

2014/2015

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ARGUS®

testing the telecom network



intec

GESELLSCHAFT FÜR
INFORMATIONSTECHNIK mbH

ARGUS: in use throughout Europe



Distribution partners in Europe:

- Norway
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- England
- Ireland
- Netherlands
- Belgium
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- Switzerland
- Austria
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ARGUS: intec inside

Innovative measurement technology and a comprehensive service from one source

For more than 25 years intec Gesellschaft für Informationstechnik mbH has successfully been developing products for the international telecommunications market. We now specialize in high-quality, value telecom handheld testers and have established ourselves as one of the leading providers of xDSL, ISDN, IP and fibre measurement technology in Europe and abroad.

Since 1997 we offer customer-specific test equipment under the trade name of ARGUS® with a „Made in Germany“ quality guarantee. Benefiting from local manufacturing and the fact that all development, sales, marketing and logistics activities are provided by

ourselves, we are able to react promptly to requirements and new challenges. As a medium sized German company we offer our customers a comprehensive service from detailed documentation, hands on instructions and free updates through to effective, capable assistance to support our customers with their day-to-day measurement routine.

Our ARGUS® testers combine all the features needed for on-site testing; in addition, they excel with their high user-friendliness. They simplify the day-to-day work, for example when it comes to physical line qualification and troubleshooting on the last mile, commissioning xDSL and ISDN connections or



the levelling of a wide range of Ethernet routes – both optical and copper-based. They also test Triple Play services such as VoIP, IPTV and data transfers as well as monitoring their quality of service (SLA). All of this makes the ARGUS® tester an indispensable tool for the maintenance of the last mile. An essential factor for our success is the ability to innovate: we continuously update our portfolio and always cover the latest standards, including current existing technologies such as 2005 ADSL2+, 2013 VDSL2-

Vectoring and even GPON, as well as VDSL2-Bonding.

Our customers have appreciated the quality of our products and services for many years. This trust in our products has enabled us to supply more than 80,000 ARGUS®-Testers throughout the world during the last 15 years – a large majority of which have been delivered to international network operators such as Deutsche Telekom, Vodafone, Telefonica, KPN, British Telecom and Telekom Austria.

In the past years, more than 80 000 test devices have been delivered in Europe and throughout the world.

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D-58507 Luedenscheid
Germany

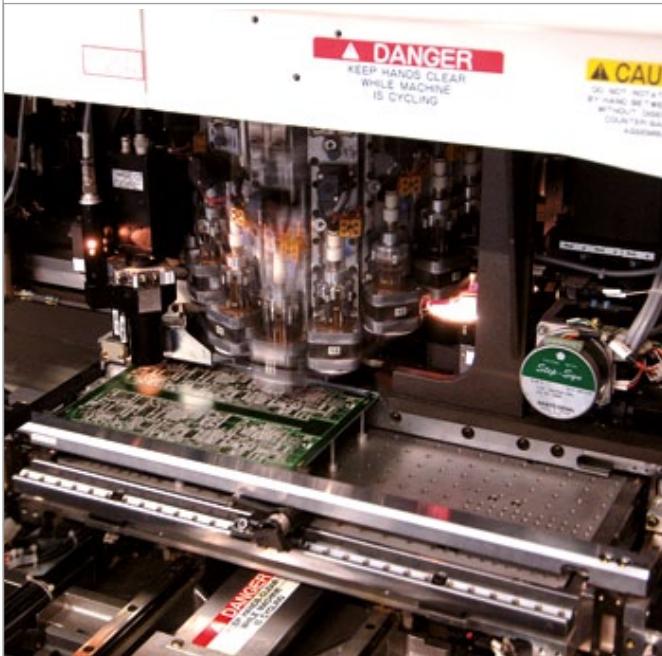
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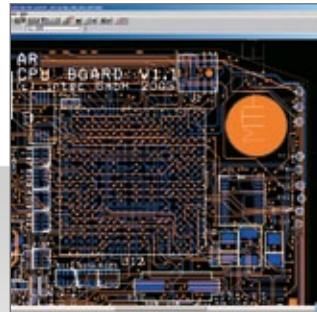
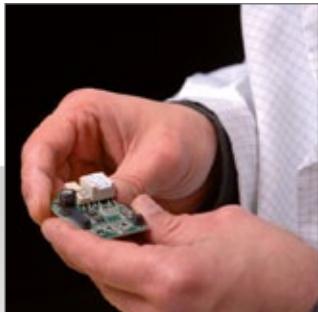
Single-source quality



We concentrate the entire core know-how at one location – from software and hardware development to marketing, sales and service. As a result, we can react to our customers' wishes and suggestions in the shortest possible time and thus offer products that are exactly tailored to suit user requirements.

The equipment is also manufactured (under our control) in Germany. To maintain the high quality of all our ARGUS testers, we use the most modern processes and have implemented a DIN EN ISO 9001 certified quality management system. Furthermore, we test all of our equipment in our own in-house calibration laboratory. Moreover, each individual tester must pass an automatic optical inspection (AOI) as part of the production process.

The result: first-class products "Made in Germany".



Success via innovation

Exceptional innovativeness is one of the key factors in our success. In the last years, we have expanded our product spectrum with the addition of numerous new products, which, besides ISDN, POTS, ADSL, SHDSL, VDSL2 and E1, also include different Ethernet interfaces and a lot of copper test functions as well as an extensive range of protocols and routines for functional tests in professionally used LANs.

By high-impedance switching to the subscriber line, the Line-

Scope also permits a spectrum analysis for a quick initial physical line qualification.

Our unique combination of DSL and GigE combi tester ARGUS 165 also supports tests of typical broadband technologies such as fiber tests (FTTx), Gigabit Ethernet and Triple-Play. In addition, it also includes a range of features that provide even greater user-friendliness, flexibility and expansion options. These features include additional system interfaces for faster data

transfers, a high-quality color display as well as support for convenient operation from the mains or the highpower lithium-ion battery pack.



Service has priority at intec

Our customer service is not limited to the extensive personal advice given in selecting a product. Once the equipment is in use, the service continues as our staff provides assistance free of charge by telephone or e-mail. The customer is also well advised in countries abroad, where

our international sales partners provide competent support for users.

From the very beginning, we have offered an update service free of charge for all of our products and we were the first manufacturer of telecommunication testers to do so. Incidentally, this service is free without any additional registration. Using our free update tool, customers can use a PC to perform updates themselves without needing to return the product. The current version of the firmware can be downloaded from www.argus.info/en/service/

and then simply transferred to the device. All of the manuals are available in PDF format at the same site.

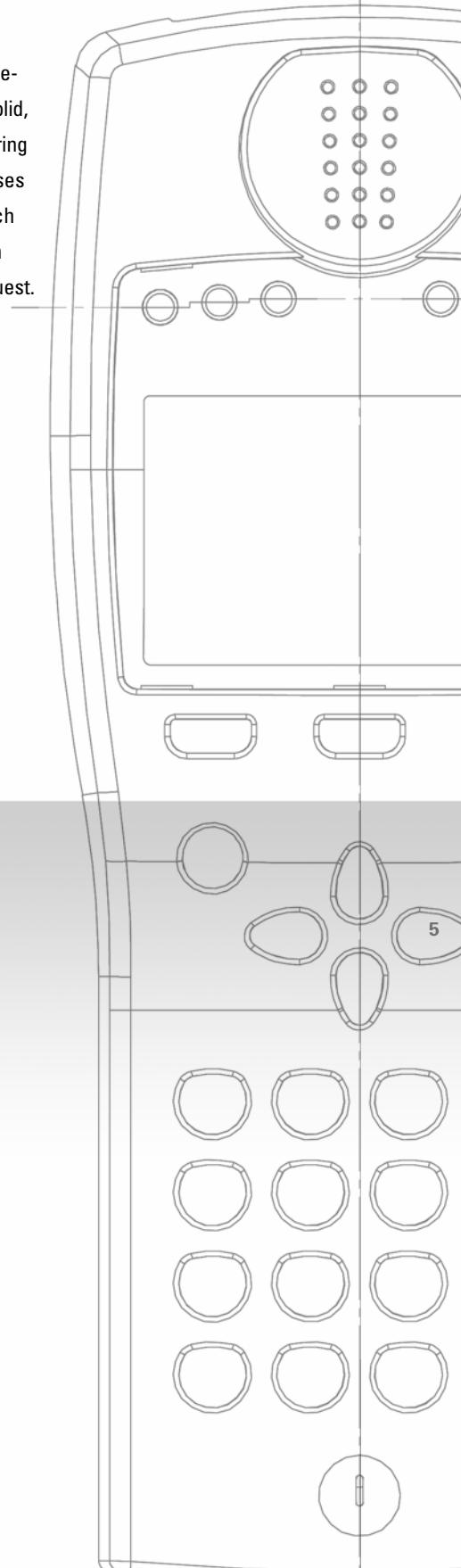
Additionally, we also hold seminars, in which we offer solid, up-to-date know-how covering the various types of accesses and the technologies which are based on them. We can also come to you upon request.

RoHS compliance

The European RoHS (EU Directive on the Restriction of Hazardous Substances) directive restricts the use of certain hazardous substances in electrical and electronic equipment. It applies to the WEEE (EU Directive on Waste Electrical and Electronic Equipment) directive, too.

Since 2007 all of the directive's requirements are of course satisfied by all ARGUS products.

From the very beginning, we have offered an update service free of charge for all of our products and we were the first manufacturer of telecommunication testers to do so.



Flexible and future-proof The ARGUS products

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ARGUS testers present complex relationships in a form that is clear and easily understood and, therefore, they are indispensable aids in the installation of new accesses, in locating and clearing faults in existing PBXs, as well as in determining and monitoring the quality of service. These testers provide certainty while troubleshooting by systematically interrogating and checking the various portions of the transmission circuit. Depending on which functions of an access or network should be checked, an ARGUS tester can replace – for test purposes – the PC, the telephone, the user's network path, the modem or even the terminal on the IP level. The source of the problem can thus be precisely located permitting the installer or service engineer to quickly and effectively clear the fault. This saves not only the installer and service technician, but also your customer a great deal of time and money.



Convenient use

We value and therefore have put in the effort to design an exceptionally uncomplicated, convenient user interface. This goal has been met by designing in features such as numerous automatic interrogations, intuitive menu structures, ergonomic design, a large and yet practical selection of functions as well as the low weight of the tester itself.

All of our testers can be directly connected to a PC or notebook to conveniently view and analyse the measurement results as well as to easily store larger quantities of data.

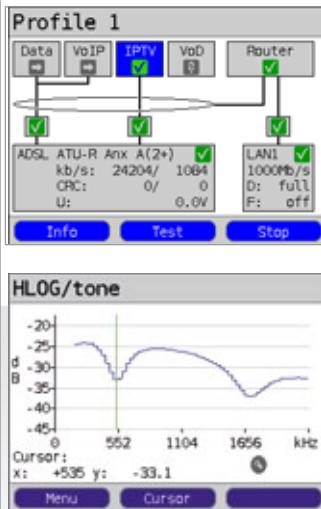
„ARGUS testers present complex relationships in a form that is clear and easily understood and, therefore, they are indispensable aids in the installation of new accesses, in locating and clearing faults in existing PBXs, as well as in determining and monitoring the quality of service.“

Our product philosophy

From the very beginning, we have designed our testers to include everything that a service technician needs onsite in a single, compact and light weight device – from extensive test functions and interfaces to a convenient display all the way to an integrated handset.

To save the user time and effort involved in swapping modules, we have decided to design our testers to be completed without the use of exchangeable modules. All of the interfaces supported by an ARGUS tester are immediately ready for use onsite – no module swapping necessary. In the case of the ARGUS 152 xDSL/ISDN tester that means immediate access to test functions for VDSL2, ADSL, Ethernet, ISDN (BRI S/T and U interface) as well as POTS. A VoIP test, which is started by pressing a softkey, delivers results in seconds, evaluates these – e.g. in accordance with the MOS procedure – and presents this information on the display.

ARGUS 165 exhibits an organic extension of this philosophy: Its broad spectrum of features can be quickly and easily extended with additional functions by simply downloading a firmware update. Here again, all of the desired routines are directly available in one and the same device.



ARGUS 165

The comprehensive all-in-one solution: the new ARGUS 165 xDSL+GigE combi tester combines all standard broadband interfaces (ADSL, VDSL incl. Vectoring, SHDSL) and fast Gigabit Ethernet interfaces with comprehensive Triple Play test functions in one measurement device. Without having to swap modules, the user can select or change the interface via the intuitive menu and perform tests at the press of a button.

The ARGUS 165 supports this with, amongst other things, two SFP slots and a copper-based Gigabit Ethernet interface. Thanks to the various Gigabit Ethernet SFPs, the tester offers the greatest possible compatibility for connection to fiber-based interfaces. It is thus possible to carry out Triple Play or performance tests directly on GPON modems, GigE switches etc. via the Gigabit Ethernet interface (copper or fiber).

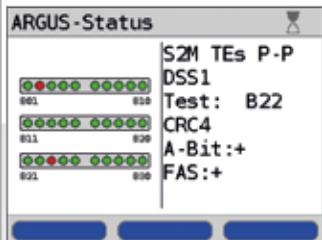
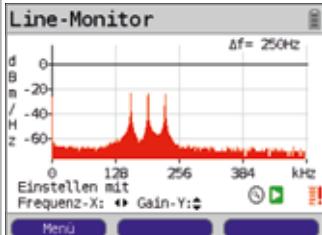
A further option offered by the ARGUS 165 is the possibility of using the conventional telephone interfaces ISDN (BRI S/T/U, PRI/E1) as well as POTS. Using a loop function and a traffic generator, the user can analyze the capacity of Ethernet cabling or devices at different packet sizes and full performance (1 Gbit/s) across different layers. Throughput tests in accordance with RFC 2544 are thus also possible. For HTTP and FTP downloads the interfaces can even reach speeds with multiple 100 Mbit/s.

If the Ethernet cabling is defective, the ARGUS 165 can immediately locate the source of the fault through its comprehensive Ethernet TDR. In this way, as well as shorts, opens and mismatches, amongst other things, the delay or polarity of wire pairs can also be determined.

If required, parallel Triple Play test functions can also be added to the ARGUS 165. In this way, IPTV suitability can also be checked by means of VoD testing or channel scanning. Data services and VoIP (incl. MOS) can also be tested via xDSL and Gigabit Ethernet. Several of these IP tests can optionally also be carried out via the new more powerful IPv6 protocol.

The handheld tester also enables physical analysis of DSL copper wires (Cu tests) using a line scope; the time and frequency domains are displayed in real time. Using the optional Active Probe II, even high-ohmic measurements on an existing DSL connection are possible without interference. An RC test is also possible. If necessary, these tests can also be considerably extended in the field by simply connecting the new compact ARGUS Copper Box via USB, thus enabling all important electrical parameters such as voltage, current, isolation resistance, LCL and NEXT (at 1 MHz), and many more, to be automatically and quickly determined via tip, ring and ground. Furthermore this handheld tester can be used to do a PESQ analysis directly at ISDN BRI S/T/U and POTS accesses and of course when using VoIP via xDSL and Ethernet.





ARGUS 155

As the handiest high-end combi tester in its class, the ARGUS 155 integrates VDSL2 (all profiles and VDSL-Vectoring), ADSL (Annex A, B, J, L, M) as well as SHDSL (2, 4 and 8 wire), Ethernet, ISDN PRI/E1, BRI/S/T/U and POTS interfaces in a single measurement device – without having to swap modules.

Thanks to its Gigabit Ethernet interface (GigE), the ARGUS 155 achieves a download speed of more than 100 Mbit/s with HTTP and FTP downloads, such as is already standard with fibre optic modems (ONT) on the LAN interface. If the Ethernet cabling is faulty, the ARGUS 155 can immediately locate the source of the fault by means of Ethernet TDR via the GigE interface. This makes it possible, for instance, to detect shorts, opens or mismatches, but also the delay or polarity of the wire pairs, among other things.

Flexible expansion capabilities mean that the existing interfaces can be extended with additional functions, as required. For example, the SHDSL interface also operates in SHDSL.bis as well as optionally in ATM, TDM or EFM modes.

Copper tests (Cu tests) for physical line qualification without synchronization with the DSLAM are always included. If necessary, these tests can also be considerably extended in the field by simply connecting the compact ARGUS Copper Box via USB, thus enabling all important electrical parameters such as voltage, current, isolation resistance, LCL, NEXT and many more, to be automatically and quickly determined via tip, ring and ground.

The TDR (Time Domain Reflectometer) function makes it possible to measure line lengths and trace sources of faults. A high-impedance connection enables a Line Scope to display the time and frequency domains (FFT) in real time. The optional Active Probe II, which is required for this, can be connected to an existing DSL connection and switched between symmetrical and asymmetrical operation.

The ARGUS 155 tests parallel the quality of VoIP, IPTV and data services over xDSL and Ethernet with optional Triple Play test functions. Thanks to its integrated handset, it can simulate not only terminal equipment such as a telephone, PC or STB, but can also determine all relevant quality parameters and evaluate voice quality according to the MOS method. It tests IPTV suitability by means of a stream analysis, a VoD test or a channel scan. Several of these IP tests can also be performed using the new, more powerful IPv6 protocol.





ARGUS 162

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 and POTS if needed.

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).

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 Reflec-tometer) 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.

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.





ARGUS 152

Compact, lightweight and robust: The ARGUS 152 multifunction tester checks interfaces and services quickly and reliably – and at a very reasonable price. VDSL2 (incl. Vectoring), ADSL, Ethernet, ISDN (BRI S/T/U) and POTS, as well as the physical condition of the local loop, can be easily tested without having to swap modules.

A new high-quality ADSL/VDSL chipset with improved efficiency ensures that the ARGUS 152 delivers high-performance testing and rapid analysis. In addition to resistance, capacitance and voltage measurement, the ARGUS 152 features, when using its Gigabit Ethernet interface, an optional HTTP download, which enables speeds at more than 100 Mbit/s on the protocol level. The ARGUS 152's Ethernet cabling tests make it possible to detect shorts, opens or mismatches, but also the delay or polarity of the wire pairs, among other things.

On request, the universal tester can also be extended on an individual basis, thus offering the user a high degree of flexibility. For instance, additional copper tests (Cu tests) can be used to assess line quality, even without synchronization with the DSLAM. If necessary, these tests can also be considerably extended in the field by simply connecting the new compact ARGUS Copper Box via USB, thus enabling all important electrical parameters such as voltage, current, isolation resistance, LCL and NEXT (at 1 MHz), and many more, to be automatically and quickly determined via tip, ring and ground. The optional Active Probe II can even be used to carry out high-impedance measurements on an existing

DSL connection, without creating interference on it.

To quickly identify any asymmetries between the wires, if required, a symmetry test compares the balance over the whole DSL frequency spectrum (up to 30 MHz) between the tip wire and the ring wire with reference to ground. In the event of damage, the integrated TDR (Time Domain Reflectometer) function can be used to measure line lengths and trace sources of faults, such as bridged taps. Moreover, if required, an Advanced TDR function (Adv. TDR) can be integrated, with which line lengths and sources of faults can be detected even more accurately.

If lines without a DSL receiver (e.g. in the case of a rewiring) need to be tested for their DSL suitability, the ARGUS 152 can optionally check this without any problem, even if there is no DSLAM. Regardless of line condition and length, the user can use two devices and an activated Line Qualification (LQ) function to determine data rates, even when systems consisting of a modem (xTU-R) and DSLAM (xTU-C) fail.

Easy Triple Play testing: The handheld tester also offers an optional Triple Play analysis for testing parallel VoIP, IPTV and data services over xDSL and Ethernet. Thanks to its handset, the ARGUS 152 can simulate not only terminal equipment such as a telephone, PC or STB, but can also determine all relevant quality parameters. In this way, for example, voice quality can be evaluated according to the MOS method. Several of these IP tests can also optionally be performed using the new, more powerful IPv6 protocol.



Active Probe II can even be used to carry out high-impedance measurements on an existing



ARGUS 42 plus

ADSL combination tester at a fair price: the ARGUS 42^{plus} tests ADSL, as well as optionally ISDN and POTS. In addition to the various access types and protocols, the tester also determines e.g. the attainable transmission speed or noise floor of the line.

Basic Triple Play tests are also supported: the ARGUS 42^{plus} can be upgraded to a fully featured voice tester if desired. The combination tester can then be used to set up voice calls to test and evaluate not only POTS and ISDN connections, but also calls placed via VoIP. The ARGUS 42^{plus} evaluates the voice quality, delivers a MOS value.

The testing set also checks the resistance and capacitance and performs voltage measurements on top. Optionally, HF signals can be detected or data services can be tested, e.g. by enabling the passive bridge or router modes. This allows determining the transmission quality of the line.

The handheld tester, which weighs just 450 g, is remarkably user-friendly thanks to its intuitive menu structure.



ARGUS® 151

ARGUS® 42 BASIC

xDSL TESTERS

ARGUS 151: compact, versatile and easy to use

Handy Tester with multiple functions: The new ARGUS 151 combines state-of-the-art VDSL Vectoring measurement technology and many features, that makes work easier in a compact, easy-to-use device - and all that at a very competitive price. The VDSL+ADSL tester (Annex A + B + J + L + M), which is ready for operation within a few seconds, supports VDSL Vectoring and comes with a Gigabit Ethernet interface (10/100/1000 Base-T) for downloads with multiple 100 Mbit/s. Resistance, Capacitance and voltage measurement are integrated into this all-rounder. Even more functionality is provided by the Ethernet TDR for check-up the LAN cabling as well as by an optional TDR function for

the detection of damages or interferences on long lines (up to 6 km). On request for quick and simple testing, parallel triple play tests like VoIP (Voice over IP), IPTV and other data tests are available, which are increasingly being provided via the more powerful IPv6 protocol and are in need of testing. The ARGUS 151 cannot just simulate the terminal equipment such as telephone, PC or set-top box (STB) but can also determine all the relevant quality parameters. Easy handling is ensured via the intuitive menu structure and the large colour display with 320 x 240 pixels. A high-performance lithium-ion battery pack enables long operating times when out of the office.



Equipped with the optional ARGUS Copper Box, the ARGUS 151 also manages copper tests for measuring all important electrical values of a local loop.



ARGUS 42 basic

Easy entry into the world of ADSL measurement technology: the inexpensive ARGUS 42 basic ADSL Tester offers impressive features such as quick availability and user-friendly testing of "ADSL-over-POTS" and "ADSL-over-ISDN". The device is supplied with an IP ping function by default. The checker can optionally support a passive bridge mode.

Thanks to its easy handling, the ADSL Tester requires only few prior knowledge. All of the functions and tests can be quickly selected and started by pressing a softkey. The most important measurement results such as the up- and downstream data rates of the loop are displayed automatically. The handheld tester can also be configured easily via its keypad.

The ARGUS 42 basic is remarkably user-friendly thanks to its easy handling and quick availability. This handy tester weighs just 395 g and offers long operating times of several hours.



ARGUS 3u plus

The ARGUS 3u plus is an impressive and versatile connection tester for ISDN and POTS interfaces. It enables an accurate installation of POTS accesses as well as BRI S/T and U interfaces, and is therefore suitable for checking all functions before and after the NTBA.



This handy tester supports automatic testing of accesses, services and supplementary services and also offers voltage and signal level measurements as well as a bit error rate test (BERT). Another function is the HF detection, which can distinguish between active BRI U and ADSL signals.

In addition, the test set features RC measurements and loop length calculation as well as an integrated mini splitter, filtering interference from ADSL frequencies. Optionally, a cabling test of the BRI S/T bus can be performed.

ARGUS 3u NT

The ARGUS 3u NT provides all functions necessary for installing and maintaining BRI S/T and U, as well as POTS accesses. It tests BRI S/T interfaces in TE, NT and leased line modes, including D channel monitoring and verifies BRI U and POTS interfaces in TE mode. When monitoring, D channel data can be recorded and then decoded on a PC with user-friendly filters and search functions.

In addition to automatic testing of accesses, services and supplementary services, this handy tester also offers voltage and signal level measurements as well as a bit error rate test (BERT). Other functions provided by the handheld tester include a HF detection, which can distinguish between active BRI U and ADSL signals, and an integrated mini splitter, which prevents interference from ADSL frequencies. RC testing and a line length calculation complete the scope of functions offered by the test set.

A cabling test of the BRI S/T bus can also be performed optionally.

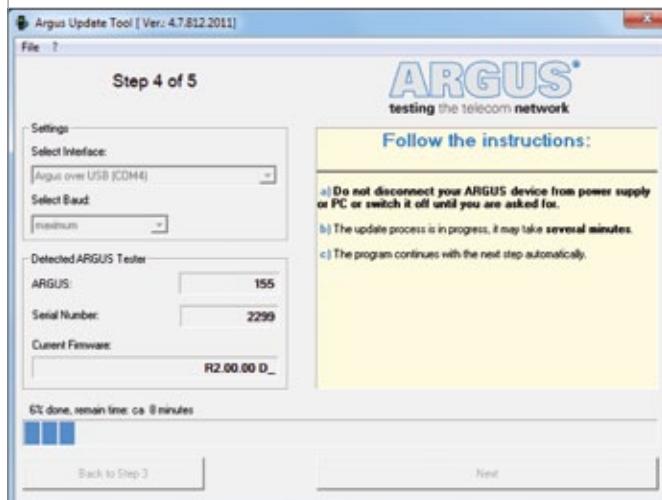


ARGUS 3u basic

The ARGUS 3u basic tests BRI S/T and U accesses in TE and leased line modes plus POTS interface optionally. The user-friendly test set provides automatic testing of accesses, services and supplementary services. It also supports voltage and signal level measurements, as well as a bit error rate test (BERT). With this full set of features, the ARGUS 3u basic offers a truly impressive and low-cost entry into the world of ISDN measurement technology.

The extremely lightweight handheld tester is particularly user-friendly thanks to its intuitive menu structure.





Step 4 of 5 during an update with ARGUS Update-Tool

Update-Tool

A free tool is available to update ARGUS testers and ARGUS Copper Box, which is also included in our WINplus and WINanalyse software packages. With this tool, the latest firmware versions can be downloaded to the tester from www.argus.info/en. The whole procedure is very simple and intuitive, thanks to the integrated step-by-step instructions.

WINplus

WINplus PC software offers the ideal communication platform between the ARGUS handheld testers and a PC. The software can be used to view a clear tabular and graphic presentation of all of the test results on the screen and easily generate a printout of an access acceptance report – for example for xDSL, ISDN, VoIP or IPTV.

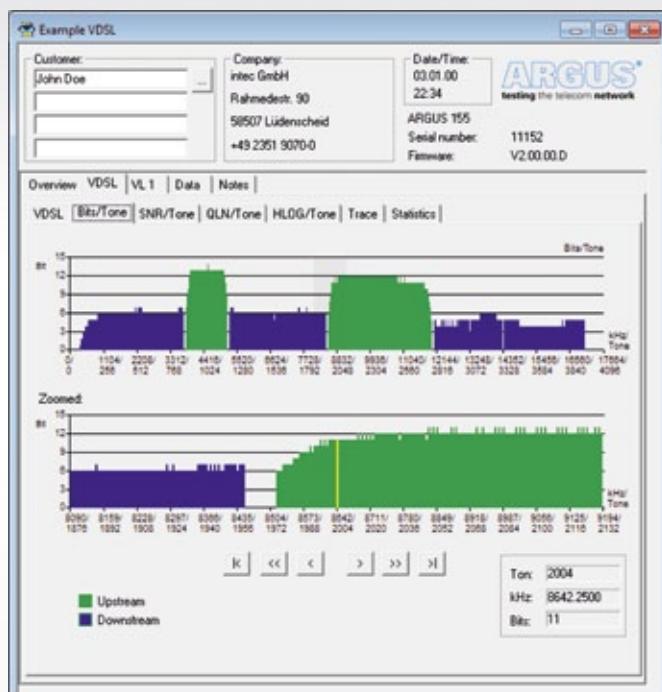
In addition, WINplus supports the configuration of ARGUS testers using a PC: configurations from the tester can be easily uploaded to the PC, edited there, compared and archived – or transferred back to the tester.

WINanalyse

WINanalyse includes all features of the WINplus software for displaying results from an ARGUS tester on the PC as well as additional analysis functions for evaluating the tests. The software can capture errors that occur while setting up an xDSL connection or during the connection and then display these along with the various xDSL parameters in their proper chronological order.

For ISDN applications, WINanalyse offers the option of extending for testers that are designed to, for example ARGUS 155, to include complete D channel report analysis. The software decodes the data recorded by one of these ARGUS testers with a real-time D channel monitor. WINanalyse displays this data in a table or presents the interpreted results in the form of clear text in a separate text window. The software decodes DSS1, X.25 in the D channel and other protocols and can simultaneously record the data from several D channels.

For tests on PRI interfaces, WINanalyse provides a graphic presentation of the bit error rate test results (MegaBERT) including analysis functions, offering a clear overview at all times.



Graphical illustration of measurement results using WINplus



ARGUS Overview

	165	162	155	152	151	42 plus	42 basic	3u NT	3u plus	3u basic
VDSL2 (incl. Vectoring)	✓	✓	✓	✓	✓					
ADSL ¹	✓	✓	✓	✓	✓	✓	✓			
SHDSL	✓		✓							
ETH 10/100 BT	✓	✓	✓	✓	✓	✓	✓			
ETH 1000 BT (Cu)	✓	✓	✓	✓	✓					
SFP (FTTx)	✓	✓ ²								
VDSL Bonding			✓ ²							
BRI U + BRI S/T TE/LL	✓	✓	✓	✓		✓		✓	✓	✓
BRI S/T NT/Mon.	✓	✓	✓	✓	✓			✓	✓	
PRI/E1	✓		✓							
POTS	✓	✓	✓	✓		✓		✓	✓	✓
RFC2544	✓									
RC	✓	✓	✓	✓	✓	✓		✓	✓	
Line Scope	✓	✓	✓	✓	✓					
TDR	✓	✓	✓	✓	✓					
Line Qualification										
Advanced Copper Tests										
Copper Box	✓	✓	✓	✓	✓					
Ethernet TDR	✓	✓	✓	✓	✓					
Bridge/Router	✓	✓	✓	✓	✓		✓ ²	✓		
IP Tests	✓	✓	✓	✓	✓		✓ ²	✓		
Down-/Upload	✓	✓	✓	✓	✓		✓ ²	✓ ²		
IPTV	✓	✓	✓	✓	✓		✓ ²	✓ ²		
VoIP+MOS	✓	✓	✓	✓	✓		✓ ²	✓ ²		
	165	162	155	152	151	42 plus	42 basic	3u NT	3u plus	3u basic



inclusive



optional



minimum one DSL interface is part
of the standard package

¹ Annex may vary depending on country

² On request

intec

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