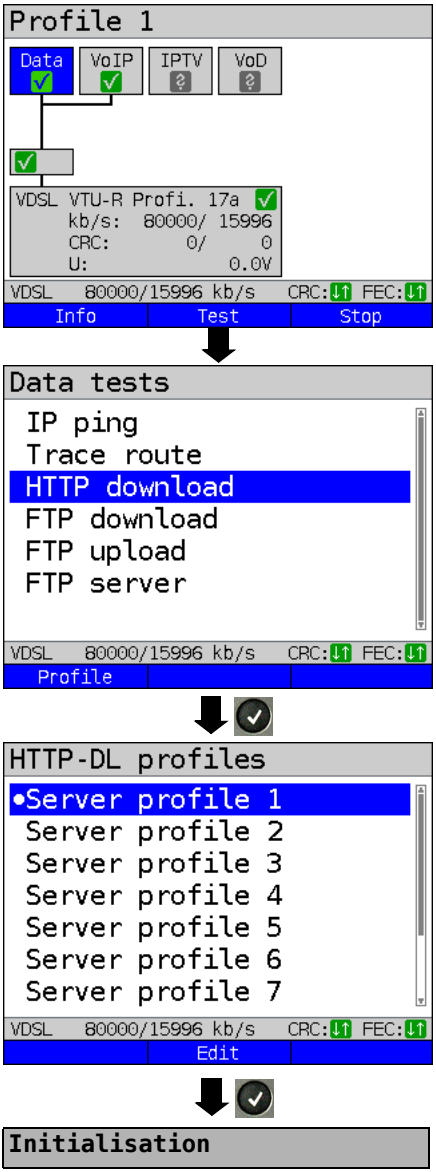
17 Parallel tests

ARGUS permits parallel testing of different IP-based services (Data, VoIP, IPTV and VoD) running on xDSL or Ethernet interfaces.
The settings for each test are described in the respective chapters.

The following tests can be run in parallel. Any combination of the tests listed here is possible.

Service	Test	Remark
Data	IP ping*[1], see page 118	For theses tests, up to 10 tests can be conducted concurrently (incl. tests using the other services).
	Traceroute*[1], see page 124	
	HTTP download, see page 128	
	FTP download, see page 135	
	FTP upload, see page 137	
	FTP server, see page 141	See remark for VoIP.
VoIP	VoIP call, see page 148	These tests can be combined with any other test. Note that only one VoIP test can be active at any time.
	VoIP wait, page 166.	
	VoIP PESQ test, see page 288	
IPTV	IPTV, see page 168	These tests can be combined with any other test. Note that only one IPTV test can be active at any time.
	IPTV scan, see page 183	
	IPTV passive, see page 190	
VoD	VoD, see page 194	See remark for IPTV
	*[1] Also possible via the services VoIP, IPTV and VoD.	

The possibility of parallel testing is illustrated using HTTP download and VoIP via the services Data and VoIP. Display and operation for further parallel tests, e.g. IPTV, is performed in the same way as for Data and VoIP.



ARGUS status screen.

The VDSL VTU-R access shown in the example and the services Data and VoIP are active.

<Info> Duration of activation

<Test> Opens test selection.

<Stop> Deactivates the service.



e.g. select HTTP download

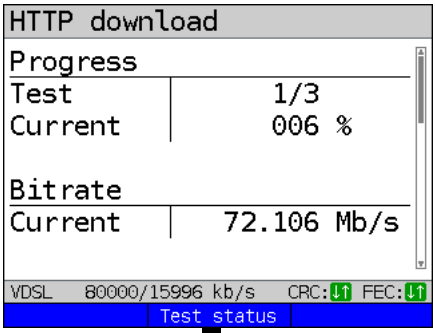
<Profile> Displays the available HTTP download profiles, see page 128.

Mark the server profile:
(default is indicated with ●).

<Edit> Edits the marked profile, see page 128 for changes to the individual settings.

HTTP download starts automatically.

HTTP download



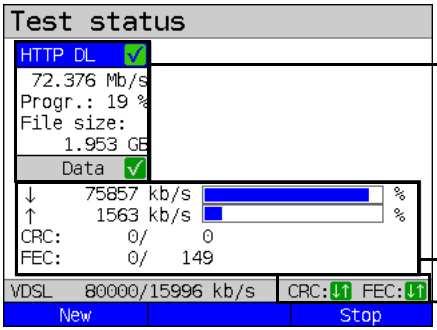
Display during HTTP download:

- Current download/total number of downloads, in this example the first download attempt out of three (1/3) is displayed.
- Data transferred so far (in this example 6 %)
- Current net average download rate (in this example 72,106 Mbit/s)

See page 131 for further result parameters.

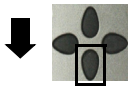
Cancels test

Test status



Display of test status:

- Currently selected test as well as test-dependent result parameters, in this example the current net average download rate, the current progress and the size of the file to be transferred. The display of results depends on the respective test. See the chapter on the individual test for more information on the result parameters.
- The current download in kbit/s is represented as a percentage of the entire downstream range.
- The current upload in kbit/s is represented as a percentage of the entire upstream range.
- Number of CRC and FEC errors in down- and upstream

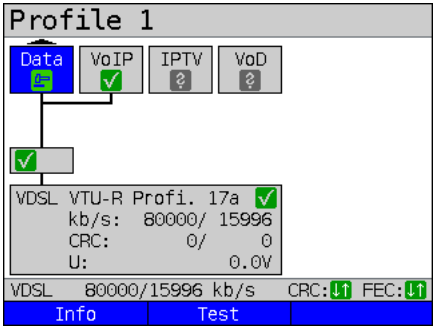


Cursor down

or

Switches to the test result parameters, in this example for HTTP download.

<Stop> Stops the test, in this example HTTP download.



ARGUS in status screen.



Opening test status

<Info> Duration of activation.

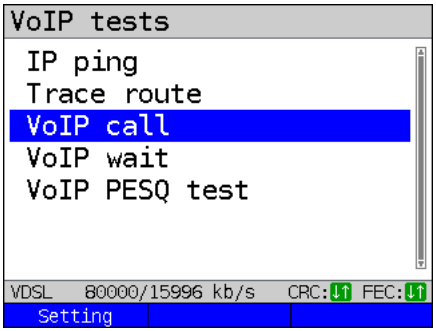
<Test> Opens test selection.



Switches to the test result parameters, in this example for of HTTP download.



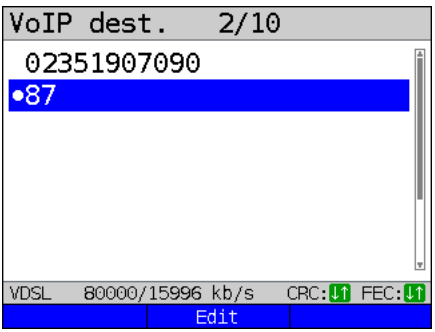
Switch to the service VoIP using the cursor keys and open test selection.





e.g. select VoIP call





Mark the VoIP destination (default is indicated with ●).

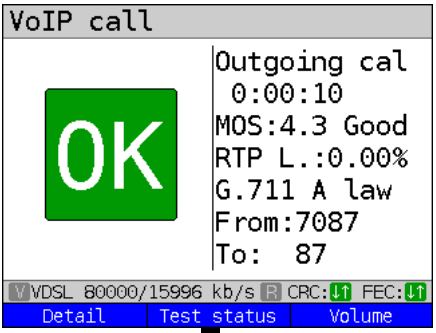
Scroll down with the cursor, mark a blank line and add a new VoIP destination using **<Edit>**.

<Edit> Edits the VoIP destination number.



Connecting

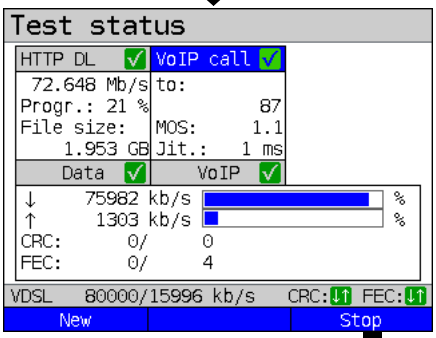




The called subscriber has taken the call ("Connected!"), see page 157.

<Info> Displays the VoIP parameters.

<Volume> Opens volume control.



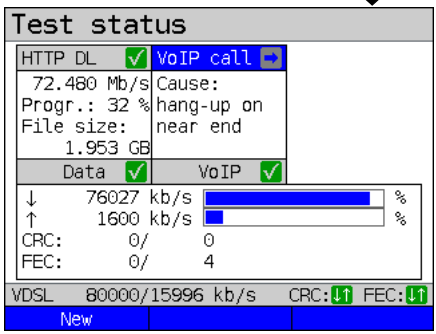
ARGUS executes an HTTP download and a VoIP call in parallel.



When more than one test is executed, you can select the tests with the left and right cursor keys. For more than three tests, the test row expands to the right.

<New> Selects a new single test.

<Stop> Stops the test, in this example VoIP call. Depending on the test, it can be reinitialised using **<Start>**. The configuration remains unchanged.



The VoIP call is stopped.



To start a new VoIP call test, the old one must be cleared by pressing  twice.

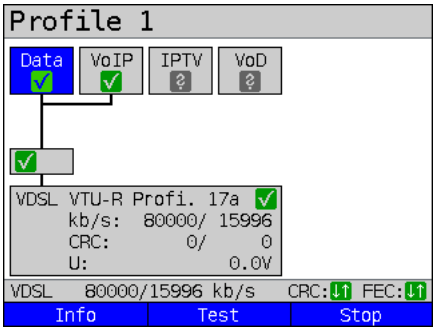
 or

Switches to the test result parameters, in this example from HTTP download.

<New> Selects a new single test.

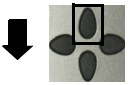
18 Auto tests

Concurrent tests (s. chapter 17 page 202) can also be executed automatically in an auto test. To to this, you can save different test scenarios in up to five auto test profiles.
The same rules as for the individual tests apply for the settings, execution and control.

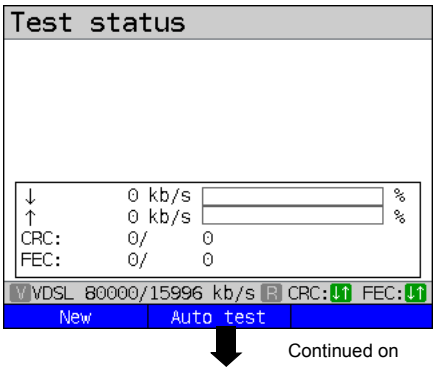


ARGUS in status screen.

Physical layer, virtual line and two of the services are successfully activated.



Cursor up

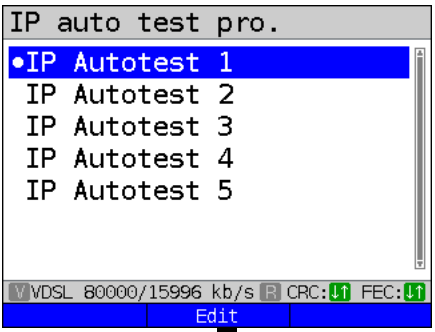


ARGUS in test status

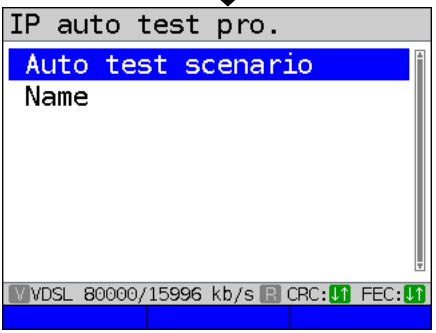
No test has been started yet.

<New>	Selects a new individual test.
<Auto test>	Opens auto test profiles.

Continued on next page

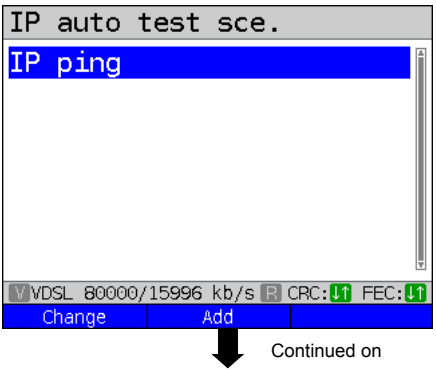


ARGUS lets you preconfigure up to five auto test profiles.



Define a scenario. You can configure up to ten individual tests (see page 202). The number of data tests (e.g. IP ping, download, ...) is limited to ten; IPTV and VoIP each can be selected only once (see page 202).

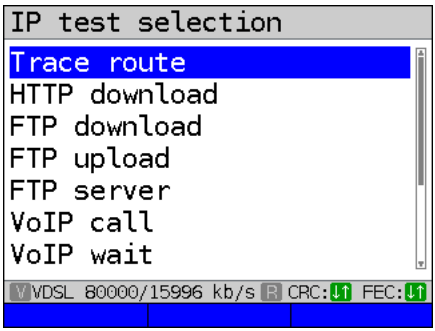




In general, at least one IP ping test is always preconfigured.

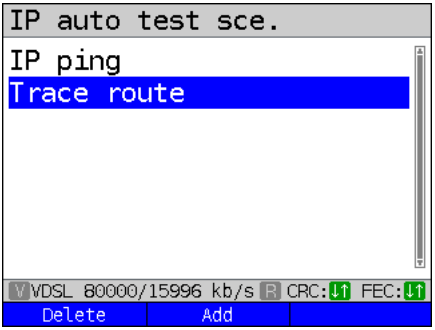
<Change>	Replaces IP-ping with a different test.
<Add>	Adds a further test.

Continued on next page



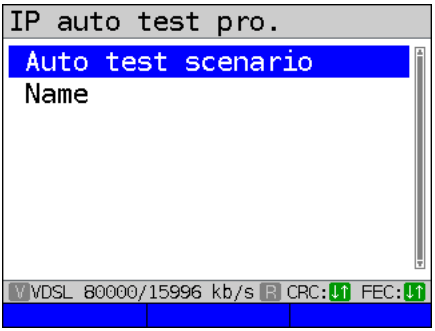
Select the desired test and confirm with



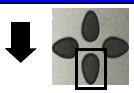


In addition to the IP ping test, a traceroute test is also started automatically and simultaneously via the auto test profile.

<Delete> Removes the test from the list.

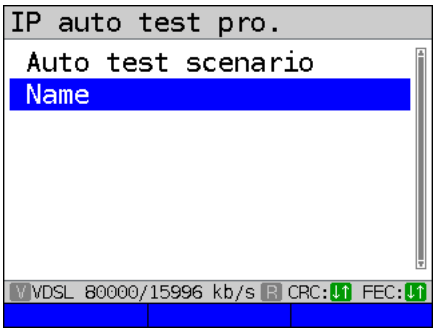


The scenario is accepted and saved.

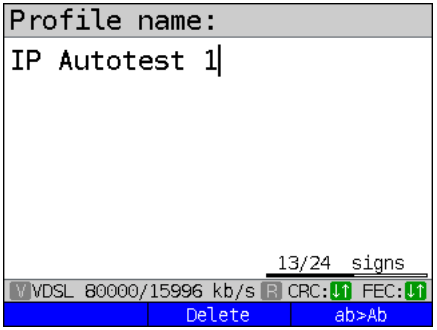


Cursor down

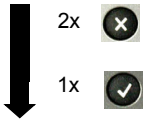
Continued on next page





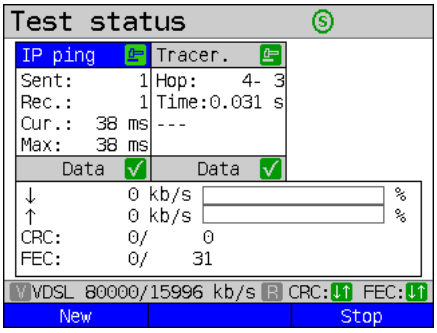


Give the auto test a clear name, like “triple-play test” or similar.
Use the alphanumeric keyboard.



Exit auto test setup by pressing twice and then start the test with .

see page 202 for instructions.





The individual tests are configured as described starting on page 118.

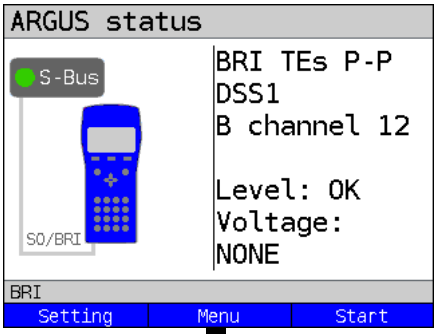
19 Operation on an ISDN Access

The voltages on the subscriber line may not exceed 48 VDC (BRI S/T) or 145 VDC (BRI U) and should be free of AC voltage.

19.1 Setting the ISDN Interface and Access Mode

Use the included connection cable to connect either the ARGUS "BRI/PRI/E1" jack to the S-Bus access to be tested or the ARGUS "Line" jack to the U to be tested and then switch the ARGUS on. The ISDN settings are made in the chapter 5 Configuring accesses page 25. In this example the ISDN TE mode was selected.

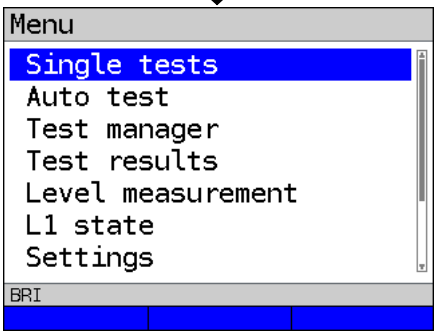
ARGUS State Display



ARGUS State Display, see page 214.

<Setting>	Open the "ISDN settings" menu, see page 216.
<Start>	Repeat the B channel test.

Main Menu



The menus, which are available for the type of access under test, are listed in the Main Menu.



The ARGUS will open the marked menu (in this example, Single tests).



Select a menu.The selected menu will be marked blue in the display.



To return to the previous menu (in the example, the State display).

TE simulation

In the Access Menu (see page 212), select the desired simulation mode:

- **TE automatic**

  On an S-Bus interface or U interface access, the ARGUS will automatically determined the D channel Layer 2 mode (P-P or P-MP). If the ARGUS determines that the access supports both modes, a configuration menu will open in which you can select the desired Layer 2 mode.

- **TE P-P (point-to-point) or TE P-MP (point-to-multipoint)**

  Afterwards, the access and the protocol stack will be initialized in accordance with the selected setting.

NT simulation

In the Access Menu (see page 212), select the desired simulation mode:

- **NT P-P (point-to-point) or NT P-MP (point-to-multipoint)**

  Afterwards, the access and the protocol stack will be initialized in accordance with the selected setting.

19.2 Initialization phase followed by a B channel Test

Initialization on a BRI S/T or U -interface access

The ARGUS will begin the initialization after taking over the existing, confirmed settings or new settings for the type of access and mode. Next the ARGUS will setup Layer 1. While it is setting up Layer 1, the "Sync/L1" LED above the display will blink. If the ARGUS cannot setup Layer 1, it will display the message “No net”. When the ARGUS is operated on a U interface access, it can take up to 2.5 minutes to activate Layer 1. As soon as Layer 1 is successfully setup, the "Sync/L1" LED will light continuously.

Once Layer 2 has been setup, the "Rx/Tx/L2" LED will light.

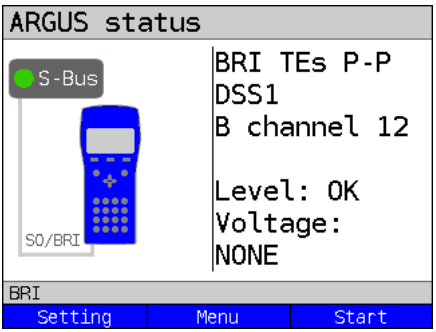


If both modes (P-P / P-MP) are found when Layer 2 on the D channel is checked, the mode must be selected manually (see page 213).

If everything has been detected without errors, the ARGUS will display the type and mode of access found. Additionally, a qualitative assessment of the level will be displayed.
The ARGUS will automatically determine the protocol (in both TE and NT mode) or use the protocol set manually (see page 217 protocol). On a bilingual access, the ARGUS will use the DSS1 protocol.

The "IP / L3" LED will light after the ARGUS has setup Layer 3. At the same time the ARGUS will start a B channel test and then display the results. If an error occurs in the B channel test (e.g. access is not plugged-in), the ARGUS will display an error message (see appendix). The ARGUS will then idle in the State display:

Example:
ARGUS State Display on a BRI access



Display:

- Type of access (in the example, BRI S/T)

- Access Mode

NTs	NT Simulation Slave (see L1 page 217)
NTm	NT Simulation Master L1
TEs	TE Simulation Slave L1
TEm	TE Simulation Master L1

- Bus configuration

D channel Layer 2 mode

P-P	Point-to-point
P-MP	Point-to-multipoint

- D channel protocol

in the example, DSS1

- The availability of the B channels

B12	Both channels are available
B1-	Only B channel 1 is available
B-2	Only B channel 2 is available
B--	No B channel is available



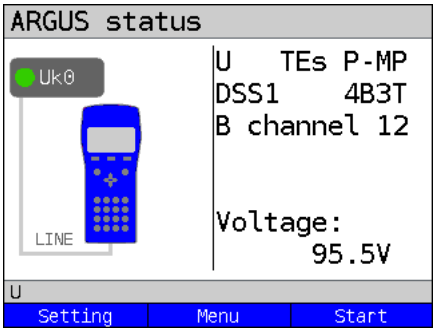
If only one B channel is available, this can have an impact on the service check and the testing of the supplementary services.

- Level and voltage evaluation

OK normal	Level/voltage is alright
<<	Level/voltage too low
>>	Level/voltage too high
--	No level/voltage
OK INV	Emergency supply
<Start>	Repeat the B channel test.
<Setting>	Open the "ISDN settings" menu, see page 216.

It must be mentioned again, that the ARGUS only determines the general bus status once when switched on or when the ARGUS first connected. On the other hand, the status of the protocol stacks for Layers 1, 2 and 3 will be continually monitored and displayed.

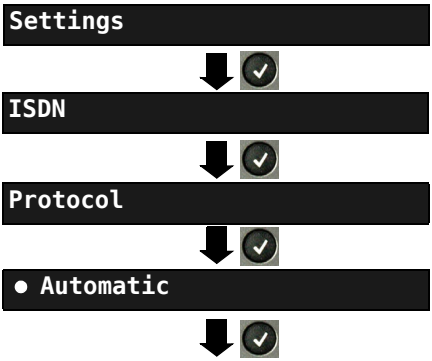
- ARGUS State Display on a U interface



Display:
- Access type (in the example, BRI U)
- Access mode (in the example, TEs)
- L2 protocol (in the example, DSS1)
- BRI U variant (line coding)
- Voltage when idle

19.3 ISDN Settings

It is possible to configure the following "ISDN Parameters" as needed. The procedure for configuring a parameter will be illustrated with a single example: It is possible to restore the parameters, see page 345.



The ARGUS takes the marked setting for use as the default and returns to the next higher menu.

ARGUS - Main Menu.

Use the cursor keys to select, e.g. protocol.



Mark the desired protocol. The selected protocol will be marked in blue (in this example, Automatic). The default protocol will be marked in the display by a ●. The ARGUS will use the default protocol for the ISDN connection.



Open the next higher menu without making any changes. The ARGUS will continue to use the default setting.

Setting	Explanation
ISDN:	
L1 permanent?	On a BRI S/T connection in NT mode, Layer 1 (L1) is permanently active. Default setting: ***No***

Protocol	As an alternative to automatic protocol determination, you can also set the Layer 3 D channel protocol manually. If the protocol setting is changed, the ARGUS will save this new setting permanently, i. e. it will use this protocol the next time that it is switched on. ISDN Protocols: - Automatic - DSS1 - CorNet-N - CorNet-T (not for the access types "NT P-P" and "NT P-MP") - CorNet-NQ (for the access types "TE P-P" and "NT P-P" only) - QSIG (for the access types "TE P-P" and "NT P-P" only) - VN4 Default setting: ***Automatic***
Alerting mode	You can specify whether, for an incoming call on a S-Bus point-to-point access, the ARGUS should only display the access number without extension or the complete number with extension. When set to "Manual", the ARGUS will display the extension. Incoming calls will be signaled. When the ARGUS accepts a call, it will send the Layer 3 "Alert" message. The digits of the extension that have been sent by this point will be displayed.  With the Manual setting, an incoming call must be answered within 20 seconds or it will be lost. Furthermore, you should note that the remote subscriber will not hear a ringing tone. If it is set to “Automatic”, the ARGUS will only display the access number without extension or, depending on the configuration of the access in the exchange, it may not display the number called at all. Default setting: ***Automatic***
Clock mode	This parameter sets where the clock will be generated in the case of a S-Bus access. You can either specify that the ARGUS generates the clock (Master) or that it is the slave of a clock generated at the other end (Slave). Setting: In NT mode: ***Master*** In TE mode: ***Slave*** Leased line: ***Slave*** Any change to this setting will not be saved permanently; it will only apply to the current measurement.

BRI termination	You can add terminating resistors to a BRI access. Setting: In NT mode: ***Terminating resistor switched in*** In TE mode: ***No terminating resistor is switched in*** Leased line: ***No terminating resistor is switched in*** Any change to this setting will not be saved permanently; it will only apply to the current measurement.
Call parameters	Four different parameters can be set for (ISDN) calls generated on both the network-side (ARGUS in NT mode) and on the user-side (ARGUS in TE mode): 1. Type of number (TON) for the CGN (=CGPN) or CDN (=CDPN) element of a SETUP signal Network-side: Net CGN TON Net CDN TON User-side: User CGN TON User CDN TON Default setting: ***unknown*** 2. Numbering Plan for the CGN (=CGPN) or CDN (=CDPN) element of a SETUP signal: Network-side: Net CGN NP Net CDN NP User-side: User CGN NP User CDN NP 3. CGN/CDN Subaddress CGN/CDN Sudaddress Type: User specific and NSAP Default setting: ***User specific*** 4. UUI (User User Info) *For more information, see Prefix on page 219.
Services	Up to three user-specified services (user spec. 1 to user spec. 3) can be entered and saved. For each "user spec. service“, you must enter the info-elements BC, HLC and LLC in hexadecimal (switch with the left softkey). To do so, use the keypad and the A . . F softkey (e.g. to enter a "C", press the softkey three times; for an "F", press it six times).

Call acceptance	If the ARGUS is set to "own MSN/DDI" and is in TE mode on a P-MP access, it will only signal those calls which are placed to the MSN (on a P-P access, the DDI) of the access under test. If set to “all MSN/DDI”, the ARGUS signals all calls. Prerequisite: - the own number must be entered in the speed-dialling memory under "own number" (see "Saving call numbers in the speed-dialling memory" on page 348). - the incoming call must have a destination MSN Default setting: ***all MSN/DDI***
Voice coding	There are two options for coding voice data in a B channel: - ***A-law*** (Default setting) - µ-law
DTMF / Keypad	DTMF or Keypad setting Default setting: ***DTMF***
CUG Index	Enter the CUG index that the ARGUS should use when testing the CUG (Closed User Group) service. Range: 0 to 32 767 Default setting: ***148***
Keypad	A maximum of three Keypad Infos can be stored. First use the vertical cursor keys to select one of the three available memory locations for Keypad Infos. **<Edit>** Edit the selected Keypad Info. Afterwards, use the keypad to enter the Keypad Info.  Save the Keypad Info.
Prefix	Entry of the national or international telephone prefix. The prefix is selected in "Call parameters" under the selection "Type of number", see page 218. National: ***0 (Default setting)*** International: ***00 (Default setting)***
AOC	Set wheter the NT simulation charging information to be transmitted. Default setting: ***On***

Starting functions with the numeric keys / key combinations
Using the ARGUS keypad, you can start important functions / tests directly, regardless of the menu that the ARGUS is currently showing. If a function is called where the ARGUS expects the entry of a digit, pressing a number key will be interpreted as the expected input. The assignment of functions to the numeric keys can also viewed on the ARGUS display. Open the Main Menu and select "Help" or press number key "1". An overview of the available key combinations can be found on page 104.

19.4 Bit Error Rate Test

The bit error rate test (BERT = Bit Error Rate Test) is used to check the transmission quality of the access circuit.

As a rule, the network operator will guarantee an average error rate of 1 x 10^{-7}, in other words in long-term operation 1 bit error in 10 million transmitted bits. A higher bit error rate will be especially noticeable in transmitting data.

The application program detects the errors in the data blocks transmitted and requests that the remote partner send them again, which reduces the effective throughput of the ISDN connection.

In the bit error rate test, the tester establishes an ISDN connection to a remote tester (end-to-end) or calls itself (self call), sends a standardized (quasi-) random number string and compares the received data with that which was sent. The individual bit errors are summed and depending on the test procedure and equipment evaluated in accordance with the ITU Guideline G.821.

During the test, the ARGUS counts the bit errors and after the test is done it calculates the bit error rate and other parameters in accordance with ITU-T G.821.

As a rule, the quality of the network operator’s access circuits is quite good. Therefore, no bit errors should occur in a one-minute test. However, if an error occurs, the test should be repeated with a measurement time of 15 minutes to achieve higher statistical precision. The access circuit is heavily distorted, if more than 10 bit errors occur within a test period of 15 minutes.

Contact the network operator or the supplier of the PBX equipment and ask them to test your access circuit.



When used on an NGN (Next Generation Network), where a packet switched connection (e.g. IP) can follow a circuit switched network (e.g. ISDN), the "UDI64k" must be explicitly selected for the BERT. Then the ARGUS will, in accord with RFC 4040, switch to clear mode, deactivate the echo canceler and not use a codec.

The BERT can be performed in three different ways:

1. **BERT in an extended call to oneself**

   A remote number is not needed, since the ARGUS sets up the ISDN connection to itself. In this case, the ARGUS requires two B channels for the test.

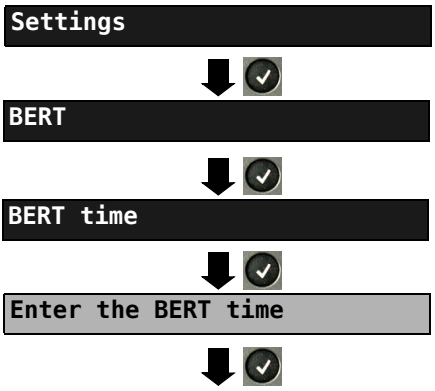
2. **BERT with a loopbox**

   A loopbox (e.g. another member of the ARGUS family of testers at the remote end) is required. The test uses one B channel.

3. **BERT end-to-end**

   This test requires a waiting remote tester (e.g. a second ARGUS in the "BERT wait" mode)(see page 228, BERT wait). A bit pattern is sent to this remote tester. Independent of the bit pattern received, the remote tester will use the same algorithm to generate the bit pattern that it sends back. Therefore, both directions are tested independently.

BERT Parameter Configuration



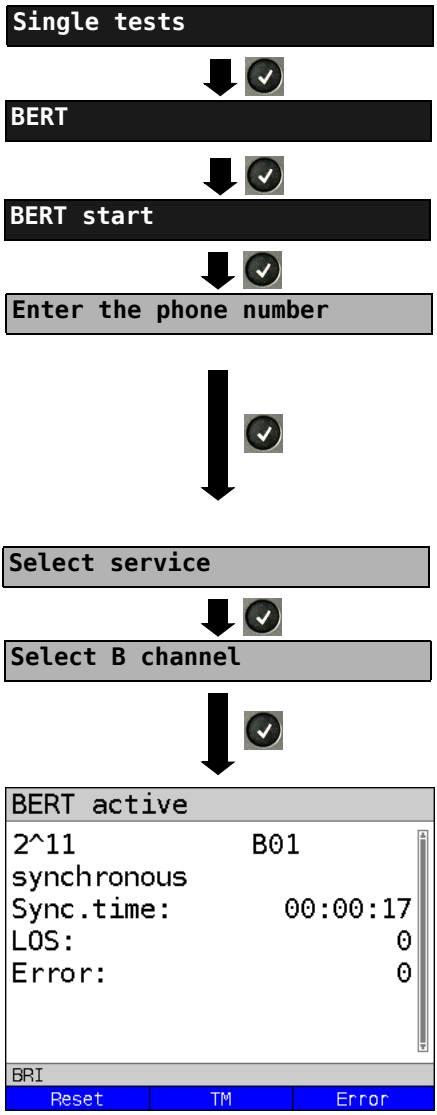
ARGUS - Main Menu

The procedure for configuring a parameter will be illustrated with a single example. The default settings can be restored at any time (see page 345).

The ARGUS sets the value entered as the default BERT time and returns to the next higher menu.

Setting	Explanation
BERT:	
BERT time	You can use the keypad to enter measurement times ranging from 1 minute to 99 hours and 59 minutes (= 99:59). If the time is set to 00:00 (= BERT with unlimited measurement time), the BERT will not stop automatically. In this case, the BERT must be terminated manually by pressing the . Default setting: ***00:00*** (continuous) In the case of an Autom. Test ***(see chapter 19.9 Automatic Performance of Multiple Tests, page 248)*** the ARGUS will automatically set this to a value of 1 minute.
Bit pattern S/T/U	This function is used to select the bit pattern to be sent cyclically by the ARGUS to perform a BERT on a S-Bus or U interface access. Several predefined bit patterns are available Default setting: $2^{11}-1$ Additionally, it is also possible to enter a 16 bit long pattern of your choice in binary: Use the horizontal cursor keys to move the cursor right or left. **<Delete>** Changes the digit before the cursor from 1 to 0
Error level	This is the level used to evaluate whether the BERT had an "acceptable" bit error rate. If the BERT has a bit error rate, which exceeds this error level, the ARGUS will display a "NO" (Not OK) as the test result. Using the keypad, this parameter can be set to any value from 01 (= 10^{-01}) to 99 (= 10^{-99}). The default threshold (error level) is 10^{-06} (1E-06). That means that, in the event that the bit error rate is less than 10^{-06} (one error in 10^6 = 1,000,000 sent bits), the bit error rate test will be evaluated as "OK".
HRX value	Setting the HRX value (Hypothetical reference connection, see the ITU-T G.821). Using the keypad, you can enter a value ranging from 0 to 100 %. Default setting: ***15 %***

BERT Start



ARGUS - Main Menu.

The speed-dialling memory will now open (see page 348). Enter/dial your own number to perform the BERT in an extended call to oneself (two B channels) Enter/dial a remote number for a BERT to a loopbox (one B channel) or end-to-end.



Scroll through the speed-dialling memory.

Using the cursor keys, select the service which should be used for the BERT.

First press **<Delete>** and then enter the B channel on the keypad. If you enter an "*", the ARGUS will choose any B channel that is free.

BERT Start

The ARGUS display after the connection has been setup and synchronized in both the send and receive directions:

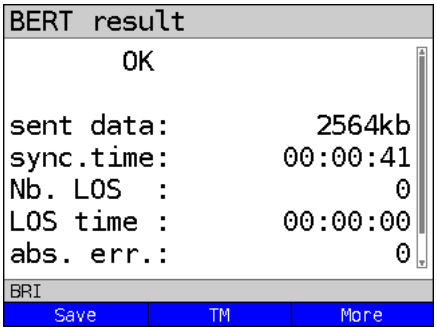
- The bit pattern and B channel / bit rate used
- The synchronicity of the bit pattern (in this example, synchron)
- Sync. time in h:min:s (time in which the ARGUS can sync to the bit pattern)
- LOS counter: shows the absolute number of synchronization losses. Synchronization is lost at an error rate greater than or equal to 20 % within a period of a second.
- The number of bit errors that have occurred

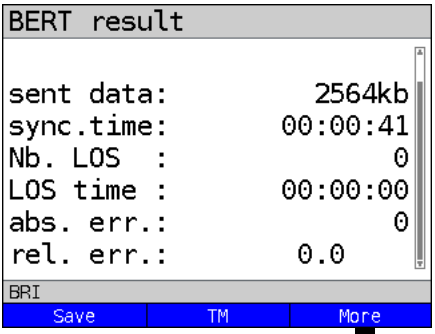
<Error>	The ARGUS will generate an artificial bit error, which can be used to test the reliability of the measurement (in particular for end-to-end tests).
<TM>	Open the Test Manager, see page 264.
 or **<Reset>**	Restarts the BERT. The test time and number of bit errors will be reset.
	Stop BERT

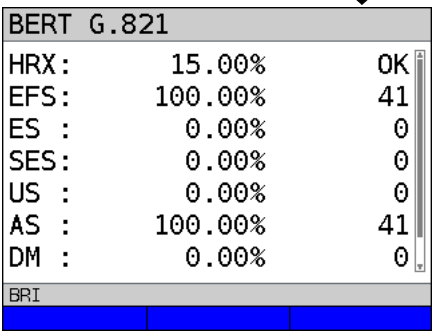
If the ARGUS has been so configured and a bit error is detected, this will be signaled by a brief alarm; in the event that the synchronisation is lost, a constant alarm will sound (see page 343, Alarm tone).

After the BERT is over, the ARGUS will display the cause and the location which initiated the disconnect. If the test ran normally, the ARGUS will display “Active clearing” on this line.

BERT results:









Scroll through the results

- The evaluation of the results depends on the error threshold (in this example OK), see page 222.
- Trans. data (transferred data):
  (K = 1024 bits, k = 1000 bits)
- Sync. time in h:min:s
  (Time within which the ARGUS can sync to the bit pattern)
- No. LOS (counter)
  Synchronization is lost at an error rate greater than or equal to 20 % within a period of a second.
- LOS time: Duration of the BERT minus the sync. time (the time in which the ARGUS could not sync to the bit pattern after it had been in sync at least once)
- abs. err: The number of bit errors
- Rel. err: The bit error rate
  (e.g. 9.7E-07 = $9.7 \cdot 10^{-7}$ = 0.00000097)

Display of other characteristic values (in accordance with ITU-T G.821):

All values are given as relative values (in percentages) as well as in absolute figures.
The ARGUS evaluates the measurement results to determine whether they satisfy the threshold limits defined in the CCITT G.821; with consideration of the defined hypothetical reference connection HRX (displaying OK or NO (Not OK)).



Scroll through the results



Return to the previous display

Characteristic values (in accordance with ITU-T G.821)

HRX Defines the hypothetical reference connection.

EFS Error Free Seconds:
The number of seconds in which no error occurred.

ES Errored Seconds:
The number of seconds in which one or more errors occurred.

SES Severely Errored Seconds:
The number of seconds in which the bit error rate is greater than 10^{-3}. In one second, 64,000 bits are transferred, thus BitErrorRate (BER) = 10^{-3} equates to 64 bit errors.

US Unavailable Seconds:
The number of all sequentially adjacent seconds (at least 10 sec) in which BER > 10^{-3}.

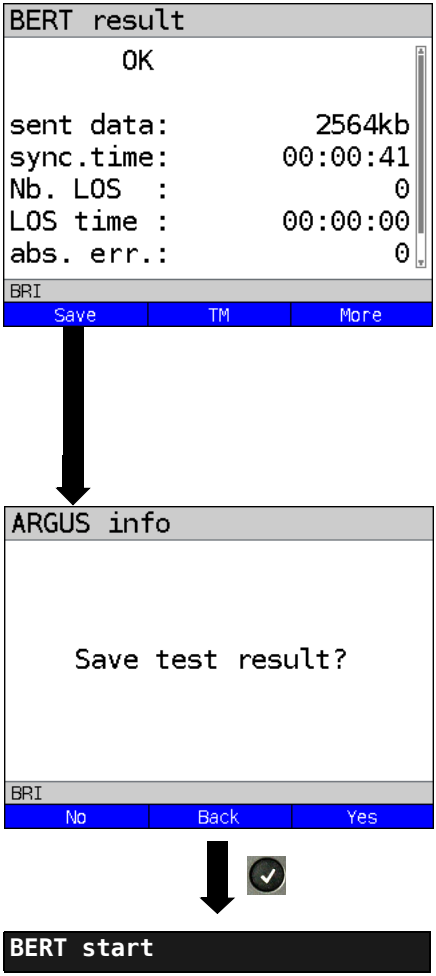
AS Available Seconds:
The number of all sequentially adjacent seconds (at least 10 sec) in which BER < 10^{-3}.

DM Degraded Minutes:
The number of minutes in which the bit error rate is greater than or equal to 10^{-6}. In one minute, 3,840,000 bits are transferred, thus a BER = 10^{-6} corresponds to 3.84 bit errors (3 errors = OK (no degraded minutes), 4 errors = NO (Not OK) (Degraded Minutes).

LOS Loss of Synchronize:
Synchronization is lost at an error rate greater than or equal to 20% within a period of a second. The absolute number of synchronization losses will be shown.

BERT saving

The ARGUS can store the results of several BERTs. The ARGUS saves the results together with the date, time and call number of the access under test (if this number has been entered as the "own" number in the speed-dialling memory, see page 348) in the next free memory location (see page 332). If all of the memory locations are used, the ARGUS will request permission to overwrite the oldest test results.



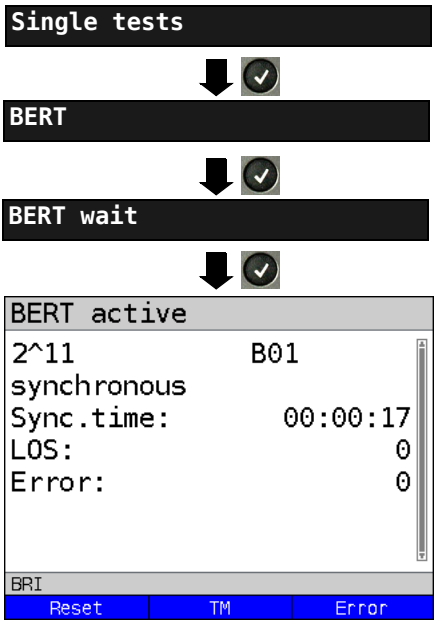
Use the keypad to enter the name under which the ARGUS should save the results, for more information see page 332.

BERT - saving the result

Display the saved BERT results, see page 333.

BERT wait

In “BERT wait” mode, the ARGUS will wait for the BERT at the remote end. This is required for an end-to-end test.



ARGUS - Main Menu.

Activate “BERT wait”

The ARGUS first waits for a call and then sets up the connection. During the connection, the received bit pattern will be evaluated while an independent bit pattern will be sent back.

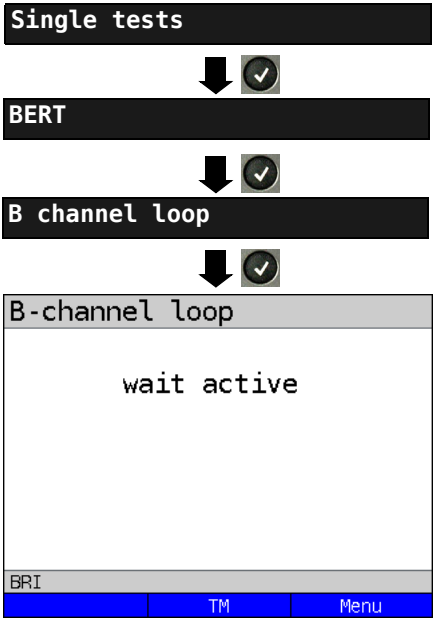
<TM> Opens the Test Manager (see page 264).

For information on the displays shown, see "BERT start" on page 222.

Display BERT results

B channel loop

“B channel loop” mode is required in order to run a bit error rate test using a loopbox (an ARGUS is the loopbox) at the remote end.



ARGUS - Main Menu.

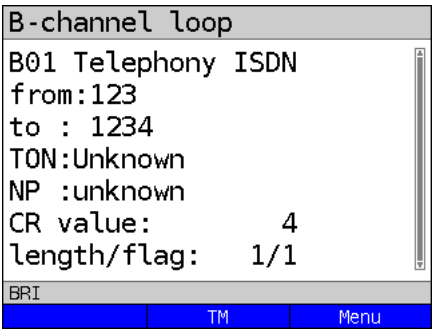
Activate a “B channel loop”

The ARGUS will wait for a call. Any incoming call (regardless of the service) will be taken immediately. The ARGUS will switch a loop back in the B channel that is specified by the exchange and then send the received bit pattern back to the caller/ sender.

<TM> Open the Test Manager (page 264).

<Menu> Open the Main Menu: the “B channel loop” remains active.
From this menu, you can start a second B channel loop connection (this is also possible using **<TM>**). If you press **<TM>** (see page 264) the ARGUS will return to the "B channel loop, wait active" display.

Exit the “B channel loop” mode.



Display shown after accepting a call:

- B channel used and service
- The caller's number (from:)
- The number dialled (to:)
- If available: TON, NP, UUS etc.

<TM> Opens the Test Manager (page 264).

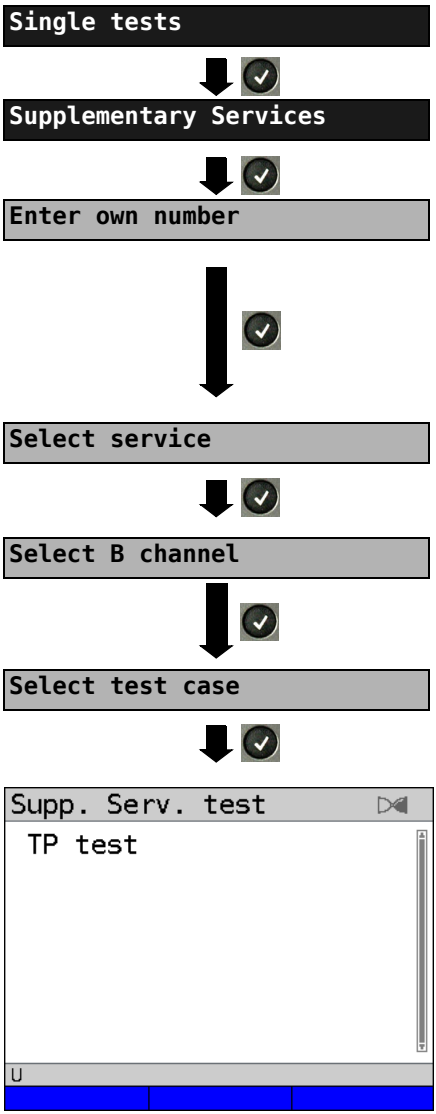
<Menu> Open the Main Menu.

Clear down the B channel loop connection; the B channel loop, however, remains active!

19.5 Supplementary Services Test

The ARGUS checks whether the access under test supports supplementary services.

Suppl. service interrogation in DSS1



ARGUS Main Menu

The speed-dialling memory opens (see page 348).

Scroll through to your own call number (the number of the access under test) or enter it using the keypad.
The ARGUS will test the availability of the supplementary service (in part by placing a call to itself).

Using the cursor keys, select the service which should be used for the supplementary services test.

Enter the B channel on the keypad. The ARGUS suggests the B channel used last. If you enter an "*", the ARGUS will choose any B channel that is free.

The ARGUS will determine whether the selected supplementary service is supported by this access.

Start test

Display the test results:
+ = suppl. service supported
- = suppl. service not supported

Scroll through the results

Close the results display and open the next higher menu

Test	Explanation
TP	The ARGUS tests the TP (Terminal Portability) supplementary service by making a self call.
HOLD	The ARGUS tests the HOLD supplementary service by making a self call.
CLIP	The ARGUS checks, one after the other, whether the 4 supplementary services CLIP, CLIR, COLP and COLR are supported. To do so, the ARGUS will setup as many as three calls to itself. CLIP: Will the calling subscriber's number be displayed at the called subscriber? t = CLIP temporarily available p = CLIP permanently available CLIR: Will the display of calling subscriber's number at the called subscriber be suppressed or is it possible to temporarily suppress the display? If the ARGUS displays an *, it is not possible to determine the availability of the service, since no CLIP has been setup. t = CLIR temporarily available p = CLIR permanently available COLP: Will the call number of the subscriber who answered be displayed on the caller's phone? COLR: Will the display of the call number of the subscriber who answered be suppressed on the caller's phone or is it possible to temporarily suppress the display? If the ARGUS displays an *, it is not possible to determine the availability of the service, since no COLP has been setup. ⚠ The suppl. services CLIP, CLIR, COLP and COLR will be tested in pairs. If CLIR or COLR is set up permanently, it is not possible to make a clear assessment.
DDI	Can a caller directly dial in to an extension on the PBX access under test?
CF	The ARGUS will check whether the 3 supplementary services CFU, CFB and CFNR are supported. CFU: Can this access immediately forward an incoming call? CFB: Can this access forward an incoming call when it is busy; in other words does it support Call Forwarding Busy? CFNR: Can this access forward an incoming call when it is not answered?

⚠	In the CF test, the ARGUS attempts to set up a call diversion to the call number that is in the speed-dialling memory location for “remote call number 1” (see "Saving call numbers in the Speed-dialling Memory" on page 24). When performing a CF test, the ARGUS will report an error if this location does not contain a valid call number to which it is possible to divert a call.
CW	Does the access under test support call waiting?
CCBS / CCBS-T	Will the access under test automatically recall a remote subscriber if the number called was busy?
CCNR / CCNR-T	Will the access under test automatically recall a remote subscriber if the call was not answered?
MCID	Does the access tested allow identification of malicious callers (call tracing)?
3pty	Does the access under test support a three-party conference call? For this test, you need the assistance of a remote subscriber, whose call number must be entered. A connection is necessary.
ECT	Is an explicit call transfer supported by the access under test? For this test, you need the assistance of a remote subscriber, whose call number must be entered. A connection is necessary.
CUG	The ARGUS then uses a self call to check whether the access under test belongs to a closed user group.
CD	An incoming call will be diverted immediately. This form of call diversion differs from the others in that it is invoked on a call-by-call basis, and is not preconfigured to a specific destination.
AOC	The ARGUS checks whether the charges can be sent to the access under test. The test uses a call to oneself to check both AOC-D (AOC during a call) and AOC-E (AOC at the end of a call).
SUB	A call is made to oneself and answered to check the transfer of the sub-address in both directions. Are sub-addresses supported on the access under test?
UUS	Does the access under test support the transfer of user data?

No Screening	If the caller supports CLIP No Screening (CNS) and the ARGUS is in TE mode, the ARGUS will display all of the connected network-side call numbers. It is also possible to check the CLIP No Screening function by monitoring with the WINanalyse software on a PC.

Error Messages

If an error occurs during the Supplementary Services Tests or if it is not possible to setup a call, the ARGUS will display the corresponding error code (e.g. 28).
Example: The error code 28 equates to "wrong or invalid number".
In the table below, you will find that this is an error from the network and that it reports that the call number was incomplete or in the wrong call number format (see “ARGUS Error Messages (DSS1)” on page 366).

A few error codes and their meaning:

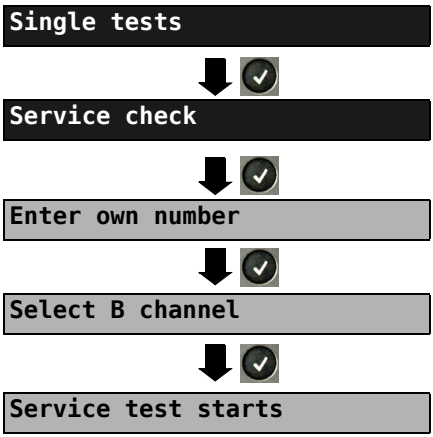
Description	Cause (from network) DSS1	Cause ARGUS internal
no or another access	__	201, 204, 205, 210, 220
wrong or invalid number	1, 2, 3, 18, 21, 22, 28, 88	152 ,161, 162, 199
one or more B channels busy	17, 34, 47	___
wrong service	49, 57, 58 ,63 , 65, 70, 79	___

19.6 Service check

The ARGUS checks, which of the following services are supported by the access under test:

Service	Name displayed on the ARGUS
Speech	**Speech**
Unrestricted Digital Information (data telecommunications)	**UDI 64kBit**
3.1 kHz audio	**3.1**
7 kHz audio	**7 kHz audio**
Data transfer with tones & displays	**UDI-TA**
Telephony	**Telephony ISDN**
Telefax Groups 2/3	**Fax G3**
Fax Group 4	**Fax G4**
Combined text and facsimile communication	**Mixed**
Teletex Service basis mode	**Teletex**
International interworking for Videotex	**Videotex**
Telex	**Telex**
OSI application according to X.200	**OSI**
7 kHz Telephony	**Telephony 7kHz**
Video telephony, first connection	**Video telephony 1**
Video telephony, second connection	**Video telephony 2**
Three user-specific services (see, page 218)	**User-specified 1 to 3**

The test runs automatically.
The ARGUS will make a separate self call to test each of the user-specific services. However, the call will not be answered so no charges will be incurred.



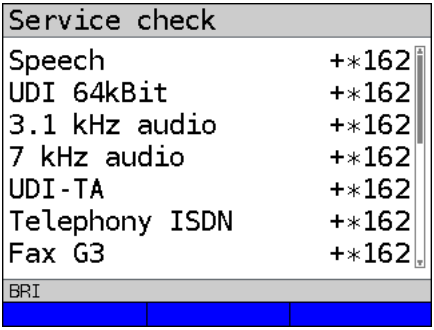
ARGUS - Main Menu

Enter the own (local) number of the access under test or select it from the speed-dialling memory.

The ARGUS suggests the B channel used last. If you enter an "*", the ARGUS will choose any B channel that is free.

There are PBXs that use separate call numbers for incoming and outgoing calls. In this case, for the Service tests, you can enter a “remote” call number that does not match the “own” number that is stored in the ARGUS. If the Service check should extend outside of the local exchange, it is possible to perform the Service check in an end-to-end mode. In this case, you must enter the remote call number for a second terminal device. The ARGUS will then automatically check whether the remote terminal can accept the call under the various services – in other words, whether it is “compatible” with these services. In the test results, the second part (second +, - or *) refers to the answer from the remote exchange.

Test results:



The ARGUS will display the results of the test once it is done. The ARGUS makes a distinction between outgoing calls (the first +, - or *) and incoming calls (the second +, - or *).

- **+** = suppl. service supported
- **-** = suppl. service not supported
- ***** = No definite assessment can be made so an error code is displayed. In such case, it is recommended that you have someone place a call to the access under test using this service.



Scroll through the results



Close the results display and open the next higher menu.

Interpreting the test results:

Display	Explanation
+ +	The self call functions OK or the remote end can take the call for this service.
+ -	The call was sent successfully, however, it was rejected at the remote end due to a lack of authorization.
-	An outgoing call with this service is not possible.
+ *	The call was sent successfully, the call to the remote end failed (e.g. remote end busy thus no B channel was available for the call back).
*	Wrong number, no B channel available or other error.

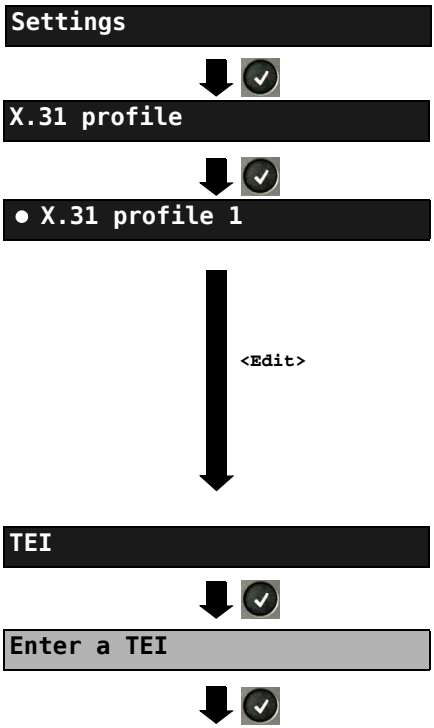
If the outgoing call is not successful, it is not possible to make a statement about an incoming call. Therefore, you will never see “- +” or “- *” on the display.

19.7 X.31 Test

The ARGUS will perform a “Manual X.31 Test” or, if desired, an “Automatic X.31 Test”:
In the case of an automatic test, the ARGUS will first setup the D channel connection and then an X.31 connection. The ARGUS will then automatically clear the connection and display the results.

In the case of a manual test, the ARGUS will setup a D channel connection and an X.31 connection. The duration of this connection is determined by the user (or the opposing end). For the duration of the connection, the ARGUS will repeatedly send a predefined data packet. The ARGUS will count all of the data packets sent and received and will display (where possible) the contents of the data packets received.

Configuring the X.31 parameters



ARGUS - Main Menu.

The ARGUS stores the parameters of the X.31 Test in the three X.31 profiles.



Mark a profile for editing. The selected profile will be marked blue in the display. The default profile will be marked in the display with a ●. The ARGUS will use the parameters in the current profile for the X.31 Test.



The ARGUS takes over the marked profile as the default and returns to the Settings menu.

The default parameters can be restored at any time (see page 345).

The ARGUS saves the TEI entered and returns to the next higher menu.

Setting	Explanation
X.31 profile:	Up to three user-defined X.31 profiles can be created. **<Edit>** The selected profile will be opened for editing.
Packet number	Number of packets sent Range: 0 to 65 000 Default setting: ***10***
TEI	Entry (from the keypad) of the TEIs (Terminal Endpoint Identifier) to be used in the X.31 test. If you enter **, the ARGUS will automatically select a TEI. Range: min. 0 to a max. of 63 Default setting: ****** *(automatic)***
LCN	Entry (from the keypad) of the LCN (Logical Channel Number) to be used in the X.31 test. Range: 0 to 4095 Default setting: ***1***
Packet size	Size of the data packets: 16, 32, 64, 128 or 256 bytes. Default setting: ***128 Bytes***
Agree packet size	Negotiate with the network side (DCE) regarding the data packet size. If the desired data packet size is larger than the default, this parameter should be set to “yes”. Default setting: ***No***
Window size	Window size of Layer 3, selection of 1 to 7 packets. Default setting: ***2 Packets***
Agree window size	Negotiate between the terminal (DTE) and the network (DCE) an agreement regarding the window size. Default setting: ***No***
Throughput	Data throughput in bits/s: 75, 150, 300, 600, 1200, 2400, 4800 or 9600 bits/s. Default setting: ***1200 bit/s***
Agree throughput	Agree on the data throughput Default setting: ***No***

User data

Content of the user data

- Format setting for the user data
- Entry of the ASCII data

ASCII data



Use the cursor keys to select one of the three available memory locations for the ASCII data (in this example, the first location 1/3).

● ASCII data 1/3

<Edit>

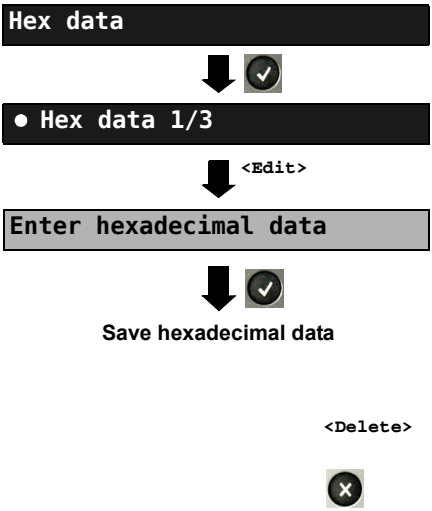
Enter ASCII data



Save ASCII data

Use the numeric keypad to enter the ASCII data.When the right softkey is pressed it assumes a different meaning and thus influences the entries made from the keypad (letters or digits):

<12>ab>	Entry of the digits 0 to 9 plus * and #
<ab>AB>	Entry of lowercase characters (e.g. to enter a “C” press the “2” on the keypad three times), plus @, /, -, and .
<AB>12>	Entry of the uppercase characters and @, /,- and .
	Move the cursor
<Delete>	Delete the character before the cursor
	Do not save ASCII data.



- Entry of the hexadecimal data:

Select one of the three available memory locations for the hexadecimal data (in this example, the first location 1/3)

Use the keypad to enter the hex value. To enter the values "A...F", use the softkey **<A..F>** (e.g. to enter a "C", press the softkey **<A..F>** three times). To confirm the entry of the hexidecimal characters A to F press **<OK>** (the softkey in the middle changes from **<Delete>** to **<OK>**).

<Delete> Delete the character before the cursor

Do not save the hexadecimal values.

CUG	Closed User Group. Default setting: ***No***
CUG Index	Coding for Closed User Group Range: min. 0 to 255 max. Default setting: ***1***
D bit	Local: DCE acknowledges data packets, i. e. flow control on local DTE-DCE path. End-to-end: DTE-DTE flow control Default setting: ***Local***
Facilities	Coding for various supplementary services A maximum of 3 facilities can be stored. For instructions, see User data on page 238.
Profile name	Use the keypad to enter the profile name for the X.31 profile. The ARGUS will later display this name for the profile.

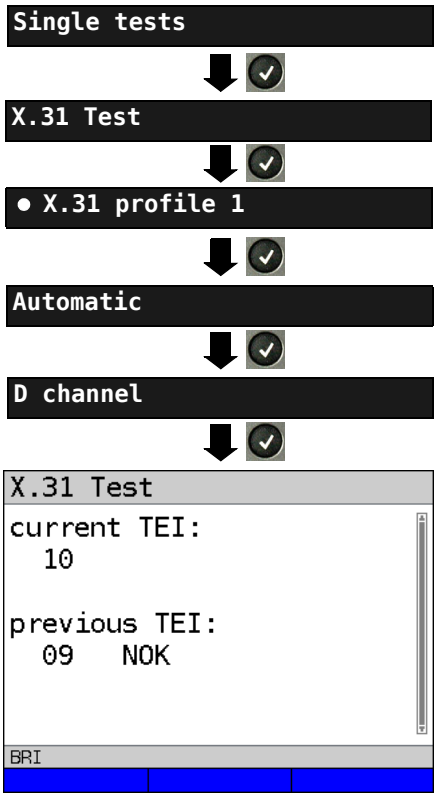
Automatic X.31 Test

D channel

The “automated X.31 Test in D channel“ consists of two steps:

First step: The ARGUS tests whether it is possible to access the X.25 service via the D channel on the ISDN access under test. The ARGUS sequentially checks all the TEIs from 0 to 63. All the TEIs with which the X.31 service is possible on Layer 2 will be displayed.

Second step: For each TEI with which X.31 is possible on Layer 2, a "CALL_REQ" packet will be sent and then the ARGUS will wait for an answer. Beforehand, the ARGUS will request the entry of the X.25 access number, which will be saved in speed-dialling memory under X.31 test number (see page 348). With the entry of the X.25 access number, you can - if you wish - select a logical channel (LCN) other than the default.



ARGUS Main Menu.

Select the profile.

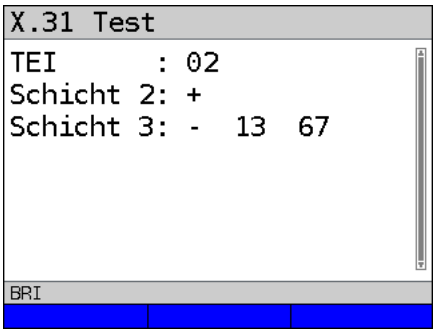
<Edit> Change to the profile parameters (see page 237).
The parameters can be edited.

Start test

The test can take up to 4 minutes.
The ARGUS will display the currently tested TEI, the previously tested TEI and the results:

OK = X.31 is available for this TEI
NOK = X.31 is not available for this TEI

Test results



The ARGUS will check whether the X.31 service is available for Layer 3 for the TEIs found in Step 1.
Example: Test results

TEI 02 The first valid TEI is 02.

Layer 2
- **+** First test step was successful
- **-** First test step was not successful

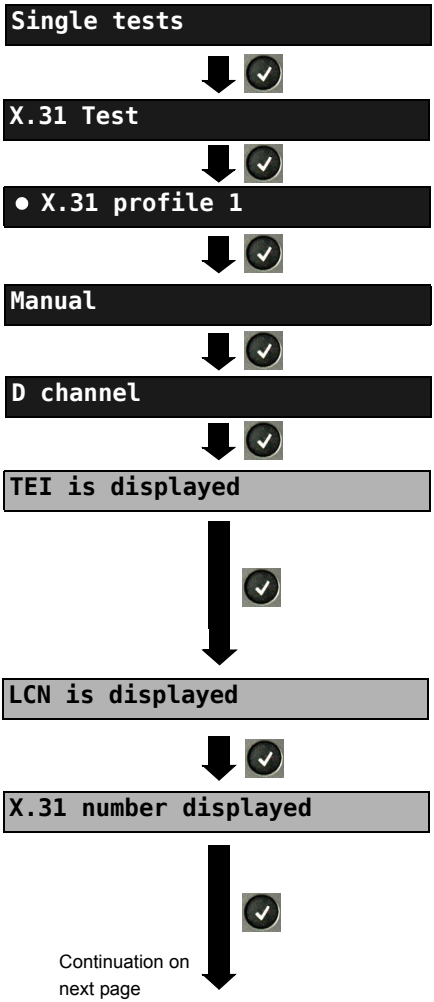
Layer 3
- **+** Second test step was successful
- **-** Second test step was not successful
  In this case, the ARGUS will display the relevant X.31 cause for the failure (in the example above: 13) and the associated diagnostic code, if there is any (see the Appendix page 367).

If the X.31 service is not supported, the ARGUS will report “X.31 (D) n. impl.”.

Manual X.31 Test

D channel

The ARGUS first requests a TEI, an LCN and an X.31 number (the ARGUS uses the values stored in the X.31 profile). If an "**" is entered for the TEI, the ARGUS will automatically determine a TEI. Using the first TEI with which X.31 is possible, the ARGUS will setup a connection.



ARGUS - Main Menu

Select the profile.

<Edit> Change to the profile parameters (see page 237).
The parameters can be edited.

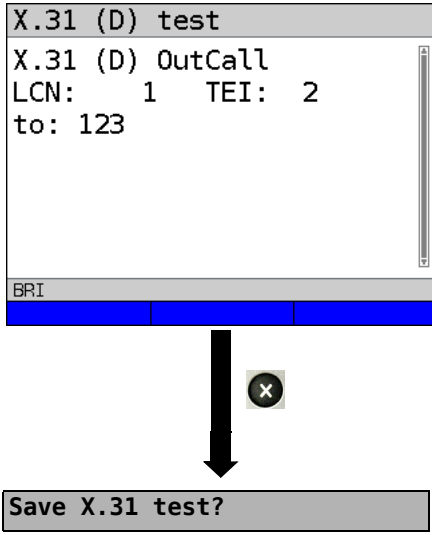
The ARGUS displays the TEI stored in the X.31 profile. It can be edited from the keypad. If you enter "**", the ARGUS will automatically select a TEI.

<Delete> Delete the TEI

The ARGUS displays the stored LCN (see page 237). It is possible to edit the LCN from the keypad.

The ARGUS displays the X.31 number saved in the speed-dialling memory (see page 348). It can be edited from the keypad.

Setup an X.31 connection.



The ARGUS will display the LCN, the TEI, the X.31 number and the negotiated connection parameters.

<Data>	Sends a predefined data packet
<Statistic>	Displays the L1/L2/L3 statistics
<L2>	Scrolls to the L2 statistics
<L3>	Scrolls to the L3 statistics

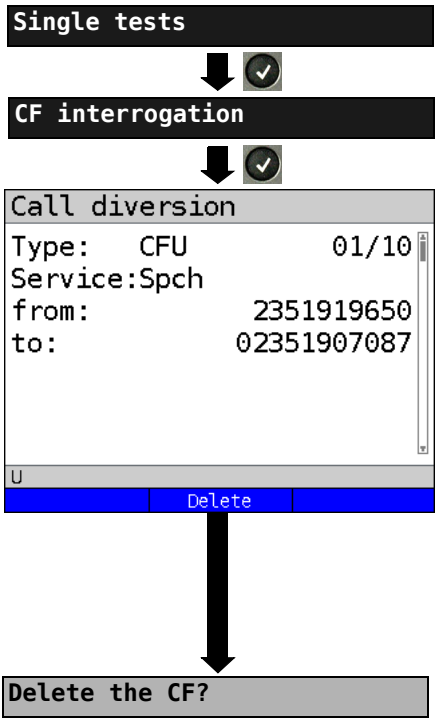
The X.31 connection will be maintained until the user or the remote end clears it. When the X.31 connection is cleared, the ARGUS will automatically clear the D channel connection.

<Yes>	The ARGUS saves the results (see page 332).

19.8 Call Forwarding (CF)

CF Interrogation

The ARGUS will check whether a call diversion has been setup in the exchange for the access under test. The ARGUS will show the type of diversion (CFU, CFNR or CFB) and the call diversion's service. The display is limited to a maximum of 10 call diversions. The ARGUS will count any additionally set up call diversions. The ARGUS can clear any call diversion setup in the exchange.



ARGUS - Main Menu.

Start the CF Interrogation. The test can take a few seconds.

Display:

- Type of call diversion (in the example, CFU)
- The type of call diversion will be displayed / number of call diversions found
  In this example: Display the first of a total of one call diversion found (01/10)
- The call diversion service
- The number that should be diverted (from:)
- The number to which calls should be diverted (to:)

<Delete> Delete call diversion

Security query

<Yes> Clears the displayed call diversion in the exchange. If this is not possible, the ARGUS will report: "Call diversion not changeable!"

<All> Delete all call diversions.

Do not delete the call diversion! Open the Single Tests Menu.



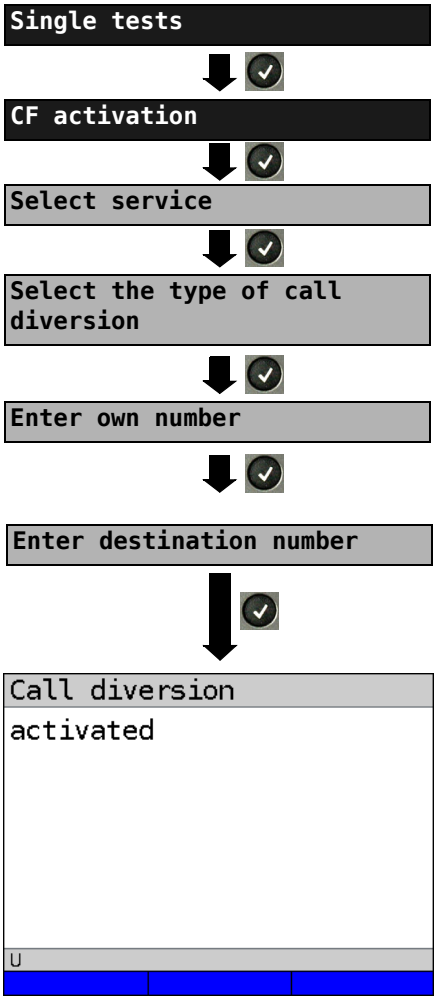
Some PBXs or exchanges do not permit the use of the mechanism used (by the ARGUS) for the interrogation of the call diversions for all MSNs or they return a negative acknowledgement of the interrogation of call diversions, implying that no call diversions have been set up. In the event of a negative acknowledgment, the ARGUS will require that the local MSN is entered. The call diversion interrogation will be repeated MSN-specific. Naturally, in this case, the results of the interrogation of the call diversion only apply for the entered MSN and not for the entire access.

Abbreviations used for the services and service groups on the display:

Bearer Service	**Abbreviation**
All services	**All**
Speech	**Spch**
Unrestricted Digital Information (data telecommunications)	**UDI**
Audio 3.1 kHz	**A3k1H**
7 kHz audio	**A7KHz**
Telephony 3.1 kHz	**Tel31**
Teletext	**TTX**
Fax Group 4	**FaxG4**
Video syntax based	**ViSyB**
Video Telephony	**ViTel**
Telefax Groups 2/3	**FaxG3**
Telephony 7 kHz	**Tel7k**

CF Activation

Using the ARGUS, call diversions can be setup in the exchange.



ARGUS - Main Menu.

Using the cursor keys, select the "Service" of the call diversion.

Using the cursor keys, select the type of call diversion.

The speed-dialling memory opens (see page 348).
Under own (local) number, enter the call number which should be diverted.

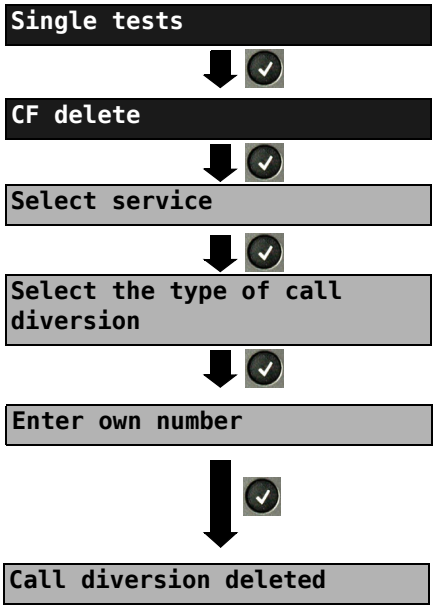
Enter the call number to which calls should be diverted.

Set up the call diversion

Open the Single Tests Menu.

CF Delete

The ARGUS can clear selected call diversions setup in the exchange.



ARGUS - Main Menu.

Using the cursor keys, select the "Service" of the call diversion.

Using the cursor keys, select the type of call diversion.

The speed-dialling memory opens (see page 348).
Under "Own number", enter the call number which should no longer be diverted.

Delete call diversion

Open the Single Tests Menu.

19.9 Automatic Performance of Multiple Tests

The ARGUS performs an automatic test series and displays the test results. The required parameters (e.g. measurement time and error level for the BERT, see page 221) should be checked before the automatic test series is begun.

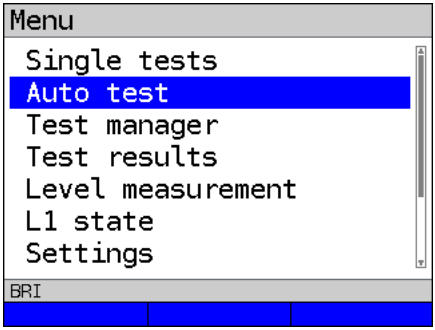
Using the ARGUS WINplus or WINanalyse software, the test results can be saved on a Windows PC. On the PC, WINplus / WINanalyse can be used to generate a comprehensive report that can then be printed, sent by e-mail and/or archived. The ARGUS automatically performs the following sequence of single tests:

On a BRI S/T or U-interface (ARGUS in TE mode)

- Status
- Level measurement
- Service check
- BERT in an extended call to oneself
- Supplementary service test (Suppl.serv.test)
- CF Interrogation (Call Diversions)
- X.31 test

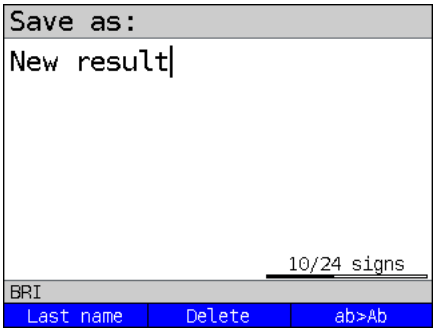
On a BRI S/T or U interface leased line (permanent circuit)

- Level measurement
- BERT in end-to-end mode (e.g. with a loopbox on the remote end)



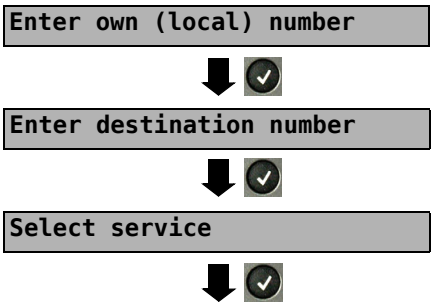
ARGUS - Main Menu

Select Auto test.



Select the memory location. For each memory location used, the ARGUS will display the name assigned to the memory location (in this example, New result).

Press the 4 GHI on the numeric keypad to directly access a memory location. A indirection through the main menu is not necessary.



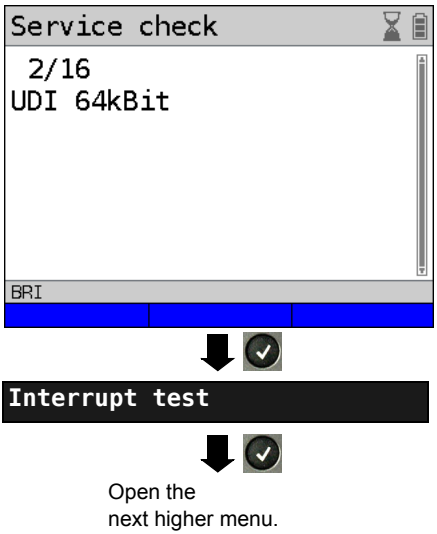
In TE mode:
Enter the “Own number”; on accesses using the DSS1 protocol you must also enter a “remote number”.

Select service
(required for Supp.Serv.test and BERT).

Start the automatic test

During the test sequence, the ARGUS will display the single test currently running.

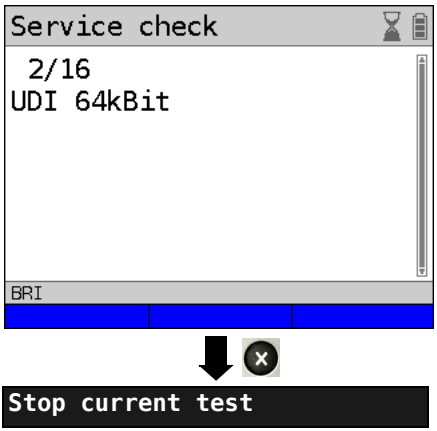
Terminating the test (early):



Open the next higher menu.

The ARGUS will terminate the test sequence, any test results already gathered will be lost. Any "old" data stored in this memory location from a prior test will be retained.

Skipping individual tests:

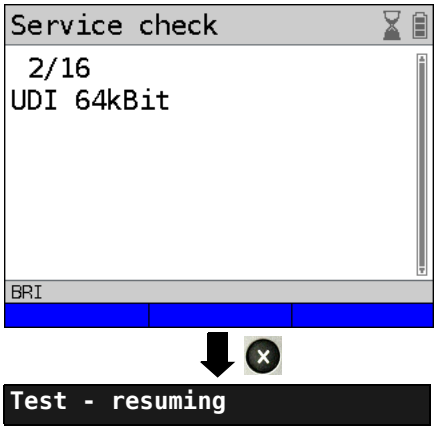


In this case, the ARGUS will execute the next single test.

A single test can be skipped: In this example, the ARGUS is currently running a Service check.

Stop the current single test.

Resuming a test:



The ARGUS can resume an interrupted single test: In this example, the ARGUS is running a Service test.

Stop the current single test

The ARGUS repeats the “interrupted” single test (in the example: a Service check).

For information on displaying the test results, see page 333.

19.10 Connection

The ARGUS can set up a connection for the following services:

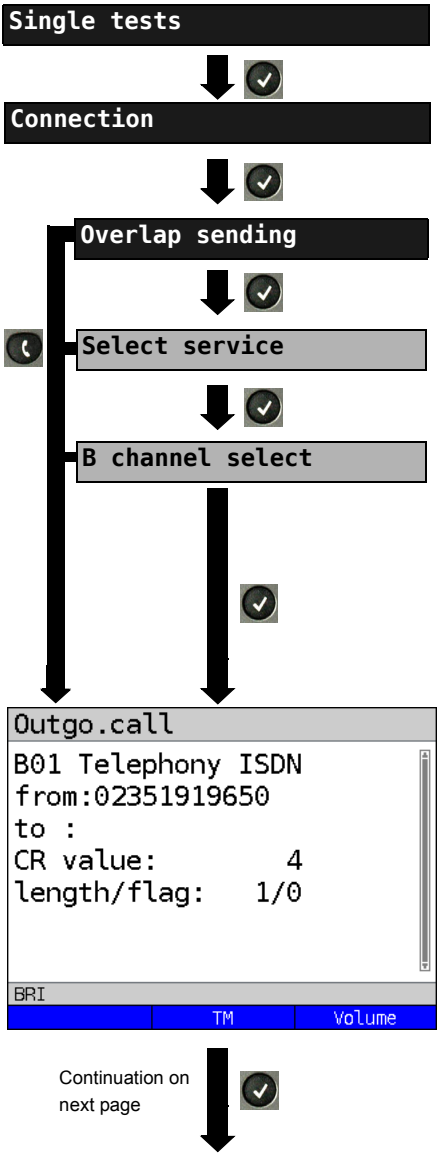
Service	Display
Speech	**Speech**
Unrestricted Digital Information (data telecommunications)	**UDI 64kBit**
3.1 kHz audio	**3.1 kHz audio**
7 kHz audio	**7 kHz audio**
Data transfer with tones & displays	**UDI-TA**
Telephony	**Tel. ISDN**
Telefax Groups 2/3	**Fax G3**
Fax Group 4	**Fax G4**
Combined text and facsimile communication	**Mixed**
Teletex Service basis mode	**Teletex**
International interworking for Videotex	**Videotex**
Telex	**Telex**
OSI application according to X.200	**OSI**
7 kHz Telephony	**7 kHz**
Video telephony, first connection	**Videotel. 1**
Video telephony, second connection	**Videotel. 2**
Three user-specified services (see, page 218)	**User-specified 1 to 3**

A headset or the integrated handset can be used as a phone during a telephone connection.

When a connection is set up, pressing the number keys (0-9) or the * or # will generate and send the corresponding DTMF tones.

Overlap sending (outgoing call)

In overlap sending, the digits entered for the call number are sent individually.



ARGUS - Main Menu

<Call no.> Open the call number entry dialog

The ARGUS will open the Connection display.
Besides overlap sending (as shown on the left), one of the following can be selected here
- En-bloc sending (see page 255)
- Redialling (see page 256)
- Keypad dial (see page 260).

Select the service to be used for the connection.

Enter the B channel on the keypad. The ARGUS suggests the B channel used last. Press **<Delete>** first before entering a new B channel. If you enter an *, the ARGUS will choose any B channel that is free. The ARGUS will show whether the B channel is available.

To set up a connection

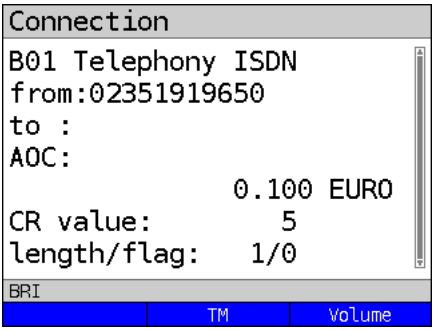
Enter the call number on the keypad. Display:

- B channel and service
- The number in the speed-dialling memory under “own number”, see page 348 (from:)
- The number dialled (to:)
- Other information depending on the access, e.g. TON and NP

<TM> Start the Test Manager, see page 264.

<Volume> Set the volume

or Cancel setup



or

Disconnect

The connection is setup using B channel 1.

Depending on the type of access other information will be displayed.
- Subaddress of the caller (SUB)
- Destination number
- User-User Information (UUI)
- Display Information
- Type of number (TON)
- Numbering plan (NP)
- Units for charges

<TM> Start the Test Manager, see page 264.

<Volume> Set the volume

- Display Advice of Charges (AOC):

If the charges are not given in units, rather directly as currency, the ARGUS will display the current charges in currency. If, in DSS1, the call charges are not provided in accordance with the DIN ETS 300182 standard, rather in the form of the information element DISPLAY (DSP), the ARGUS will display the DISPLAY message's character string.

Note regarding the entry of the own call number

Separate the extension from the access number with a # (e.g. 02351 / 9070-40 is entered on the ARGUS as: 023519070 #40). For an outgoing call, the ARGUS uses the entire call number (without #) as the number called (CDPN or DAD) and, for the calling number, only the extension (DSS1-CGPN).
A '#' at the beginning of a call number is treated as a valid character. A '#' at the end of the own call number instructs the ARGUS to not send the caller's number for outgoing calls (CGPN or OAD).

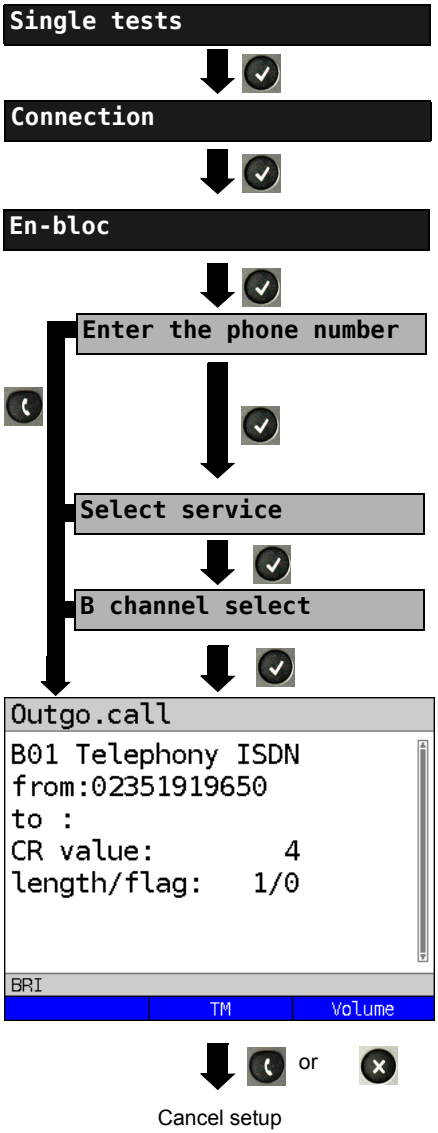
Simplified overlap sending using the telephone key

pressed once: The ARGUS will open the Connection/Overlap window directly regardless of the currently open menu.

depressed again: A dial tone will be heard and once the call number is entered, the call will be setup.

En-bloc sending (outgoing call)

In en-bloc sending, the ARGUS sends the entire dialling information in one block.



ARGUS - Main Menu

<Call no.> Open the call number entry dialog

The speed-dialling memory opens (see page 348).
Use the cursor keys to scroll to desired the number or reenter the number on the keypad.

The ARGUS will open the Outgo. call display, operation like by overlap sending.

Enter the B channel on the keypad (for details on entry, see “Overlap sending”).

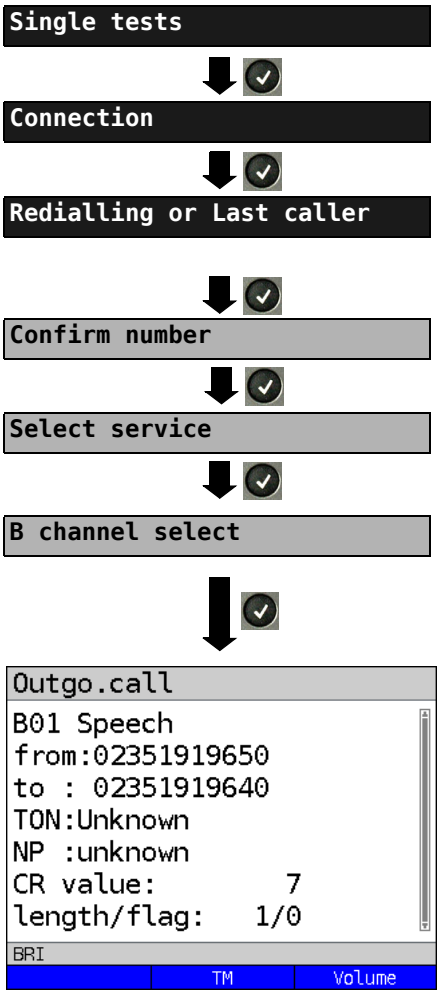
For more information on the displays and operation, see Overlap sending page 253.

<TM> Start the Test Manager, see page 264.

<Volume> Set volume

Redialling (outgoing call) + Last caller (incoming call)

The ARGUS will set up a call using the last number dialled or the number of the last caller.



ARGUS - Main Menu

<Call no.> Open the call number entry dialog

Enter the B channel on the keypad. The ARGUS suggests the B channel used last. Before entering a new B channel first press **<Delete>**. If you enter an *, the ARGUS will choose any B channel that is free. The ARGUS will show whether the B channel is available.

The dialling procedure will begin using the number last called or the number of the last caller.

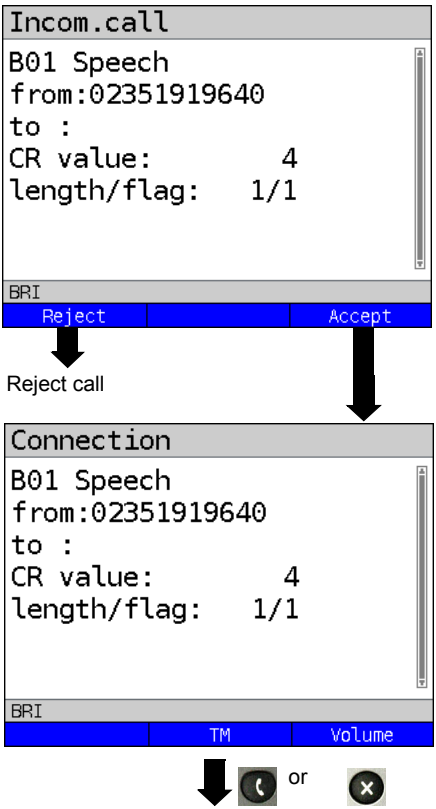
For more information on the displays and operation, see Overlap sending page 253.

<TM> Start the Test Manager, see page 264.

<Volume> Set volume

Incoming Call

An incoming call can be taken at any time even when a test (e.g. a BERT) is in process (see page 265). The ARGUS will signal an incoming call with an audible tone and a message on the display. On a P-MP access, you can use the Call acceptance (see page 219) function to configure the ARGUS to only signal incoming calls which are addressed to the MSN that corresponds to your own call number. This function can only be used when your own call number has been entered into the speed-dialling memory (see page 348) and the incoming call has a destination MSN.



Display:

- B channel used and service
- The caller's number (from:)
- Destination number (to:)
- Other information depending on the access, e.g. TON and NP

The ARGUS will display the complete destination number (DDI), if the Alerting mode is set to manual (see page 217).

Accept call

Depending on the type of access additional information will be displayed (in the example, CR value and length/flag).

The call number of the last incoming call will be saved in the "Last caller" memory location.

<TM> Start Test Manager, see page 264.

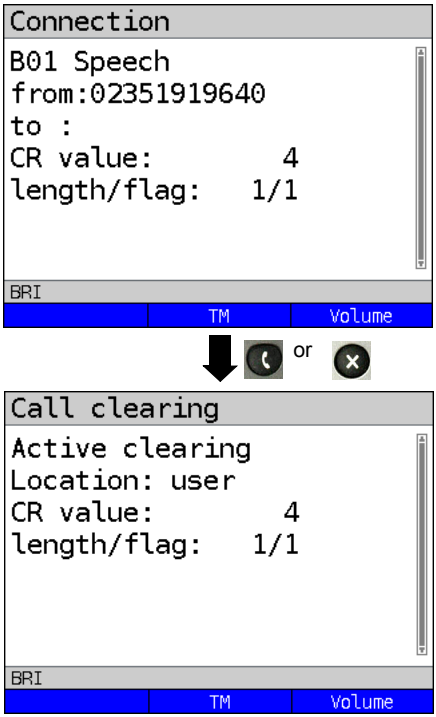
<Volume> Set volume.

The ARGUS displays the cause of the disconnect (see page 258).

Charge information in NT mode:

In NT mode, the ARGUS will – for incoming calls – send advice of charges in accordance with DSS1 as units and as currency (in euros).

Clear (disconnect) the connection



<TM>	Start Test Manager, see page 264
<Volume>	Set volume

The ARGUS will display the cause (see the table below) of the disconnect (e.g. Normal clearing) and the location where the cause occurred (e.g. subscriber).
Depending on the access, additional information will be displayed (in this example, Units).

The following causes are shown in clear text:

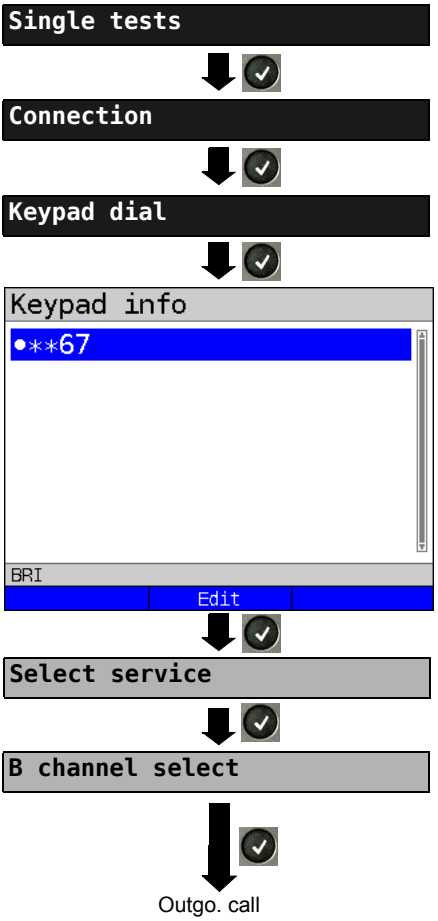
Reason	Display	Explanation
255	Active clearing	Clearing User actively initiated the disconnection
Length 0	Normal clearing	Cause element with Length 0
01	unalloc. number	Signals “No access under this call number”
16	Normal clearing	Normal clearing
17	User busy	The number called is busy
18	No user respond	No answer from the number called
19	Call time too long	Call time too long

21	Call reject	The call is actively rejected
28	Wrong number	Wrong call number format or call number is incomplete
31	Norm. clearing	Unspecified “normal class” (Dummy)
34	No B chan.avail.	No circuit / B channel available
44	Req.chan.unavail	Requested B channel not available
50	Req.fac.not subs	Requested supplementary service (facility) not subscribed
57	BC not authoriz.	Requested bearer capability is not enabled
63	Srv./opt.n.avail	Unspecified for “Service not available” or “Option not available”
69	Req.fac.not impl.	Requested facility is not supported
88	Incompat. Dest.	Incompatible destination
102	Timer expired	Error handling routine started due to time-out
111	Protocol error	Unspecified for “protocol error class”
127	Interworking err	Unspecified for “interworking class”

Other causes are not shown in clear text, rather as decimal codes (see ”ARGUS Error Messages (DSS1)" on page 366).

Testing Features via the Keypad

This feature is only relevant on an S-Bus or U interface. Some network operators do not support the standard DSS1 features, rather they expect the user to control the network via so-called keypad command sequences. In these cases, the desired facility is usually activated by entering a series of characters and then sending these characters within a DSS1-specific protocol element. These so-called keypad elements are imbedded in a setup message. Each step is acknowledged either acoustically (handset) or via special protocol elements (cause). These causes are displayed by the ARGUS.



ARGUS - Main Menu.

Select keypad info, see page 219.

<Edit> Edit the selected keypad info entry. Afterwards, use the keypad to enter the keypad info.

Using the cursor keys select the service that should be used for the connection.

Use the keypad to enter the B channel for the connection, see page 253.

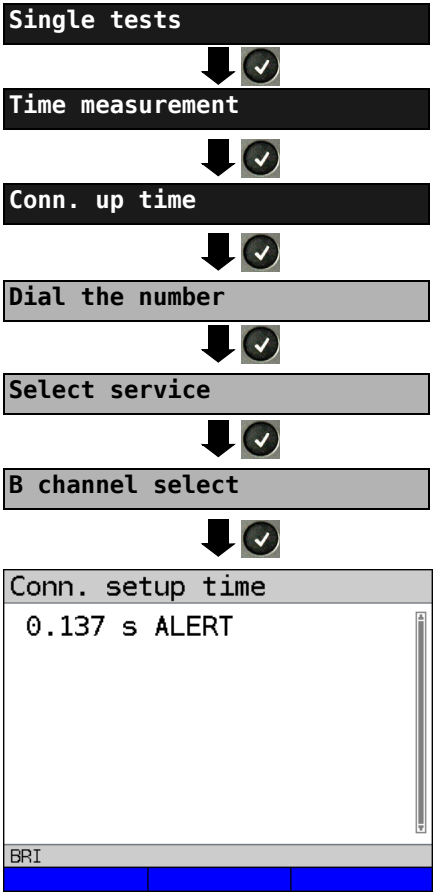
Start the dialling procedure.
For more information on the displays and operation, see Overlap sending page 253.

19.11 Time Measurement

The ARGUS measures three different times:
- Connection setup time
- The propagation delay of the data
- The difference between the propagation delays for the data on two B channels.

Connection setup time

The ARGUS places an outgoing call and measures the time between sending the SETUP and receiving the ALERT or CONN. The ARGUS disconnects automatically as soon as the measurement is completed.



ARGUS Main Menu

The speed-dialling memory opens (see page 348). Use the cursor keys to scroll to desired the number or reenter the number on the keypad.

Enter the B channel on the keypad

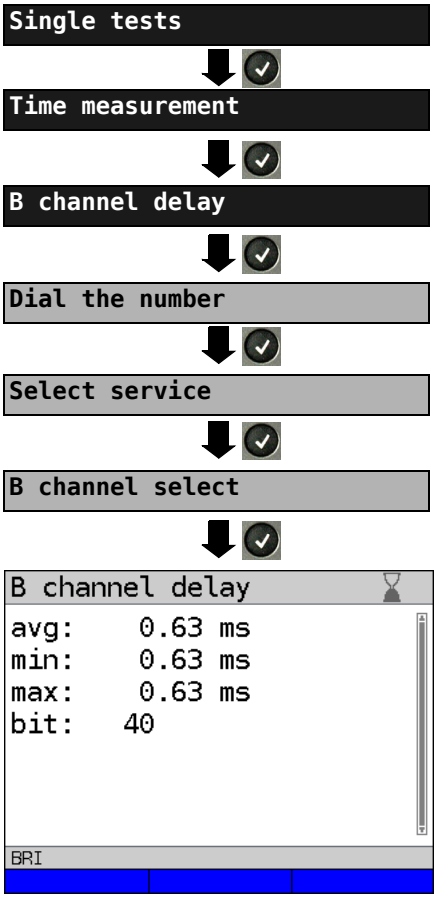
Perform measurement

Display:
- Connection setup time in seconds
- L3 message received when the connection has been fully setup

If the ARGUS cannot perform the measurement - e.g. because the call number entered was wrong or no B channel is free - the cause (see page 364) will be displayed.

B channel delay

The ARGUS places a call to itself (self call) or to a remote loopbox and measures the propagation delay for the data in the selected B channel. The measurement (continuous measurement) must be terminated manually.



ARGUS Main Menu

The speed-dialling memory opens (see page 348).
Use the cursor keys to scroll to desired the number or reenter the number on the keypad.

Enter the B channel on the keypad

Perform measurement

Display

avg:	average B channel delay
min:	shortest B channel delay
max:	longest B channel delay
bit:	The average B channel delay in bits (multiples of the time required to send a bit at 64 kbit/s, it takes 15.26 µs to send a bit).

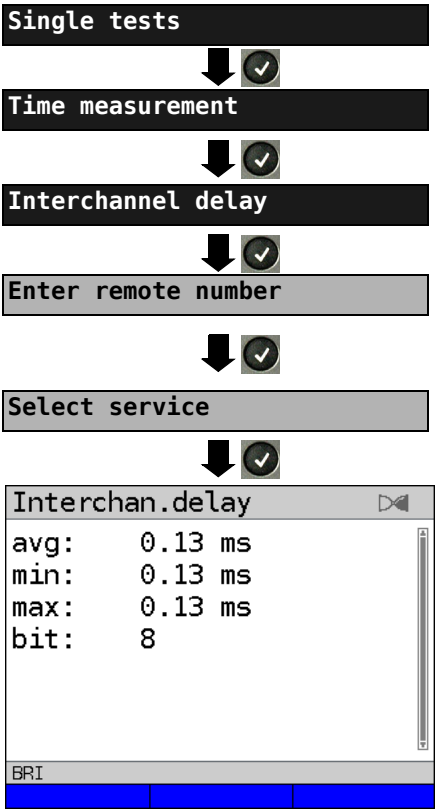
The measurement will be repeated in cycles (continuous measurement).

Stop measurement, the ARGUS will display the last measurement.

If the measurement cannot be performed (e.g. because the call number entered was wrong or no B channel is free) the ARGUS will display the corresponding cause. If the ARGUS does not receive the data back in the B channel within 13 seconds, it will display the message “No loop”.

Interchannel delay

The ARGUS establishes two separate connections to a remote loopbox. The loopbox sends the respective B channel data back on the same channel. The ARGUS measures the propagation delay for the data on each of the B channels and determines the difference between the two propagation delays (interchannel delay). The measurement (continuous measurement) must be terminated manually.



ARGUS Main Menu

The speed-dialling memory opens (see page 348).
Use the cursor keys to scroll to desired the number or enter a new number.

Perform measurement

avg:	average interchannel delay
min:	shortest interchannel delay
max:	longest interchannel delay
bit:	The average interchannel delay in bits (multiples of the time required to send a bit at 64 kbit/s, it takes 15.26 µsto send a bit).

The measurement will be repeated in cycles (continuous measurement).

Stop measurement.The ARGUS will display the last measurement.

If the measurement cannot be performed (e.g. because the call number entered was wrong or no B channel is free) the ARGUS will display the corresponding cause. If the ARGUS does not receive the data back in the B channel within 13 seconds, it will display the message “No loop”.

19.12 Managing Multiple Tests on an ISDN Access

The ARGUS can simultaneously start several tests or “connections” independently of each other. As an example, a BERT can be run at the same time that you make a phone call. The individual tests or “connections” use resources.

All of the tests that have been started will be administered by the Test Manager. Using the Test Manager, you can start new tests, switch between tests running in parallel or terminate all of the tests that are currently running.



ARGUS - Main Menu

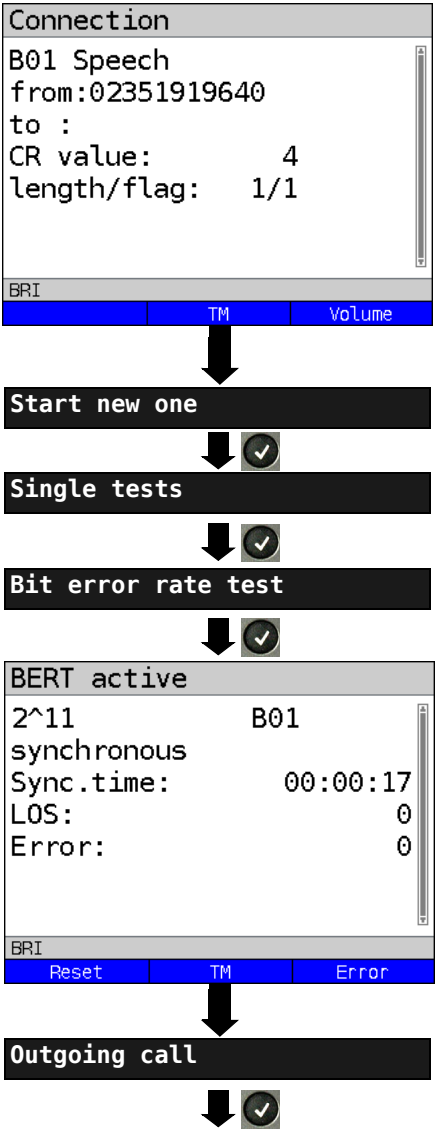
Open the Test Manager

<TM> or MNO 6

Opens the Test Manager directly in the Single Tests Menu if a connection has already been setup or if the ARGUS is running a test.

Starting Several Tests to Run Simultaneously

Starting a new test or connection during an existing connection



Open the Connection display.

Example:
There is a connection on B channel 1.

Open the Test Manager (can also be opened by pressing the 6 MNO -key).

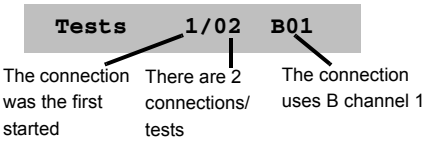
Select the desired test (e.g. bit error rate test, BERT).

Start BERT, the connection is still setup.

For information on running a BERT, see page 222.

Open the Test Manager, mark “Outgoing connection”.

An example of the display



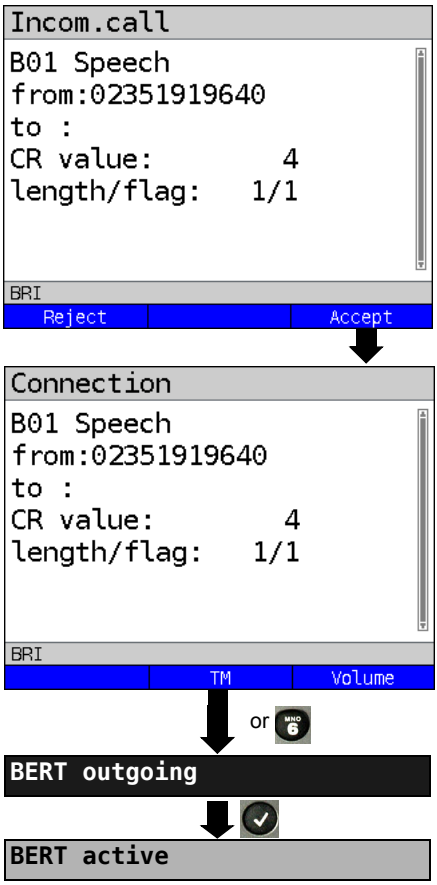
If a test (or connection) is canceled (or cleared), the ARGUS will return to the Test Manager if there is another test (or connection) running in the background.

Some tests use so many resources that they cannot be run in every combination with other tests. In this case, the ARGUS will display the message “Test not possible at this time”.

Test / Connection	**Number of times that a test or connection can be started at the same time:**	**It is possible to change to another test:**
Incoming call	2	Yes
Outgoing call	2	Yes
BERT	2	Yes
Loop	2	Yes
Service check	1	No
Suppl.serv.test	1	No
Time measurement	1	No
X.31 test	1	No
CF Interrogation / Active / Delete	1	No
Automatic test	1	No

Switching between Parallel Tests or Connections

This operation will be illustrated using the example of "Accepting an incoming call during a BERT". The ARGUS signals an incoming call both audibly and on the display (see page 252). The incoming call can be accepted without influencing the currently running BERT. If either the “B channel loop” or the “BERT wait” function is active, the call will be accepted automatically.



While running a BERT, the ARGUS displays information about an incoming call.

<Reject> Reject the incoming call. The ARGUS will switch to the BERT.

Accept call
The BERT will continue in the background.

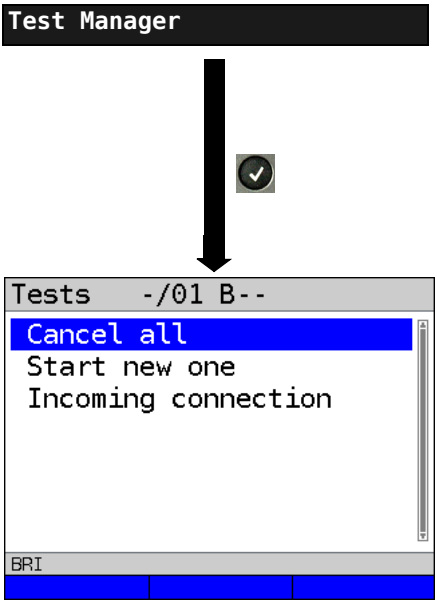
Mark “BERT outgoing”.

Switch to BERT.

The connection remains active in the background, the handset is assigned to the connection.

The handset will be assigned to the appropriate currently active connection. The assignment of the handset to a given connection is also retained in the background.

End All Currently Running Tests or Connections



ARGUS - Main Menu.

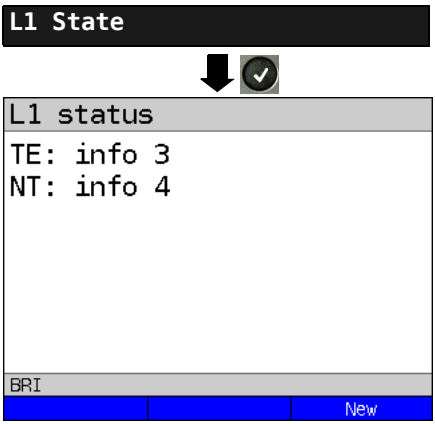
Open the Test Manager

<TM> or 6 — Opens the Test Manager directly in the Single Tests Menu if a connection has already been setup or if the ARGUS is running a test.

All tests will be terminated and all connections cleared down.

19.13 The L1 State of an S-Bus Access

The ARGUS displays the current status of Layer 1: i. e. which signal does the remote end receive and which signal does the ARGUS receive?



ARGUS - Main Menu

The ARGUS displays the state of Layer 1 or of the signal, which is currently being sent (Info 0 to Info 4).

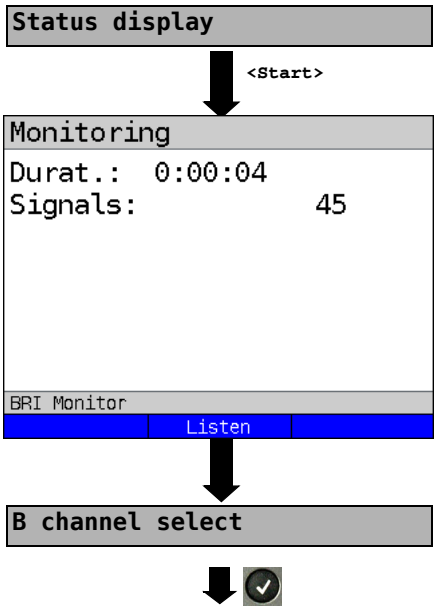
<New> Layer 1 will be setup again

Close the display and open the Main Menu.

19.14 Monitor

The ARGUS accepts all of the D channel signals from the S-Bus access and sends these D channel signals over the USB interface to a PC which must be running ARGUS WINplus or WINanalyse. The Bus and Layer 1 are not influenced by the monitoring.

The Monitor settings are made in the chapter 5 Configuring accesses page 25.



Continuation on next page

Monitoring is not yet active!

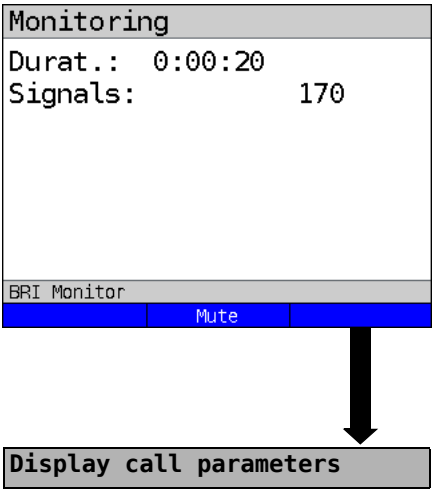
Start monitoring

The ARGUS displays the recording time in h:min:sec and the number of recorded signals.

Stop monitoring.

Listening-in on voice data

Enter the second B channel from the keypad (first press **<Delete>**) or use the cursor keys to select it. The ARGUS will switch the handset to this B channel.



Listening-in on voice data
(Direction: Net --> User) possible.

<Mute>	To stop listening
<Talk>	Parallel call display while monitoring The ARGUS searches all of the D channel signals sent for a SETUP. If a SETUP is detected, the **<Call>** softkey will be displayed.

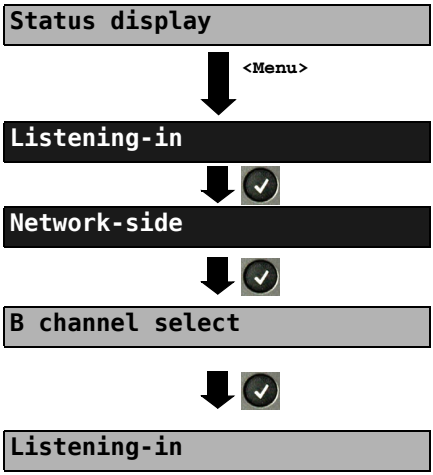
The ARGUS displays the call parameters of the last SETUP received.
Display:

- Call direction (N -> U for Net -> User)
- B channel used
- Service
- Own number (from:)
- Destination number (to:)

Depending on the type of access additional information will be displayed.

- Sub-address (SUB)
- User-User-Info (UUI)
- DSP messages
- Type of number (TON)
- Numberin Plan (NP)

Listening-in when monitoring is not active



Monitoring is not active!

It is possible to passively listen-in on the network-side, the terminal-side or both sides.

Enter the B channel from the keypad (first press **<Delete>**) or use the cursor keys to set it.

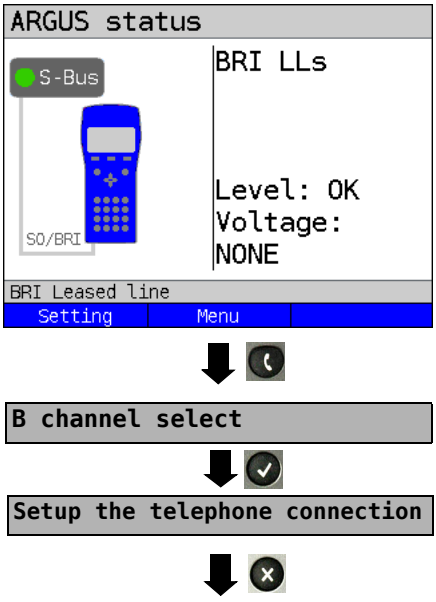
Stop listening-in and open the Main Menu.

19.15 Leased Lines on an ISDN Access

Besides dial-up connections to any subscriber, ISDN also supports the use of permanent circuits switched to a specific remote location (leased lines). These leased lines (permanent circuits) are available after setting up Layer 1, in other words after synchronizing both terminals by exchanging HDLC-frames. The location where the clock is generated can be selected (see page 217). A quick and simple test of a leased line can be made by placing or taking a call on a selected B channel. However, for a more precise test, a bit error rate test should be run.

Both ends of the leased line (permanent circuit) must use the same channel.

Telephony



The Leased line settings are made in the chapter 5 Configuring accesses page 25.

<Setting> ISDN parameter configuration, see page 216.

Enter the B channel from the keypad (first press **<Delete>**) or use the cursor keys to set it.

The ARGUS will display the B channel used and the duration of the leased line (in h:min:sec).

<Volume> Set the volume

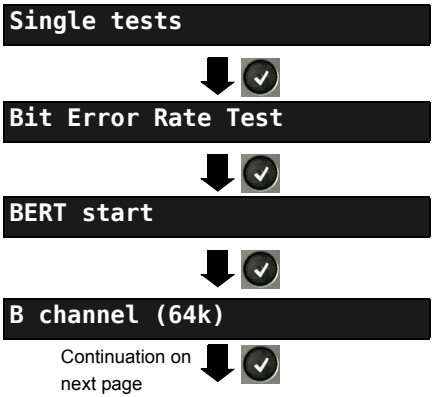
<TM> Start the Test Manager, see page 265.
Another connection can be setup.

Alternatively, the connection can be setup via Connection in the Single Tests Menu.

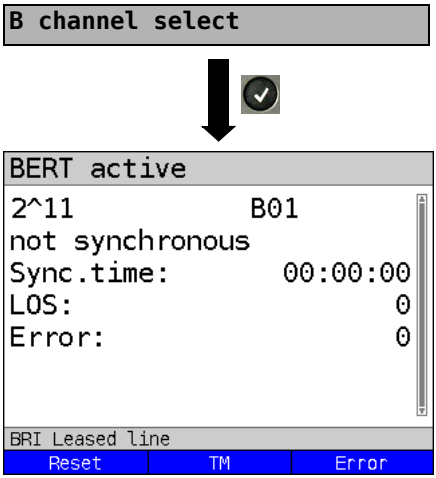
Bit Error Rate Test

There are a number of variants of the bit error rate test: In the simplest case, a B channel loop will be set up at the remote end; for information on parameter settings, see page 221. After selection of the channel to be tested (B channel or D channel), the ARGUS will send the test pattern, receive it back and evaluate it accordingly.

The displays and operation are, in largest part, similar to those of a BERT on a dial-up connection (see page 220, Parameter settings, page 222), however, you need not enter call numbers or select a service.



In the case of a BRI in end-to-end mode (see page 221 and page 228), it is also possible to run a BERT in the D channel with HDLC framing (channel selection: D channel).



First press **<Delete>** and enter the B channel on the keypad, or use the cursor keys to set it.

BERT Start

During the BERT, the display shows:

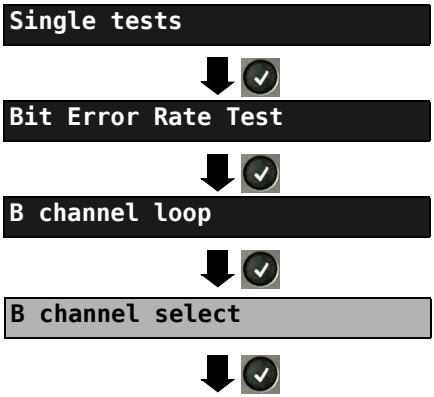
- The bit pattern and channel used
- The synchronicity of the bit pattern (in this example, synchron)
- Sync. Time in h:min:s
  The time in which the ARGUS can sync to the bit pattern.
- LOS
  Synchronization is lost at an error rate greater than or equal to 20 % within a period of a second. The absolute number of synchronization losses will be shown.
- Fault: the bit errors that have occurred.

<Reset>	The test time and number of bit errors will be reset.
<TM>	Start Test Manager, see page 264.
<Error>	Insert artificial bit errors to test the reliability of the BERT.
	Stop the BERT Display the test results, see page 333.

For information on saving the test results, see page 227.

Loopbox

The ARGUS can be used as a loopbox on a permanent circuit (leased line).



Activate loopbox

ARGUS - Main Menu

Channel selection:
The ARGUS will loop on either one B channel (Channel selection: B channel) or on all B channels and the D channel (Channel selection: All framed).

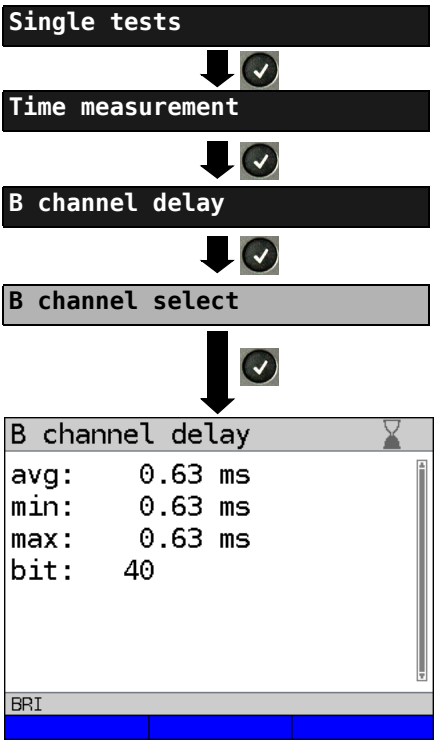
The ARGUS will display the B channel used and how long the loopbox has been activated (in h:min:sec).

Deactivate the loopbox.

Time Measurement

B channel delay

The ARGUS will measure the delay on the selected B channel. If the ARGUS does not receive the data back in the B channel in about 13 seconds, it will display the message “No loop”. The measurement (continuous measurement) must be terminated manually.



ARGUS - Main Menu

First press **<Delete>** and enter the B channel on the keypad, or use the cursor keys to set it.

Perform measurement

Display:

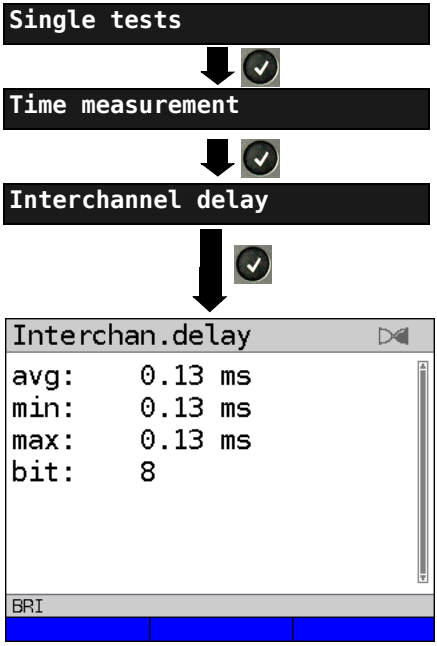
avg:	average B channel delay
min:	shortest B channel delay
max:	longest B channel delay
bit:	The average B channel delay in bits (multiples of the time required to send a bit at 64 kbit/s, it takes 15.26 µs to send a bit).

The measurement will be repeated in cycles (continuous measurement).

Stop measurement, the ARGUS will display the last measurement.

Interchannel delay

The ARGUS will send the B channel data to a loopbox which will then send it back on the same channel. The ARGUS measures the propagation delay for the data on each of the B channels and determines the difference between the two propagation delays (interchannel delay). If the ARGUS does not receive the data back in the B channel in about 13 seconds, it will display the message “No loop”.
The measurement (continuous measurement) must be terminated manually.



ARGUS - Main Menu

Perform measurement

Display:

avg:	average interchannel delay
min:	shortest interchannel delay
max:	longest interchannel delay
bit:	The average interchannel delay in bits (multiples of the time required to send a bit at 64 kbit/s, it takes 15.26 µs to send a bit).

The measurement will be repeated in cycles (continuous measurement).

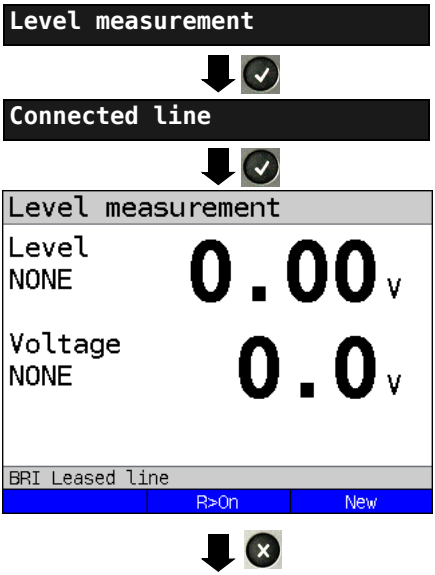
Stop measurement, the ARGUS will display the last measurement.

19.16 Level Measuring on an ISDN Access

Level Measurement on a S-Bus Access

Level measurement – connected line

The ARGUS measures the level of the received useful signal and the phantom feed. The measurement will be updated continuously.



ARGUS - Main Menu

Start measurement

The ARGUS will display the level of the useful signal (Level) and the feed voltage.

Evaluation of the useful signal level:

<<	Level is too low
>>	Level is too high
OK	Level is alright (0.75 V $^{+20\ \%}_{-33\ \%}$ i.e. from 0.9 V to 0.5 V)
None	No level

Evaluation of the feed voltage:

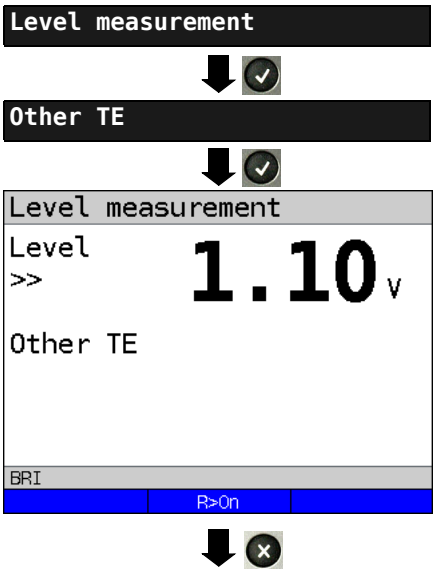
Voltage OK Normal voltage	Normal feed (40 V $^{+4,25\ \%}_{-13,75\ \%}$ i.e. from 41.7 V to 34.5 V)
Voltage OK Feed voltage	The (inverted phantom) feed is alright (OK).
Voltage None	No feed (Voltage)

<R>On>	**100** Ω resistor switched in
<R>Off>	**100** Ω resistor switched off
<New>	Setup Layer 1 again

Stop measuring level.
Open the Level measuring menu.

Level measurement other TE

In TE mode, the ARGUS will measure the level of a terminal connected in parallel. In this case, the ARGUS is passive. Layer 1 must be activated on the terminal. The ARGUS updates its measurement continuously.



ARGUS - Main Menu

Start measurement

The ARGUS displays the level and an evaluation of the useful signal:

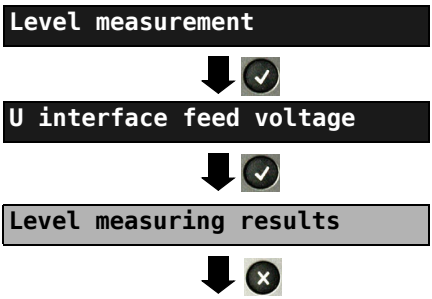
`<<`	Level is too low
`>>`	Level is too high
`OK`	Level is in order (0.75 V $^{+20\ \%}_{-33\ \%}$ i.e. from 0.9 V to 0.5 V)
`None`	No level

Stop measuring level.
Open the Level measurement menu.

`<R>On>`	**100** Ω resistor switched in
`<R>Off>`	**100** Ω resistor switched off
`<New>`	Setup Layer 1 again

Level Measurement on a U interface

Measurement of feed voltage on a U interface



ARGUS - Main Menu

Start measurement

The ARGUS will display the level of the feed voltage. The measurement will be updated continuously.

Stop measuring level.
Open the Level measuring menu.

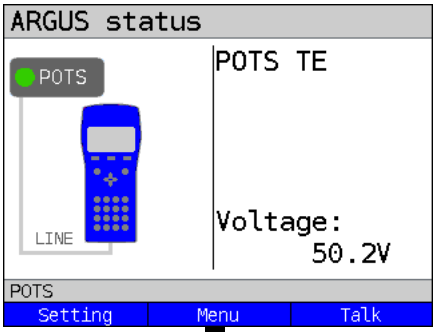
20 Operation on a POTS access

The voltages on the subscriber line may not exceed 130 VDC and should be free of AC voltage.

20.1 Setting the POTS Interface

Use the included connection cable to connect the ARGUS (Line jack) to the POTS access to be tested and then switch the ARGUS on. The POTS settings are made in the chapter 5 Configuring accesses page 25. In this example the POTS TE mode was selected:

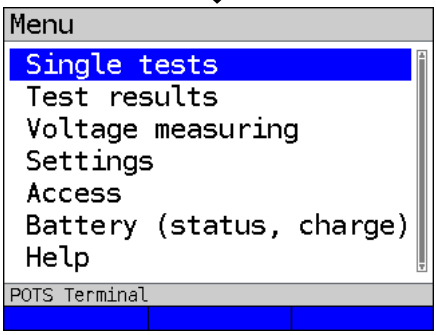
ARGUS State Display



The ARGUS displays the voltage on the line when it is "on hook“ (not busy).
Positive voltage: Polarity on a+; on b- (red wire is a, black wire is b)
Negative voltage: Polarity on a-; on b+

<Setting>	Opens the Settings menu for POTS parameters, see page 283.
<Menu>	Open the Main Menu
<Call>	For information on setting up a call, see page 285.

Main Menu



The various menus available for the selected type of access will be shown in the Main Menu.



The ARGUS will open the marked menu (in this example, Single tests).



Select a menu. The selected menu will be marked blue in the display.



Return to the previous menu (in the example, the State display).

Note: Open the Main Menu and select "Help" or press number key "1". An overview of the possible key combinations can be found on page 104.

20.2 POTS Settings

It is possible to configure the following "POTS Settings". The default settings can be restored at any time (see page 345).

Setting	Explanation
POTS	
Dial mode	Selection of the dial mode: DTMF or pulse dialling Default setting: ***DTMF***
CLIP Mode	Select the transfer procedure used to pass the call number: **FSK** CLIP via FSK (Frequency Shift Keying) For Germany and some other places in Europe **DTMF** CLIP via DTMF (Dual-tone multi-frequency) For Scandinavia and the Netherlands The ARGUS will automatically detect that a CLIP was sent using DTMF with the polarity reversal and will set itself accordingly (e.g. Netherlands). Default setting: ***FSK***
DTMF parameter	Settings for the three parameters Level, Duration and Interval of the DTMF signals generated during POTS (analog) operation.
Level	Setting the DTMF level: The level can range between -30 dB and +9 dB. Use the cursor keys to raise or lower the level by 3 dB. Range: -30 to +9 dB Default setting: ***-3 dB***
Time	Setting the DTMF time: Range: 40 to 1000 ms Default setting: ***80 ms*** Use the cursor keys to raise or lower the setting: In the range 40 - 200 ms: 10 ms steps In the range 200 - 300 ms: 20 ms steps In the range 300 - 1000 ms: 100 ms steps

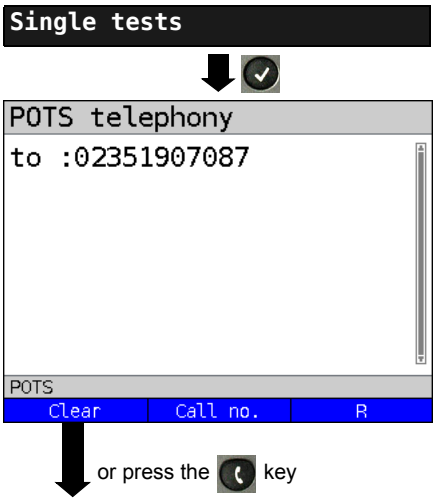
Interval	Setting the interval between two DTMF characters: Range: 40 to 1000 ms Default setting: ***80 ms*** Use the cursor keys to raise or lower the setting: In the range 40 - 200 ms: 10 ms steps In the range 200 - 300 ms: 20 ms steps In the range 300 - 1000 ms: 100 ms steps
Defaults	Restores the default settings: Level = -3 dB, Time = 80 ms, Interval = 80 ms
FLASH time	Sets the length of a FLASH. This setting is needed in order to use special features of a PBX. Range: 40 to 1000 ms Default setting: ***80 ms*** Use the cursor keys to raise or lower the setting: In the range 40 - 200 ms: 10 ms steps In the range 200 - 300 ms: 20 ms steps In the range 300 - 1000 ms: 100 ms steps

For information on restoring the default parameter settings, see page 347.

20.3 Connection on a POTS Access

Outgoing Calls

The ARGUS sets up a connection to another terminal. If the terminal at the other end is a telephone, the handset integrated in the ARGUS or a headset can be used to hold a conversation.



For information on the ARGUS in the "POTS telephony" access mode, see page 282.
The ARGUS - Main Menu

<Call> Setup the connection:
or Enter the number on the keypad. Each of the number's digits will be dialled individually. The ARGUS will display the number dialled. As soon as the remote party answers, a voice connection will be set up.

<Call no.> The ARGUS will display the last number dialled (simplified last number redial) or that of the last caller.

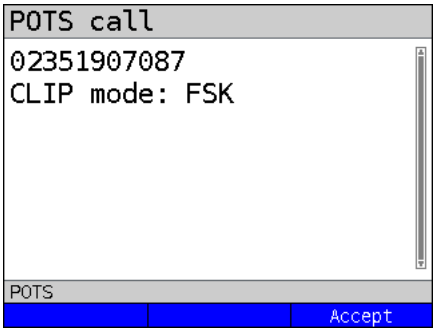
<R> Generate a FLASH signal.

Scroll through the speed-dialling memory to select a different number or enter a new one using the keypad.

Simplified overlap signaling using the key: and the ARGUS will immediately open the POTS telephony display. Once the call number is entered, the call will be setup.

Incoming Call

The ARGUS signals an incoming call both audibly and on the display.



If the access supports CLIP, the ARGUS will display the number of the caller (for information on CLIP mode, see page 283).

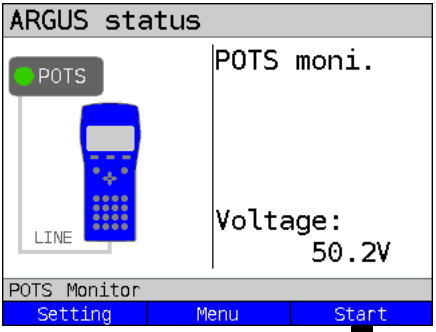
<Accept> or Accept call

The call number received will be saved in the “Last caller” memory location.

20.4 POTS Monitor

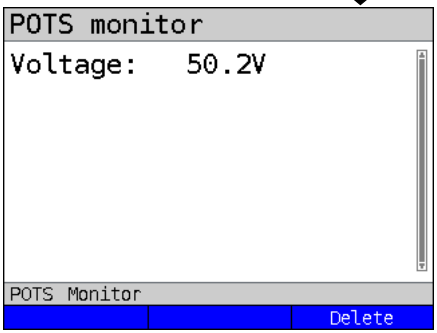
The POTS monitor function provides a high impedance tap (for listening-in) that does not influence the interface. You can listen-in on the line with the integrated handset or a headset without having the ARGUS send on or otherwise influence the interface.

The POTS monitor settings are made in the chapter 5 Configuring accesses page 25.



The ARGUS displays the voltage level on the line when it is “on hook” (not busy).

Start Monitoring



The ARGUS displays the voltage (when "off hook"), the number of the caller (if CLIP is supported) and the DTMF characters dialled by both telephone subscribers.
Any received DTMF characters will be appended to the line, which will shift left for each character once it is full. An incoming call will be signalled acoustically.



Press to display additional information, if available on the access

<Loud> Increase volume
(The microphone is off.)

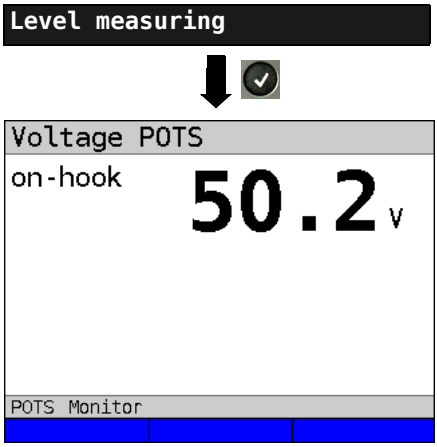
<Delete> Clears the display.



Stop monitoring and the ARGUS will open the State Display.

20.5 Level Measuring on a POTS Access

The ARGUS measures the voltage level in both the normal case and when the line is “busy” (trunk line).



ARGUS Main Menu

Start Measurement

The ARGUS will display the polarity of the 2-wire POTS line (red wire "a"; black wire "b") as well as the "on hook" and "off hook" voltage levels.

<New> To repeat the measurement

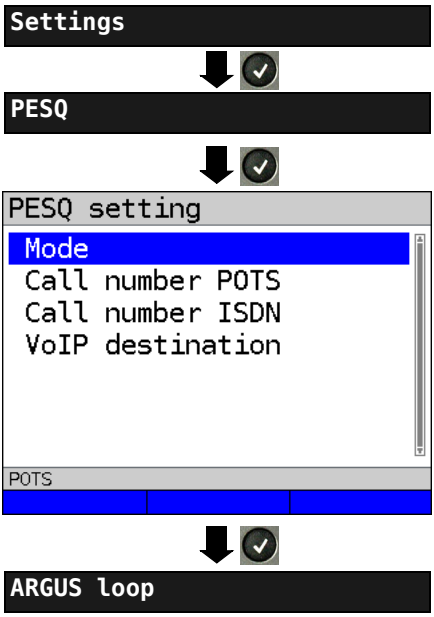
Open the Main Menu

21 PESQ

To objectively assess voice quality, ARGUS performs a Perceptual Evaluation of Speech Quality (PESQ) analysis according to ITU-T P.862 directly on an ISDN, POTS, xDSL or on Ethernet. The PESQ test is only available for interfaces that have previously been enabled (e.g. ISDN option).
The PESQ analysis is not performed by ARGUS directly but by a PESQ server, which has its own telephone number. ARGUS is connected directly to the subscriber access and loops a standardised voice recording to the server.
To assess the talker side, ARGUS transmits the voice recording to the server, which returns the calculated PESQ value to ARGUS. ARGUS shows the PESQ value directly in the display.
To assess the talker and listener sides, the voice recording is initially sent from the server to ARGUS, then looped back to the server.

The entire network to be tested including all its gateways and other components must be RFC2833-compliant.

21.1 PESQ configuration



ARGUS in Main Menu

Use the cursor keys to select the parameter (in this example Mode).

Select using the cursor keys (e.g. ARGUS Loop).

ARGUS adopts the marked setting.

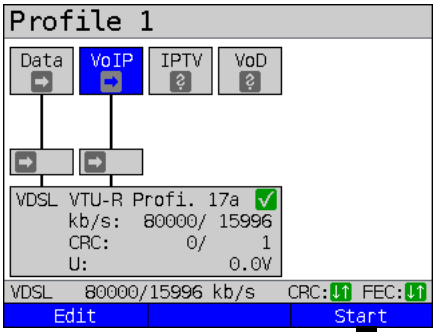
ARGUS switches to the next higher-level menu without saving the altered parameter.

Setting	Description	
PESQ:		
Mode	Loop:	Evaluation of talker and listener side. ARGUS receives the voice recording from the server and loops this back to the server.
	Sending:	Evaluation of talker side. ARGUS transmits the voice recording to the server.
Call number POTS	Enter the server number for the PESQ test at the POTS interface. Selection via the POTS speed dial list.	
Call number ISDN	Enter the server number for the PESQ test at the ISDN interface. Selection via the ISDN speed dial list.	
VoIP destination	Enter the server number for the PESQ test at the xDSL interface and on Ethernet. Selection via the list of VoIP destinations.	

21.2 PESQ test on xDSL or Ethernet access via VoIP

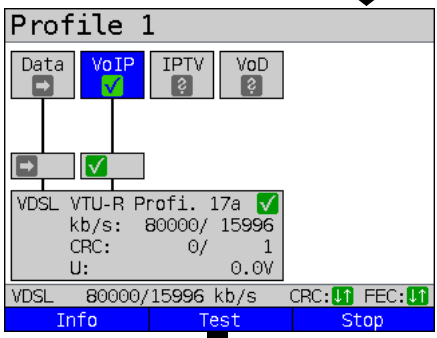
You need to first start VoIP telephony before you can perform the PESQ test on xDSL or Ethernet. For details on configuring the VoIP parameters, see the chapter VoIP tests, page 148.

Starting VoIP telephony (example: operation on VDSL interface)



Connecting the service.

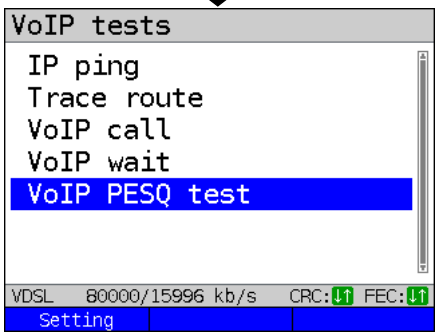
<Edit> Assigns a virtual line to the service VoD or edits it.



If no xDSL connection is established, ARGUS automatically connects at this point using the default profile (see page 46).

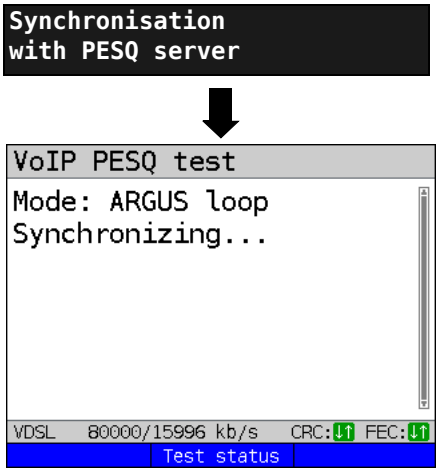
<Info> Displays the VDSL connection parameters.

<Stop> Displays the VDSL connection.



<Setting> Displays the PESQ settings, see page 288.

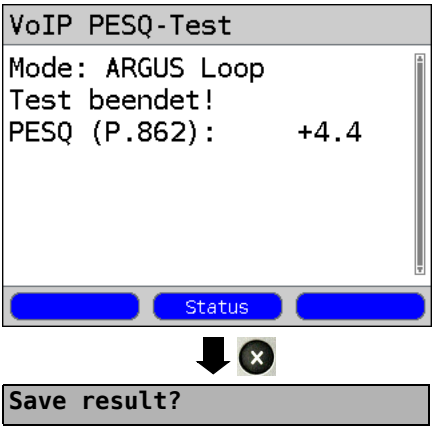
Continued on next page



ARGUS dials the number entered under "VoIP destination" in the PESQ parameters.

<Test status> Displays test status without ending the test or starting a new test, see page 202.

Test result:



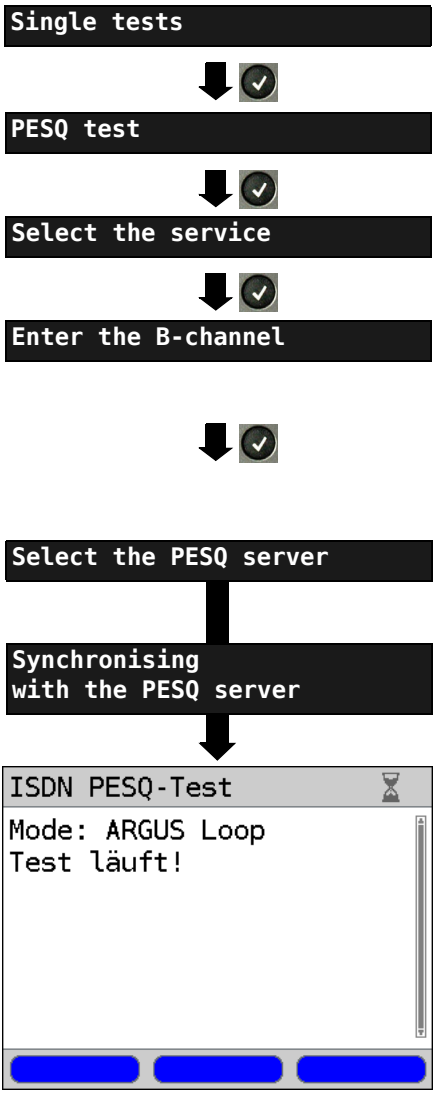
ARGUS displays the set mode (in this example ARGUS loop) and the PESQ value calculated according to ITU-T P.862.

The PESQ quality scale ranges from +4.5 (excellent) to -0.5 (bad).
These values may be assessed analogously to the MOS values (see page 154).

Exits results.

For saving results, see IP ping page 123.
Sends trace file to PC, see page 94

21.3 PESQ test on an ISDN access



ARGUS in the main menu (BRI or U-interface) must be selected as the access.

Select a voice service, e.g. ISDN telephony.

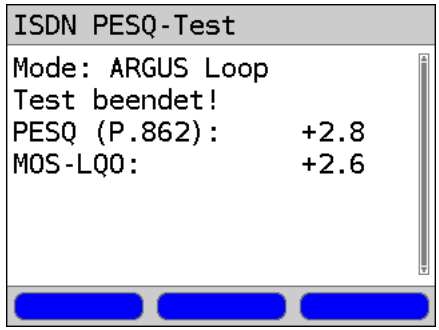
Enter the B-channel using the number keys. ARGUS suggests the B-channel last used. Press **<Delete>** before entering a new B-channel. Entering * causes ARGUS to select a free B-channel. ARGUS indicates whether the B-channel is available.

ARGUS dials the number entered under "ISDN number" in the PESQ parameters.

In the event of synchronisation problems, varying the DTMF parameters may lead to a solution. Under the menu option "POTS", you can also change the corresponding DTMF parameters
- Level
- Duration
- Inter-digit interval

for PESQ and ISDN.

Test result:



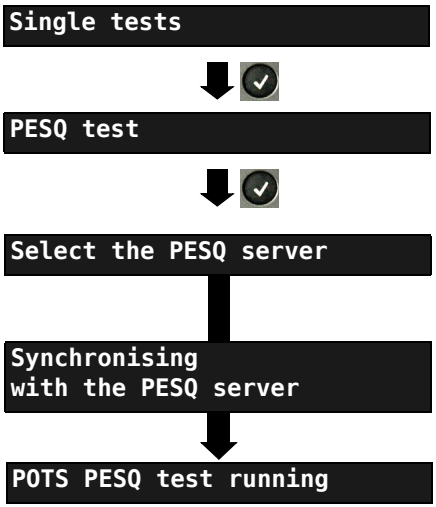
ARGUS displays the set mode (in this example ARGUS Loop) and the calculated PESQ value according to ITU-T P.862 as well as the POTS MOS_{LQO} (LQO = Listening Quality Objective) according to ITU-T P.800.1.

The PESQ quality scale ranges from +4.5 (excellent) to -0.5 (bad).
These values may be assess analogously to the MOS values (see page 154).



ARGUS saves the result in memory under the first free record number; you can enter a record name of your choice (default: New result) using the number keys.

21.4 PESQ test on an POTS access



ARGUS in main menu (POTS must be selected as the access).

ARGUS dials the number entered under "Number POTS" in the PESQ parameters.

Observe the information under (s. chapter. 21.3 PESQ test on an ISDN access page 292).

The test result is displayed as described for the PESQ test on the ISDN interface.

22 Copper tests

In the Access menu, ARGUS offers the menu option "Copper tests", which enables you to investigate the physical properties of the line.
This chapter briefly describes how to use the various functions. It is not possible to describe the interpretation of the results in the customary detail here. As the results are usually provided in graph form, they can only be interpreted correctly in conjunction with a knowledge of the line being measured. ARGUS supports this using a variety of aids, such as the Zoom and Cursor functions.

Note:
The Ethernet cable tests (including Ethernet-TDR) are described in chapter „23 Ethernet cable tests“ (see page 323).

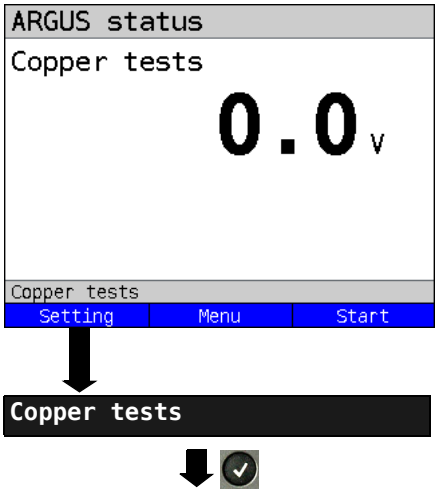
22.1 R measurement

When connected to the test points via the Line socket, ARGUS continuously measures resistance and displays the results in real time.

The line must be de-energised and voltage free for R measurement!

R measurement is a two-wire measurement that measures the loop resistance (short-circuit) between Tip(a) and Ring(b).

The chapter "Configuring accesses", page 29, explains how to set up the access type "Copper tests".

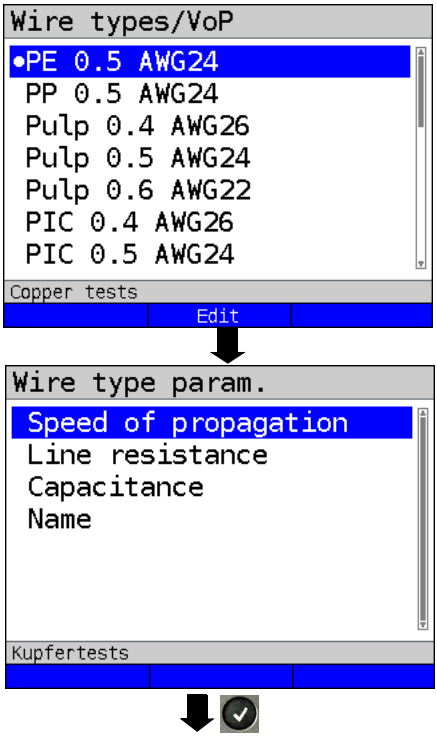


ARGUS in the status display.
Any DC voltage on the line is indicated here.

<Setting>	Switches to Copper/cable test settings..
<Menu>	Switches to main menu.
<Start>	Directly accesses "Single tests" menu.

Continued on next page

22.1.1 Wire types





Selects the wire types to be configured.

<Edit> Edits the wire-type parameters.

Setting	Description
Wire type/VoP	
Propagation speed	To determine the distance, the calculation must take into account a correction value dependent on the wire type that specifies the ratio of the pulse propagation speed in the cable to the speed of light in a vacuum (c_0 = 299.792458 m/µs). For many cable types, the pulse time is also specified in V/2. Minimum: 45.0 m/µs (VoP in %: 30) Maximum: 149.7 m/µs (VoP in %: 99.9) Default: ***98.9 m/µs (VoP in %: 66.0)*** The choice of propagation speed as VoP or V/2 is saved.
Line resistance	Sets the line resistance per kilometer. Range: 20 Ω/km to 200 Ω/km Default: ***80 Ω/km***

Capacitance	Sets the capacitance (operating (mutual) capacitance) per kilometer. Range: 35 nF/km to 100 nF/km Default: ***35 nF/km***
Name	Enter the name of the wire type. Default: ***PE 0.5 AWG24***



The configured cable types are also used for RC measurement and TDR measurement.

List of preconfigured default wire types:

No.	Name	Wire diameter (mm)	Line resistance (Ohm/km)	Mutual capacitance (nf/km)	VoP (m/µs)	Note
1	PE 0.5 AWG24	0.5	80	39	66.0	Outdoor cable, Polyethylene, air filled
2	PP 0.5 AWG24	0.5	80	39	66.0	Outdoor cable, Polypropylone, air filled
3	Pulp 0.4 AWG26	0.4	150	36	60.0	Outdoor cable, conductor with pulp jacket, air filled
4	Pulp 0.5 AWG24	0.5	80	39	67.0	Outdoor cable, conductor with pulp jacket, air filled
5	Pulp 0.6 AWG22	0.6	65	38	68.0	Outdoor cable, conductor with pulp jacket, air filled
6	PIC 0.4 AWG26	0.4	150	36	64.0	Outdoor cable, conductor with plastic jacket, air filled
7	PIC 0.5 AWG24	0.5	80	39	66.0	Outdoor cable, conductor with plastic jacket, air filled
8	PIC 0.6 AWG22	0.6	65	38	67.0	Outdoor cable, conductor with plastic jacket, air filled
9	PIC 0.9 AWG19	0.9	29	34	72.0	Outdoor cable, conductor with plastic jacket, air filled
10	Jelly 0.9 AWG19	0.9	29	34	68.0	Outdoor cable, petroleum/jelly filled cable
11	Filled 0.4 AWG26	0.4	150	36	58.0	Outdoor cable, filled
12	Filled 0.5 AWG24	0.5	80	39	60.0	Outdoor cable, filled

13	Filled 0.6 AWG22	0.6	65	38	62.0	Outdoor cable, filled
14	PTFE/Teflon 0.5 AWG24	0.5	80	39	67.0	Outdoor cable, conductor with teflon jacket
15	Wire type 15	-	80	49	66.7	default, editable
16	Wire type 16	-	80	49	66.7	default, editable
17	Wire type 17	-	80	49	66.7	default, editable
18	Wire type 18	-	80	49	66.7	default, editable
19	Wire type 19	-	80	49	66.7	default, editable
20	Wire type 20	-	80	49	66.7	default, editable

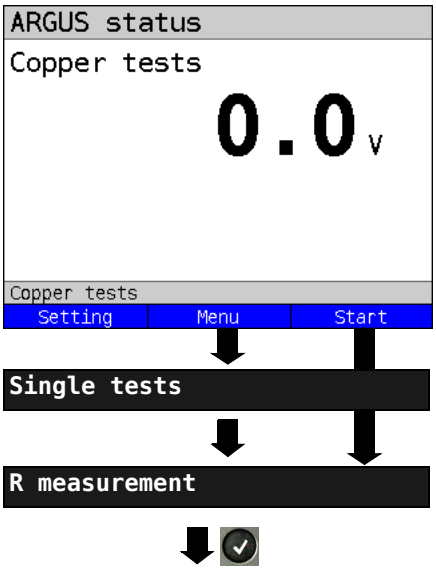
Conversion of AWG to mm and mm to AWG:



$$d_{mm} = 0{,}127\ mm \times 92^{\frac{36-AWG}{39}}$$

$$AWG = -39 \times \log_{92}\left(\frac{dmm}{0{,}127\ mm}\right)+36$$

22.1.2 Starting R measurement



ARGUS status display.
Any DC voltage on the line is indicated here.
- Max. measuring range: 200 V
- Resolution: 0.1 V
- Accuracy: ±2 %.

Before starting the RC measurement disconnect any voltage on the line.

<Menu>	Switches to main menu.
<Start>	Directly accesses the single test menu or starts the RC measurement (depending on options).

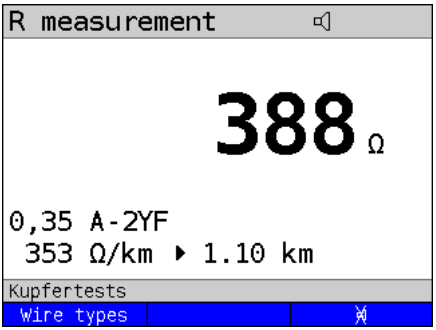
Select one of the Copper tests:
- Copper box
- R measurement
- RC measurement
- etc.

Start the desired copper test directly by selecting it.
In this example, R measurement.



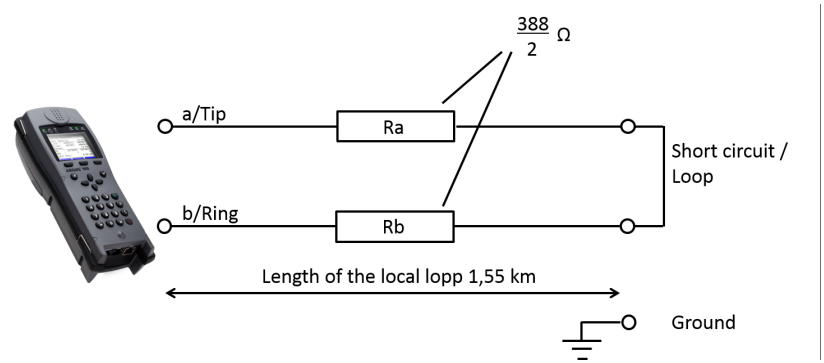
The R measurement starts automatically.

Loop:



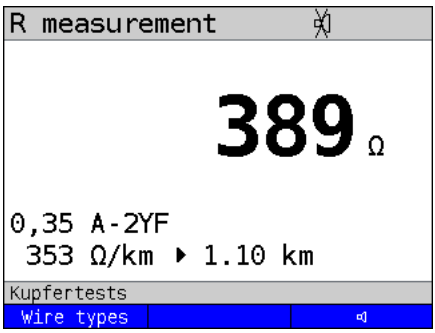
In this example, the R measurement shows a resistance of 388 Ω . This is the resistance for the entire core system, in which the a-core (tip) and the b-core (ring) are short-circuited (loop). This makes the two cores equivalent to a single core with a length of 388 Ω/353 Ω/ km = 1.1 km, see equivalent circuit diagram.

Equivalent circuit diagram:



Loop resistance = 2x resistance

ARGUS alway calculates the length of the circuit.



ARGUS generates a signal tone for a resistance < 20 Ω.

<◂▸ Deactivate signal tone

22.2 RC measurement

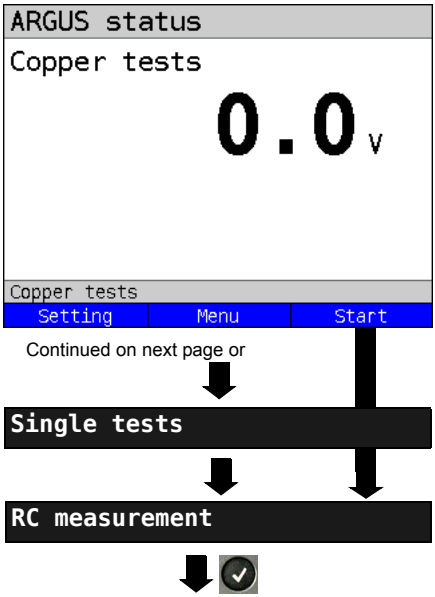
ARGUS conducts a resistance test (loop) and a capacitance test (open). ARGUS is connected to the test points via the socket Line. Switch on ARGUS.

The line must be de-energised and voltage free for RC measurement!

When testing capacitance, note that the measured capacitance value can be falsified if a large capacitance is connected in series with a resistor.

RC measurement is a two-wire measurement that measures the loop resistance (short-circuit) and the capacitance (open line) between Tip(a) and Ring(b).

The chapter "Configuring accesses", page 29, explains how to set up the access type "Copper tests".



ARGUS status display.
Any DC voltage on the line is indicated here.
- Max. measuring range: 200 V
- Resolution: 0.1 V
- Accuracy: ±2 %.

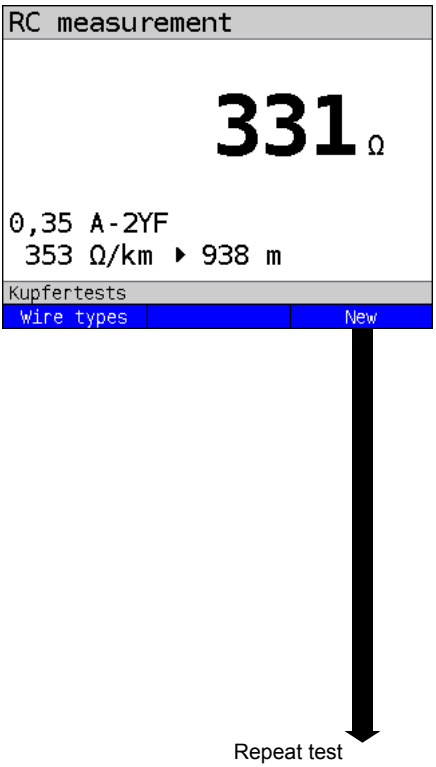
Before starting the RC measurement disconnect any voltage on the line.

<Menu>	Switches to main menu.
<Start>	Directly accesses the single test menu or starts the RC measurement (depending on options).

Select one of the Copper tests:
- Copper box
- R measurement
- RC measurement
- etc.

Start the desired copper test directly by selecting it.
In this example, RC measurement.

Loop:



ARGUS first measures the resistance. ARGUS determines the capacitance when it detects an open line (infinite resistance).

ARGUS displays the resistance. The capacitance is not displayed because a loop is used in this example. ARGUS also determines the approximate line length, see equivalent circuit diagram page 298.



Browse through the wire types.

<Wire teypes> Switches to the wire types.

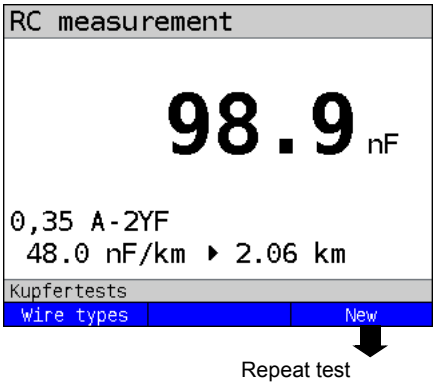
<New> Repeats measurement.



Switches to status display.

Resistance test: 20 Ω to 100 kΩ
Accuracy: 20 Ω ≤ R ≤ 100 Ω: ±10 %
R > 100 Ω: ±2 %

Open line:



ARGUS displays the capacitance. The resistance is outside the possible range (> 100 kΩ).



Browse through the wire types.

<Wire teypes> Switches to the wire types.

<New> Repeats measurement.



Switches to status display.

Capacitance test: 1 nF to 1 µF
Test accuracy: ±5%

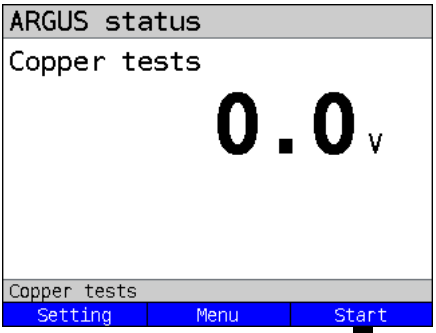
22.3 Line scope

With the line scope, ARGUS performs a real-time analysis on the connected line. The high-ohm line scope can e.g. be patched into an existing link between modem and DSLAM. You can display the results in either the time or frequency range (FFT).

The voltage on the line may not exceed 200 V DC or 100 V_{pp} AC.

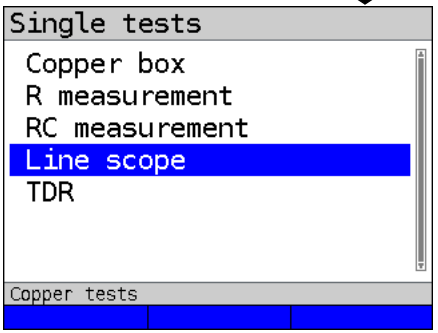
22.3.1 Starting the line scope

The chapter "Configuring accesses", page 29, explains how to set up the access type "Copper tests".



ARGUS status display.
Any DC voltage on the line is indicated here.

<Menu>	Switches to main menu.
<Start>	Directly accesses "Single tests" menu.



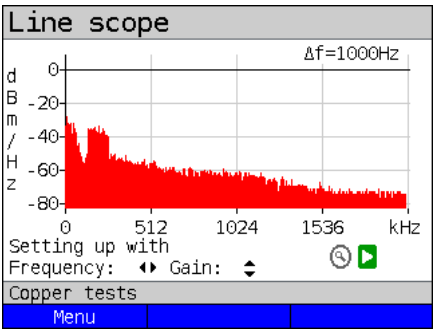
Select one of the Copper tests.
- Copper box
- R measurement
- RC measurement
- Line scope
- TDR

Start the desired copper test directly by selecting it.

In this example, the line scope.

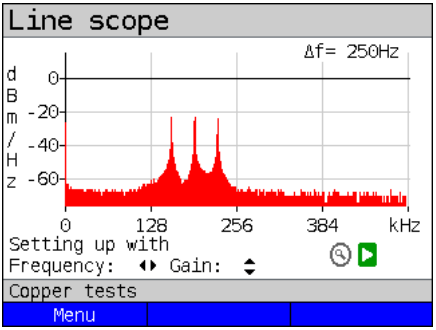
Continued on next page

Line scope status display



The line scope can identify a variety of states or occurrences on the line.
This example shows the ADSL (Annex B) connection with ISDN-U interface established between the modem and DSLAM.
The line scope is located in direct proximity to the modem, as it is particularly effective upstream in the spectrum.
If the upstream were significantly less than the downstream, it would be in direct proximity to DSLAM.

<Menu> Opens the graph function, see page 304



Finding the modem:
In addition to the general state of the line/ connection, a variety of events can be detected.
In this example, we can see the handshake tones that a modem connected to the line sends periodically in order to establish a connection with the DSLAM.
This also reveals whether or not an active modem is connected to the other end of the line.

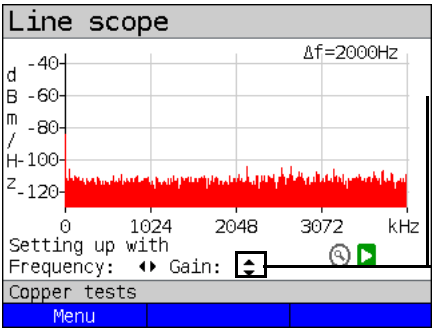
In addition to the wanted signals such as the DSL spectrum or the handshake tones, the line scope can also detect unwanted signals such as temporary interference sources (real-time operation) or peculiarities in noise (with respect to background noise).

Connection example without probe:



Gain:

To ensure optimum detection of different signals, match the gain (y-axis) with the reduction of the frequency range shown (x-axis). ARGUS always begins with the lowest gain (-26 dB in the frequency range up to 3 MHz). Measuring range: -130 to +10 dBm/Hz.



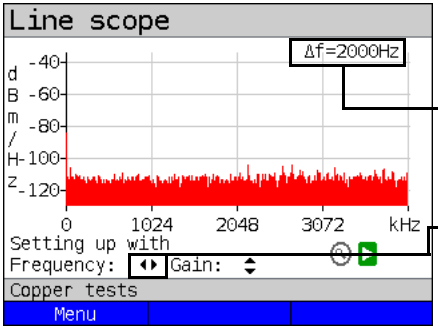


Gain-Y: Gain settings:
-26 dB, - 20 dB, 0 dB, 20 dB

ARGUS displays all measurement results as dBm/Hz values. These values are only comparable with others when the resolution of the measured frequency band is taken into account, as here the total energy of the frequency band is determined "per Hz". The bandwidth ARGUS is measuring is indicted in the display as Δf .

Frequency range:

A frequency range of from 20 kHz to 30 MHz is available for measurement; the resolution varies depending on the selected range.

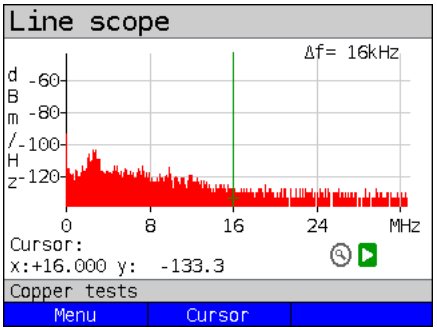


The bandwidth Δf at the top right in the display shows which frequency range is being shown in the display.



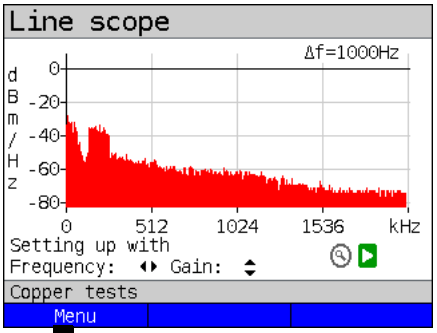
Frequency-X: Setting the displayed frequency range. Every press of the cursor key halves, respectively doubles the displayed range.

Example:



In a measuring range up to 32.768 MHz, up to 2048 values can be displayed, so: Δf = 32,768 MHz / 2048 values = 16 kHz. Consequently, a y-value marked by the cursor and displayed (in this example 16 MHz) is the mean (in this example -133.3 dBm/Hz) across the frequency range of 16 MHz - Δf/2 to 16 MHz + Δf/2, or 15.992 MHz to 16.008 MHz.

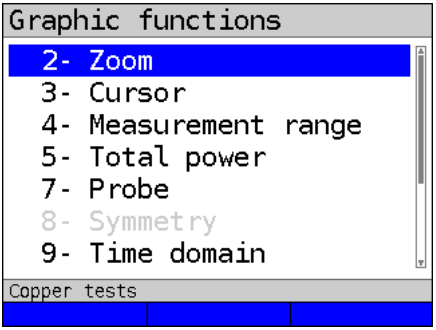
22.3.2 Graph functions



The graph functions Zoom and Cursor enable detailed analyses of the graphs.

<Menu> Opens graph functions.

Press  in the status display (in the graph) to save the results and stop the line scope.



The "Graph functions" menu opens:

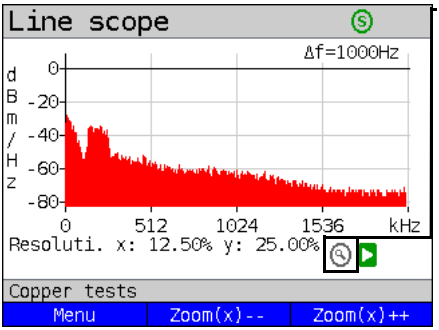
 Exits the menu without changing.

 You can also use this number key to activate the Zoom function within a graph.

 The function of the cursor is described on page 305.

 Accepts the selection and returns to the graph.

Zoom (2):



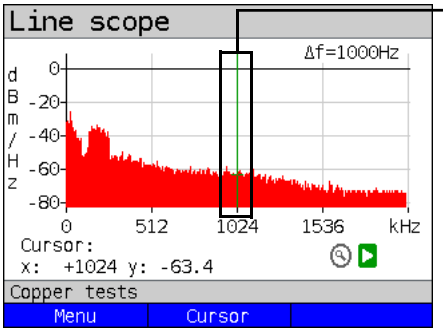
The magnifying glass shown in the display rests on a white background.
It has not yet been zoomed.
When the magnifier is over a dark background, the graph is zoomed.

<Zoom(x)++> Magnifies the middle section of the graph (100%).

<Zoom(x)--> Not yet zoomed! Reverses **<Zoom(x)++>** and resets magnification.

 lets you toggle the meaning of the softkeys and choose between x-axis and y-axis zoom, see page 52.

Cursor (3):



When the Cursor function is started, a green cursor line appears in the middle of the graph.

<Cursor> You can toggle the cursor on and off as needed using the Cursor softkey after activating it in the menu.

The values of the graph for the position under the cursor are displayed in the graph as follows:

x: +1024 kHz (accuracy ± 1 %)

y: -63.4 dBm/Hz (accuracy ± 2 dB)

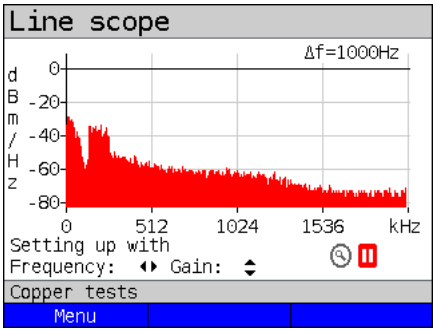
When the Stop function (see page 309) is activated, you can move the cursor faster.



You can use the left and right cursor keys to move the cursor to any position on the graph to measure it.
Briefly pressing a cursor key causes the cursor to jump to by one position in the graph. When the cursor key is held down, the steps the cursor covers in the graph become progressively larger.

The zoom function and the cursor function can also be combined. For example, you can determine a certain value using the cursor more easily when you have previously zoomed in on a specific range. However, the starting position of the cursor can vary.

Measuring range (4):

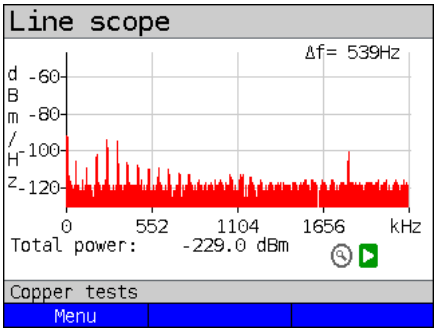


When the line scope starts, it is in the measuring range in the status display. You can set the frequency range (x) and the gain (y) in the measuring range. If you have hidden the measuring range in order to work with the cursor or zoom, you can restore it:

<Menu>

or  Restores measuring range.

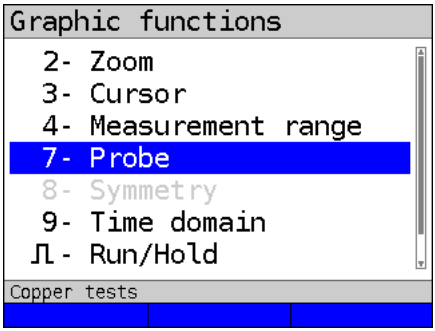
Total power (5):



ARGUS displays the total power. The total power is the sum of all individual power measurements (Δf) over the entire visible range, in this example -299 dBm over 2.2 MHz.

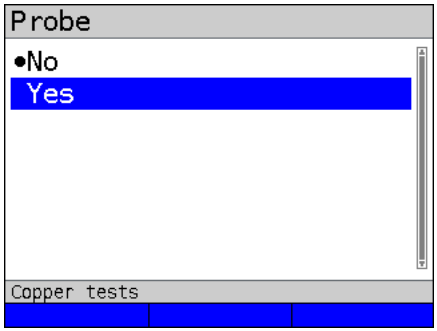
<Menu>
or 5 Restores total power display

Probe (7):



The line scope is high-ohm.
Input impedance: 3.6 kΩ
Input capacitance: 30 pF

However, even with the line scope you may also need to use a high-ohm probe (ARGUS Active Probe).

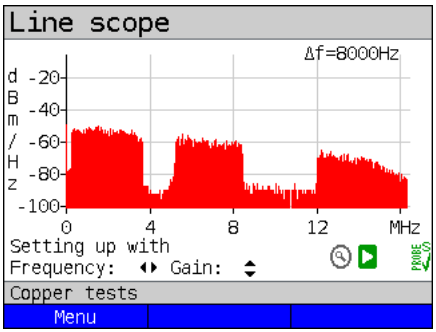


ARGUS Active Probe II:
Input impedance: 70 kΩ
Input capacitance: 1 pF
Functions: Symmetry/asymmetry toggling

After connecting the probe, you can switch it on using this menu.

7 To activate the probe, see page 311.

Symmetry (8):

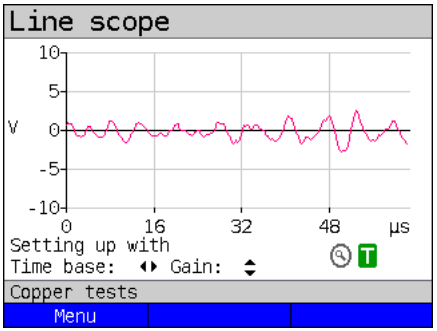


Once the probe has been switched on and detected, you can switch between symmetric and asymmetric operation using Symmetry.
In asymmetric operation, the useful signal is hidden so that you see only noise and any interference sources (see example illustration).



Symmetry/asymmetry toggling

Time domain (9):



<Menu>

or 

Opens time domain

In the line scope, you can switch from the frequency range to the time domain. In this respect, the line scope operates like an oscilloscope that permits display of AC voltages from 0 to 40 V_{pp} with a resolution of 2 mV_{pp}.
This makes it easy to recognize different AC voltage signals, e.g. the square-wave signal of an E1 access.

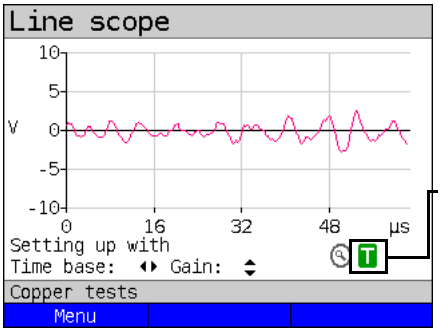




The gain and time base can be set using the horizontal and vertical cursor keys analogous to the frequency range.



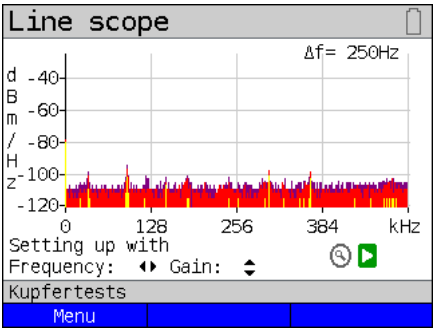
The cursor functions are also available in the time domain for analysing the signal. However, there is no zoom function.



If ARGUS detects that the connected signal regularly exceeds a certain threshold, ARGUS tries to trigger automatically in response to this so as to optimally display the signal in the time domain.

The trigger symbol is green.
If no signal is present or the level is too low, the trigger symbol is red. ARGUS does not trigger.

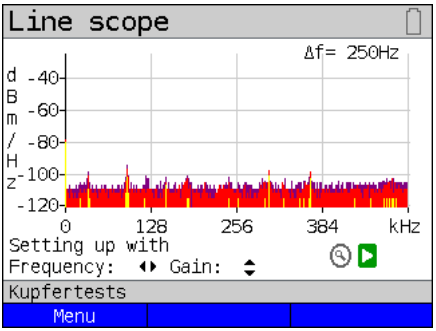
Peak hold (min/max) (0):



The peak-hold function can be additionally activated using the number key 0.

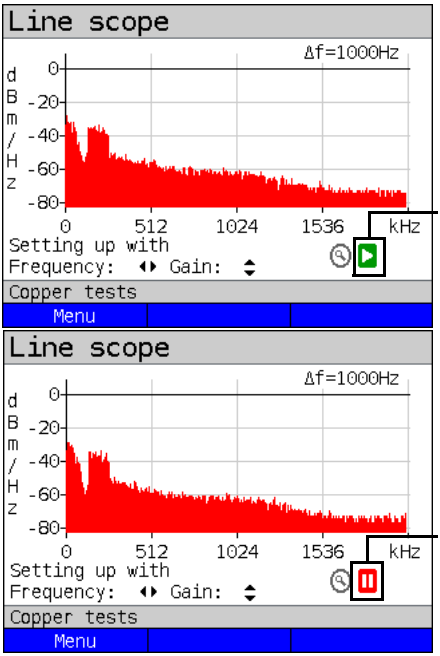
When the peak-hold function is used, positive (blue) and negative (yellow) peaks are shown graphically. The result is a blue curve of maxima and a yellow curve of minima over time. The instantaneous values continue to be displayed in red.
In the maximum values in particular, sporadic fliers (interference pulses) are visible and permit comparison between different lines (e.g. particularly clearly with the aid of a suitable clip-on ammeter).

100 Ohm Input resistance (#):



Particularly when using a suitable clip-on ammeter, it may be necessary to adjust the input resistance of the line monitor (input impedance, see page 306). The red symbol indicates that the line monitor is operating with an input resistance of 100 Ω..

Start/stop



You can stop and restart a running test (realtime mode) at any time.

Test running

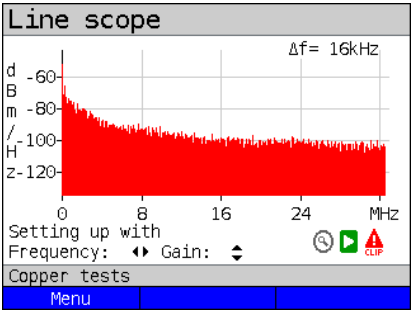
Stop test

Test is stopped

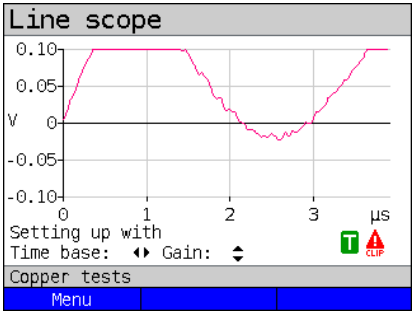
Restart test

Clipping:

Frequency range:



Time domain:



If the signal at the line scope input is too strong or the gain in the frequency range and time domain are displayed as too large, the input stage of the line scope is overdriven.

In this case, ARGUS displays the clipping symbol CLIP. The displayed signal is clipped both in the frequency range and the time domain. You can remedy this by reducing the gain.

Saving test results without terminating the line scope

You can save your results of the measurement without disconnecting in the same way as for VDSL, see page 65.

22.4 Active Probe

The ARGUS Active Probe is an active, high-impedance probe that can be passively patched into an existing connection without interfering with it.



In spite of the high impedanceprobe , it can cause transient losses of existing connections when it is patched in.

The ARGUS Active Probe II is designed to be used with the ARGUS line scope. The high-ohm line scope (input impedance 3.6 kΩ)) can also be used without the ARGUS Active Probe II (see page 304).

22.4.1 Active Probe II

The ARGUS Active Probe II has the following technical specifications:
- Input impedance: 70 kΩ
- Input capacitance: 1 pF
- Frequency range: 10 kHz to 30 MHz (± 1.5 dB)
- Attenuation, symmetrical 14.5 dB
- 2 x 4 mm banana plug sockets (spacing 12 mm)
- Data transmission to ARGUS via RJ45 lead (pins 4/5)
- Supply voltage: 5 V via ARGUS USB-host interface and USB cable

The Active Probe II can be operated in both symmetric and asymmetric mode. You can switch between these two operating modes using the hotkey  or via the menu. See page 307, line scope for an application example.

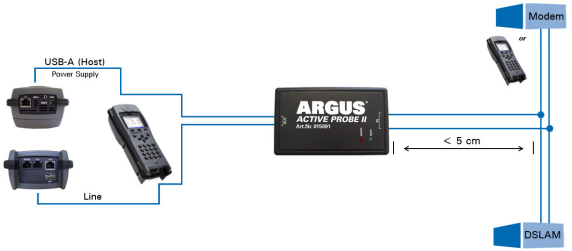
The Active Probe II:



22.4.2 Connecting the Active Probe II

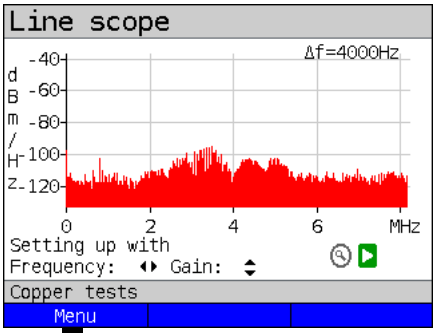
Connect ARGUS to the Active Probe II via the Line socket and the USB-A interface (host). ARGUS supplies the Active Probe with a voltage of 5 V via the USB host interface. Connect the Active Probe to the line to be tested (in this example Active Probe II between modem and DSLAM) using a lead that is as short as possible (< 5 cm).

Connection example:



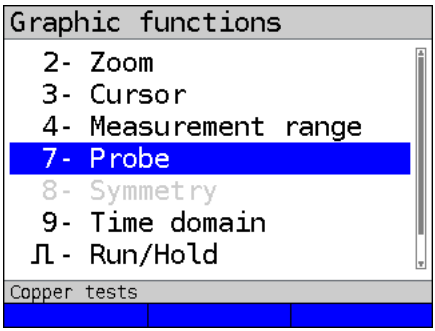
The connection cable and adapter supplied with the device have been designed to be as short as possible. The Active Probe II should be operated using leads that are as short as possible. To obtain optimum measurement results, it is important for the Active Probe to be connected in direct proximity to the line to be tested. Every extension of these connecting leads increases the input capacitance of the Active Probe, which can falsify the measurement results. Even the positions of the two leads in relation to each other can falsify the results as the lengths increase. When the Active Probe is used as supplied, ARGUS automatically subtracts the additional attenuation from the measurement results.

22.4.3 Starting Active Probe II (example with line scope)

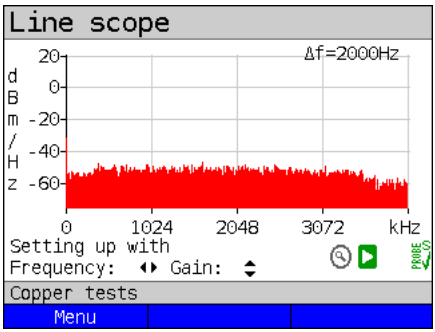


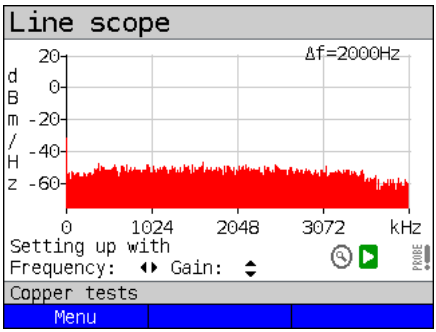
Continued on next page

After starting a test (in this example with Line scope), you can open the Probe menu using the graph functions or the number key 7.









Opens the Probe menu directly.

Select "yes" to use the probe.
ARGUS then switches on the supply voltage to the USB-A interface and automatically subtracts the additional damping caused by the Active Probe from the measuring results.

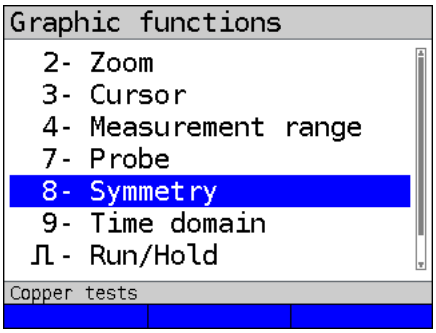
When the Active Probe is active and properly supplied from ARGUS, the green LED on the probe lights up.

Activation of the probe can take up to 10 seconds.

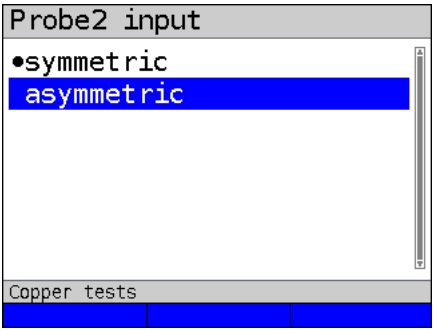
A green tick mark in the lower right of the display indicates during a test that the Active Probe is connected correctly.

If the Active Probe is not connected correctly and thus not detected by ARGUS or intentionally deactivated via the Probe menu, ARGUS displays an exclamation point in the lower right of the display.

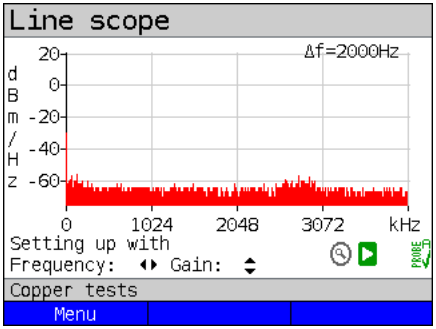
Toggling symmetry/asymmetry:



See the Line scope description on page 307 for an example for toggling symmetry/asymmetry.



Once the test is started and Active Probe II activated, you can toggle the probe input between symmetric and asymmetric operation using the number key 8.



When switched to asymmetric mode, ARGUS displays possible interference sources and the line noise. The usable signal is hidden.

Saving test results without terminating the Line scope

You can save your results of the measurement without disconnecting in the same way as for VDSL, see page 65.

22.5 TDR

The TDR function enables you to determine line lengths in realtime or localise interference sources. Correct interpretation of the pulses displayed by ARGUS permits e.g. detection of stub lines, poor contacts or short-circuits. For this purpose, ARGUS transmits a pulse on the connected line and displays its reflection response.

The line may not carry a DC voltage greater than 200 V DC and must be free of AC voltage components.

The result of a TDR measurement in the ARGUS display may give the impression of multiple interference sources on the line. It is recommended that you eliminate the first interference source on the line and then repeat your measurement. It is possible that the first interference source caused one or more reflections, which can greatly falsify the reflection at the second interference source. Often, there is no second interference source on the line.

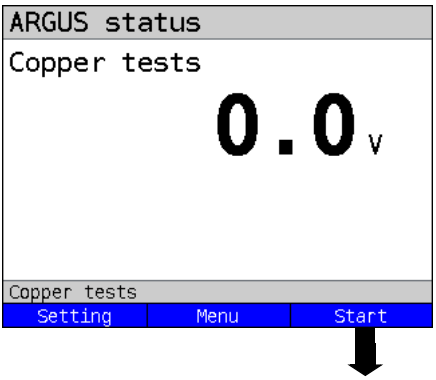
ARGUS generates a reflection at approx. 3 m. To precisely measure short lines and avoid this reflection, using e.g. a 5 m long connection lead is recommended. The pulse continues to be displayed in the graph but using the cable ensures that this is not on the line.

22.5.1 TDR settings

The chapter "Configuring accesses", page 29, explains how to set up the access type "Copper tests".

22.5.2 Starting TDR

The chapter "Configuring accesses", page 29, explains how to set up the connection type "Copper tests".



ARGUS status display.
ARGUS indicates any DC voltage on the line.

<Setting>	Switches to the settings for the wire-type list, see page 295.
<Menu>	Switches to main menu.
<Start>	Directly accesses "Single tests" menu.

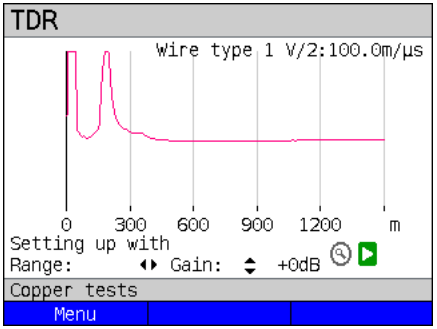


Select and start TDR.

Continued on next page



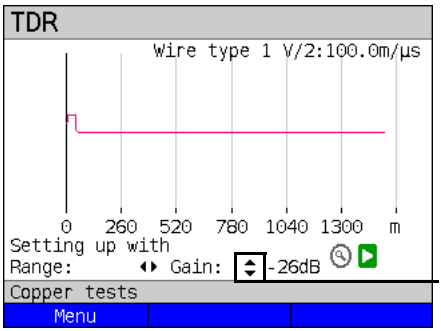
TDR status display:



ARGUS displays possible interference sources on the copper twisted pair directly.
In this example, after the input pulse (starting at 0 meters) we can see a second pulse that spikes at approx. 150 m. This can indicate a 150 m long line that is open at its end.

The adjustable range, the gain and the graph functions permit more detailed analysis.

Gain:

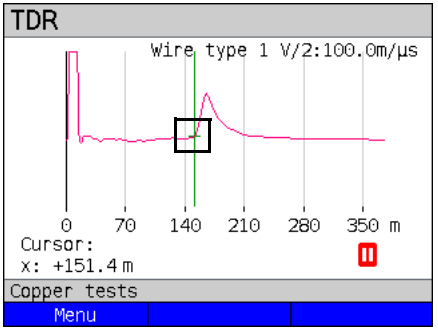


To ensure optimum detection of pulse reflections, match the function for adjusting the gain (y-axis) with the reduction/ enlargement of the range shown (x-axis). ARGUS always starts with the lowest gain (-26 dB) at a range of 1500 meters.



Gain-Y: Sets the gain
from -26 dB, -20 dB, 0 dB, +14 dB
+24 dB, +34 dB, +44 dB

Range:



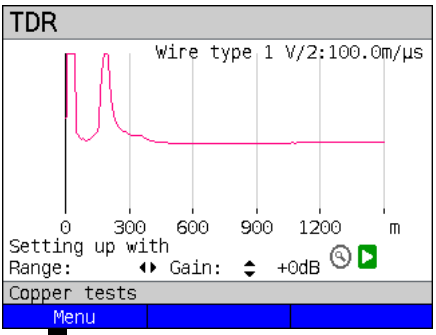
The measurements with the TDR can take place in a measuring range of from 3.5 to 6000 meters. The resolution is approx. 0.3 % of the displayed measuring range.

The accuracy is approx. ±2 % of the measuring range. When determining the distance, try to determine the start of a pulse where possible, and not the relative maximum.



Range-X: Sets the displayed measuring range. Every press of the cursor key halves or doubles the displayed range.

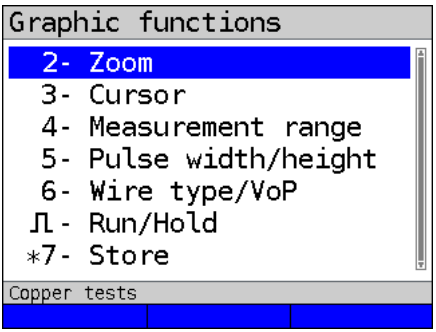
22.5.3 Graph functions



The graphic functions Zoom and Cursor enable detailed analyses of the graphs.

<Menu> Opens graph functions

Press in the status display (in the graph) to save the results and stop the TDR function.



The Graph functions menu opens.

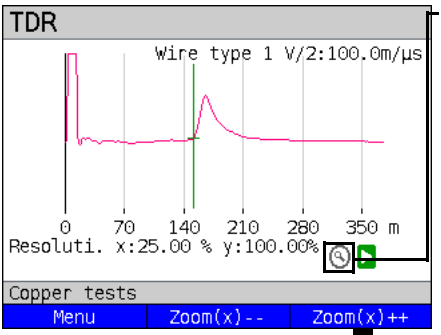
Exits the menu without changing.

You can also use this number key to activate the Zoom function within a graph.

The function of the cursor is described on page 317.

Accepts the selection and returns to the graph.

Zoom (2):



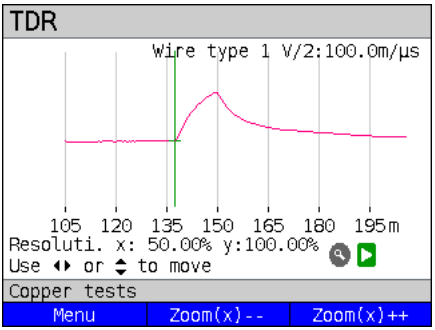
Continued on next page

The magnifying glass shown in the display rests on a white background.
It has not yet been zoomed.
When the magnifier is placed over a dark background, the graph is zoomed.

<Zoom(x)++> Enlarges the middle section of the graph (100%).

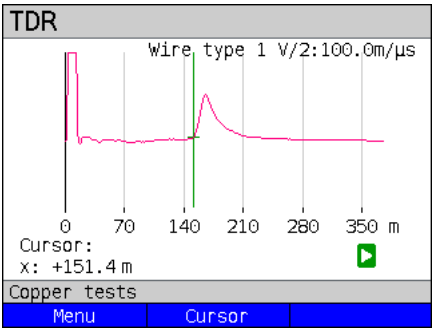
<Zoom(x)--> Not yet zoomed! Reverses **<Zoom(x)++>** and resets magnification.

When zooming, the y-axis always remains at 100 %. No y-axis zoom is available.



You can vary the graph size from 25% to 100% using the zoom softkeys. This doubles or halves the resolution.
When concurrently using the cursor, you can precisely localise the reflection on the measured line.

Cursor (3):



When the Cursor function is started, a green cursor line appears in the middle of the graph.

<Cursor> You can toggle the cursor on and off as needed using the Cursor softkey after activating it in the menu.

The values of the graph for the position under the cursor are displayed below the graph:

x: +151.4 m



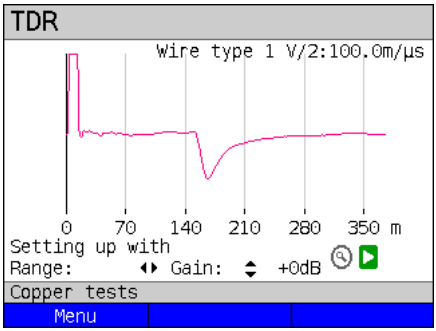
When the Stop function (see page 319) is activated, you can move the cursor faster.



Use the left and right cursor keys to move the cursor to any position on the graph to measure it. Briefly pressing the cursor key causes the cursor to jump to a new position in the graph. When the cursor key is held down, the steps the cursor covers in the graph become progressively larger.

The Zoom function and the Cursor function can also be combined. For example, you can determine a certain value using the cursor more easily when you have previously zoomed in on a specific area. However, the starting position of the cursor can vary.

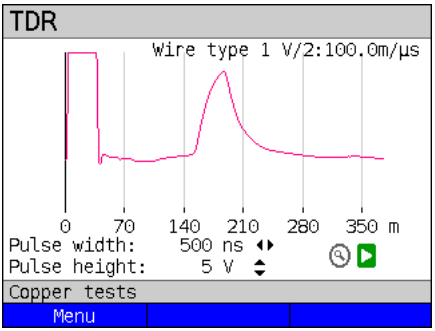
Measuring range (4):



When the TDR function starts, it is in the measuring range in the status display. You can set the range (x) and the gain (y) in the measuring range.
If you have hidden the measuring range in order to work with the cursor or zoom, you can restore it:

<Menu>
or 4 GHI — Restores the measuring range

Pulse width/height (5):



You can configure the width and height of the pulse that ARGUS outputs to the line.

5 JKL — Configuring the pulse

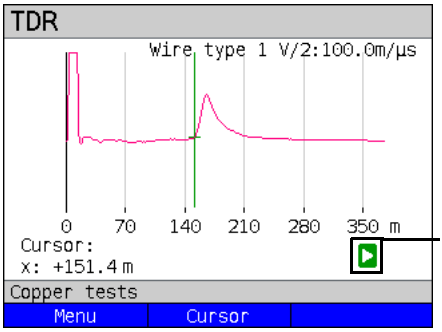
Height:
The pulse height sets the level of the pulse ARGUS outputs to the line in volts. The default value is ***5 V***, but can be increased to 20 V. In principle, it is recommended that you increase the pulse height as the distance increases.
On short, very noisy lines as well, increasing the pulse can make the reflection stand out better against the noise, for a more reliable interpretation.

Width:
The pulse width sets the duration of the pulse ARGUS outputs to the line in nanoseconds (ns). The default value is ***500 ns***, but you can increase this up to 2000 ns (2 µs) depending on the measuring range. Just like a more powerful pulse, a longer pulse contains more energy, and thus is generally more suitable for use on longer lines. However, a longer pulse can also conceal important reflections, which can then no longer be correctly interpreted.

Wire types (6):
The absolute VoP value must always be less than 1. However, ARGUS always displays this in percent. In a wire with a VoP value of 0.7, a signal propagates at 70 % of the speed of light (c_0).
For many cable types, the pulse time is also specified in V/2: V/2 = VoP [%] * 1.5. In this example, the V/2 value would come to 95.5 m/µs for a VoP of 0.637 resp. 63.7 %.
A typical patch cable has e.g. a VoP of 0.667 resp. 66.7%, which corresponds to a V/2 of exactly 100 m/µs.

To measure e.g. building wiring precisely, it is important to set the correct VoP value. You can determine the correct VoP using a reference cable of known length before the measurement.

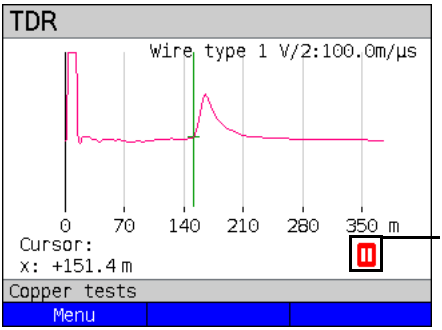
Start/stop



You can stop and restart a running test (realtime mode) at any time.

Test running

Stop test



Test is stopped

Restart test

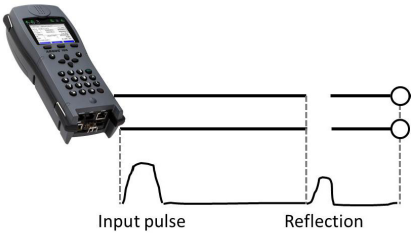
Saving test results without terminating the TDR

You can save your results of the measurement without disconnecting in the same way as for VDSL, see page 65.

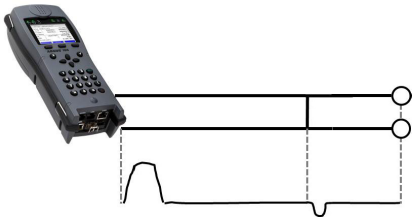
22.5.4 Examples

The following signal forms can help you in interpreting the reflection responses that ARGUS displays.

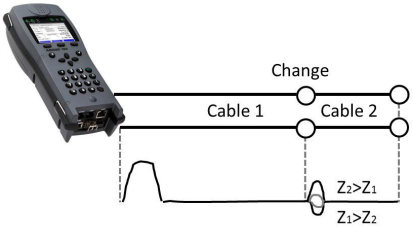
Examples:



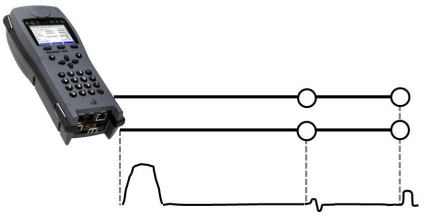
Open cable
The reflected pulse is positive. No proximate interference sources or the far end of the line can be seen.



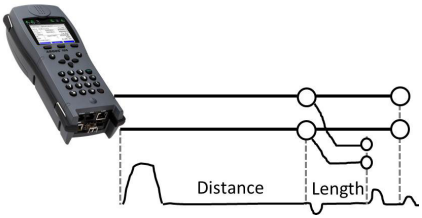
Short-circuit
The reflected pulse is negative. No proximate interference sources or the far end of the line can be seen.



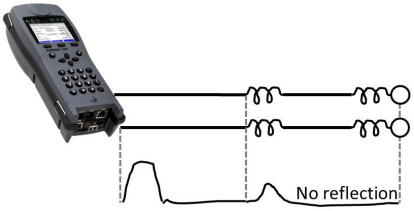
Mismatch
Different line cross-sections were used. The greater the mismatch, the greater the amplitude of the reflection.



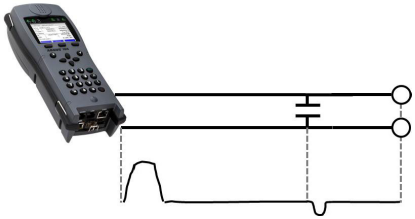
Poor contact point
A poor contact between two lines distorts the reflection into an S-shape. The worse the contact, the greater the reflection.



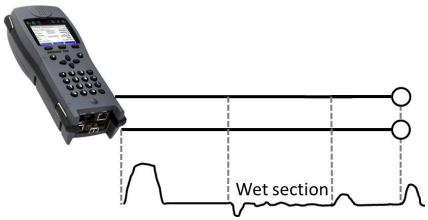
Stub line
The beginning of a stub line appears in the form of a negative reflection, followed by a positive reflection corresponding to the length of the stub line when the end of the stub line is open.



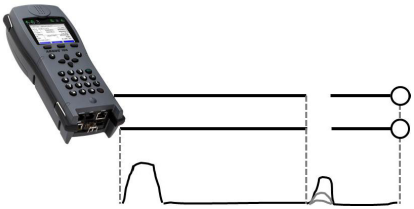
Loading coils
Loading coils deployed on the line are optimally designed for transmitting voice frequencies. They do not let DSL signals through. The TDR function enables you to detect the first coil in a line. The reflection is positive with a long tail in the direction of the end of the line. The following faults cannot be detected.



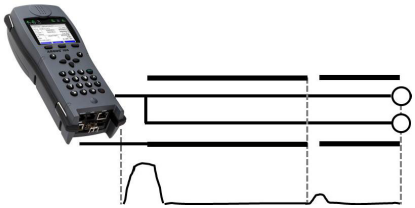
Capacitive network
Like a short-circuit, the reflection from a capacitive network is negative.



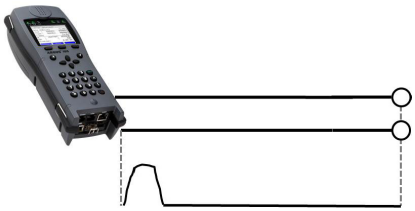
Moisture
Moisture penetrating the cable has the same effect on the reflection as a stub line. However, the zone between the negative and positive reflection appears significantly noisier than for a normal stub line.



Loose/intermittent contact
Realtime operation is extremely suitable for detecting intermittent contacts. The amplitude of the positive reflections varies depending on the intermittent contact frequency.



Open shielding
Broken or open cable shielding can be detected by connecting the “a“ and “b“ cores to ARGUS via one contact and the shielding to a second. The reflection looks like an open line.



Correct line termination
When the line is properly and correctly terminated, the pulse generated by ARGUS is completely absorbed. No further reflections are visible.

23 Ethernet cable tests

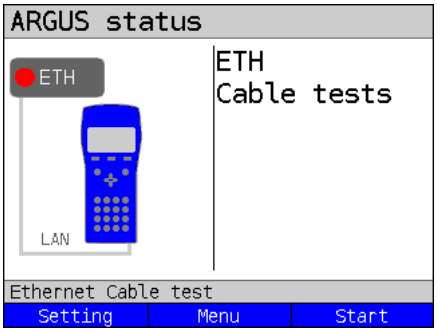
The local loop must be voltage-free.

The Ethernet cable tests can only be performed on the LAN interface.

23.1 Configuring the Ethernet interface

Connect the local loop to the ARGUS socket "LAN" and switch on ARGUS. The chapter "Configuring the local loop", page 29, explains how to set up the connection type "Ethernet Cable Test".

Status screen



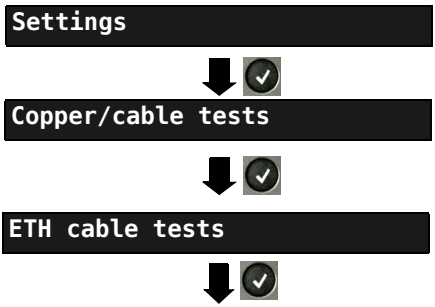
Test not yet started:
red LED in display!

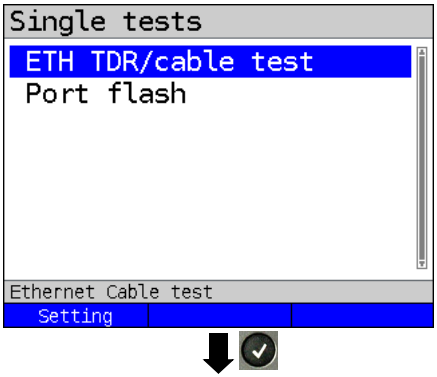
Meaning of LED image in display:
Red LED: no test started

<Setting>	Opens the Ethernet cable test setup, see page 323.
<Menu>	Switches to main menu.
<Start>	Starts the Ethernet cable test, see page 325.

23.2 Ethernet cable test settings

You can configure the following "Ethernet parameters". You can restore the default settings at any time (see page 347). The following example is used to illustrate how to modify a parameter.





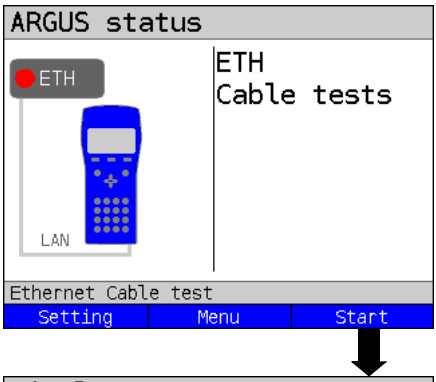
Select e.g. ETH/TDR cable test.

Setting	Description
ETH TDR/cable tests: Configuring the cable test parameters.	
Propagation speed	To determine the distance, the calculation must take into account a correction value dependent on the wire type that specifies the ratio of the pulse propagation speed in the cable to the speed of light in a vacuum (c_0 = 299.792458 m/µs). For many cable types, the pulse time is also specified in V/2. Minimum: 45.0 m/µs (VoP in %: 30) Maximum: 149.7 m/µs (VoP in %: 99.9) Default: ***98.9 m/µs (VoP in %: 66.0)*** The choice of propagation speed as VoP or V/2 is saved.
Line resistance	Sets the line resistance per kilometer. Range: 20 Ω/km to 200 Ω/km Default: ***80 Ω/km***
Capacitance	Sets the capacitance (operating (mutual) capacitance) per kilometer. Range: 35 nF/km to 100 nF/km Default: ***35 nF/km***
Name	Enter the name of the wire type. Default: ***PE 0.5 AWG24***
ETH port flash	
Interval that ARGUS keeps the port active before performing a link disconnect. The disconnect time depends on the switch. Range: 1 - 5 seconds Default: ***1 s***	

23.3 Ethernet cable test

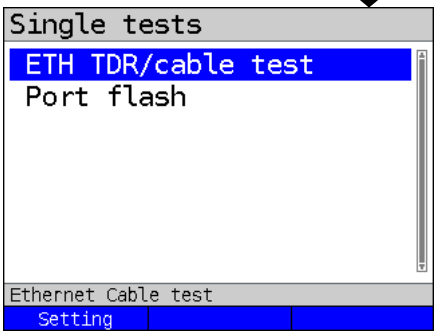
The Ethernet cable test checks for faults in LAN cabling. ARGUS interprets the measurement result and determines whether this indicates an open line, a short-circuit or a mismatch.

23.3.1 Starting Ethernet cable test



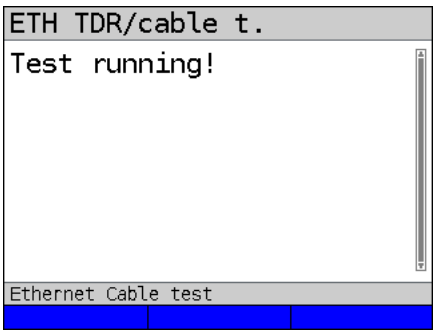
ARGUS in the status line.

<Setting>	Opens the Ethernet cable test settings, see page 324.
<Menu>	Opens the main menu.
<Start>	Starts Ethernet cable test.

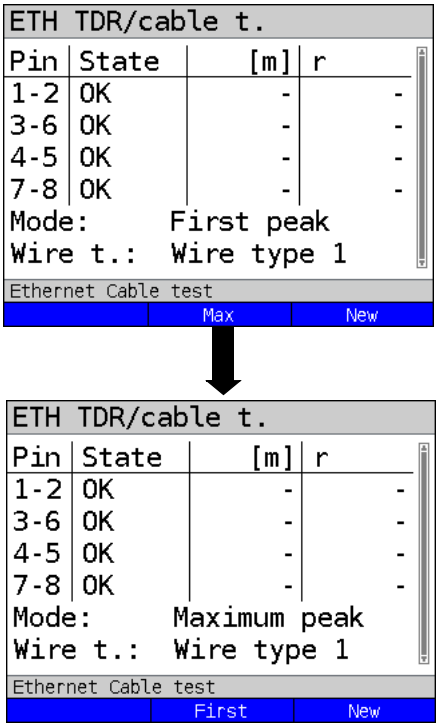


Select one of the Ethernet tests:
- ETH TDR/cable test
- ETH port flash

Start the desired Ethernet test directly by selecting it.
In this example, this is the ETH/TDR cable test.



The Ethernet TDR/cable test is executed.



The cable test was executed with "First peak" mode.

Display:

- Pin pair
- Status of respective pin pair
- Display of distance to fault.
- Reflection coefficient

In this example, the line is correctly terminated. ARGUS returns "OK" for all cores.

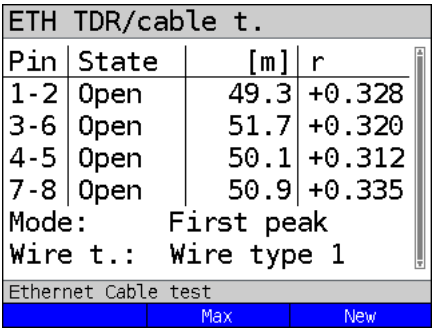
<Max> Switches the measuring mode to "Maximum peak".

<New> Starts a new test.

If no line is connected, the device may deliver false results.

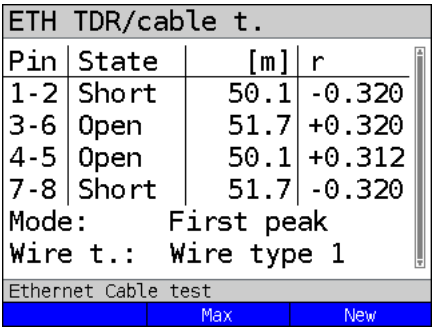
The Ethernet cable test is standard-compliant to a length of 100 m.

Example measurements:



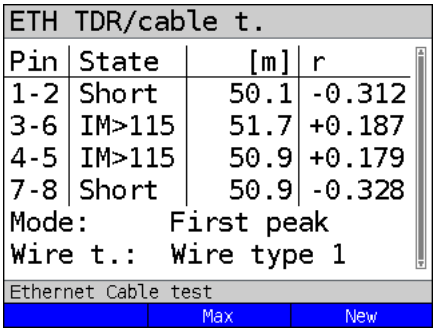
Open end

In this example, the line is open on all pairs. ARGUS locates the fault in the area from 49.3 m to 51.7 m.
This indicates that the line is open at approx. 50 m.



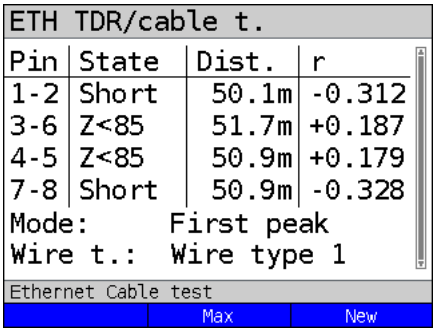
Short

In this example, the line is short-circuited between pairs 1-2 and 7-8. ARGUS displays the value "Short" as the status.



Mismatch

This example shows a mismatch (>115 Ω) at pairs 3-6 and 4-5. This indicates an open cable end or an impedance transition >115 Ω.



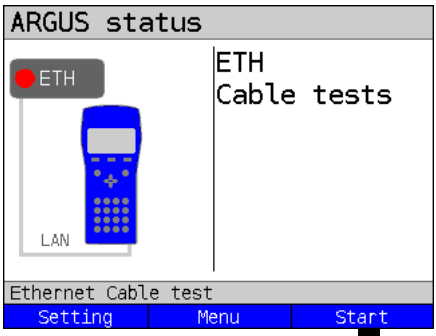
Mismatch

This example shows a mismatch (<85 Ω) at pairs 3-6 and 4-5). This indicates a short or an impedance transition <85 Ω..

23.4 Ethernet port flash

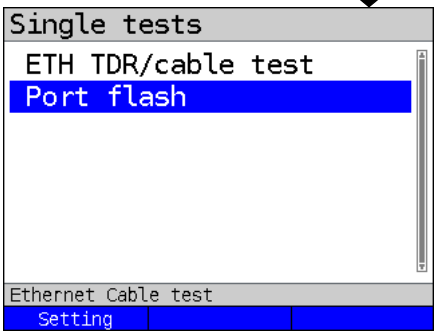
ARGUS can identify the port currently in use on the Ethernet switch using the test "Ethernet port flash". To facilitate identification, the flash frequency at the switch can be set in ARGUS.

23.4.1 Starting Ethernet port flash



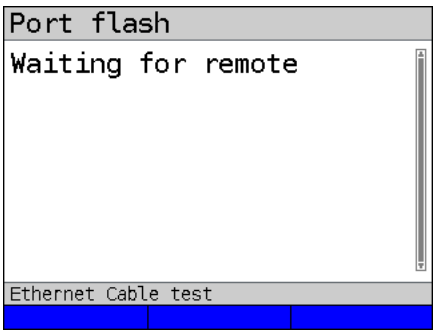
ARGUS in the status line.

<Setting>	Opens the Ethernet cable test settings, see page 324.
<Menu>	Opens the main menu.
<Start>	Starts Ethernet cable test.

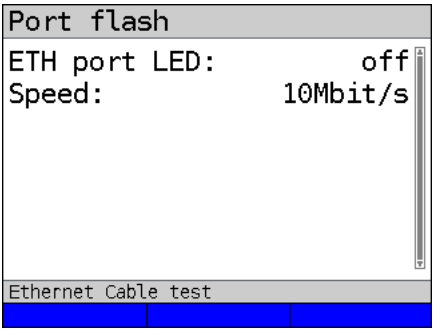


Select one of the Ethernet tests:
- ETH TDR/cable test
- ETH port flash

Start the desired Ethernet test directly by selecting it.
In this example ETH port flash.



The Ethernet port flash test is executed.



The test "ETH port flash" has been executed.

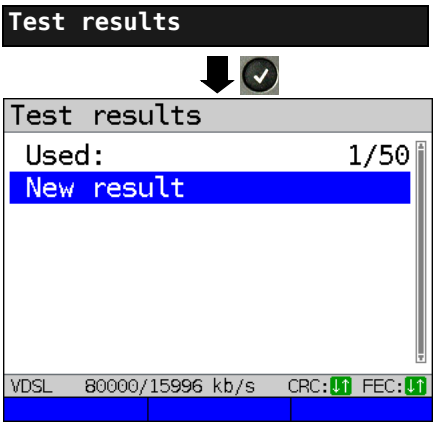
Display:

- Indication whether the port LED is flashing (in example "off").
- Link speed attained.

24 Test results

The saved test data are displayed either in the ARGUS display or on the PC. You can transfer the results to the PC, where the software WINplus / WINanalyse generates a detailed measurement log (along with other functions).

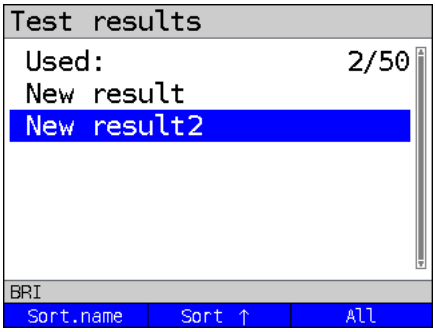
ARGUS stores the test results together in 50 definable save slots. The system suggests "New result" as the default save name. The saved test results are also deleted when all configuration settings are reset.
The functions ("View", "Rename", "Send to PC", "Delete") in the Test results menu refer to one test result. You must thus first select a save slot with a test result:



ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

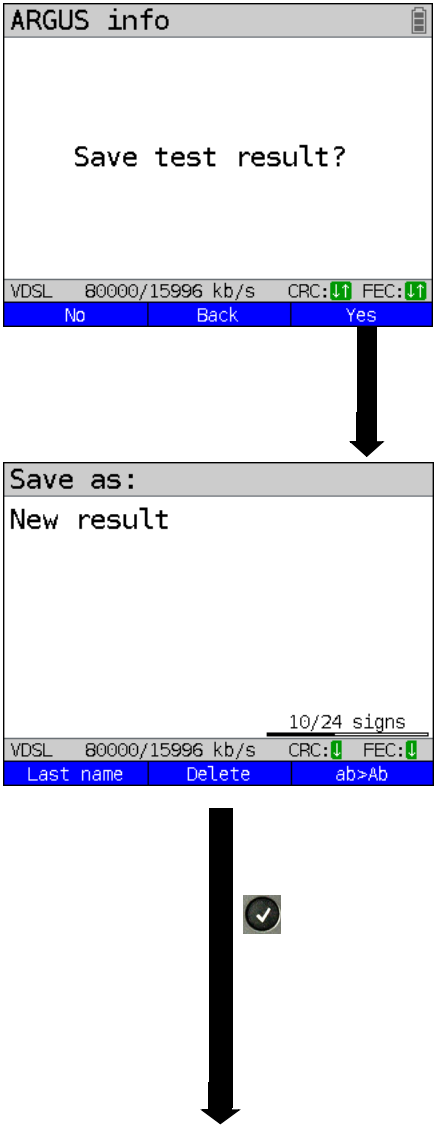
ARGUS displays the name of the stored result and the number of occupied slots.



When multiple test results are saved, ARGUS lets you sort them by name and time (as in this example). You can also sort them manually.

<Sort time>	Sorts test results by time.
<Sort ↑>	The marked test result is moved up one place in the list.
<Sort ↓>	The marked test result is moved down one place in the list.
<All>	Deletes all test results or send to PC.

24.1 Saving test results



You can save the result after the end of a test or after disconnecting a connection.

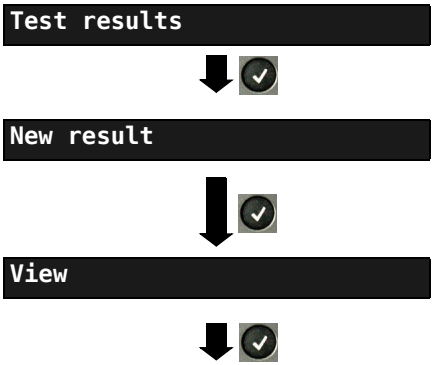
ARGUS saves the test result in the first free slot. If all slots are occupied, you need to manually select a slot to overwrite.

ARGUS proposes "New result" as the save name.

You can accept the displayed save name or enter a new one using the number keys. The right softkey changes its meaning when pressed, affecting your entry. You can enter up to 24 characters. ARGUS displays the number of characters used so far.

<Last name>	ARGUS suggests the last save name used.
<Ab>AB>	Entry begins with upper-case letters and continues in lower-case.
<AB>12>	Entry of upper-case letters.
<12>ab>	Numerical entry.
<ab>AB>	Entry of lower-case letters.
	Entry of special characters, e.g. @, /, -, ., *, ?, %, =, &, ! etc.
	Entry of special characters e.g. _, :, +, # etc.
<Delete>	Deletes the place in front of the cursor.
	Moves cursor
	Don't save result, return to previous display.

24.2 Displaying saved test results



Display of test result

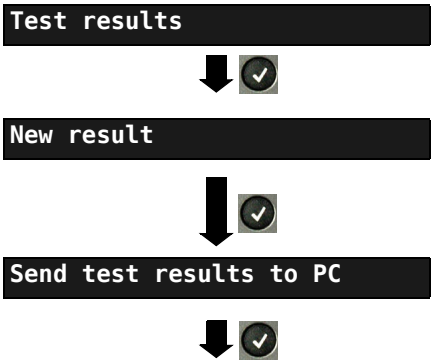
ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

Select a save slot (in this example selection of the first slot with the save name "New result").

24.3 Sending test results to a PC

You can send the test results to a PC for viewing and archiving. Connect ARGUS (ARGUS socket "USB-B") to the interface of your PC using the cable supplied with the device and start the software WINplus or WINanalyse.



Start data transmission to PC

ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

Select a save slot (in this example selection of the first slot with the save name "New result").
All test results are transmitted.

24.4 Delete test results



The test result is deleted.

ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .



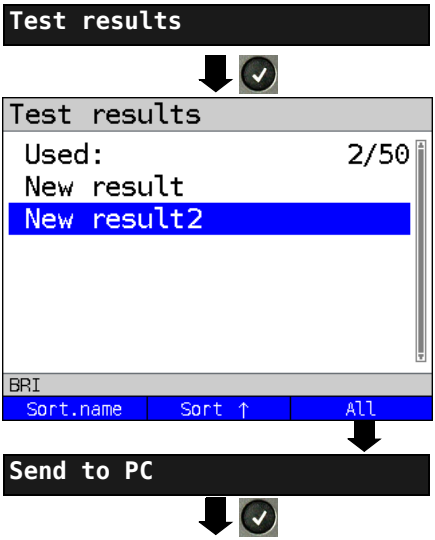
Select a save slot (in this example selection of the first slot with the save name "New result").

Deletes the test result stored in the selected slot.

To deletes all test results, see on page 347 “Restoring the factory settings”.

24.5 Sending all test results to PC

ARGUS transfers all saved test results to the connected PC. Connect ARGUS to the PC and start ARGUS WINplus or WINanalyse.



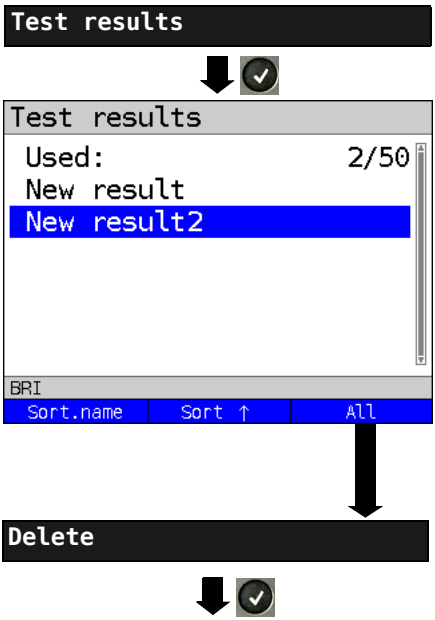
Start data transmission to PC

ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

24.6 Deleting all test results

ARGUS deletes all saved test results from its internal memory.



ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

Confirm the security prompt with **<Yes>**; all 50 possible test results are deleted.

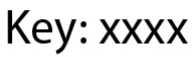
25 WLAN

You can make your ARGUS WLAN-capable with the ARGUS-WLAN option (Article no.: 016250) or the ARGUS-WLAN kit (Article no.: 016251). The WLAN-option and the WLAN kit each contain a USB nano WLAN stick and an options key (see "Software option", page 343). You must enter this in ARGUS one time.

WLAN USB Nano Stick



Options key



ARGUS Mini USB Hub



WLAN option (Article no.: 016250)

You only need the WLAN kit (or the ARGUS USB mini-hub) if your ARGUS only has one USB host interface and you wish to connect two USB devices (e.g. WLAN + ARGUS Copper Box).

Always insert your USB devices in the hub first before you power up ARGUS.

Technical features:

USB nano-stick	
Interface	USB 2.0 type A
Antenna	internal
WLAN standard	IEEE 802.11 b/g/n
Encryption	WPA2

25.1 Starting WLAN



Access list or any point in the menu.

ARGUS manager display

- M-interface ETH / WLAN, see page 341
- LCD brightness, see page 340
- Automatic shutdown, see page 343
- Auto. charge, see page 349
- VNC server start, see page 341

You can activate/deactivate or change settings using the cursor key .

The WLAN interface is now activated.

See page 341 for WLAN settings such as SSID, password, channel, etc.

The WLAN interface is now activated. ARGUS is now in access-point mode (ARGUS-AP).
The WLAN symbol in the status line is green .

You can set up a WLAN connection with ARGUS by selecting the WLAN access with the name Argus162_SerialNumber on a smart phone, tablet or laptop and entering the password stored in ARGUS.

Electronic job management applications can also access ARGUS and pick up measurements using WLAN.

25.2 Test results via WLAN

If for example a laptop has a working WLAN connection with ARGUS, you can open the Web server by entering the IP address of the ARGUS unit (see page 342) or myargus.info in your browser's address bar.



The test results with the name data.csv can be opened directly or saved on the laptop. You can also use this functionality to save, delete and rename measurement logs. For this, you require a WebDAV application/app on your PC/laptop or smart phone/tablet.

The .csv file contains the connection parameters of the last measurement conducted.

The command "VNC" lets you control ARGUS remotely via your browser.

You may first need to activate the VNC server on ARGUS, see page 341.

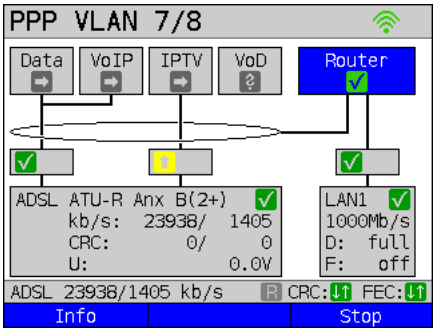
Further information regarding the VNC server is available on request.

The ARGUS Web server has its own SSL certificate (myargus.info), which permits https:// access.

You can also access ARGUS using WebDAV via myargus.info. By this means, you can download measurement logs in .amp format directly from ARGUS via Ethernet or WLAN.

25.3 WLAN in router mode

When the ARGUS WLAN interface is active, it is always connected directly with the ARGUS router. If you want to use ARGUS as a true WLAN access point (ARGUS-AP) and e.g. start a download with this device as the gateway, you must first start a DSL access (ADSL, VDSL, see page 46).



If the router (see diagram) has been started, both WLAN and LAN are connected to the ARGUS router.

The smart phone, tablet or laptop can use ARGUS as an access point. All applications such as data, VoIP or video that can be run e.g. on a smart phone can now be executed to test the connecting devices via ARGUS - thus replacing all customer devices.



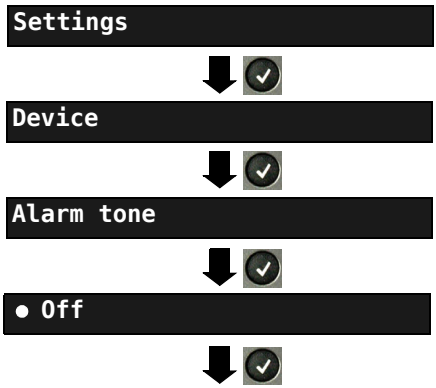
WLAN and LAN are not linked via an Ethernet bridge. Each requires its own configuration. They may not be configured identically. A test from WLAN to LAN or vice-versa is not possible.

26 ARGUS settings

ARGUS can be custom-configured for special requirements. The default values are restored using "Reset" (see page 347).

26.1 Configuring the device

Changing a device setting is described using the setting "Alarm tone" as an example.



ARGUS adopts the marked setting as the default.

ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

Select a setting (e.g. Alarm tone) using the cursor keys.

The default is indicated with a ● in the display.

Mark the desired setting. The marked setting is highlighted in blue in the display.

Return to next-higher level menu without saving setting change.

Setting	Description
Menu language	Select the operating language Default: ***depends on country***
LCD brightness	Sets display contrast: 16 contrast levels are possible. You can increase or decrease the contrast using the cursor keys. The vertical arrow shows where the current contrast lies in the range from low to high contrast.
Date / time setting	Enter the date, time, time offset and daylight savings time via the number keys. Switch between the lines using the up and down cursor keys. Change the three following settings, from top to bottom, so that all settings take effect: Time offset: Set the time offset (coordinated world time: UTC-12 to UTC+14) for your time zone here. UTC+1 is the setting for central Europe.

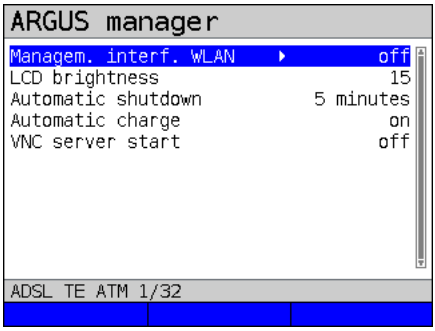
	Daylight savings time:	If central European time is selected, ARGUS calculates with a total time offset of UTC +2 during the summer months.	
	Date / time:	To set the time manually, enter the correct time in your time zone using the ARGUS number keys. In automatic time setting, ARGUS automatically reads the time from a preconfigured time server. Default: ***0.de.pool.ntp.org*** This can be changed to a different server. The prerequisite is that ARGUS can connect to the internet. Carry out e.g. a ping test (e.g. ping www.argus.info).	
	The time you enter runs on the built-in ARGUS realtime clock until the power supply is interrupted. When ARGUS is switched off and the batteries removed, the clock continues to run for a few days on its internal buffer. The time is undefined as soon as the buffer is exhausted, and must be set again.		
Management interface	Start management interface	Determines whether the management interface is used. If WLAN was selected as the management interface, ARGUS operates as a WLAN router, see page 342. Depending on the selected interface, ARGUS displays either a WLAN or an Ethernet symbol. WLAN:  WLAN is not active (gray)  WLAN is active (green) Ethernet:  Ethernet is selected Default: ***off***	
	VNC server	Start VNC	Determines whether the VNC server is used. Default: ***off***
		VNC scaling	Determines the scaling used to display the ARGUS screen on the PC. Range: Factor 1 - factor 4 Default: ***Factor 2***
	WLAN	When WLAN is grayed out, the management interface must first be halted (see above) by setting "Start management interface" to off. Then restart it again.	
		SSID	The service set identifier (SSID) is a user-definable name with which ARGUS can be identified as a network. Your SSID can also be displayed using the keyboard shortcut  and  Default: ***Argus162_SerialNumber***

		Password		If WLAN was selected as the management interface (see page 343), mobile devices log in using a password query. The password (default: ***argus162***) can also be displayed using the keyboard short-cut  and .
		Channel		Selects the WLAN channel on which the WLAN stick transmits. Range: Channel 1 to 11 Default: ***1***
		DHCP server		Settings for the DHCP server: - Starting and ending IP address Range: Range 0.0.0.0. to 255.255.255.255 Default: (assignment see RFC 3330) Start: ***192.168.10.30*** End: ***192.168.10.40*** - Domain name, see "User name" page 91 for details - Duration of reservation for IP addresses Range: 1 - 99999 seconds Default: ***240***
		Interface	Interface	Selection of the management interface (Ethernet or WLAN). Default: ***ETH***
			IP address	ARGUS IP address Range: 0.0.0.0 to 255.255.255.255 Default: ***192.168.20.1*** (for issuing see RFC 3330)
			Netmask	IP netmask Range: 0.0.0.0 to 255.255.255.255 Default: ***255.255.255.0*** (issuing see RFC 3330)
			Gateway	Gateway IP address Range: 0.0.0.0 to 255.255.255.255 Default: ***0.0.0.0*** (assignment see RFC 3330)

<table>
<tr><td>Ring volume</td><td>You can set the volume of the ring tone ARGUS uses to signal an incoming call.
For one thing, you can adjust the initial volume.
- Default: Level 1 (very quiet)
You can also adjust the end volume.
- Default: Level 7 (very loud)
For an incoming call, ARGUS begins with the initial volume (very quiet) and increases the volume with each ring until it reaches the final volume level (very loud).</td></tr>
<tr><td>Alarm tone</td><td>ARGUS generates alarm tones in different situations, e.g. as soon as a bit error occurs in BERT or ARGUS has synchronised with an xDSL access, and when error counters reach high counts.
<table>
<tr><td>Short - long</td><td>Successfully synchronised</td></tr>
<tr><td>Long - short</td><td>Lost synchronisation</td></tr>
<tr><td>Short - short</td><td>Error counter spike (the tone relates only to the last second. Only one tone sounds even when multiple errors are displayed.)</td></tr>
</table>
The setting "off" suppresses all alarm tones.
Default: off</td></tr>
<tr><td>Jingle</td><td>An ARGUS jingle is played after the device powers up and initialises.
Default: off</td></tr>
<tr><td>Power management</td><td>Automatic off: Sets the no-activity period after which ARGUS switches to power-saving mode when the power supply is not connected. When power-saving mode is turned off entirely, ARGUS will display a warning that switching off power-saving mode reduces the battery time the next time it is powered up. You can deactivate this warning with the "X" key. <On> cancels deactivation.
Default: after five minutes</td></tr>
<tr><td>Software option</td><td>Activates a software option You must enter an activation key via the keypad. A variety of options can be activated in ARGUS; each one requires entry of a 20-digit code via the number keys.This code will be provided on request.

There are also codes for resetting options. You should only enter these codes when you understand what they do.</td></tr>
</table>

ARGUS manager	You can also access the ARGUS manager via the key.



Display ARGUS manager

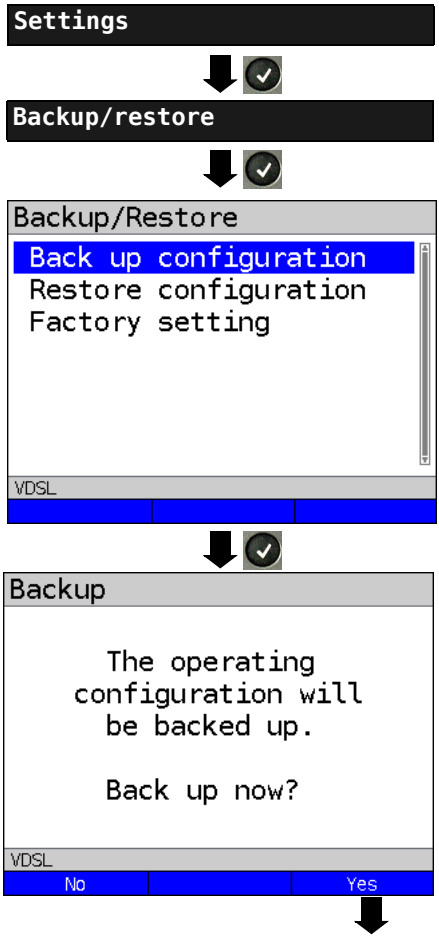
- Managem. interface ETH/WLAN, see page 342
- LCD brightness, see page 340
- Automatic shutdown, see page 343
- Automatic charge, see page 349
- VNC server start, see page 341

Use the cursor keys to activate / deactivate or change the settings.

26.2 Backing up and restoring settings

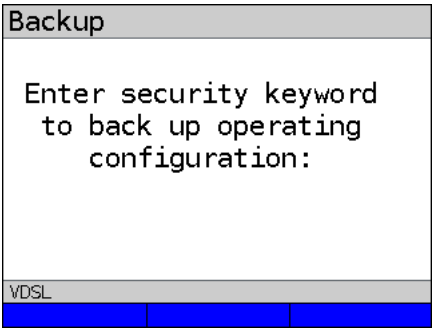
With ARGUS, you can back up all settings (speed dial memory, PPP user name, PPP password, IP addresses, profile names, user-specific details, keypad information and more) and restore them if needed.

Backing up settings

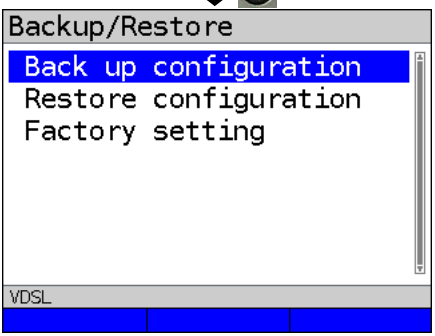


ARGUS in Main Menu

All settings made in ARGUS are backed up unchanged and can thus be restored later.

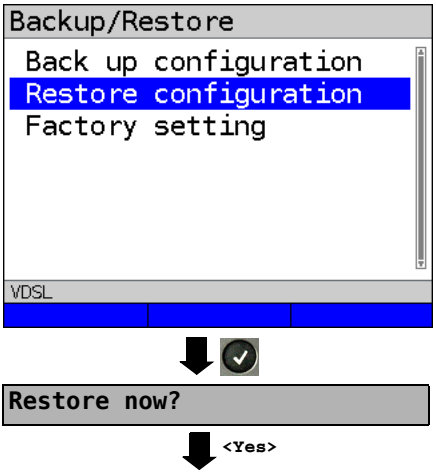


Enter the security password to back up or restore settings.
You can obtain this from your Technical Support or directly from intec (see page 10).



The settings are now backed up and can be restored as necessary.

Restoring settings



Select "Restore settings"

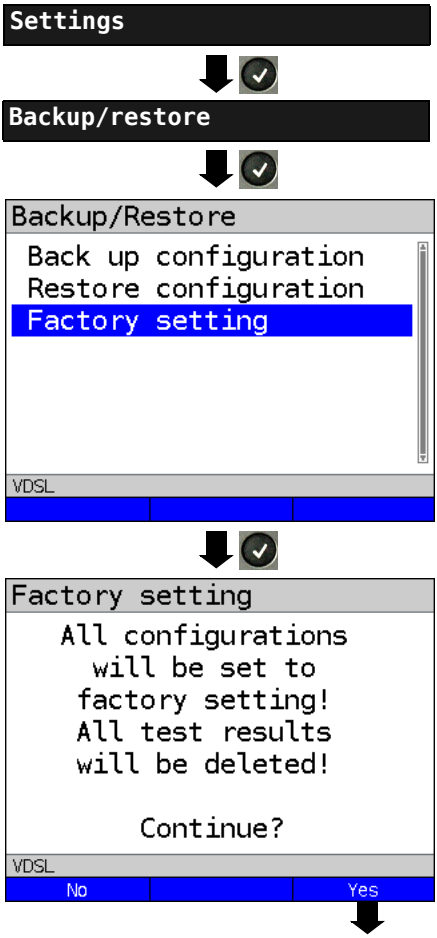
and Restores the saved test settings.

If no settings have been backed up, this function has the same effect as "Restore factory setting", see page 347.
A security password is not required.

26.3 Restoring the factory settings

ARGUS resets all settings to the factory defaults.

The speed-dial memory, PPP user name and password, IP addresses, profile-names, user-specific services, keypad information and all test results stored in ARGUS are erased.



All parameters are reset to the factory defaults.

and ARGUS jumps directly to the security prompt.

Enter the security password to delete all settings.
You can obtain this from Technical Support or directly from intec (see page 10).

and Restores the saved test settings.

If no settings have been backed up, this function has the same effect as "Restore factory defaults", see page 346.

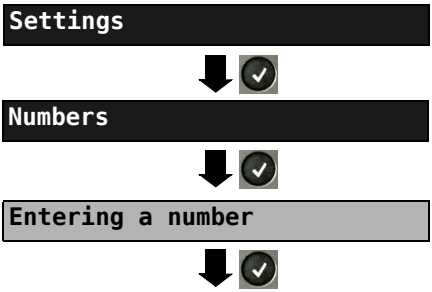
The following steps are performed as for "Backup settings", see page 345.

26.4 Saving numbers in the speed dial memory

You can save ten 24-digit numbers in the speed dial memory.

The own number of the test access must must be entered in the first speed dial slot (display shows own number); this is important in particular for the automatic services test on ISDN accesses). In the speed dial menu, you can jump to the end of the list by moving up one slot from the top entry.

You can store remote numbers in the slots "Remote numbers 1 to 8". In the slot "X.31 test number", ARGUS expects the X.25 access number for the X.31 test (see page 236).



ARGUS saves the number and switches to the next higher level menu.

ARGUS in Main Menu



Scroll down to the desired speed dial slot. Enter the number using the keypad.

<Delete> Deletes the space when the cursor is behind the last character, otherwise deletes the character under the cursor.



Switches to the next higher-level menu without saving the number.

When entering the own number with and extension (operating ARGUS on a PBX), note the following: The extension is separated from the number using a "#". For outgoing calls, ARGUS uses the entire number (without "#") as the destination address (CDPN resp. DAD) and the number after the "#", i.e. the extension, as the sender address (CGPN resp. OAD). A "#" at the beginning of a number is treated as a valid digit.

Example: 02351/9070-40 is entered as 023519070#40.

If the number ends with "#", later calls are made without CGPN resp. OAD. This is important for some PBXs.

27 Using the battery pack

Changing the battery pack

Power down ARGUS and disconnect the power adapter. Then release the knurled screw securing the battery pack.

Handling the battery pack



ARGUS may only be operated using the battery pack supplied with the device; connecting other power supply units to the contacts of the device will damage ARGUS.

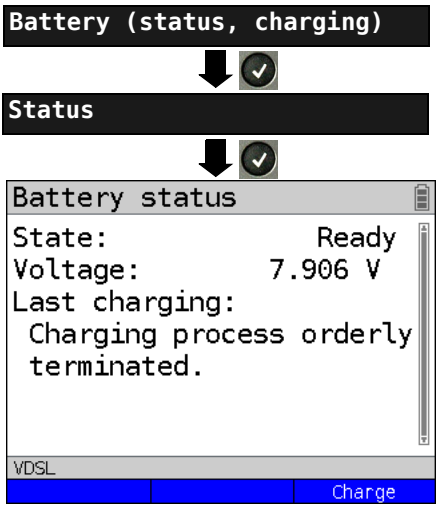
- Only charge the supplied battery pack in ARGUS.
- Do not use the ARGUS battery pack in other devices.
- Active charging of the battery pack and automatic charging (on by default) may only be carried out in a temperature range of 0 °C to +40 °C.
- Charge the battery pack completely at least once a month (even if the device has not been used for a longer period!).
- The lithium ion battery pack should be stored with a charge of 40 to 60 %. When storing the device for longer periods, you should refresh this charge level every six months. To prevent full discharge, remove the battery pack from the device for long-term storage.
  To maximise battery life, do not store the battery long-term at temperatures above +50 °C.
- See the chapter Safety information (page 11) for detailed information on using and transporting the lithium ion battery pack safely.

Automatic charging of the battery pack when ARGUS is powered down

ARGUS automatically charges the battery pack as soon as the device is powered down when the power adapter is connected and the battery voltage is too low. During charging, ARGUS displays "Charging battery" in the display. Hold down the power button to switch ARGUS off before the batteries are charged. ARGUS remains powered up after the battery pack is fully charged.

Status

ARGUS indicates the current state of the battery graphically in the display when no power adapter is connected. A battery symbol flashes in the display when it is down to a power reserve of approx. 8 minutes (depending not the operating mode). Tone errors, and in extreme cases malfunctions, can occur in this period. Connect the power adapter. ARGUS can recharge the battery completely when the power adapter is connected. The ARGUS power pack does not require manual discharge. A complete charging process can take up to approx. 6 hours.



ARGUS in Main Menu

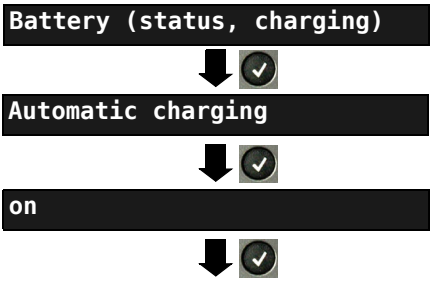
When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

Connect the power adapter!
Start the charging process.

During the charging process, ARGUS displays the current status and the voltage.

<Charge> Starts the charging process.

Automatic battery charging in the background



ARGUS adopts this setting and switches to the next higher level menu.

ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

ARGUS charges the battery automatically in the background when the mains adapter is connected as soon as the battery status falls below a threshold value (battery symbol in display)

When ARGUS is disconnected from the power adapter before that battery is completely charged, ARGUS does not automatically continue charging when it is subsequently reconnected because the charge is no longer below the threshold.

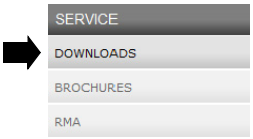
28 Firmware update

You can download firmware files online free of charge at www.argus.info/service and then upload them to ARGUS.
Go to the Web page www.argus.info.

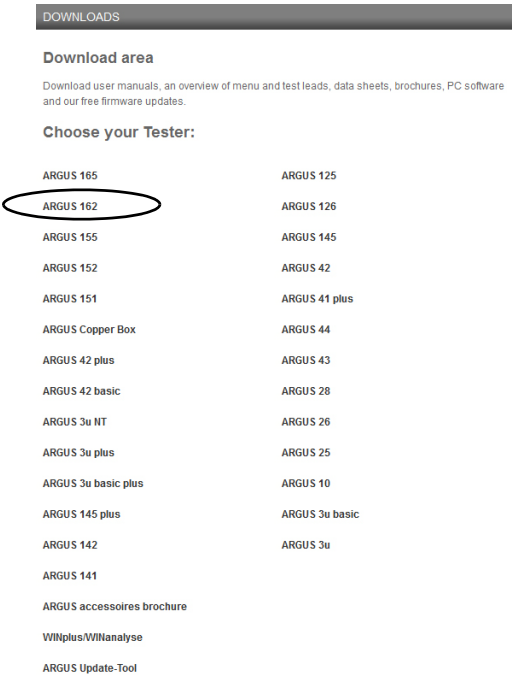
Click the menu option "Service" (highlighted in blue here) in the navigation bar.



In the drop-down Service menu, click the option "Downloads".



This opens up a product overview.



Select your ARGUS device.

Once you select your device, you are automatically taken to the firmware updates. Select your country-specific firmware variant.



When you select your variant, a browser dialogue opens that enables you to save the firmware to your local PC. The following steps are explained in the WINanalyse manual and in the update tool instructions.

Important information on updating your ARGUS firmware

- Never under any circumstances update ARGUS when it is operating in battery mode.
- Connect ARGUS to the power adapter before uploading the update file from the PC.
- An ARGUS USB cable is required for updating (USB cable with mini-USB plug).
- You should back up the configuration and measurement logs to a PC before performing an update.
- Do not disconnect ARGUS from the PC during the update.
- Do not switch off ARGUS during the update.
- Be sure to observe the messages in the ARGUS display, and not just the instructions of the update tool on the PC.
- The update is only complete when the update tool displays the corresponding message on the PC and ARGUS starts with the "normal" startup screen after being restarted by the update tool.
- ARGUS only powers back up when you click one of the two buttons ("Back to step 1" or "Exit program") at the end of the update.

If problems occur because of a failure to follow these instructions, repeat the update process up to three times. Each repetition makes it possible to overwrite further faulty software components.

When connecting an ARGUS Copper Box, it can occur that ARGUS automatically initialises the Copper Box with the correct firmware in order to avoid compatibility issues. This can take a moment.

29 Appendix

A) Abbreviations

	Characters
1TR6	Signalling protocol (D-channel protocol) for national ISDN of the former German national PPT (Bundespost)
2B1Q	2 binary 1 quaternary - line code
3PTY	Three party service
4B3T	4 binary 3 ternary - a modified monitored sum 43-code (MMS43)
Δf	Bandwidth
Ω	Ohm (electrical resistance)
	A
A	Ampere (electrical current)
A3K1H	Audio 3.1 kHz
A7kHz	Audio 7 kHz
POTS	POTS interface (a-core and b-core)
AAL	ATM adaptation layer
AC	Alternating Current or Access Server
ADSL	Asymmetric Digital Subscriber Line
AI	Action indicator
AIT	Application information table
AMP	ARGUS measurement protocol
ANSI	American National Standards Institute
Anx.	Annex
AOC	Advice of charge
AOC-D	Advice of charge Charging information during the call
AOC-E	Advice of charge Charging information at the end of the call
APL	("Anschlusspunkt Linie") Service termination point
AS	Available second
ASCII	American Standard Code for Information Interchange
ATM	Asynchronous Transfer Mode
ATU-R	ADSL Transceiver Unit
Auto-MDI-X	Automatic Medium Dependent Interface Crossing
Avg	Average
AWG	American Wire Gauge
AWS	("Anrufweiterschaltung") Call forwarding (1TR6)
	B
BC	Bearer capability

BER	1. Basic Encoding Rules 2. Bit error rate
BERT	Bit error rate test
BR	Bridge
BRAS	Broadband access server
BRI	Basic rate interface
	C
C	Celsius
c_0	Speed of light
CALL PROC	CALL PROCeeding message
CAT	Conditional access table
CC	Continuity counter
CCBS	Completion of calls to busy subscriber
CCNR	Call complete no response
CD	Call deflection
CDN	see also CDPN
CDPN	CalleD party number
CF	Call forwarding
CFB	Call forwarding busy
CFNR	Call forwarding no reply
CFU	Call forwarding unconditional
CGN	see also CDPN
CGPN	CallinG party number
CLIP	1. Calling Line Identification Presentation 2. Clipping
CLIR	Calling Line Identification Restriction
CNS	CLIP-no screening
CO	Central office
Codec	Coder decoder
COLP	Connected Line Identification Presentation
COLR	Connected Line Identification Presentation
CONN	CONNect message
CONN ACK	CONNect ACKnowledge message
CQE	Conversational Quality Estimated
CR	Call reference
CRC	Cyclic redundancy check
CT	Call transfer
CUG	Closed user group
CW	Call waiting
	D
DAD	Destination address (1TR6)

dB	Decibel
dBm/Hz	Performance measurement with the reference quantity 1 mW (milliwatt) per hertz
DC	Direct Current
DCE	Data communication equipment
DDI	Direct dialling in
DDM	Digital diagnostic mode
DF	Delay factor
DFU	("Datenfernübertragung") Remote data transmission
DHCP	Dynamic Host Configuration Protocol
DiffServ	Differentiated services
DIN	Deutsches Institut für Normung - German Institute for Standardization
DISC	DISConnect message
DL	Download
DM	("Dienstmerkmal") Service
DMT	Discrete Multitone Transmission
DNS	Domain Name System
DPBO	Downstream power backoff
DSCP	Differentiated services codepoint
DS	DownStream band
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexer
DSS1	Digital Subscriber Signalling System No. 1
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi Frequency
DTU	Data Transmission Unit
	E
E1	Primary Rate Interface
EAZ	("Endgeräteauswahlziffer") Local calling number (1TR6)
ECT	Explicit call transfer
E-DSS1	European Digital Subscriber Signalling System Number 1
EFM	Ethernet in the First Mile (see protocol IEEE 802.3ah)
EFS	Error Free Seconds
EC	European Community
EIT	Event Information Table
ElektroG	Elektro- und Elektronikgerätegesetz, German law governing electrical and electronic devices
EMC	Electromagnetic compatibility
EN	European standard
EoA	Ethernet over ATM
EOC	Embedded operations channel

ES	Errored seconds
ete	end-to-end
ETH	Ethernet
ETSI	European Telecommunications Standards Institute
	F
F	Farad (unit of electrical capacitance)
Fax G3	Telefax group 3
Fax G4	Telefax group 4
FEC	Forward error correction
FFT	Fast Fourier transform
FSK	Frequency shift keying
FTP	File Transfer Protocol
FV	("Festverbindung") leased line
FW	Firmware
	G
GB	Gigabyte
Gbit/s	Gigabits per second
GBG	("Geschlossene Benutzer Gruppe") Closed user group
G.hs	ITU-T G.994.1 handshake procedure
GigE	Gigabit Ethernet
	H
h	hour
HD	High definition
HDB3	High density bipolar of order 3
HDLC	High-level data link control
HDSL	High bit rate digital subscriber line
HEC	Header error checksum
hex	Hexadecimal
HLC	High layer compatibility
HLOG	Amplitude of transmission function per tone
HOLD	Call hold
HRX value	Hypothetical reference value
HTTP	Hypertext Transfer Protocol
HVT	("Hauptverteiler") Main distribution frame
Hz	Hertz (measuring unit of frequency)
	I
IAD	Integrated access device
ID	Identifier
IEEE	Institute of Electrical and Electronics Engineers
IGMP	Internet Group Management Protocol
INFO	INFOrmation Message

INP	Impulse noise protection
IP	Internet Protocol
IPCP	Internet Protocol Control Protocol
IPoA	Internet Protocol over ATM
IPoE	Internet Protocol over Ethernet
IPTV	Internet Protocol Television
ISDN	Integrated Services Digital Network
ISO	International Standards Organization
ISP	Internet service provider
ITSP	Internet telephony service provider
ITC	Independent TC
ITU	International Telecommunication Union
	K
KB	Kilobyte
KVZ	("Kabelverzweiger") Cable branch box
kbit/s	Kilobits per second
	L
L1	Layer 1 in the OSI reference model
L2	Layer 2 in the OSI reference model
L3	Layer 3 in the OSI reference model
LAN	Local Area Network
LAPD	Link access procedure for D-channels
LCD	Liquid crystal display
LCN	Logical channel number
LCP	Link Control Protocol
LED	Light-emitting diode
LLC	Low layer compatibility
LOS	Loss of synchronize
LOSWS	Loss of sync word seconds
LQ	Line qualification
LQO	Listening quality objective
	M
m	Meter
MAC	Media Access Control
MB	Megabyte
Mbit/s	Megabits per second
MCID	Malicious call identification
MDF	Main distribution frame (see also HVT)
MDI	Media Delivery Index (RFC 4445)
MLR	Media loss rate
MMS	Microsoft Media Server Protocol

min.	Minute
Modem	Modulator-demodulator
MOS	Mean opinion score (ITU-T P.800)
MPEG	Moving Picture Experts Group
MSA	Multiple source agreement
MTU	Maximum Transmission Unit
mV_{pp}	Millivolt peak-to-peak
	N
n/a	not available
n/r	not received
n/u	not used
NAT	Network address translation
NGN	Next generation network
NIT	Network information table
NOK	Not OK
NP	Numbering plan
NSAP	Network service access point
NSF	Network specific facilities
NT	Network termination
NTBA	Network termination for ISDN basic rate access
NTR	Network timing reference
	O
OAD	Origination address (1TR6)
OAM	Operation, Administration and Maintenance
OM	Omni mode
OoS	Out of Sequence
OSI	Open Systems Interconnection
OUI	Organizationally unique identifier
	P
P/N	Part number
PABX	Private automatic branch exchange
PADI	PPPoE active discovery initiation
PADO	PPPoE active discovery offer
PADR	PPPoE active discovery request
PADS	PPPoE active discovery session confirmation
PADT	PPPoE active discovery termination
PAM	Pulse amplitude modulation
PAP	Password Authentication Protocol
PAT	Program association table
PC	Personal computer
PCR	Program clock reference

PD	Protocol discriminator
PDU	Protocol data unit
PE	Polyethylene
PESQ	Perceptual evaluation of speech quality (ITU-T P.862)
PIC	Plastic-insulated conductor
PID	Packet identifier
PLR	Packet loss ratio
PMT	Program map tables
POTS	Plain old telephone service (PSTN)
P-P	Point-to-point
P-MP	Point-to-multipoint
PMMS	Power measurement modulation session
PMS	Physical media specific
PP	Polypropylene
PPP	Point-to-Point Protocol
PPPoA	Point-to-Point Protocol over ATM
PPPoE	Point-to-Point Protocol over Ethernet
PPTP	Point-to-Point Tunneling Protocol
PRI	Primary rate interface
PSD	Power spectral density
PSI	Program specific information
PTFE	Polytetrafluoroethylene
PWR	Power
	Q
QLN	Quiet line noise
QoS	Quality of service
	R
RC	Resistance (R) and capacitance (C)
REIN	Repetitive electrical impulse noise
REL	RELease message
REL ACK	RELease ACKnowledge message
REL COMPL	RELease COMPLete message
RF	Radio frequency
RFC	Request for comments
RJ	Registered jack (standardised socket)
RoHS	Restriction of Hazardous Substances
RT	Router
RTCP	Real-Time Control Protocol
RTP	Real-Time Transport Protocol
RTSP	Real-Time Streaming Protocol
Rx	Received

	S
s	second
S/N	Serial number
SBC	Session Border Controller - Outbound Proxy
SCI	Sending complete indication
SDT	Service description table
SES	Severely errored second
SFF	Small form factor
SFP	Small form factor pluggable
SHINE	Single high impulse noise event
SIN	Service indicator (1TR6)
SIP	Session Initiation Protocol
SNR	Signal-to-noise ratio
SNRM	Signal-to-Noise ratio margin
Spch	Speech
SSL	Secure Sockets Layer
STB	Set-top box
STUN	Session Traversal Utilities for NAT
SUB	Subaddressing
SUSP	SUSPend message
	T
T	Trigger
TAL	("Teilnehmeranschlussleitung") Subscriber line
TC	1. Trellis code
	2. Transmission convergence
TCP	Transmission Control Protocol
TC-PAM	Trellis-coded pulse amplitude modulation
TDM	Time division multiplex
TDR	Time domain reflectometry
TDT	Time and date table
TE	TErminal, terminal equipment
TEI	Terminal endpoint identifier
Tel31	Telephony 3.1 kHz
Tel7k	Telephony 7 kHz
TLS	Transport Layer Security
TM	Test manager
ToN	Type of Number
ToS	Type of service
TP	Terminal portability
TS	1. Technical specification
	2. Transport stream

TTX	Teletext
Tx	Transceived
	U
UDP	User Datagram Protocol
UL	Upload
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
US	Upstream band
USB	Universal Serial Bus
UTC	Coordinated Universal Time
UUI	User-user info
UUS	User-to-user signalling
	V
V	Volt
V/2	Pulse propagation time
VC	Virtual channel
VCC	1. Virtual channel connection
	2. Voltage at the common collector
VCI	Virtual channel identifier
VC-MUX	Virtual circuit multiplexing
VDSL	Very High Speed Digital Subscriber Line
ViSyB	Video syntax-based
ViTel	Video telephony
VLAN	Virtual Local Area Network
VL	Virtual line
VNC	Virtual Network Computing
VLC	Video LAN client
VoD	Video on demand
VoIP	Voice over Internet Protocol
VoP	Velocity of propagation
VPI	Virtual path identifier
V_{pp}	Volt peak-to-peak
VTU-R	VDSL transceiver unit
	W
WAN	Wide Area Network
WEEE	Waste Electrical and Electronic Equipment
www	World Wide Web
	X
xDSL	Collective term for the different DSL variants
xTU-C	xDSL Transceiver Unit - Central Office
xTU-R	xDSL Transceiver Unit

	Z
Z	Apparent resistance
ZWR	See SRU

B) Vendor identification numbers

Abbreviation	Manufacturer
ALCB	Alcatel (STMicroelectronics)
ANDV	Analog Devices
BDCM	Broadcom
GSPN	Globespan
IKNS	Ikanos
IFTN	Infineon
META	Metanoia
STMI	STMicroelectronics
TSTS	Texas Instruments

C) CAUSE-Messages – DSS1 Protocol

Dec.	Cause	Description
01	Unallocated (unassigned) number	No access under this call number
02	No route to specified transit network	Transit network not reachable
03	No route to destination	Wrong route or routing error
06	Channel unacceptable	B channel for the sending system not acceptable
07	Call awarded and being delivered in an established channel	Call awarded and connected in an already existing channel (e.g., X.25 virtual switched connection)
16	Normal call clearing	Normal clearing
17	User busy	The number called is busy
18	No user responding	No terminal equipment answered (Timer NT303 / NT310 time-out)
19	No answer from user (user alerted)	Call time too long
21	Call rejected	Call rejected (active)
22	Number changed	Call number has been changed
26	Non-selected user clearing	Incoming call not awarded to this terminal
27	Destination out of order	Destination / access out of order
28	Invalid number format (address incomplete)	Wrong call number format or call number incomplete
29	Facility rejected	Requested service is rejected
30	Response to status inquiry	Response to status inquiry
31	Normal, unspecified	Unspecified for "normal class" (Dummy)
34	No circuit / channel available	No circuit / B channel available
38	Network out of order	Network not operational
41	Temporary failure	Network is temporarily not operational
42	Switching equipment congestion	Switching equipment is overloaded
43	Access information discarded	Access information could not be transferred
44	Requested circuit / channel not available	Requested circuit / B channel is not available
47	Resources unavailable, unspecified	Unspecified for "resource unavailable class" (Dummy)
49	Quality of service unavailable	The requested quality of service is not available
50	Requested facility not subscribed	Requested service attribute not subscribed
57	Bearer capability not authorized	The requested bearer capability is not enabled
58	Bearer capability not presently available	The requested bearer capability is not currently available
63	Service or option not available	Unspecified for "service unspecified or option not available class" (Dummy)
65	Bearer capability not implemented	Bearer capability is not supported
66	Channel type not implemented	Channel type is not supported
69	Requested facility not implemented	Requested facility is not supported
70	Only restricted digital information bearer capability is available	Only limited bearer capability is available

79	“Service or option not implemented, service or option unspecified, option not implemented class“ (Dummy)	Unspecified
81	Invalid call reference value	Invalid call reference value
82	Identified Channel does not exist	Requested channel is invalid
83	A suspended call exists, but this call identity does not	The call identity entered is the wrong one for the parked call
84	Call identity in use	The call identity is already in use
85	No call suspended	No call has been parked
86	Call having the requested call identity has been cleared	The parked call has been cleared
88	Incompatible destination	Incompatible destination
91	Invalid transit network selection	Invalid format for the transit network identifier
95	Invalid message, unspecified	Unspecified for "invalid message class" (Dummy)
96	Mandatory information element is missing	The mandatory information element is missing
97	Message type non-existent or not implemented	This type of message is in this phase not permitted, not defined or not supported
98	Message not compatible with call state or message type non-existent or not implemented	In this phase, the message is not permitted, not defined or not supported
99	Information element non-existent or not implemented	In this phase, the content of the information element is not permitted, not defined or not supported
100	Invalid information element contents	Invalid content in information element
101	Message not compatible with call state	Message not valid in this phase
102	Recovery on timer expired	Error handling routine started due to time-out
111	Protocol error, unspecified	Unspecified for "protocol error class" (Dummy)
127	Interworking, unspecified	Unspecified for "interworking class" (Dummy)

D) ARGUS Error Messages (DSS1)

ERROR Number	Cause	Description
0	Network	The network is not in a state defined for DSS1. This may, however, occur in connection with normal clearing on a PBX.
1 to 127	Network	DSS1 causes
150	ARGUS	An error occurred during the supplementary service test. Frequent cause: no response from network
152	ARGUS	The CF-Test was started with the wrong own number.
153	ARGUS	No HOLD is available, but HOLD is required to test the supplementary service (ECT, 3pty).
154	ARGUS	CLIR or COLR could not be tested, since CLIP or COLP is not available
161	ARGUS	The party called did not answer within the prescribed time (approx.10 sec)
162	ARGUS	A call was setup to a remote subscriber, instead of being setup – as was expected – to your own number.
163	ARGUS	The Auto-Test could not setup a connection and therefore the AOC-D supplementary service could not be tested.
170	ARGUS	During the Suppl.services test, a call came in without a B channel (call waiting). Therefore, it was not possible to accept the call and test.
199	ARGUS	A call number was entered.
200	ARGUS	Internal error
201	ARGUS	Network did not confirm acceptance of the call (CONN sent, no CONN_ACK received from network)
204	ARGUS	a) Layer 2 connection has been cleared down b) No response to SETUP c) Layer 2 connection could not be setup
205	ARGUS	Reestablish the Layer 2 connection
206	ARGUS	The selected B channel is already busy.
210	ARGUS	No response to the clear-down (REL sent, no REL_CMP/ REL_ACK received from network)
220	ARGUS	Remote end signaled that it is in State 0.
245	ARGUS	Keypad sent via ESC, but no response was received from network
250	ARGUS	FACility was sent, but no response was received from network

X.31 Test – Error messages

X.31 Causes

0 to 255	Network	See ISO 8208: 1987(E) Table 5- Coding of the clearing cause field in clear indication packets, page 35
257	ARGUS	No answer from network (to a CALL-REQUEST or a CLEAR-REQUEST)
258	ARGUS	Unexpected or wrong answer from network (no CALL-CONNECTED or CLEAR-INDICATION as answer to CALL-REQUEST)
259	ARGUS	The network has indicated in a DIAGNOSTIC message that the logical channel is invalid. Origin: No (=1) or a wrong LCN was set.
512	ARGUS	It was not possible to determine an internal or external cause. Origin: Layer 2 could not be setup or remote end does not support X.31
65535	ARGUS	The X.31 Layer 3 test was not performed. The error can only occur in a test log.

X.31 Diagnostic (only for a cause less than 256)

0 to 255	Network	See ISO 8208: 1987(E) Figure 14a page 121 Figure 14b page 123 et seq. And/or CCITT Recommendation X.25, Annex E

E) Error message: PPP connection

ARGUS Display	Description
External fault:	
Negotiation err	Cannot negotiate the network protocol for PPPD, so the remote site is not reachable.
Idle release	Connection was terminated, since there was no activity.
Time out rel	Connection was terminated, since the maximum connection time elapsed.
PPP: Echo req. error	Remote site did not answer echo requests so the connection has been terminated. (PPP connections are tested at regular intervals by sending echo requests to the remote site.)
Hanging up rel	Disconnected by remote site.
Loopback erro	The setup of the PPP connection was cancelled, since a loopback was detected.
Authent. Error	Authentication error: Wrong user name or password - rejected by remote site.
PADO timeout	No PADO packets received.
PADS timeout	No PADO packets received.

F) Error message: Download test

ARGUS Display	Description
External fault:	
Http redir.error	Fault: Too many HTTP redirects.
http: no response	No answer from HTTP server.
Http serv.error	HTTP server has returned an error. (for details see the table below "HTTP Error Messages")
Http encod.error	Due to an encoding problem, data transfer with HTTP is not possible.
Ftp open error	Error when opening the FTP connection.
Ftp login error	FTP login error. Wrong user name or password or anonymous login not supported.
Ftp passiv err.	FTP server does not support passive transmission mode.
Ftp rec. error	FTP receive error.
Network error	Network error
Ftp error	General FTP error.
URL error	Fault: No HTTP or FTP URL specified.
Socket error 2	Error when connecting a socket. The server's HTTP service is not available.
Http Head.error	Error in the header of the requested HTTP file.
Ftp no file	FTP download error: No such file or directory found.
Unknown address	Unknown host address. Possible cause: Error in the address entered, DNS resolution not working or network not accessible.
Unknown download error	Unknown download error

G) HTTP status codes:

Display on ARGUS: Code No.	Meaning
100	Client should continue its request.
101	The protocol is being changed at the Client's request.
200	The Client's request has succeeded.
201	The Client's request that a new document be created was successful.
202	The Client's request has been accepted for processing.
203	The Client's request will be answered with information from a source other than the server.
204	The Client's request was successful. The server sends [no content] only the HTTP header.
205	The Client's request was successful. The server [resets content] sends a new HTTP body.
206	The Client's request was successful. The server sends only part of the requested document [partial content].
300	The request was not precise enough so multiple documents have been returned.
303	The requested resource has been found at a different URI and should be retrieved from there.
304	The requested document has not been changed in the interim.
305	The requested document must be retrieved from a proxy instead of from the server.
307	The requested resource has been temporarily relocated to a different URI [temporary redirect].
400	Syntax error in the Client's request [Client error].
401	The request requires user authentication.
402	Payment is required to process this request.
403	The Client's request has been refused. (e.g. because authentication failed.)
404	The requested document was not found (e.g. because of an error in the URL entered or while the document is no longer available).
405	The method specified by the Client in its request is not allowed by the server.
406	The requested document in a format that is not supported by the Client.
407	The request requires that the Client authenticate itself with a proxy.

408	The Client did not place its request within the time allowed by the server [Request Timeout].
409	Due to a conflict (e.g.another request) the Client's request cannot be completed by the server.
410	The requested URL is [gone] no longer available on the server.
411	The Client sent data to the server without a defined Content Length.
412	The preconditions in the Client's request could not be satisfied by the server.
413	The Client's request has been refused by the server because the request entity is too large.
414	The Client sent a URL to the server that is too large (e.g. because of the form values contained).
415	The Client's data is not supported by the server.
416	The range (in a document) requested by the Client does not exist.
417	The server could not (or did not wish to) satisfy the Client's expectation given in the Expect request header field.
424	Due to a failed dependency, the requested document will not be sent by the server.
500	Due to an unexpected condition, the server cannot fulfill the Client's request (e.g. faulty configuration, missing or wrong CGI program).
501	The server does not support the function required to fulfill the Client's request.
502	The server received an invalid response from an upstream server or proxy which it accessed in attempting to fulfill the request.
503	The server is currently unable to handle the request due to a temporary overloading of the server.
504	The Client's request (of a gateway or proxy) did not receive a response within the specified time.
505	The server does not support the HTTP protocol version that was used in the Client's request.

H) General Error Messages

Display on ARGUS	Description
Prot. not supp.	The protocol (IP, PPPoE, etc.) is not supported in the selected mode.
Unknown error	Unknown error occurred.
No PPP connec.	No PPP connection can be setup.
Test aborted	Test aborted by user.
Ping start error	Error when starting the Ping test.
Fault: PPP connection	Unexpected termination of the PPP connection.
Unexp. PING end	Unexpected termination of the Ping test.

l) VoIP SIP status codes

SIP requests:

The six basic requests / methods:

INVITE Invite a user to a session (call - initiates a session)

ACK Acknowledge an INVITE request

BYE Terminate a session (hangup)

CANCEL Terminates the setup of a connection

REGISTER Provides data regarding subscriber availability (host name and IP address)

OPTIONS Supplies information regarding the functions supported by the other SIP telephone

SIP responses:

SIP responses are answers to SIP requests. There are six basic types of SIP responses with numerous sub-responses:

1xx Informational responses (180 indicates for example that the phone of the party called is ringing)

2xx Reports that the request has been successful

3xx Redirection responses

4xx Client failure responses

5xx Server failure responses

6xx Global failure responses

Display on ARGUS: Code No.	Meaning	Explanation
100	Trying	The ARGUS is attempting to setup a call.
180	Ringing	The phone at the other end is ringing.
181	Call Being Forwarded	The call is being forwarded.
182	Call Queued	The call is in a wait loop.
183	Session Progress	The call is being setup.
200	OK	Everything is all right.
202	Accepted	Connection has been accepted.

300	Multiple Choices	There is no unique destination address for the remote end. Please select one.
301	Moved Permanently	Calls are being permanently forwarded.
302	Moved Temporarily	Calls are being temporarily forwarded.
305	Use Proxy	A proxy must be used.
380	Alternative Service	Alternative service
400	Bad Request	The request is not OK.
401	Unauthorized	You are not authorized.
402	Payment Required	Payment is required.
403	Forbidden	This is not permitted.
404	Not Found	The remote end was not found or does not exist.
405	Method Not Allowed	The method (e.g. SUBSCRIBE or NOTIFY) is not permitted.
406	Not Acceptable	The options used in the call are not supported.
407	Proxy Authentication Required	The proxy must be authenticated.
408	Request Timeout	The time for the request has been exceeded (timeout).
409	Conflict	There is a conflict.
410	Gone	The subscriber is no longer reachable here.
411	Length Required	The length must be supplied.
413	Request Entity Too Large	The values are too long.
414	Request URI Too Long	The URI is too long. (Destination address)
415	Unsupported Media Type	The codec is not supported.
416	Unsupported URI Scheme	The URI scheme is not supported. (Destination address)
420	Bad Extension	The extension is wrong.
421	Extension Required	An extension is necessary.
423	Interval Too Brief	There is a problem with the SIP parameters. (Register Expire is too short)
480	Temporarily Unavailable	The subscriber is currently not reachable.
481	Call/Transaction Does Not Exist	This connection does not exist (any longer).
482	Loop Detected	A redirection loop has been detected.
483	Too Many Hops	Too many redirects.
484	Address Incomplete	The SIP address is incomplete or faulty.
485	Ambiguous	The SIP address is not unique.
486	Busy Here	The destination is busy.
487	Request Terminated	The request has been terminated.
488	Not Acceptable Here	The call cannot be accepted.
491	Request Pending	A request is waiting.

493	Undecipherable	Decryption error.
500	Server Internal Error	Internal error in the server.
501	Not Implemented	The requested method (functionality) has not been implemented.
502	Bad Gateway	The gateway is bad.
503	Service Unavailable	The service is not available.
504	Server Time-Out	The gateway did not respond in time.
505	Version Not Supported	The SIP protocol version is not supported.
513	Message Too Large	The message length is too long. Use TCP.
600	Busy Everywhere	All terminals are busy at the remote end.
603	Declined	The system at the remote end refused to accept the call.
604	Does Not Exist Anywhere	This user does not exist any longer.
605	Not Acceptable	SIP request not acceptable.

J) Software Licenses

The ARGUS firmware includes code from what are known as Open Source packages, which have been published under various licenses (GPL, LGPL, MIT, BSD, etc.).
Additional information can be found – if requested in your order – on the CD-ROM included in the package (see Software_License.htm) or can be viewed at
http://www.argus.info/web/download/Software_License.
In the event that you are interested in the sources licensed under GPL or LGPL, please contact support@argus.info. A machine-readable copy of the source code can be obtained from intec Gesellschaft für Informationstechnik mbH for a minimal fee - to cover the cost of physically copying the code. This offer is valid for 3 years.

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