

ARGUS® 166

XDSL + GIGE-TESTER

G.fast

VDSL

ADSL

SHDSL

SFP

GigE

LTE-))

ISDN

POTS

Cu

TDR

Copper
Box

Data
101101011011

IP
TV

Vo
IP

USB

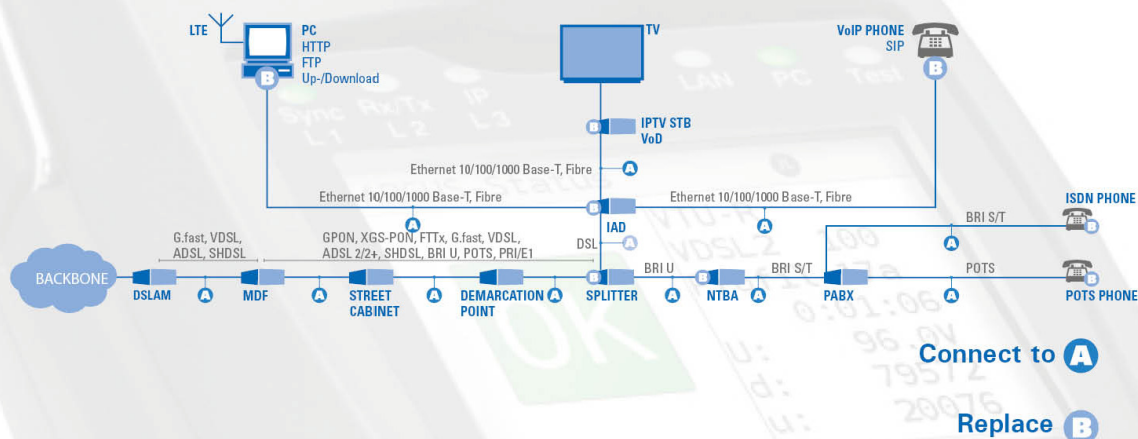
WLAN-))



intec

GESELLSCHAFT FÜR
INFORMATIONSTECHNIK mbH

Where to use the ARGUS?



The all-in-one instrument

No other tester offers so many interfaces and functions: the ARGUS 166 combines all commonly used broadband (xDSL, GPON, XGS-PON, LTE) and Gigabit Ethernet interfaces with comprehensive triple-play functions in a single measuring device.

This user-friendly xDSL-GigE combi tester stands out thanks to its wide range of interfaces and high-capacity (up to 1 Gbit/s) GigE functionalities such as loop, traffic generator and RFC2544. This makes it ideal not only for qualifying Ethernet connections but also for a broad array of performance tests, particularly for super vectoring and G.fast accesses as well. Thus, the ARGUS 166 is the ideal tester for MSAN commissioning.

The ARGUS 166 is unmatched: it is the only meter on the market that covers G.fast, VDSL2 profile 35b bonding, ADSL2/2+, SHDSL (up to 8 wire), GigE performance tests and telephony (ISDN/POTS) as well as copper (TDR, DMM etc.) and wireless (WLAN, LTE). The ARGUS 166 is also equipped with two SFP ports, e.g. for FTTx (active Ethernet), GPON and XGS-PON, for unique flexibility. All IP tests (Data, VoIP, IPTV and GigE tests) can also be performed using the ARGUS 166 SFP slots.

Your advantage: The ARGUS 166 is the integrated all-in-one tester that combines all current test scenarios in one single, multi-functional, handy and intuitively operable device.

intec Gesellschaft für Informationstechnik mbH

For over 35 years, intec Gesellschaft für Informationstechnik mbH has stood for innovative measurement technology - developed and produced for telecommunications networks in Europe. Our ARGUS® testers make fiber optic and broadband infrastructures accessible, document efficiently and support daily maintenance and troubleshooting in fiber optic and copper networks as well as via Ethernet. We deliver what network operators and service technicians need: speed, security and trust.

Our solutions are optimally adapted to European standards, norms and protocols. Linguistic and technical localization, fast shipping within the EU and direct technician support guarantee short distances and fast help without detours. For us, "Made in Europe" stands for quality, transparency and sustainability. Thanks to modular, scalable products, we serve both small companies and large network operators. Long-term product maintenance and regular updates make your investment future-proof.

We are driven by our innovation: We integrate the latest technologies such as GPON, XGS-PON, ADSL2+, VDSL2 vectoring, VDSL2 bonding, VDSL2 profile 35b or G.fast (profile 106a and 212a) and are constantly developing our portfolio. This means that ARGUS® testers are ideally equipped for current and future requirements. Our user interface is based on freely configurable tiles: technicians start directly with the appropriate measurement configuration - simple, fast and error-free. Clearly displayed results are transmitted via WLAN to smartphones, central servers or the ARGUS® app. Supervisors can also take over devices remotely and provide active support. Central management and archiving of test results make it easier to handle large network structures - significantly reducing training costs and error rates.

Our ARGUS® testers have been sold over 100,000 times - including to leading European network operators such as Deutsche Telekom, Vodafone, Telefónica, KPN, BT and Telekom Austria.

Specifications broadband interfaces:

General:		Application, Settings + Results:	
G.fast Tester 	G.fast Modem Simulation, FTU-R, CPE G.fast Bridge + G.fast Router ITU-T G. 9700/9701 (Profiles 106a, 212a) Time Division Duplexing (TDD)	G.fast / VDSL / ADSL - Net Data Rate [kBit/s] - Attainable Data Rate [kBit/s] - Relative Capacity [%] - SNR Margin / Loop Attenuation [dB] - Output Power [dBm] - Interleave Delay [ms] - Impulse Noise Protection [Symbols] - FEC + CRC, Far/Near [Errors] - ES, SES, LOSS + UAS, Far/Near [sec] - Reset / Resync [Number] - Bitswap Events - Seamless Rate Adaption (SRA) - Retransmission (G.INP) - Vendor, Far/Near [Name] - Version, Far/Near [Number] - Modem Trace - Bits/SNR/QLN/Hlog Tone/Freq. Graphs - OK/Fail Evaluation: Bitrate, CRC, FEC - DC Voltage, UDC	G.fast / VDSL - Signal Attenuation [dB] - Showtime No Sync [Number] - Seamless Rate Adaption (SRA) - Data Transmission Unit (DTU) - INP REIN + INP SHINE [Symbols] - Expected Throughput Rate (ETR) [kBit/s] - Electrical Length @1 MHz [dB] - EFM Statistics: Frames + Bytes VDSL - Vectoring Mode - Graphic Long-time Trace In ARGUS ADSL - Latency Mode - Graphic Long-time Trace In ARGUS
VDSL Tester 	VDSL2 Modem Simulation, VTU-R, CPE VDSL2 Bridge + VDSL2 Router ITU-T G.993.2 (Profiles 8, 12, 17a, 30a) ITU-T G.993.2 Annex Q (Profile 35b), Super Vectoring (Vplus) ITU-T G.993.5, G.vector (Vectoring) ITU-T G.998.4, G.INP (Retransmission) ITU-T G.998.2, G.bond (Bonding) 8, 12, 17a, 30a and 35b Bonding		
ADSL Tester 	ADSL Modem Simulation, ATU-R, CPE ADSL Bridge + ADSL Router ITU-T G.922.1, Annex A+B (ADSL) ITU-T G.992.2, Annex A (G.lite) ITU-T G.992.3, Annex A+B+L+M (ADSL2) ITU-T G.922.5, Annex A+B+J+M (ADSL2+)		
SHDSL Tester 	SHDSL Modem Simulation, STU-R, CPE SHDSL Terminal Device SHDSL Bridge + SHDSL Router SHDSL DSLAM Simulation, STU-C ITU-T G.991.2, Annex A+B+F+G (G.SHDSL) ETSI TS 101 524 V 1.2.1 (ETSI SHDSL) ETSI TS 101 524 V 1.2.2 (E.SHDSL.bis) ITU-T G.994.1 (G.hs) SHDSL 2, 4 and 8 Wire	- TC Sublayer: ATM, TDM, HDLC, EFM - Independent TC (ITC) - Line Probing (PMMS) - Data Rate/Line [kBit/s] - Resync/Line [Number] - Used Wire Pair/Line - SNR Margin/Line [dB] - SNR/Line + Attenuation/Line [dB]	- Output Power/Line [dBm] - CRC/Line, Far/Near [Errors] - LOSWS, ES, SES, US - Display of EFM States/Line - Graphic Long-time Trace In ARGUS - EFM Statistics: Frames + Bytes - ATM: OAM Cells, User VCCs, AAL5 PDUs - Parameters/Segment (for SRU)
GigE Tester 	Ethernet According to IEEE 802.3 2 x 10/100/1000 Base-T (RJ45/8P8C) 2 x SFP Interface, Supports: 100 Base-FX/LX 1000 Base-BX/LX/SX/ZX DDM According to SFF-8472	- Link Status / Autonegotiation, Far/Near - Auto-MDI(X) Function - Speed (10, 100, 1000 Mbit/s) - Duplex Mode (Full, Half) / Flow Control - Polarity/Wire Pair (+/-) - Pair skew/Wire Pair [ns] - Frames, Bytes (Rx/Tx) [Number] - Errors, Collisions [Number]	- SFP: Digital Diagnostic Mode (DDM): - Manufacturer Name, OUI, Item Number, Revision, Serial Number, Date, Coding, Medium, Speed - Optical Level (Tx/Rx), ±3 dB - Optical, PWR (Tx/Rx), ±3 dB - Temperature, Voltage, Current (Tx) - Max. Cable Length (Cu, SM, MM/OM1-4)
GPON Tester 	GPON Modem Simulation, ONT, CPE GPON Terminal Device ITU-T G.984 Via GPON-SFP-ONT DDM According to SFF-8472 (See Ethernet) GPON Bridge/Router*	- Link Status / Link Speed / ONT Status - Optical Network Unit ID (ONU ID) - ODN Class - OLT Tx Power - Passive Optical Network ID (PON ID) - Vendor + Equipment ID / Version	- GPON Modem Trace - Serial Number Configurable - Password Configurable - Scan PLOAM message (ONU ID, S/N)* - SFP: Digital Diagnostic Mode (DDM): - See Ethernet - Measuring range at 1490 nm: -8 to -30 dBm - Accuracy at -20 dBm: ±0.5 dB, calibrated - Optical Line Attenuation
XGS-PON Tester	XGS-PON Modem Simulation, ONT, CPE XGS-PON Terminal Device ITU-T G.9807.1 Via XGS-PON-SFP-ONT XGS-PON Bridge/Router*	- Link Status / ONT Status - Optical Network Unit ID (ONU ID) - ODN Class - OLT Tx Power - Passive Optical Network ID (PON ID) - Vendor + Equipment ID / Version	- XGS-PON Modem Trace - Serial Number Configurable - Password Configurable - Scan PLOAM message (ONU ID, S/N)* - SFP: Digital Diagnostic Mode (DDM): - See Ethernet - Measuring range at 1577 nm: -7 to -34 dBm - Accuracy -20 dBm: ±0.5 dB, calibrated - Optical Line Attenuation
PON installation test	GPON installation test PON level check	- guided measurement sequence - target attenuation can be entered as threshold value - automatic OK /Fail evaluation - PDF measurement protocol - SFP parameters (s. Eth/GPON)	- calibrated measurement of the insertion loss with ±0.5 dB accuracy - Assistance for up to 64 fibers - Evaluation PON-ID - Query of the job data etc.

General:		Application, Settings + Results:	
LTE Scanner 	LTE Tester Via LTE USB Stick - Long Term Evolution (3.9G) 800, 1600 and 2600 MHz 2 x Ext. Antenna Connection (CRC-9)*	- Automatic Frequency Band Selection - SIM and PIN Necessary* - LTE Provider [Name] - Frequency (d/u) / Frequency Band [MHz] - Codes and IDs: MCC, MNC, TAC, GCID	- EARFC (EUTRA abs. RF channel no.) - Signal Strength (RSRP) [dB] - Signal Quality (RSRQ) [dB] - SNR Margin (SINR) [dB] - Color Evaluation of RSRP, RSRQ, SINR
WLAN Scanner 	WLAN Tester WLAN Access Point Mode IEEE 802.11b/g/n (2,4 GHz) IEEE 802.11a/an/ac (5 GHz)* Via WLAN USB Stick - Internal FPC Antenna or - External Antenna (RP SMA Socket)* WEP To WPA2 Enterprise	- Access Point Mode (WLAN Router) - WLAN for Smartphones/Laptops for: - Downloading via xDSL/Ethernet - Browsing via xDSL/Ethernet - WLAN Scan (WLAN Terminal) - Counter: Found Access Points - List: Found Access Points - Number 2.4 GHz / 5 GHz Networks	- Network/Name (SSID) - Signal Strength (RSSI) [dBm] - Signal Quality [%] - MAC Address of AP - Used Channel/Frequency - Used Protocol - Negotiated Encryption / Authentication - Group Cipher / Pairwise Cipher
WLAN spectrum analysis	optional: ARGUS 2G4 Scope graphical WLAN spectrum analysis for 2.4 GHz for the specific WLAN troubleshooting	- Real-time Analysis /Graphics - passive (no WLAN Interference) - Channel Load - Graphical representation	- Detection of - Bluetooth Devices - Motion Sensors - Microwave Ovens - Baby Phones

Specifications Protocol + IP tests (Triple Play):

General:		Applications, Settings + Results:	
Protocol Tests		- Configurable MAC Address - Use of Virtual Lines (VL): Maximum Flexibility as Well as Control and Priorization under Real Conditions by Several VLs simultaneously - One VL/Service Each (Data, VoIP, IPTV, opt.) - VL Configurable in Profiles (20) - IP, PPPoE via xDSL, G.fast + Eth (PPTP) - EoA, IPoA, PPPoA via ADSL - VPI/VCI, VLAN (Modus, ID, Prio., TPID) - PPP Profiles (Username, Password) - IP Version (IPv4, IPv6, Dual) + DHCP	- Display of BRAS Information - AC Name, Service Name, Session ID - Display of PPP Information - PPP Packets/Bytes (Tx/Rx) - PPP Trace (PPP Commands, Time) - Display of IP Information - IPv6: Global Unicast/Link Local Address - IPv4: Assigned IP, Gateway, DNS - Recording of a Data Log for Evaluation on PC (e. g. Wireshark)
Data Tests (Data Tester) PC/Terminal Simulation IP Ping Test Traceroute Test http Up-/Download Test ftp Up-/Download Test ftp Server Test Textbrowser ARGUS® Real Speed Formal (RFC6349) ARGUS® Real Speed Direct (iperf)		- Memory with up to 10 IP Addresses, IPv4/6 Address as Number or Name - Number of Pings, Pause Configurable (Ping), Packet Size + Fragmentation Configurable - Traceroute: Max. Hops, Probes + Timeout Conf. - Down-/Upload Server Profiles (10): - Server Addr., File Name/Size, Number, Number of Parallel Downloads Configurable - FTP: Username + Password - Display Results IP-Ping - Display of Packets (Tx/Rx/repeated) - Checksum Error [Number] - Error Packets [Number] - Round Tripe Time (min/max/avg) [ms] - Display Results Traceroute - Current Hop + Probe / List of Hops - Response Time of Hops [s] - IP Address of Current Hops	- Display Results Down-/Upload - Current/Total Number [Number] - Already Loaded Data [%] - Average Speed [Mbit/s] - Loaded Bytes [MB] - Transfer Time/Remaining Time [h:min:s] - ARGUS® Real Speed Direct (iperf) - Speedtests up to 10 Gbit/s, depending on utilization (min. 1 Gbit/s guaranteed) - Client /Server Mode - TCP Throughput Down- /Upload - ARGUS® against ARGUS® - ARGUS® Real Speed Formal (RFC6349) - Throughput Test - Evaluation TCP Throughput according to RFC 6349
VoIP Tests (VoIP Tester) IP Telephone Simulation Testing of VoIP Connections incl. Acoustics (dif. Codecs) MOS Evaluation (ITU-T P.800) Call Generator (up to 30 Calls)		- Configuration in VoIP Profiles (20): - SIP Username, Password, Registrar Server, Out-bound Proxy/SBC, Domain, Listen + Remote Port, Authentication, Caller ID, User Agent, Qualify, Process of Registration - Phone Settings: RTP Port Area, Silence Detection, Jitterbuffer, Codecs, DTMF - STUN Server - MOS Threshold for OK/Fail Evaluation - VoIP QoS, Layer 3 Diffserv: RTP/SIP: ToS, DSCP - VoIP QoS, Layer 2 VLAN Prio.: RTP/SIP: VLAN Prio. - Codecs: G.726 (16/24/32/40), G.729 (A/B), G.711 (a-law/μ-law), G.722 - Display of Own Number, Number of Called Person	- Duration of Connection [h:min:s] - MOS Plain Text Evaluation, According to E Model R Factor, ITU-T G. 107 (current/avg), MOS (current/avg/min/max/ideal) - Statistics: RTP Packets (Tx/Rx), - Error Counter: RTP Drop, RTP Error - RTP Jitter Rx (current/avg/min/max) - Lost RTP Packages (avg/min/max) - RTCP Contents: - RTP Jitter far (current/avg/min/max) [ms] - Lost RTP Packets of Remote Side - Network Delay (current/avg/min/max) [ms] - Display of Registration Details: - SIP Codes, Registrar IP, Proxy, URI
IPTV Tests (IPTV Tester) IPTV STB Simulation (Settopbox) OK/Fail Evaluation IPTV Channel Scan IPTV Monitor (IPTV passive) VoD Test*		- Configuration in IPTV Profiles (up to 3): - Editable Channel List (up to 250 Channels) - Multicast IP + Port, Channel Name, IGMP version - Limits for IPTV OK/Fail Evaluation: IGMP Latency, Sync Error, PCR Jitter, Error Indication, CC Errors, CC Error Rate, Audio + Video Bytes, RTP Jitter, RTP Sequence Error, Current + Total RTP Loss Rate - Different VLs for IGMP + RTP - Scan Profiles (3) Configurable: max. Zapping Time - VoD Profiles (3) Configurable: Type of Stream, Server Address + Port, File Name, RTSP Type + Server Type, Jitterbuffer - Limits for VoD OK/Fail Evaluation: PCR Jitter, Continuity Error - Display of Selected IPTV Channel, Test Duration, current Bitrate, OK or Fail Evaluation	- Packets Loss (current/min/max/avg) [Number] - RTP/UDP Packet Loss Rate [%] - Delay [ms] + Delay Factor [ms] - Media Loss Rate (MLR) [%] - IP Address of Channel + Port - IGMP Latency (Activation Time) [ms] - For Correlation: xDSL CRC Counters - RTP Errors, RTP Sequence Errors - MPEG Bitrate + Packets (min/max/ ...), Bytes (current/min/max/avg/Sum), PCR Jitter (current/min/max/avg) [ms], CC Errors + Error Rate (current/max) [%], Error Sync + Indication - Codecs and PIDs (Packet Identifier) - Channel Zapping Time (min/max/avg) [ms] - VoD Error Status, Container Type, Packets, Bytes, Cont. Error, Bitrate and many more

Specifications Ethernet Tests, ISDN and POTS:

General:	Applications, Settings + Results:	
Ethernet Cable Tests	Ethernet Port LED Flash	Port LED Flash with Timing
Network Scan	- Auto Mode (manual, autom.) - Network Address + Net Mask Configurable - Display of DHCP Discovery, Gateway, DHCP + DNS Server, Net Mask, No. of Detected Clients/Subnet	- Number of Open Ports/Clients - Client Information: IP + Open Ports, MAC, Computer Name, NetBIOS Name - Display of Detected Services, e. g. Mail, Print, Web, File, Database and many more
GigE Loop	- Layer Configurable (L1 to L3): MAC Modus (own MAC or all), VLAN Mode + ID, Prio., TPID Configurable, IP Mode and own IP Address - Loop DSL (ATM): VPI/VCI Configurable	- Duration of Loop [h:min:s] - Looped Packets, Looped Packets/Second [Number] - Throughput [Mbit/s] - MAC Address
GigE Traffic Generator Package Generator	- Layer Configurable (L1 to L4): L2: MAC, VLAN Mode + ID, Prio., TPID L3: IP Mode, Address, Gateway, Net Mask L4: UDP Port, Bandwidth - For DSL (ATM): VPI/VCI Configurable - Bandwidth, Endless Mode, Frame Size, Follow-Up Time, Time to Live (TTL)	- Display of Data Rate [Mbit/s] - Line Rate + Frame Rate (avg) (Tx/Rx) - Frame (OK/Break/Errors) (Tx/Rx) - Frame Errors (Rx): Ethernet FCS, MAC Not OK/External, Payload - Duration of Traffic Generator - Frame (Tx/Rx), Frame Losses [%]
RFC2544 Test (1-Port), (2-Port)* RFC2544 Test via xDSL* Throughput Test Latency Test Frame Loss Test	- Configuration in RFC2544 Profiles (20): Netto Frame Size Configurable - IPv4: 64 up to 1596 Byte (1 Port: 10232) - IPv6: 84 up to 1596 Byte (1 Port: 10232) - Tests: Throughput, Latency, Frame Loss - Data Rate, Duration, Limits Configurable - Layer Configurable (L1 to L4): see Traffic Generator - Maximum Data Rate: 1 Gbit/s (1000 BT) - RFC2544 Test in 2 Port mode for xDSL/ETH or ETH/ETH connections	- Display Pause Frames, Connection/Test Status, Duration - Current Tx Frame Size [Byte] - Current Tx Rate/Second [Mbit/s] - Graphic Display of All Results: - Throughput: Target/Actual Comparison [%], Tx Frame/s, Throughput Rate [%] and many more - Latency: Latency Rate [Mbit/s], Latency/Frame Size [ms] and many more - Frame Loss: Frame Loss Rate [%], Frame Transmission Rate [%] and many more

General:	Applications, Settings + Results:	
BRI U Interface ETR 80/ANSI T1.601 ISDN BRI U TE Simulation	- Line Coding: 4B3T or 2B1Q - ISDN BRI U TE Mode, ISDN BRI U Leased Line - ISDN BRI U Voltage Measurement (OK/Fail)	- Details about Tests, Functions and Results, see BRI S TE Interface - High-Impedance listening, see POTS
BRI S Interface ITU-T I.430 BRI S Terminal BRI S Telephone BRI S TE Simulation BRI S Signal Simulation BRI S Monitoring	- BRI S TE Mode, NT Mode, Leased line - BRI S Monitor Mode - Autom. Detection of Connection Configuration - L2 Mode: automatic, P-P, P-MP - Test Availability of B Channels - BRI S Level and Voltage Evaluation - Different Protocols configurable: Auto., DSS1, CorNet-N/T/NQ, QSIG, VN4 - Setting: Alerting Mode, Clocking, BRI S Connection, Call Parameters, Services, Call Acceptance, Codec (A-law/μ-law), DTMF, CUG Index, Prefix, AOC, ... - X.31 Test, configurable in Profiles (3): Packet Number, TEI, LCN, Size, Throughput, User Data, CUG/ Index, D-Bit, Facilities - Non-intrusive listening (Monitoring not active)	- Level Measurement (Bus Supply, Phantom) - Display of L1 Information (Info 0 to 4) - Display L1, L2 and L3 of B Channel Status - Bit Error Rate Test (BERT) ITU-T, G.821, Data, Time, LOS, Errors, HRX, EFS, SES and many more - Request of Supplementary Services DSS1: TP, HOLD, CLIP (CLIR, COLP, COLR), DDI, MSN, CF, CW, CCBS, CCNR, 3PTY, ECT, CUG, CD, AOC, SUB, UUS, CLIP no Screening (TE) - Service Tests: Language, DFU, Audio, Fax, Mixed, OSI, Telephony, Teletex and many more - Request of Call Forwarding (CF), Activating and Deleting - Connection: Call (Single/Block Dial) - Connection: Call Acceptance (Display of Number) - Time Measurements: Duration, Interchannel Delay - Loopbox for Leased Line
PRI interface ITU-T I.431 ITU-T G.703, HDB3-Code ETS 300 011 E1 Interface PRI TE Simulation PRI Signal Simulation PRI Monitoring	- Details about Tests, Functions und Results, see BRI S Interface - Additional Functions/Settings: L1 Alarms: CRC-4, AIS, FAS, E-Bit, A-Bit, Sax - Layer 1 Master/Slave Operation, TE/NT with Sax Instructions - D Channel Trace, TE/NT Mode in PC/ARGUS - Testing of PRI/E1 Leased Lines	- Bit Error Rate Test (BERT), ITU-T G.821 - in Extended Self Call and End-End-Distance-BERT - Display of Bit Errors and Bit Error Rate - OK/NOK Evaluation (see BRI S) - Services Configurable (see BRI S) - Manual Interspersing of Bit Errors - Bit Pattern ITU-T O.150: 2E11-1/E15-1, free - E1-BERT via all B Channels (MegaBERT)

General:	Applications, Settings + Results:	
POTS Tester Analogue Tester POTS Butt Set POTS Terminal Simulation POTS Monitor	- Fully-fledged POTS Butt Set, POTS Phone - POTS Terminal Equipment (TE) - Analogue Phone w/ DTMF + Pulse Dial - Incl. Fully-fledged Analogue Acoustics - High-impedance Listening on POTS - Configurable DTMF Signal Level	
		- Voltage measurement + Display Polarity when Hook-on and Hook-off - CLIP + Caller-ID acc. ETS 300 659/778 - Supports FSK + Display of DTMF Caller ID - FLASH Function (40 up to 1000 ms)

Specifications Fiber:

General:	Applications, Settings + Results:	
ARGUS OPM Optical Power Meter	- Powerful SFP Optical Power Meter - Optical Level Measurement with Wavelengths from 850 nm to 1650 nm - Measuring Range: -60 dBm to +6 dBm	
		- Powerful InGaAs Photo Diode - Live Display and Storage of the Level - Robust and protected by use in SFP Slot - at 1310, 1490 and 1550 nm (-20 dBm), 20 °C optional Calibration

Specifications ARGUS Copper Box:

General:			
	Measuring Range	Resolution	Accuracy
DC Voltage; UDC (U =): 	0 V to 9.99 V 10 V to 220 V	0.01 V 0.1 V	± (0.5 % + 2 digits) ± (0.5 % + 2 digits)
AC Voltage; UAC (U ~): 	0 V to 9.99 V 10 V to 210 V Frequency: 10 Hz to 200 Hz; 0.2 Hz; ±(1.5 % + 2 digits), sinus	0.01 V 0.1 V	± (2 % + 2 digits) ± (1.5 % + 2 digits)
Capacitive Symmetry Balance; CSym: 	10 nF to 4 µF Dielectric strength for external voltage up to 17 V DC or 17 V AC (with a load 200 kΩ)	0.01 nF	relative capacity ± 0.1 %
Capacitance; C: 	0.01 nF to 9.99 nF 10 nF to 99.99 nF 100 nF to 999.9 nF 1 µF to 8 µF Dielectric strength for external voltage up to 17 V DC or 17 V AC (with a load 200 kΩ). Measured by film capacitors	0.01 nF 0.01 nF 0.1 nF 1 nF	± (4 % + 4 digits) ± (4 % + 4 digits) ± (3 % + 1 digit) ± (3 % + 1 digit)
Isolation Resistance (105 V, max. 2 mA); Iso: 	0.1 kΩ to 99.9 kΩ 100 kΩ to 999 kΩ 1 MΩ to 9.99 MΩ 10 MΩ to 99.9 MΩ 100 MΩ to 1 GΩ Dielectric strength for external voltage up to 5 V DC or 30 V AC (with a load 200 kΩ)	0.1 kΩ 1 kΩ 10 kΩ 100 kΩ 100 kΩ	± (2 % + 1 digit) ± (2 % + 1 digit) ± (2 % + 1 digit) ± (5 % + 1 digit) ± (5 % + 1 digit)
Isolation Resistance (8 V, max. 9 mA); Iso: 	0.1 kΩ to 99.9 kΩ 100 kΩ to 999 kΩ 1 MΩ to 9.99 MΩ 10 MΩ to 40 MΩ Dielectric strength for external voltage up to 5 V DC or 30 V AC (with a load 200 kΩ)	0.1 kΩ 1 kΩ 10 kΩ 100 kΩ	± (2 % + 1 digit) ± (2 % + 1 digit) ± (2 % + 1 digit) ± (5 % + 1 digit)
Resistive Symmetry Balance; RSym: 	10 Ω to 5 kΩ Dielectric strength for external voltage up to 30 V DC or 30 V AC (with a load 200 kΩ)	0.1 Ω	0.2 % of Rs ± 0.2 Ω
Loop Resistance; R: 	1 Ω to 999.9 Ω 1 kΩ to 9.999 kΩ 10 kΩ to 99.99 kΩ 100 kΩ to 999.9 kΩ 1 MΩ to 9.999 MΩ 10 MΩ to 4.0 MΩ	0.1 Ω 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ	± (1 % + 3 digits) ± (1 % + 1 digit) ± (1 % + 1 digit) ± (1 % + 1 digit) ± (2 % + 1 digit) ± (5 % + 1 digit)
DC Current; IDC (I =): 	0.1 mA to 500 mA	0.1 mA	± (2.5 % + 3 digits)
Unbalance at 1 MHz; LCL: 	0 dB to 55 dB 55.1 dB to 65 dB The length of the test leads can influence the accuracy of the measurement. Dielectric strength for external voltage up to 3 V DC or 3 V AC. At an internal resistance of the source of 1 MΩ it will be measured up to 3.5 V DC / AC.	0.1 dB 0.1 dB	± 1.5 dB ± 3 dB

NEXT at 1 MHz; NEXT:	• 0 dB to 65 dB • 0.1 dB • ± 1dB
	Dielectric strength for external voltage up to 3 V DC or 3 V AC. At an internal resistance of the source of 1 MΩ it will be measured up to 3.5 V DC / AC.
Remote Kit Control:	• Use ARGUS and ARGUS Copper Box to control different Remote Kits to switch the Line on the remote side.
Other Functions:	• Autotest • Signature detection (e. g. PPA) • Fast cable check
Reference Conditions (calibration):	• Temperature: 23 °C ± 5 °C • Relative humidity: 50 % ± 20 % relative humidity, non-condensing • Frequency of measurement type: 50 Hz ± 5 Hz, sinus

Specifications Copper Tests:

General:	Applications, Settings + Results:	
TDR Test Time Domain Reflectometer	- Determination of the Loop Length - For Identification and Detection of Shorts, Opens, Impedance Mismatch, Bridged Taps/Stubs, Moisture, Loading Coils, Loose Contacts and more - Pre-configured List of Cable Types, Velocity of Propagation (VoP): 30 % (45 m/μs) up to 99.9 % (149.7 m/μs), Line Resistance, Mutual Capacitance - Graphic Display of Reflection Course	- Measurement Range: 3.5 up to 6000 m - Res.: 0.025 % of Measurement Range; Accuracy: ±2 % - Configureable gain: -26 dB up to +44 dB - Config. Pulse: 5 ns up to 3.2 μs, Pulse Height: 5 V and 20 V - Dynamic range: 60 dB / Amplification Level - Zoom + Cursor for a Detailed Analysis - Save + Set of Reference Curve - Start/Stop Function (Realtime Mode)
Line Scope DSL Spectrum Analysis DSL Oscilloscope	- Monitoring in Time/Frequency Domain on all Types of Lines for Telecommunications - Monitoring on active Lines with up to 200 VDC and 40 Vpp - For Identification and Detection of different Access Types (DSL, ISDN, ...) - Modem Finder, via Handshake Tones - Detection of Disturbers/Disturbing Signals - Frequency Range: 20 kHz up to 35 MHz - Resolution: 67 Hz up to 8.625 kHz or 0.025 % of Measurement Range, Accuracy: ±2 dB - Config. Gain FFT: -26 dB up to +20dB	- High-impedance or Line Termination: - Input Impedance: 3,6 kΩ, <10 pF - Switchable 100 Ω Input Resistance - Graphic Display of FFT [dBm/Hz] and of Time (Oscilloscope) - Configureable X-Axis: FFT or Time [μs] - Automatic Trigger in Time Domain - Zoom + Cursor for a Detailed Analysis - Save + Set of Reference Curve - Start/Stop Function (Realtime Mode) - Peak Hold Function (Min/Max Trailing) - Symmetry Toggling (see Active Probe)
ARGUS RF Current Clamp	• optional: ARGUS RF Current Clamp for non-intrusive detection of interferers (e.g. power supplies) with Line Scope (graphical) and by tone tracking	
ARGUS Active Probe II*	- ARGUS Active Probe II for Passive, High-impedance Intrusion on Active Connections (xDSL, POTS, ...) - Input Impedance: 70 kΩ, <1 pF - Frequency Range: 10 kHz bis 35 MHz	- Hiding the Useful Signal Symmetry/Asymmetry Toggling - Attenuation Symmetric: 14,5 dB 2 x 4 mm Banana Jacks - Data Transfer to ARGUS via RJ45

Device Specifications	
Technical Features:	
• Power supply	Li-ion battery pack or mains adaptor
• Hotkey	Quick start of various tests
• Power management	User configurable
• Keypad	18 keys, 4 cursor keys, 3 context-sensitive softkeys
• LCD colour display	QVGA - 320 x 240 pixels, backlit
• 6 LEDs	Indicating the status + Ethernet port LEDs
• Handset	Integrated earpiece and microphone
• CE marking + User safety	Complies with CE directives, fulfills EN 62368-1
• RoHS conformance	Conformance according to WEEE directive
Interfaces:	
• 2x RJ-45	For xDSL, G.fast, ISDN and POTS
• 2x Ethernet	10/100/1000 Base-T, RJ-45 test ports
• 2x SFP ports	100 Base-FX/LX, 1000 Base-SX/LX/ZX/BX
• USB client interface	Type mini B
• 2x USB host interface	Type A
• WLAN	IEEE802.11a/b/g/n
• Headset	Jack (TRS 2.5 mm, approx. 3/32")
Environmental conditions:	
• Temperature range for charging battery pack	0 °C (+32 °F) up to +40 °C (+104 °F)
• Max. Operating temperature (endurance tests)	0 °C (+32 °F) up to +40 °C (+104 °F)
• Max. Operating temperature (in battery mode)	-10 °C (+14 °F) up to +50 °C (+122 °F)
• Operating temperature (with power/car adapter)	0 °C (+32 °F) up to +40 °C (+104 °F)
• Storing Temperature	-20 °C (-4 °F) up to +60 °C (+140 °F)
• Relative humidity	Up to 95 %, non-condensing
Dimensions:	
• Size	H x W x D: 254 x 99 x 73 mm (10.0 x 3.9 x 2.9 in)
• Weight	approx. 920 g (2.03 lbs, ARGUS incl. battery pack)

Documentation and Analysis

- **Documentation** of all parameters recorded to test reports (in device and on PC) via automatic access tests
- Transfer of test results via **QR code** to a smartphone or via WLAN, ETH or DSL to cloud (FTP server).
- Free of charge firmware updates via **cloud** or **ARGUS update tool**
- WLAN extension for transferring test results to systems of an electronic order processing system, remote control via smartphone.
- Free firmware and software updates available via www.argus.info

Standard package:

xDSL basic package (incl. GigE and SFP use) with Bridge/router mode, IP tests (IP ping, IP traceroute, HTTP/FTP download, FTP upload/server), IPv6, Line Scope, Network scan, Text browser, Cloud services, WINplus PC-Software, The hardware is ready for Adv. GigE tests and the use of SFP, Carrying case (large), Lithium-Ion battery pack, Mini USB cable, Test leads, Mains adaptor, Carrying strap, Hand strap, English manual and menu map

Basic package:

- | | |
|---|---------------------|
| • ARGUS 166 VDSL2 (inkl. profile 35b / Super Vectoring) | Order number 116600 |
| • ARGUS 166 SHDSL 2-wire | Order number 116620 |

Additional interfaces: (test leads included)

- | | |
|---|--|
| • G.fast interface 106 MHz / 212 MHz | Order number 016613 / 016616 |
| • VDSL2 Bonding (up to profile 35b) | Order number 016609 |
| • VDSL2 interface (incl. profile 35b / Super Vectoring) | Order number 016608 |
| • ADSL Annex A + L + M interface | Order number 016605 |
| • ADSL Annex B + J interface | Order number 016606 |
| • SHDSL 2-wire interface | Order number 016612 |
| • SHDSL 4-wire interface | Order number 016614 |
| • SHDSL 8-wire interface | Order number 016618 |
| • GPON | Order number 016692 |
| • GPON Bridge/Router | Order number 016687 |
| • POTS TE interface | Order number 016615 |
| • ISDN BRI S/T (TE/NT) and POTS interface | Order number 016617 |
| • ISDN BRI U (TE) interface | Order number 016670 (2B1Q) or 016671 (4B3T*) |
| • ISDN PRI/E1 (TE/NT) interface | Order number 016620 |

Additional test features: (depends on existing interface)

- | | |
|--|------------------------------|
| • Adv. GigE-Tests (Loop, Traffic generator, RFC2544 tests) | Order number 016640 |
| • SFP using | Order number 016666 |
| • WLAN option | Order number 016659 |
| • ARGUS 2G4 Scope | Order number 000240 |
| • LTE option | Order number 016656 |
| • VoIP test (ADSL, VDSL2, SHDSL, Ethernet) | Order number 016630 |
| • IPTV test / IPTV ext. (ADSL, VDSL2, SHDSL, Ethernet) | Order number 016637 / 016639 |
| • VoIP + IPTV package (ADSL, VDSL2, SHDSL, Ethernet) | Order number 016633 |

• ARGUS® Real Speed Formal (RFC6349), inkl. ARGUS® Real Speed Direct (iperf)	Order number 016665
• ARGUS® Real Speed Direct (iperf)	Order number 016668
• TDR (Time Domain Reflectometer)	Order number 016651
• ARGUS Active Probe II	Order number 015091
• ARGUS Copper Box	Order number 015099
• ARGUS RF Current Clamp	Order number 000265
• PON Installation Test	Order number 016678
• ARGUS Optical Power Meter	Order number 000270
• WINanalyse license (Download version)	Order number 016562

* We would be glad to provide further details and information about additional accessories on request.

intec

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