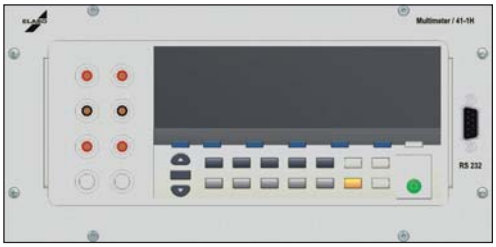
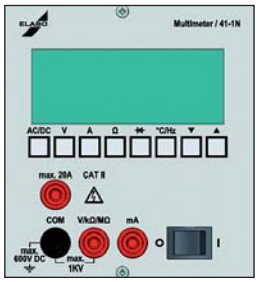
8.10 Measurement device

Multimeter



Multimeter
3HU / 52HP



Digital multimeter
3HU / 24 HP

installable into 3HU power duct

Eurocassette with multimeter with dual display, manufactured by Philips, Fluke 45
The vacuum fluorescence dual display makes possible to read two properties of an input signal simultaneously. In comparison mode, it is also possible to classify a measurement result above and below a particular range.
- real effective value measurement
- frequency measurements up to greater than 1MHz
- 1µV direct voltage sensitivity
- fluctuating decibel impedance reference values and measurement of audio tone amplification power
- selectable display resolution of 100,000, 30,000 or 3,000 digits with display speeds of 2.5, 5 or 20 measurements per second
- built-in self-test routines and software calibration
- diode and continuity testing
- overvoltage protection

Measurement range DC voltage: 100mV...750V
Direct current: 10mA...10A
AC current: 10mA...10A
AC true effective voltage: 100mV...1000V
Measurement range frequency: 1000Hz...1000kHz
Frequency range: 5Hz...>1MHz
Voltage supply system: 90-240V / AC
Measurement range resistance: 100 O-30 MO
Operating temperature range: 0°...50 °C
Mains voltage: 90...264V AC, 50 and 60Hz, <15VA
Interface: RS232

optionally available: IEEE-488 interface

Additional specifications available upon request.

Order no.
41-1H-EBS Mounting kit for multimeter
41-1H-Modul Precision multimeter

Insert plate with 5½-digit digital multimeter
Display: LCD with blue backearth illumination

Direct voltage measurement
Range: 0.2 - 2 - 20 - 200 - 1000V
max. resolution: 0.01mV (in the 200 mV range)

Direct current measurement
Range: 0.2 - 2 - 20 - 200 - 2000mA - 20A
max. resolution: 0.0001mA (in the 200µA range)

Alternating current voltage measurement
Range: 0.2 - 2 - 20 - 200 - 750V
max. resolution: 0.01mV (in the 200mV range)

Alternating current measurement
Range: 0.2 - 2 - 20 - 200 - 2000mA - 20A
max. resolution: 0.0001mA (in the 200µA range)

Resistance measurement
Range: 0.2kΩ – 2kΩ – 20kΩ – 200kΩ – 2MΩ - 20MΩ
max. resolution: 0.001kΩ (in the 200kΩ - range)
max. permissible measurement voltage: 230V / AC

Temperature measurement
Range -100...+250 with PT100 measuring head

Frequency measurement
Range: 0...50kHz

Diode test

Measurement range switch-over: automatic / manual changeover switch
Base precision: 0.05%

Additional specifications available upon request.

network-compatible

Order no. 41-1N
fitting measuring heads:
Order no. 42-1S Z41-1N diving measuring head Pt 100
Order no. 42-1U Z41-1N surface measuring head Pt 100

Article No. 46-1R.3Z102 / A3-8U.3Z102

I/O-Module for digital and analog signals

Inputs/outputs

Digital:

8 digitale inputs	DI 1…8	24V level
8 digitale outputs	DO 1…8	Floating relay contacts, switching capacity 260V/2A

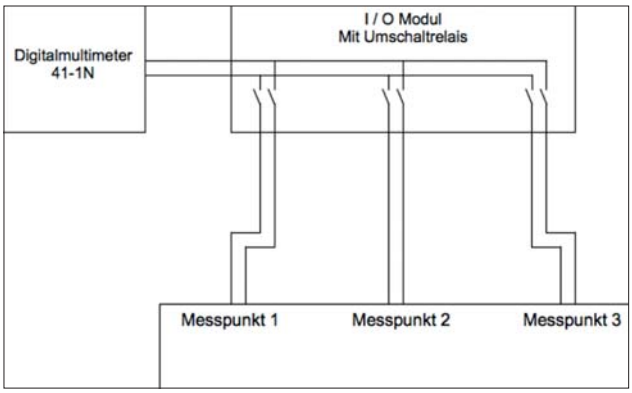
Analog:

1 analog input	AI	0…20mA
1 analog input	AI	0…10V
1 analog output	AO	0…20mA
1 analog output	AO	0…10V

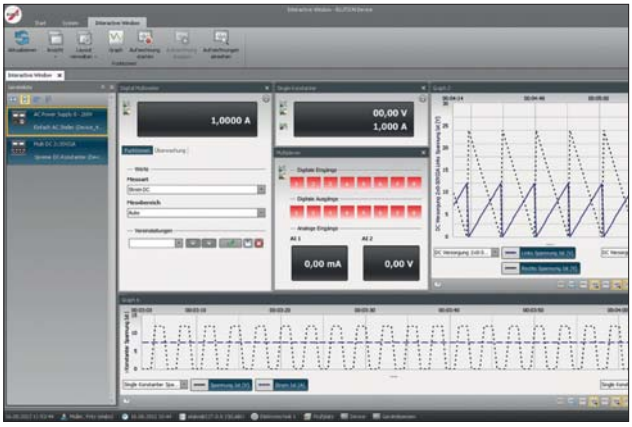
All inputs and outputs routed to 4 mm safety lab sockets.

Functional example

When performing a measuring task, voltages can be measured at three different points using a multimeter. In automated form, without an I/O module this task would be possible only if 3 multimeters were used. With the help of the I/O module, the 3 measuring points can be connected to the multimeter one after the other and the measurements can be automatically recorded.



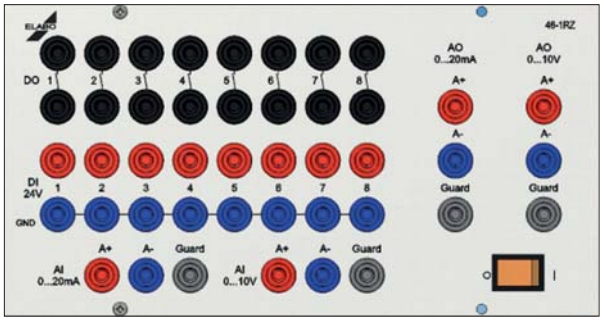
The Elabo I/O module is integrated directly into the extensive Elabo Elution software package.
Each input/output can be activated/read in either individually or collectively.



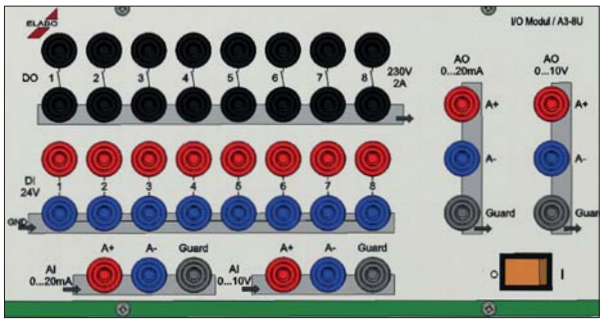
Required additional products:
Software Elution, N2-1A Elution Device,
N2-5R device driver for I/O module

Article No. 46-1R.3Z102 / A3-8U.3Z102

I/O-Module
For digital and analog signals



46-1R.3Z102



A3-8U.3Z102

Highlights

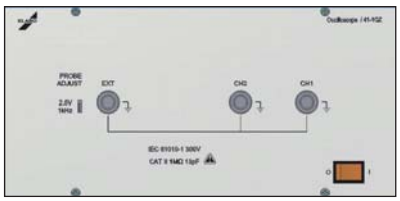
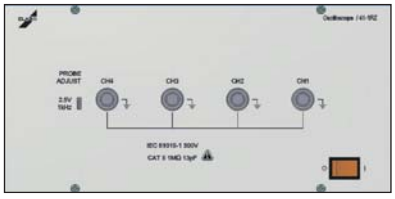
- The I/O module is the ideal addition to Elabo network technology
- In the compact 3HU / 48HP type, the module can be used in both 3HU and 6HU systems
- It can be easily integrated even in the Elabo 3HU profile channel

Areas of application

Measuring	Remotely controlled switching from various measuring points to a central measuring device
Control	Activation of pneumatic components and reading-in of end positions
Measured data recording	Integration of analog signals in the measurement process and documentation of the result
Actuator control	Actuators with analog input signals can be integrated into measurement processes

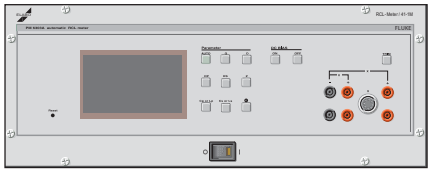
Oscilloscope

Oscilloscopes are easy to use and can be operated completely using the software provided. The user can thus take advantage of all of the advantages of the PC, such as large memory capacity and high-quality display. The Windows user interface, means that the device can be operated in the same familiar way as standard applications and programmes.

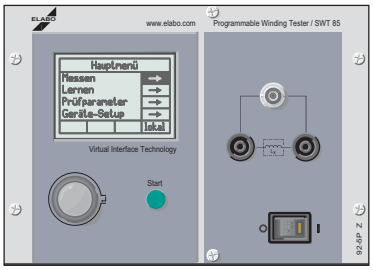
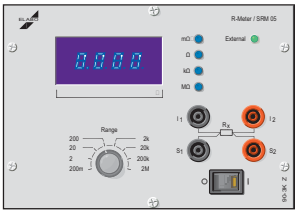
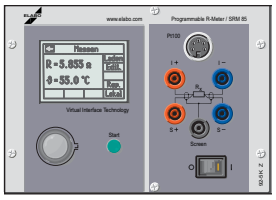
		Technical data	Order no.
2-channel oscilloscope 3HU / 52HP		Insert plate with PC oscilloscope, including Ethernet interface, manufactured by Metrix Bandwidth: 150MHz, bandwidth filter for 15MHz, 1.5MHz or 5kHz 2 channels, Class 1 Vertical: 2.5mV / div - 100V / div up to 250iV / div with Y-expansion Time bases: 35 ranges from 1ns/div to 200s/div Horizontal zoom: from x 1 to x 100, sequence 1-2-5 (display of 500 for 10 div) Trigger: Auto; Triggered Single Shot Trigger source: CH1, CH2, EXT, network Type: Slope, Pulse width or Delay (40ns-10.5s), Counting (2-16384 events), TV (525 = NTSC, 625 = PAL/SECAM), Pretrigger adjustable from 0 to 100%, Hold-off (40ns-10.5s) Max. sampling rate: Repeating signals = 100MS/s, Single Shot=200MS/s Vertical resolution: 10bit (9 used) Memory depth: 50,000pts. (memory capacity depends on the PC used) Afterglow duration: 100ms, 200 ms, 500ms, 1s, 2s, 5s, 10s and infinite Acquisition rate: 50 kwaveforms / s / channel Display acquired samples: 19MS / s / channel FFT: calculation across 2048pts.), +, -, x, /- Editor for individual measurement functions Manual cursors: (dv, dt), PHASE and free Automat. measurements: 2-19 measurements of 19 + automatic phase, on all curve types, marker and limiter Sampling duration: from 2 s to 31 days Sampling rate: with intervals from 40µs to 53.57s Extent of analysis: basic speed up to 31st harmonic, in 1 to 2 channels and simultaneous fundamental harmonic oscillation of 40Hz to 1kHz Evaluation: continuous display of RMS value & THD - for selected harmonic: % F, Phase, Freq., VRMS Optionally available: differential voltage probes	41-1Q Z102-EBS 41-1Q Z102-Modul
4-channel oscilloscope 3HU / 52HP		the same as with type 41-1Q Z102, but 4 channels, Class 1 Trigger source: CH1, CH2, CH3, CH4, EXT, mains	41-1R Z102-EBS 41-1R Z102-Modul

RCL meter, continuity tester, LF testing equipment

The Elabo eurocassette with RCL meter is suitable for the precise determination of resistances, capacities and inductivities. The use of automatic function and range settings makes it possible for this device to measure passive components rapidly, with great precision and across wide ranges. The device is particularly suitable for laboratory use, for quality control and for customer service workshops.

		Technical Data	Order no.
RCL meter 3HU / 66HP		Eurocassette with Fluke PM 6303 A RCL meter Test item connection: via a two-pin test terminal. A four-conductor test cable or a four-pin test adapter are optionally available. Measurement ranges: Resistance R 0Ohm ... 200MOhm Capacity C 0pF ... 100mF Inductivity L 0µH ... 32kH Quality factor Q 0.002 ... 500 Dissipation factor D 0.002 ... 500 Measurement rate: 2 / s Maximum measured value resolution: R 1 mOhm; C 0.1 pF; L 0.1 µH; Q 0.001; D 0.001 Measurement accuracy: intrinsic error ± 0.25% ± 1 digit Display: LCD 4-digit for amount, dimension and associated equivalent circuit symbol Measured value display: Quality factor Q, Dissipation factor D, Parallel resistance Rp, Series resistance Rs, Impedance Z, Parallel capacitance Cp, Parallel inductance Lp, Serial capacitance Cs, Series inductance Ls, Phase angle In the operating mode RCL AUTO, the dominant component R, C or L of the test item is determined automatically and its value is displayed.	41-1M-EBS 41-1M-Modul
Continuity tester 3HU / 12HP		Eurocassette with continuity tester and for rough testing of resistances, condensers and coils. The pitch of the generator declines as the resistance value of the test item increases. A change can be reliably detected up to several MOhm. Device input: voltage-proof up a maximum of 400V AC Volume: continuously adjustable via potentiometer up to approx. 100dB at a distance of 10cm 1 volume controller 2 laboratory safety sockets 1 illuminated rocker switch	42-1F
LF testing equipment 3HU / 24HP		Eurocassette with low-frequency testing equipment 1 Signal tracer for applications in radio and television technology and for repair and maintenance of operations radio equipment, etc. 1 diode socket as measurement input 1 loudspeaker 3W / 100...15000Hz for monitoring purposes 1 demodulator with BNC input for tracking amplitude-modulated signals 1 volume controller 1 power meter for the LF output emitted by the test item 4 laboratory safety sockets 1 illuminated rocker switch	43-1F

Wound equipment testing equipment, Ohmmeter

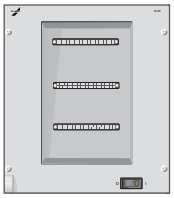
		Technical data	Order no.
Wound equipment testing equipment 3HU / 36HP		Eurocassette with digital wound equipment testing equipment for comparison measurements. With the wound equipment testing process WPV that was developed by Elabo a quality display of the wound equipment test item is obtained in a very short time. The "Pass/Fail" statement which must of necessity be particularly fast in manufacturing permits the utilisation of the device not only for manual but also for automated production. Measurement frequency: 5...200kHz Measurement error: < 0.5% f.F. Test voltage: < 24V Limit values: +/- 99% in 1% increments Display: LC graphic display 128 x 64 Pixel Resolution: 12bit 3 laboratory safety sockets 1 illuminated rocker switch Shorted coils arise when damage occurs to the enamel isolation, causing individual windings in a coil to short-circuit with one another. Often no impairment of the function will be apparent at first, although shorted coils are often the cause of late failures.	92-5P
Digital resistance meter 3HU / 36HP		Eurocassette with digital resistance meter for stand-alone operation in production, laboratory and input monitoring as well as for utilisation in automatic test systems. Technical data: Measurement ranges: 8 ranges from 200mOhm...2MOhm Display: 4 1/2-digit LED 7-segment display Measuring currents: 100mA ...1µA Measurement errors: 0.1% f.m., + 0.005% f.m./C, + 2digit Error monitoring: CURRENT; SENSE; OVERLOAD; POLARITY Temperature reference: 20°C 4 laboratory safety sockets 1 illuminated rocker switch	90-3K
Digital resistance meter 3HU / 36HP		Eurocassette with digital resistance meter for utilisation in laboratories, in production and in test rooms. The device is equipped with a TFT display. Technical data: Measurement ranges: 8 ranges from 200mOhm...2MOhm - 50°C...200°C Measurement currents: 100mA ...1µA Measurement error: +/- 0.1% f.m., + 0.05% f.m./C, + 2 digit Measurement cycle: max. 3/s Memory: 300 parameter sets Interfaces: CAN/RS232 Connection: 5 connectors, 1 diode plug	92-5K

Continuity tester, multimeter

		Technical Data	Order no.
Continuity tester 6HU / 1WU		Insert plate with two continuity testers 1 electronic, high-impedance continuity tester up to a maximum of 5MOhm (acoustic) Test current: maximum 25µA Voltage safety factor: up to approx. 400V AC 1 low-impedance continuity tester (optical) Test voltage: 22V AC 1 fine wire fuse 1 illuminated rocker switch 1 transformer with separated input and output coils 1 incandescent lamp 1 miniature loudspeaker 2x 2 laboratory safety sockets	32-1B
Continuity tester 6HU / 1WU		Insert plate with low-impedance continuity tester for testing switches, circuit breakers, etc. 1 light bulb, visual display 1 buzzer, acoustic signal test voltage 22V AC 3 laboratory safety sockets 1 illuminated rocker switch	32-1T
Digital multimeter 6HU / 1WU		Insert plate with 3 3/4-digit digital multimeter DYNATEC 9200 Measurement ranges: DC 400mV...1000V 400µA...20A AC 400mV...750V 400µA...20A R 400Ohm...40MOhm F 4kHz...4MHz Basic accuracy: ± (0.5% v. M. + 1digit) Operating modes: Continuity testing Pulse duty cycle test Logic test Data Hold Peak Hold with battery-operated	32-2H Z007

Hameg modular series

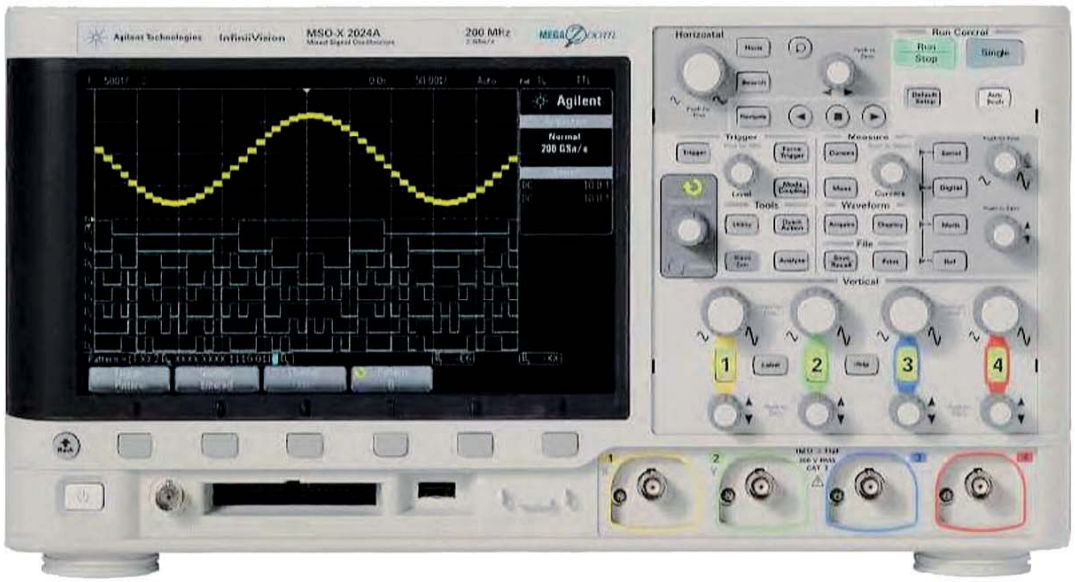
Special rack mounts for supporting the measurement and testing equipment of the "Hameg Modular System 8000" are available as supplements for the 6HU measurement and testing equipment program. The necessary power supply systems for the modules are included in the scope of delivery of the individual modules and are installed in the rack mount when an order is placed. Additional devices available upon request.

		Technical data	Order no.
Insert for Hameg modules 6HU / 2WU		Insert for supporting Hameg modules of the device series 8000 1 illuminated rocker switch Insert for one Hameg module Insert for two Hameg modules Insert for three Hameg modules	 35-4KZ01 35-4KZ02 35-4KZ03
Function generator		Function generator HM 8030-6 of the Hameg modular series 8000 For use with insert 35-4K Digital frequency display, 5-digit 7-segment LED Frequency range 0.05 up to 10MHz Operating mode: Sinusoidal, Square, Triangle, Pulse free-running, internally or externally frequency-modulated, with or without DC-offset Trigger output approx. + 5 V/TTL internal and external wobble apparatus Square rise time, typically 15ns Harmonic distortion max. 0.5% up to 100kHz, max. 3% up to 5MHz optional accessories: BNC measurement cable HZ33, HZ34 50 Ohm feed-through terminal HZ22	35-4M
Digital multimeter		Programmable digital multimeter HM 8012 of the Hameg modular series 8000 For use with insert 35-4K 4 3/4-digit display with 50.000 digit 42 measurement ranges; automatic change of range real effective value measurement for AC and AC and DC Basic accuracy 0.05% max. actuation 10µV; 0.01dBm, 10nA; 10mOhm, 0.1°C Input resistance >1GOhm (0.5V and 5VDC range) Temperature measurement in °C/°F in 0.1° increments RS-232 interface PC software for control and measurement value logging 1 set test pins HZ15	35-4L
L/C meter		L/C meter HM 8018 of the Hameg modular series 8000 For use with insert 35-4K 24 measurement ranges Max. resolution: 0.1pF, 0.1µH, 0.01U, 0.01µS 3 measurement frequencies: 160Hz, 1.6kHz, 16kHz 4-wire measurement technology Basic accuracy 0.5% internal bias voltage for electrolytic capacitors Measurement of the series and parallel components With threaded laboratory terminals in order to make it possible to clamp the components from below. The use of safety laboratory lines is possible only with an adapter.	35-4N

Article No. 35-4S

Oscilloscope

Agilent InfiniVision 2000x and 3000x Series



Highlights

- The Agilent InfiniVision can be installed either in 19" systems or alternatively in the 6HU device system
- Separate installation set available

Technical Data

	InfiniVision 2000X Series	InfiniVision 3000X Series
Analog channels	2 or 4 analog channels	
Digital timing channels	8 on MSO models or with upgrade DSOX2MSO	16 on MSO models or with upgrade DSOX2MSO
Bandwidth (extendable)	70, 100, 200MHz	100, 200, 350, 500MHz
Sampling rate	1 GSa/s per channel, 2 GSa/s with half number of channels (interleaved)	2 GSa/s per channel, 4 GSa/s with half number of channels (interleaved)
Memory depth	100kpts	2Mpts as standard, 4Mpts optional (option DSOX3MemUp)
Signal update rate	50000 signals/s	1000000 signals/s
Built-in 20 MHz WaveGen function generator	Yes (option DSOX2WAVEGEN)	Yes (option DSOX3WAVEGEN)
Search and navigation functions	No	Yes
Analysis of serial protocols	No	Yes (several options)
Segmentable memory	Yes (option DSOX2SGM)	Yes (option DSOX3SGM)
Alarm mask test	Yes (option DSOX2MASK)	Yes (option DSOX3MASK)
AutoProbe interface	No	Yes

More technical details can be found in the Agilent data sheets.

Oscilloscope
Agilent InfiniVision 2000x and 3000x Series

Model variants

InfiniVision 2000 X-Series

Model (Agilent)	Description	Bandwidth
DSOX2002A	Oscilloscope, digital, 2-channel	70MHz, 2 x 1 GS/s
DSOX2004A	Oscilloscope, digital, 4-channel	70MHz, 4 x 1 GS/s
DSOX2012A	Oscilloscope, digital, 2-channel	100MHz, 2 x 1 GS/s
DSOX2014A	Oscilloscope, digital, 4-channel	100MHz, 4 x 1 GS/s
DSOX2022A	Oscilloscope, digital, 2-channel	200MHz, 2 x 1 GS/s
DSOX2024A	Oscilloscope, digital, 4-channel	200MHz, 4 x 1 GS/s
MSOX2002A	Oscilloscope, mixed, 2-channel	70MHz, 2 x 1 GS/s
MSOX2004A	Oscilloscope, mixed, 4-channel	70MHz, 4 x 1 GS/s
MSOX2012A	Oscilloscope, mixed, 2-channel	100MHz, 2 x 1 GS/s
MSOX2014A	Oscilloscope, mixed, 4-channel	100MHz, 4 x 1 GS/s
MSOX2022A	Oscilloscope, mixed, 2-channel	200MHz, 2 x 1 GS/s
MSOX2024A	Oscilloscope, mixed, 4-channel	200 MHz, 4 x 1 GS/s

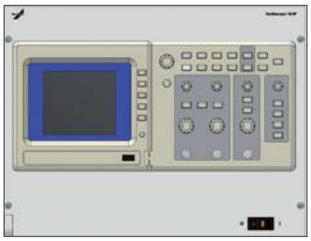
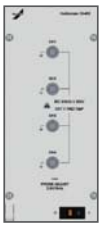
InfiniVision 3000X Series

Model (Agilent)	Description	Bandwidth
DSOX3012A	Oscilloscope, digital, 2-channel	100MHz, 2 x 2 GS/s
DSOX3014A	Oscilloscope, digital, 4-channel	100MHz, 4 x 2 GS/s
DSOX3024A	Oscilloscope, digital, 4-channel	200MHz, 4 x 2 GS/s
DSOX3032A	Oscilloscope, digital, 2-channel	350MHz, 2 x 2 GS/s
DSOX3034A	Oscilloscope, digital, 4-channel	350MHz, 4 x 2 GS/s
DSOX3052A	Oscilloscope, digital, 2-channel	500MHz, 2 x 2 GS/s
DSOX3054A	Oscilloscope, digital, 4-channel	500MHz, 4 x 2 GS/s
MSOX3012A	Oscilloscope, mixed, 2-channel	100MHz, 2 x 2 GS/s
MSOX3014A	Oscilloscope, mixed, 4-channel	100MHz, 4 x 2 GS/s
MSOX3024A	Oscilloscope, mixed, 4-channel	200MHz, 4 x 2 GS/s
MSOX3032A	Oscilloscope, mixed, 2-channel	350MHz, 2 x 2 GS/s
MSOX3034A	Oscilloscope, mixed, 4-channel	350MHz, 4 x 2 GS/s
MSOX3052A	Oscilloscope, mixed, 2-channel	500MHz, 2 x 2 GS/s
MSOX3054A	Oscilloscope, mixed, 4-channel	500MHz, 4 x 2 GS/s

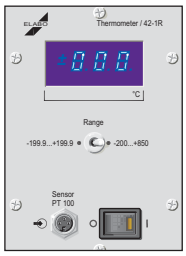
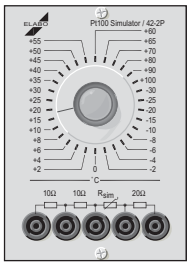
More technical details can be found in the Agilent data sheets.

Order number	Description
35-4S.3ZEBS	ES 6HU/4WU installation set for Agilent InfiniVision (Elabo system 6HU)
35-4S.3Z19“	ES 19"/5HU installation set for Agilent InfiniVision (Elabo system Primus One)
35-4S.3Zxxxxx	Agilent InfiniVision oscilloscope (please quote the desired model number when ordering)

Oscilloscope

		Technical Data	Order no.
Oscilloscope 6HU / 3BE (+ 1WU)		Digital real-time oscilloscope with colour display (1/4 VGA LCD), including one blank plate Manufactured by Tektronix, model TDS 2002B Digital Real Time 60MHz 1 GS/s sampling rate/channel Two input channels External triggering Slope and video trigger Trigger view Cursor measurement with readout Setup memory Reference curve memory Auto Setup **at the front and rear with USB port can be integrated in the Elabo EHP Lab software**	35-4P Z103-EBS 35-4P Z103-Modul
Oscilloscope 6HU / 1WU		2-channel oscilloscope Manufactured by Metrix MTX1052 Band width: 150MHz 2 channels, Class 1, shared earth vertical: 2.5mV / div-100V / div up to 250iV / div with Y-expansion Time bases: 35 ranges from 1 ns/div up to 200s/div Trigger: Auto, Triggered, Single Shot Trigger source: CH1, CH2, CH3, CH4, EXT, mains Type: Slope, Pulse width or Delay Mains supply: 100-230V / AC 47-63Hz Ethernet interface Software Optionally available: differential voltage probes	35-4Q Z102
Oscilloscope 6HU / 1WU		4-channel oscilloscope Manufactured by Metrix MTX1054 Bandwidth: 150MHz 4 channels Class 1, shared earth vertical: 2.5mV / div-100 V / div up to 250iV / div with Y-expansion Time bases: 35 ranges from 1 ns/div up to 200 s/div Trigger: Auto, Triggered, Single Shot Trigger source: CH1, CH2, CH3, CH4, EXT, mains Type: Slope, Pulse width or Delay Mains supply: 100...230V / AC 47...63Hz Ethernet interface Software Optionally available: differential voltage probes	35-4R Z102

Thermometer, temperature sensor, Pt100 simulator

		Technical data	Order no.
Digital thermometer 3HU / 24HP		Insert plate with digital thermometer for Pt100/Pt1000 Measurement range 1: - 50.0°C to + 200.0°C, resolution 0.1°C Measurement range 2: - 200°C to + 850°C, resolution 1°C 1 illuminated rocker switch I/O 1 digital display 4 digit 1 diode jack socket	42-1R.3Z601
Universal temperature sensor		Pt100 immersion temperature sensor, suitable for the 42-1R.3Z601 Temperature range: - 50°C to + 400°C Length: 150mm Diameter: 3mm	42-1S
Temperature sensor		Pt100 temperature sensor for gases, suitable for 42-1R.3Z601 Temperature range: - 50°C to + 400°C Length: 100mm Diameter: 3mm	42-1T
Temperature sensor		Pt100 temperature sensor for surfaces, suitable for 42-1R.3Z601 Temperature range: - 50°C to + 400°C Length: 300mm Diameter: 4mm	42-1U
Pt100 simulator 3HU / 18HP 		Insert plate with Pt100 simulator, on which 30 fixed temperature values can be depicted by means of a precision rotary switch which correspond to the characteristic curve in accordance with DIN 43760. Resistance material: Manganin Temperature coefficient: < 10ppm / K Long-term stability: 0.02% over years 5 laboratory safety sockets Standard values: -30, -25, -20, -15, -10, -8, -6, -4, -2°C 0°C 2, 4, 6, 8, 10, 15, 20, 25, 30°C 35, 40, 45, 50, 55, 60, 65°C 70, 80, 90, 100°C	42-2P