ElaboTestSystems

Quality – without any ifs and buts

INSTRUMENTS

High-performance equipment range

- High-voltage test devices
- Combination testers
- Accessories

ELABO

euromicron group

Systematic modularity

The new Elabo test device series for safety and functional tests

Almost unlimited deployment possibilities, robustness and flexibility have always been the characteristics of all Elabo products. One thing helps us here: always being attentive to and present in the market. It is important for us to always maintain dialogue with our customers.

This allows us to react systematically to changing conditions. This provides you the advantage of always receiving the devices and systems precisely tailored to your requirements.

The best possible combination of the latest technologies, optimum user-friendliness and perfect ergonomics – that is our constant aim!

The market proves us right. Elabo products are still market leaders.

Elabo HighPerformance

With the new ELABO HIGH-PERFORMANCE device series, Elabo is treading an innovative path in terms of compactness, intelligence and flexibility of test devices and test systems for individual industrial use.
One of the essential advantages is the systematic modularity, which allows flexible combinability of the basic devices with corresponding extension and accessory modules. The benefit to you – test devices and test systems always perfectly tailored to the respective purpose and your actual requirements.

The latest “Made in Germany” technology – economical and reliable.

Elabo – the system provider.

Starting with test devices, extension modules and the complete range of accessories – the right solution for every application.

Either as an individual solution, complete solution or as a module for OEM customers.

For manual operation, or as a fully automatic solution.

Controlled by interfaces, the modern TouchMe user interface or using the comprehensive EHP control PC software.

The advantage to you: a device family for all applications.

Elabo – always a reliable partnership.

Contents

High-voltage test devices

User safety – combined with precision

Why conduct high-voltage testing?

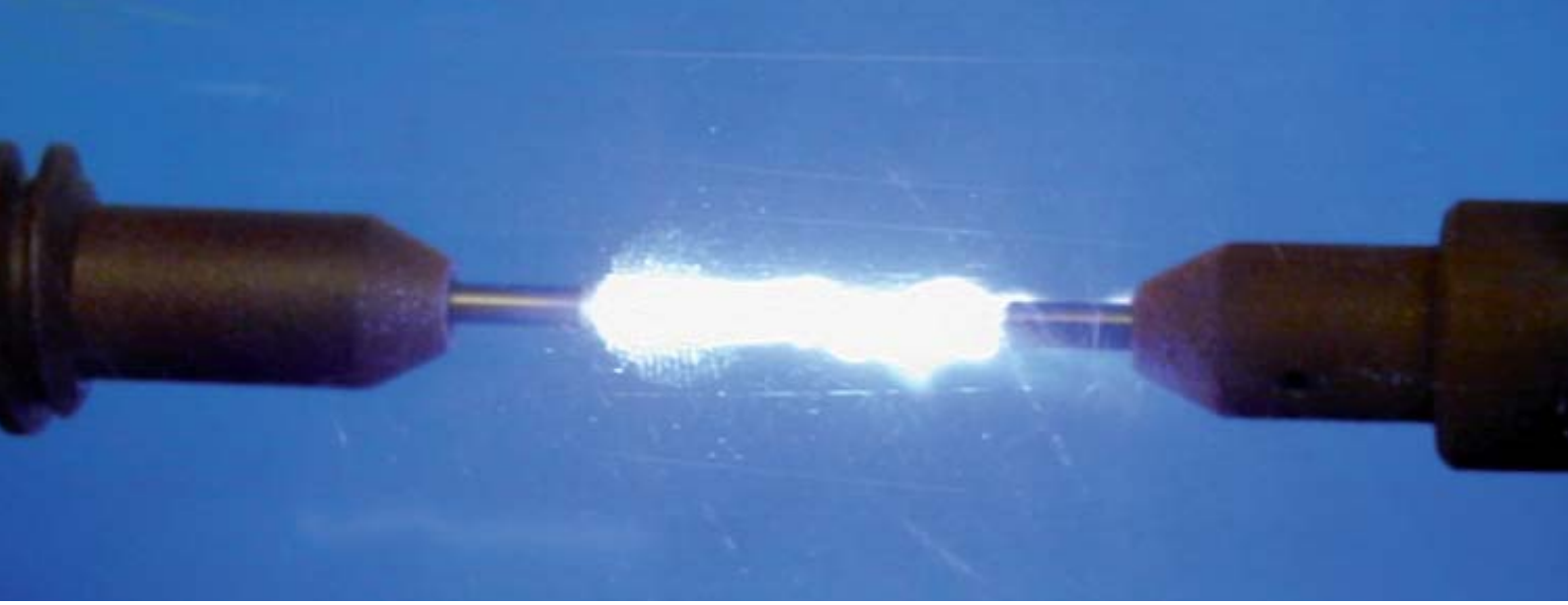
Guaranteeing product safety is regulated in practically all international standard guidelines.
A high-voltage test must almost be performed as proof of product safety.

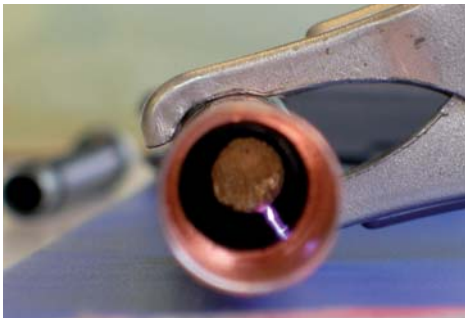
The Elabo product range offers a widely varied spectrum of different devices and add-on modules. Consequently, all test duties can be perfectly fulfilled.

In order to guarantee the user the necessary safety during device testing, all test devices in the Elabo range fulfil without exception the guidelines of EN50191 (VDE0104).

Elabo – a guarantee of reproducible and always absolutely reliable test systems compliant with standards.

Hochspannung
Lebensgefahr





High-voltage testing!

High-voltage testing serves for verification of the insulation resistance and voltage endurance on devices, machines, components and insulating materials. During the test process, voltages are applied to the test pieces that do not arise during use as intended.

During high-voltage testing, changes in materials such as deteriorating insulating properties for example in addition to faults during processing (e.g. loose terminal clamps or damaged insulation) are detected. Furthermore, proper dimensioning of air gaps and creepage paths in addition to selection of the suitable insulating materials is verified.

Common test voltages lie within the range of 1000 – 2500 V, but may however exceed 10,000 V in specific cases. High-voltage testing involves considerable risks for the operators. Consequently, it is essential to observe safety precautions, as stipulated in EN 50191(VDE0104) for example.

Elabo offers a comprehensive range of accessories in order to guarantee user protection.

Whether as a single workstation solution or a partly or fully automated test system. In the workshop, in the laboratory or in serial production.
Elabo test devices are markedly superior through their widespread and flexible versatility.
All test devices are already equipped in the basic version for the majority of applications and can also be subsequently adapted by appropriate add-on modules to modified and extended requirements.

Elabo – always solutions with a secure future.

Superior design

Versatile in use – robust construction – optimum user-friendliness

19“ drawer technology

… guarantees modularity and flexibility. Systematic execution with 19” drawer technology makes all components universally usable, in a rack or housing. Sturdy handles facilitate handling.

TouchMe - maximum ease of operation

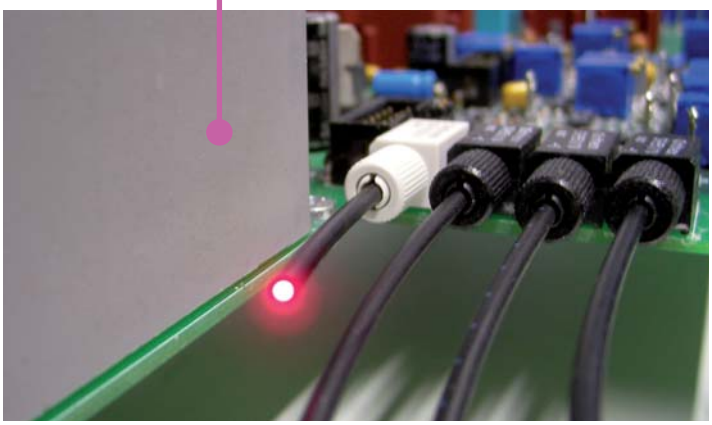
For convenient manual use of the test devices, versions with an ergonomically operated 6.5” touch display are available. An embedded system under Windows CE® forms the core component of this technology.

Flexibility in detail

Depending on the respective application, the test voltage can either be drawn from the front or rear of the device. The voltage feedback for contact monitoring can also be optionally effected on the rear of the device.

Interference resistance

Voltages up to 12,000 VAC and 16,000 VDC. Always one step ahead – optical fibers ensure reliable and interference-free signal transmission in the device.



High-quality metal housing

The systematic housing design executed in metal guarantees robustness and trouble-free operation. This ensures a long service life of our products and increases the profitability of your investment.

Electronic voltage source

Rapid, precise and variable. Parameterisable ramp slopes. Different triggering modes.

Service-friendliness

A device can be replaced in next to no time. Plug connections facilitate maintenance and calibration.

Access blocking

Parameterisable password levels guarantee effective access protection. Only authorised users can operate the device after switching on.

Interfaces

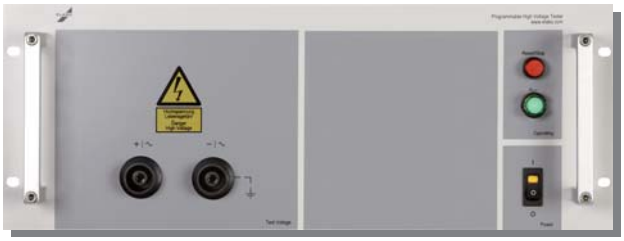
Whether via RS232-C or via Ethernet or USB. The remote controllability of the components allows flexible integration in control systems. The digital I/O interface couples the system to external accessories.

Test devices and extension modules

5.000VAC
6.000VDC

Technical data	**F1-1A / F1-1M**
Test voltage:	100 .. 2,500 VAC
	200 .. 5,000 VAC
	200 .. 3,500 VDC (option)
	300 .. 6,000 VDC (option)
Nominal power:	500 VA
Tripping current:	0 .. 1 / 10 / 100 mA
Interface:	RS232-C
Mains voltage:	230 V / ±10% / 49 .. 61 Hz
Size:	19'' / 4HU
Weight:	approx. 22 kg

Front view F1-1A



Front view F1-1M

Rear view F1-1A, F1-1M

Modular high-voltage testing device

Depending on the version and extension status, the devices provide flexible deployment possibilities during manual and automated use for high-voltage and insulation resistance testing on systems, subassemblies or components. Please ask for our product datasheet for detailed technical data.

	Description	**Size**	**Article no.**
High-voltage test device	incl. TouchMe control unit	19" / 4 HU	F1-1A
High-voltage test device	for automatic use	19" / 4 HU	F1-1M

Extension modules for the test devices

	Technical data	**For device type**	**Article no.**
DC voltage	Test voltage: 200 .. 3,000 / 6,000 VDC Tripping current: 0 .. 1 / 10 / 100 mA	F1-1A, F1-1M	F1-1A E01
Insulation resistance	Measurement range: 0 .. 1 / 10 / 100 MΩ	F1-1A, F1-1M	F1-1A E02
Security current limitation	< 3 mA for AC; < 5 mA for DC	F1-1A, F1-1M	F1-1A E03
Voltage feedback	The module allows a four-wire measurement by readback of the test voltage. Two high-voltage sockets are additionally incorporated in the back panel of the device.	F1-1A, F1-1M	F1-1A E04
Burn-Mode	Overvoltage tripping can be deactivated for troubleshooting.	F1-1A, F1-1M	F1-1A E05
Digital additional outputs	Six additional digital outputs for activation of an external switching matrix.	F1-1A, F1-1M	F1-1A E06
Ethernet	Alternative interface to RS232-C	F1-1A, F1-1M	F1-1A E10
USB	Alternative interface to RS232-C	F1-1A, F1-1M	F1-1A E12
Software package	EHP control software package	F1-1A, F1-1M	F9-9A
Device driver	On request		
Calibration	Supplied with Elabo works calibration protocol	F1-1A, F1-1M	F1-1A E99

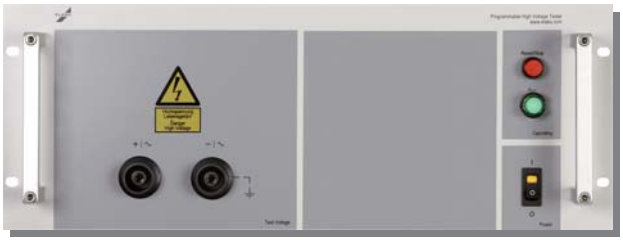
Description of the accessories can be found on page 16-23.
Also note our configuration examples on page 14-15.

Flexibility occupies a forefront position at Elabo. Consequently, the devices in this test device series are always available in two versions. For universal use or for fully automatic operation depending on the respective application.

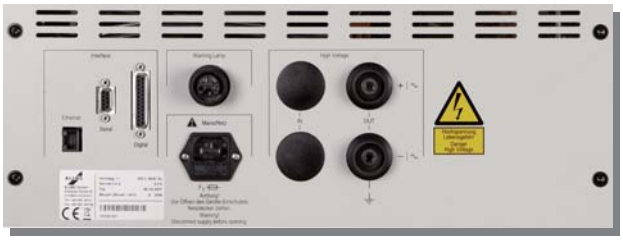
7.000VAC
9.000VDC

Technical data	**F1-1B / F1-1N**
Test voltage:	200 .. 3,500 VAC 300 .. 7,000 VAC 300 .. 4,500 VDC (option) 400 .. 9,000 VDC (option)
Nominal power:	500 VA
Tripping current:	0 .. 1 / 10 / 70 mA
Interface:	RS232-C
Mains voltage:	230 V / ±10% / 49 .. 61 Hz
Size:	19'' / 4HU
Weight:	approx. 23 kg

Front view F1-1B



Front view F1-1N



Rear view F1-1B, F1-1N

Modular high-voltage testing device

Device versions with different output voltages are available depending on the application. The optional extension modules allow individual configuration of your system. Please ask for our product datasheet for detailed technical data.

	Description	**Size**	**Article no.**
High-voltage test device	incl. TouchMe control unit	19" / 4 HU	F1-1B
High-voltage test device	for automatic use	19" / 4 HU	F1-1N

Extension modules for the test devices

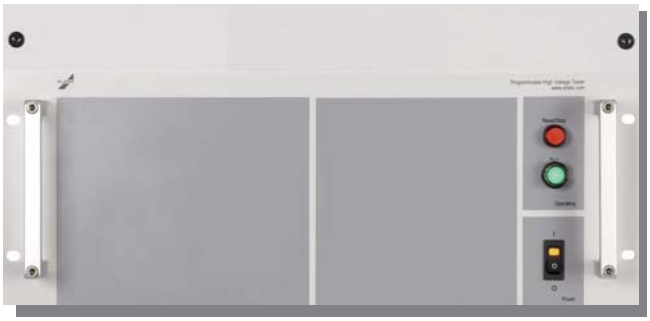
	Technical data	**For device type**	**Article no.**
DC voltage	Test voltage: 300 .. 4,500 / 9,000 VDC Tripping current: 0 .. 1 / 10 / 70 mA	F1-1B, F1-1N	F1-1B E01
Insulation resistance	Measurement range: 0 .. 1 / 10 / 100 MΩ	F1-1B, F1-1N	F1-1B E02
Security current limitation	< 3 mA for AC; < 5 mA for DC	F1-1B, F1-1N	F1-1B E03
Voltage feedback	The module allows a four-wire measurement by read-back of the test voltage. Two high-voltage sockets are additionally incorporated in the back panel of the device.	F1-1B, F1-1N	F1-1B E04
Burn-Mode	Overvoltage tripping can be deactivated for troubleshooting.	F1-1B, F1-1N	F1-1B E05
Digital additional outputs	Six additional digital outputs for activation of an external switching matrix.	F1-1B, F1-1N	F1-1B E06
Ethernet	Alternative interface to RS232-C	F1-1B, F1-1N	F1-1B E10
USB	Alternative interface to RS232-C	F1-1B, F1-1N	F1-1B E12
Software package	EHP control software package	F1-1B, F1-1N	F9-9A
Device driver	On request		
Calibration	Supplied with Elabo works calibration protocol	F1-1B, F1-1N	F1-1B E99

Description of the accessories can be found on page 16-23.
Also note our configuration examples on page 14-15.

Test devices and extension modules

Technical data	**F1-1C / F1-1P**
Test voltage:	300 .. 5,000 VAC 400 .. 10,000 VAC 400 .. 6,000 VDC (option) 500 .. 12,000 VDC (option)
Nominal power:	500 VA
Tripping current:	0 .. 1 / 10 / 50 mA
Interface:	RS232-C
Mains voltage:	230 V / ±10% / 49 .. 61 Hz
Size:	19'' / 6HU
Weight:	approx. 28 kg

Front view F1-1C



Front view F1-1P

Rear view F1-1C, F1-1P

Modular high-voltage testing device

Depending on the version and extension status, the devices provide flexible deployment possibilities during manual and automated use for high-voltage and insulation resistance testing on systems, subassemblies or components. Please ask for our product datasheet for detailed technical data.

	Description	**Size**	**Article no.**
High-voltage test device	incl. TouchMe control unit	19“ / 6 HU	F1-1C
High-voltage test device	for automatic use	19“ / 6 HU	F1-1P

Extension modules for the test devices

	Technical data	**For device type**	**Article no.**
DC voltage	Test voltage: 400 .. 6,000 / 12,000 VDC Tripping current: 0 .. 1 / 10 / 50 mA	F1-1C, F1-1P	F1-1C E01
Insulation resistance	Measurement range: 0 .. 1 / 10 / 100 MΩ	F1-1C, F1-1P	F1-1C E02
Digital additional outputs	Six additional digital outputs for activation of an external switching matrix.	F1-1C, F1-1P	F1-1C E06
Ethernet	Alternative interface to RS232-C	F1-1C, F1-1P	F1-1C E10
USB	Alternative interface to RS232-C	F1-1C, F1-1P	F1-1C E12
Software package	EHP control software package	F1-1C, F1-1P	F9-9A
Device driver	On request		
Calibration	Supplied with Elabo works calibration protocol	F1-1C, F1-1P	F1-1C E99

Description of the accessories can be found on page 16-23.
Also note our configuration examples on page 14-15.

Flexibility occupies a forefront position at Elabo. Consequently, the devices in this test device series are always available in two versions. For universal use or for fully automatic operation depending on the respective application.

16.000VAC
16.000VDC

Technical data	**F1-1D / F1-1Q**
Test voltage:	400 .. 6,000 VAC
	500 .. 12,000 VAC
	500 .. 8,000 VDC (option)
	600 .. 16,000 VDC (option)
Nominal power:	500 VA
Tripping current:	0 .. 1 / 10 / 40 mA
Interface:	RS232-C
Mains voltage:	230 V / ±10% / 49 .. 61 Hz
Size:	19'' / 10HU
Weight:	approx. 30 kg

Front view F1-1D

Front view F1-1Q

Modular high-voltage testing device

Device versions with different output voltages are available depending on the application. The optional extension modules allow individual configuration of your system. Please ask for our product datasheet for detailed technical data.

Rear view F1-1D, F1-1Q

	Description	Size	Article no.
High-voltage test device	incl. TouchMe control unit	19“ / 10 HU	F1-1D
High-voltage test device	for automatic use	19“ / 10 HU	F1-1Q

Extension modules for the test devices

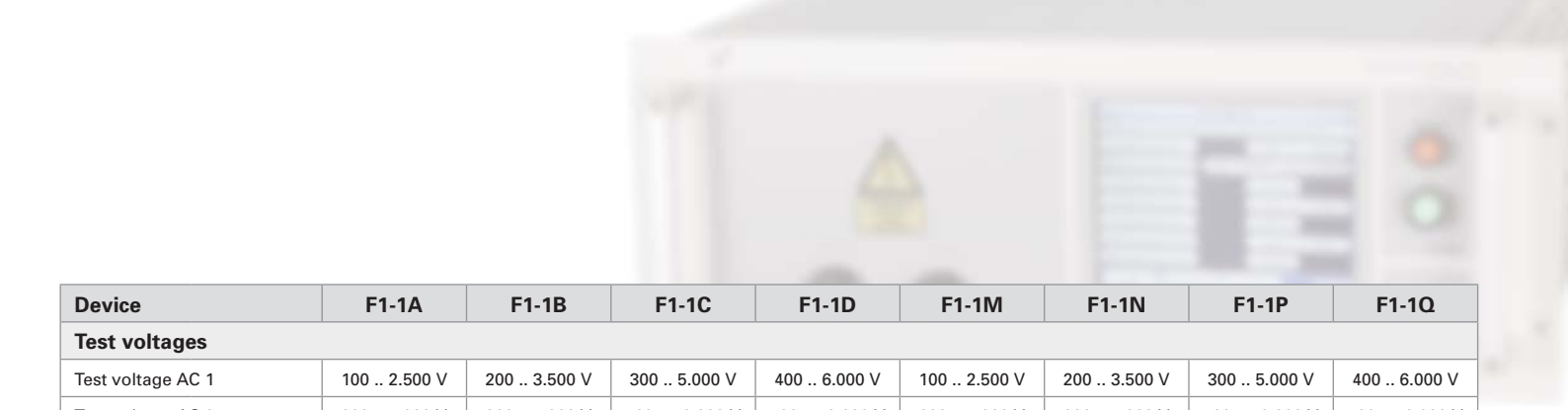
	Technical data	For device type	Article no.
DC voltage	Test voltage: 500 .. 8,000 / 16,000 VDC Tripping current: 0 .. 1 / 10 / 40 mA	F1-1D, F1-1Q	F1-1D E01
Insulation resistance	Measurement range: 0 .. 1 / 10 / 100 MΩ	F1-1D, F1-1Q	F1-1D E02
Digital additional outputs	Six additional digital outputs for activation of an external switching matrix.	F1-1D, F1-1Q	F1-1C E06
Ethernet	Alternative interface to RS232-C	F1-1D, F1-1Q	F1-1D E10
USB	Alternative interface to RS232-C	F1-1D, F1-1Q	F1-1D E12
Software package	EHP control software package	F1-1D, F1-1Q	F9-9A
Device driver	On request		
Calibration	Supplied with Elabo works calibration protocol	F1-1D, F1-1Q	F1-1D E99

Description of the accessories can be found on page 16-23.
Also note our configuration examples on page 14-15.

Test devices and extension modules – overview

Device	F1-1A	F1-1B	F1-1C	F1-1D	F1-1M	F1-1N	F1-1P	F1-1Q
Application fields								
Automatic use	●	●	●	●	●	●	●	●
Manual use	●	●	●	●				
Operation								
Touch Display 6.5”	●	●	●	●				
Interface	●	●	●	●	●	●	●	●
Start button	●	●	●	●				
Reset button	●	●	●	●	●	●	●	●
Interfaces								
RS 232-C	●	●	●	●	●	●	●	●
Ethernet	○	○	○	○	○	○	○	○
USB	○	○	○	○	○	○	○	○
USB accessory interface	●	●	●	●				
Digital interface 1	●	●	●	●	●	●	●	●
Digital interface 2	○	○	○	○	○	○	○	○
2 safety circuits	●	●	●	●	●	●	●	●
Connections								
HV test probes, rear	●	●	●	●	●	●	●	●
HV test probes, front	●	●			●	●		
Warning lights	●	●	●	●	●	●	●	●
Non-heating apparatus socket	●	●	●	●	●	●	●	●
Test functions								
High voltage AC	●	●	●	●	●	●	●	●
High voltage DC[2]	○	○	○	○	○	○	○	○
Insulation resistance measurement[2]	○	○	○	○	○	○	○	○
Current limitation (EN50191) [1, 2]	○	○			○	○		
Burn-Mode (deact. tripping) [1, 2]	○	○			○	○		
Voltage feedback[2]	○	○			○	○		

● Standard ○ Option [1] Cannot be combined [2] Extension module required



Device	F1-1A	F1-1B	F1-1C	F1-1D	F1-1M	F1-1N	F1-1P	F1-1Q
Test voltages								
Test voltage AC 1	100 .. 2.500 V	200 .. 3.500 V	300 .. 5.000 V	400 .. 6.000 V	100 .. 2.500 V	200 .. 3.500 V	300 .. 5.000 V	400 .. 6.000 V
Test voltage AC 2	200 .. 5.000 V	300 .. 7.000 V	400 .. 10.000 V	500 .. 12.000 V	200 .. 5.000 V	300 .. 7.000 V	400 .. 10.000 V	500 .. 12.000 V
Test voltage DC 1[2]	200 .. 3.000 V	300 .. 4.500 V	400 .. 6.000 V	500 .. 8.000 V	200 .. 3.000 V	300 .. 4.500 V	400 .. 6.000 V	500 .. 8.000 V
Test voltage DC 2[2]	300 .. 6.000 V	400 .. 9.000 V	500 .. 12.000 V	600 .. 16.000 V	300 .. 6.000 V	400 .. 9.000 V	500 .. 12.000 V	600 .. 16.000 V
Residual ripple DC[2]	< 3 % with R > 3MΩ							
Positioning rate for ramp	10 .. 3.500 V/s							
Adjustment inaccuracy	Typ. 10 V	Typ. 15 V	Typ. 20 V	Typ. 30 V	Typ. 10 V	Typ. 15 V	Typ. 20 V	Typ. 30 V
Measurement error, voltage	0,5% v.M. ± 2digit	1% v.M. ± 2 digit	1% v.M. ± 2 digit	1% v.M. ± 3 digit	0,5% v.M. ± 2digit	1 % v.M. ± 2 digit	1 % v.M. ± 2 digit	1 % v.M. ± 3 digit
Current ranges								
Measurement range 1 / resolution	0 .. 100 mA / 100 µA	0 .. 70 mA / 100 µA	0 .. 50 mA / 100 µA	0 .. 40 mA / 100 µA	0 .. 100 mA / 100 µA	0 .. 70 mA / 100 µA	0 .. 50 mA / 100 µA	0 .. 40 mA / 100 µA
Measurement range 2 / resolution	0 .. 10,0 mA / 10 µA							
Measurement range 3 / resolution	0 .. 1,000 mA/ 1 µA							
Current tripping	Active current Apparent current Crest value Delta I							
Accuracy Apparent current – measurement range 1	0,5 % of rdg. +/- 2 digit							
Accuracy Apparent current – measurement range 2	0,5 % of rdg. +/- 5 digit							
Accuracy Apparent current – measurement range 3	0,5 % of rdg. +/- 20 digit							
Accuracy Peak value – measurement range 1	1,0 % of rdg. +/- 5 digit							
Accuracy Peak value – measurement range 2	1,0 % of rdg. +/- 5 digit							
Accuracy Peak value – measurement range 3	1,0 % of rdg. +/- 20 digit							
Accuracy Active current – measurement range 1	1,0 % of rdg. +/- 8 digit	1,0 % of rdg. +/- 8 digit	1,0 % of rdg. +/- 16 digit	1,0 % of rdg. +/- 16 digit	1,0 % of rdg. +/- 8 digit	1,0 % of rdg. +/- 8 digit	1,0 % of rdg. +/- 16 digit	1,0 % of rdg. +/- 16 digit
Accuracy Active current – measurement range 2	1,0 % of rdg. +/- 8 digit	1,0 % of rdg. +/- 8 digit	1,0 % of rdg. +/- 16 digit	1,0 % of rdg. +/- 16 digit	1,0 % of rdg. +/- 8 digit	1,0 % of rdg. +/- 8 digit	1,0 % of rdg. +/- 16 digit	1,0 % of rdg. +/- 16 digit
Accuracy Active current – measurement range 3	1,0 % of rdg. +/- 20 digit	1,0 % of rdg. +/- 20 digit	1,0 % of rdg. +/- 40 digit	1,0 % of rdg. +/- 40 digit	1,0 % of rdg. +/- 20 digit	1,0 % of rdg. +/- 20 digit	1,0 % of rdg. +/- 40 digit	1,0 % of rdg. +/- 40 digit
Accuracy DC – measurement range 1[2]	0,5 % of rdg. +/- 2 digit							
Accuracy DC – measurement range 2[2]	0,5 % of rdg. +/- 2 digit							
Accuracy DC – measurement range 3[2]	0,5 % of rdg. +/- 2 digit							
Insulation resistance measurement								
Test voltage DC 1[2]	200 .. 3.000 V	300 .. 4.500 V	400 .. 6.000 V	500 .. 8.000 V	200 .. 3.000 V	300 .. 4.500 V	400 .. 6.000 V	500 .. 8.000 V
Test voltage DC 2[2]	300 .. 6.000 V	400 .. 9.000 V	500 .. 12.000 V	600 .. 16.000 V	300 .. 6.000 V	400 .. 9.000 V	500 .. 12.000 V	600 .. 16.000 V
Measurement range 1[2]	0,03 .. 1,00 MΩ							
Measurement range 2[2]	0,3 .. 10,0 MΩ							
Measurement range 3[2]	3 .. 100 MΩ							
Accuracy at 500 V[2]	3% of rdg. ± 1digit							
Accuracy at 1.000 V[2]	1% of rdg. ± 1digit							
Technical main data								
Nominal power	500 VA							
Short-circuit current	>200 mA	>140 mA	>100 mA	>100 mA	>200 mA	>140 mA	>100 mA	>100 mA
Mains voltage	230 V +/- 10%							
Mains frequency	49 .. 61 Hz							
Dimensions	19“ / 4 HU Depth 360 mm	19“ / 4 HU Depth 360 mm	19“ / 6 HU Depth 360 mm	19“ / 10 HU Depth 360 mm	19“ / 4 HU Depth 360 mm	19“ / 4 HU Depth 360 mm	19“ / 6 HU Depth 360 mm	19“ / 10 HU Depth 360 mm
Weight	22 kg	23 kg	27 kg	30 kg	21 kg	22 kg	26 kg	29 kg
Permissible relative humidity	25 .. 75 % rel.							
Operating temperature	10 .. 50 °C							
Test time	0.1 .. 999.9 sec. / constant testing							
Burn-Mode current[2]	approx. 200 mA	approx. 140 mA	approx. 100 mA	approx. 100 mA	approx. 200 mA	approx. 140 mA	approx. 100 mA	approx. 100 mA
Feedback threshold[2]	0.7 .. 1 x U_{Test}							

[2] Extension module required

Optimum function in practice

Elabo test devices – perfectly configured for your test duties

Requirement:
Setup of a high voltage test bench for manual testing. This example shows a typical configuration for this application. Device components and accessories tailored to needs ideally complement each other.

Description	Number	Article no.
High-voltage test device	1	F1-1B
DC extension module	1	F1-1B E01
Housing	1	93-1B
Guide rails	1	93-1F
Test probes	1	94-2A
Foot switches	1	94-2D
Warning lights	1	94-2C
Calibration	1	F1-1B E99

Requirement:
Setup of a mobile high-voltage test bench for manual testing. The sites at which tests need to be performed are often not stationary. In addition to the test systems, the Elabo-TaMo range includes a selection of flexibly configurable mobiles.

Description	Number	Article no.
High-voltage test device	1	F1-1A
DC extension module	1	F1-1A E01
Housing	1	93-1B
Guide rails	1	93-1F
Test probes	1	94-2A
Foot switch	1	94-2D
Warning lights	1	F9-2C
Calibration	1	F1-1A E99
Test mobile	1	T0-1T Z10

High-voltage testing devices from Elabo have been in demanding daily use for many years. One of the reasons is: we consistently support our customers throughout all stages of the test process.
Starting with determination of requirements, selection of the appropriate device and supplementary accessories and extending to calibration of the entire system.

Elabo – the partner for practical complete solutions

Requirement:

Integration of a high-voltage testing device in an automatic system. We offer our partners (OEM) tailored solutions for typical automatic use. You will find other useful components such as plug connectors and relays in our range of accessories.

Description	Number	Article no.
High-voltage test device 5,000 VAC	1	F1-1M
High-voltage cable	1	94-2B
Warning lights	1	94-2C
Software	1	F9-9A
Calibration	1	F1-1A E99

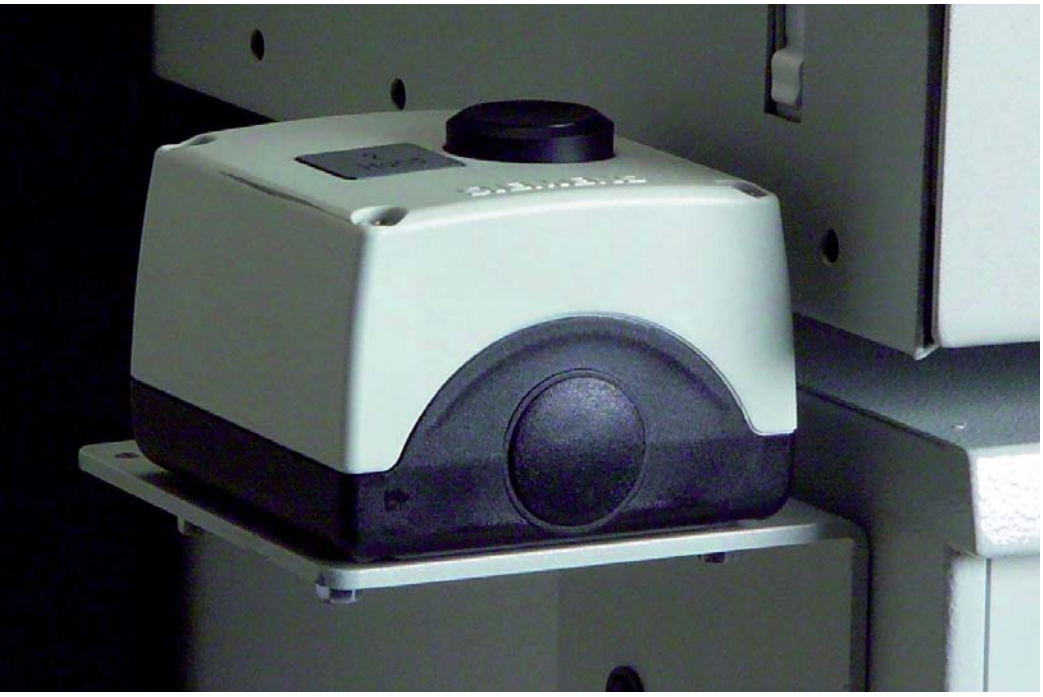
Requirement:

Setup of a high-voltage test bench with compulsory protection against contact. In combination with our test cages, ready-to-plug-in solutions can be produced that increase operating safety to a maximum.

Description	Number	Article no.
High-voltage test device	1	F1-1A
Housing	1	93-1B
Guide rails	1	93-1F
Test chamber	1	94-3A

High-voltage accessories

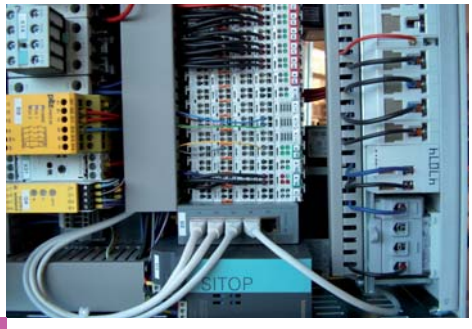
Made-to-measure additional solutions

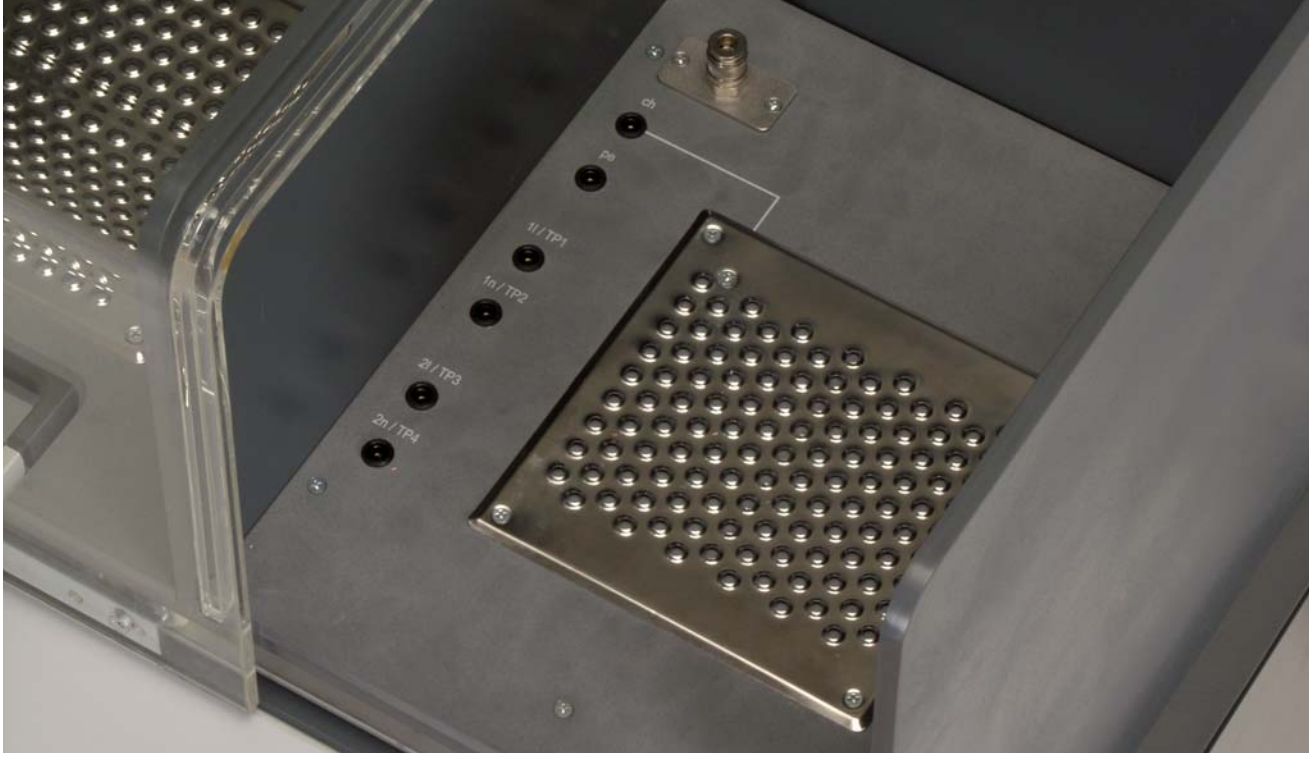


Elabo – complete
There are often very wide differences in the requirements to be met. All must always be fulfilled as closely as possible. This is why we offer you a comprehensive range of accessories with which you can be sure of being equipped for all purposes.

Elabo – extendable
Our products are designed and constructed in such a way that all devices can also be extended at a later date. The advantage to you: investments are only made when actually required.

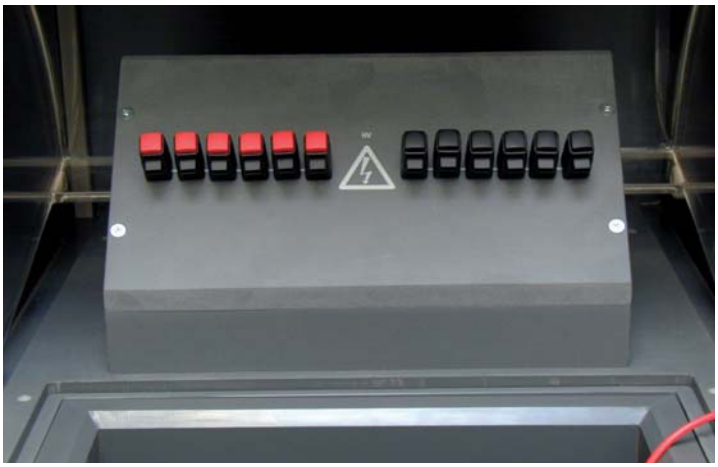
Elabo – individual
Can't find what you need?
Simply ask us!
We will then also offer you products that meet your specific requirements.





Elabo – safety
Safety always occupies a paramount position in high-voltage testing: above all for the user. This is why we offer you the accessories required so that the test process can always be performed in absolute safety.

Elabo – details
It is not only in our test devices that we pay attention to fine details, e.g. on installation of optical fibres in test devices for interference-free signal transmission. We take care that you always obtain the best for our accessories too.



Accessories for high-voltage test devices

High-voltage test probes

Elabo safety test probes with high-voltage cable and special high-voltage plug connectors.
The test probes are authorised for a voltage of 8 kV AC/10 kV DC. Consequently, we have provided other connector sockets on the test devices with a higher output voltage. All test probes can also be obtained as single items.

Technical data	for device type	Article no.
Cable length: 2 m, 2 items	F1-1A, F1-1B, F1-1M, F1-1N	94-2A
Cable length: 4 m, 2 items	F1-1A, F1-1B, F1-1M, F1-1N	94-2A Z04m
Cable length: 6 m, 2 items	F1-1A, F1-1B, F1-1M, F1-1N	94-2A Z06m

Connecting cables

Elabo high-voltage connecting cables with special high-voltage plug connectors. Different connector sockets are incorporated in the devices depending on the device version. Please therefore observe the "For device type" column when selecting.

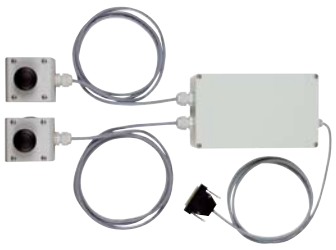
Technical data	for device type	Article no.
Cable length: 2 m, 2 items	F1-1A, F1-1B, F1-1M, F1-1N	94-2B
Cable length: 4 m, 2 items	F1-1A, F1-1B, F1-1M, F1-1N	94-2B Z04m
Cable length: 6 m, 2 items	F1-1A, F1-1B, F1-1M, F1-1N	94-2B Z06m
Cable length: 10 m, 2 items	F1-1A, F1-1B, F1-1M, F1-1N	94-2B Z10m
Cable length: 2.5 m, 2 items	F1-1C, F1-1P	94-2B ZF1-1C
Cable length: 2.5 m, 2 items	F1-1D, F1-1Q	94-2B ZF1-1D

Warning lights

According to EN50191, identification of risks at the test bench is indispensable. The Elabo warning lights can be connected to all test devices and therefore indicate the danger spot.

Technical data	for device type	Article no.
Tabletop housing with connector plug, cable length: 2.5 m	All types	94-2C
Signal column with magnetic foot and connector plug, cable length: 2.5 m	All types	F9-1A

Two-hand control



According to EN50191, use of a two-hand control according to EN 574 type IIIC and EN 354-1 at the test bench is indispensable when using fixed connected test conductors. The safety two-hand relay consists of an analysis unit and two separate pushbuttons. The unit can be directly connected to Elabo high-voltage test devices.

Technical data	for device type	Article no.
Analysis unit with connector plug and two connected operating buttons, supply lead length: 2.5 m	All types	94-2L

Foot switch

If a high-voltage test is conducted with two test probes it is ergonomic to run the test using a foot switch. Safe contact with the object to be tested is initially established and only then is the test started.

Technical data	for device type	Article no.
Sturdy foot switch with connector plug, supply lead 2.5 m	All types	94-2D

Cordon

According to EN50191, the test bench is to be delimited from other workplaces and passages, etc. This serves primarily to protect the user and the latter's surroundings. Elabo cordoning posts with the corresponding plastic chain allow flexible test bench setup.

Technical data		Article no.
Cordoning posts, plastic material, red/white with sturdy stand, height 1.1 m		94-2H
PVC link chain, red/white, for cordoning off the test bench and hanging on cordoning posts. Please indicate required length		94-2F

Warning sign

According to EN50191, warning signs are to be displayed at the test bench. Warning sign, yellow, with black print according to DIN 40 008 part 3 with supplement part 3. Required for test installations with voltages higher than 1 kV.

Technical data		Article no.
Plastic warning sign according to DIN 40008 Dimensions: 240 x 200 mm		94-2E
PVC glue-on warning sign according to DIN 40008 Dimensions: 120 x 100 mm		94-2F

Prohibition sign

A prohibition sign is to be displayed at the accesses to test fields or electrical switchgear if no adequate protection against direct or indirect contact of life-threatening voltage potentials exists.

Technical data		Article no.
Prohibition sign, round, in PVC film, self-adhesive, according to DIN 40 008 part 2, diameter 200 mm		94-2D

Accessories for high-voltage test devices

Housing

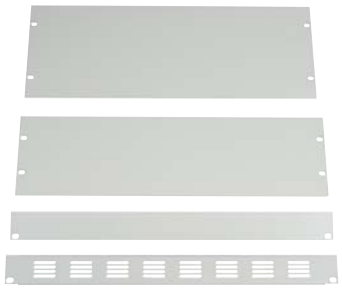
Drawer housings make the 19" drawer devices easy-to-handle modules. Guide rails and blank plates supplement the housings to suit requirements.
Sturdy powder-coated steel sheeting housing with folding carrying handles.
The housing does not have a back panel and therefore the original back panel of the inserted device is directly accessible.

Technical data	Article no.
19"/4 HU drawer housing	93-1B
19"/6 HU	93-1C
19"/8 HU	93-1D
19"/12 HU	93-1E

Guide rails

Technical data	Article no.
1 pair of guide rails Length 340 mm for steel sheeting housing 390 mm deep. Made of chrome-plated steel sheeting, including fixings. A set of guide rails is necessary for each drawer.	93-1F

Blank plates



Technical data	Article no.
Elabo blank plate 19"/1 HU RAL 7035 3 mm aluminium	51-1A
19"/1 HU with ventilation slots	51-1L
19"/2 HU	51-1B
19"/3 HU	51-1C
19"/4 HU	51-1E
19"/6HU	51-1D
19"/8HU	51-1F

Test mobile

Elabo offers a comprehensive range of test mobiles for every application.
The modular system allows design of the mobile unit to suit needs.
The following design represents a specimen configuration.

Technical data	Article no.
Elabo test mobile to receive 19" test devices and the corresponding accessories. Equipment: TaMo basic mobile 1100 mm - drawer element - support shelf - storage element - High-voltage test probe holder - cable holder The illustrated test device, test probes and housing must be ordered separately	T0-1T Z10

You can send for our current TaMo catalogue directly at the tel. no. + 49 7951 307-0.

Test chamber

Elabo test chambers guarantee maximum user protection. This makes it possible to set up a "test bench with compulsory protection against contact".
The connected high-voltage test device is not started until the test hood is safely closed.
The chambers are suitable for tests of up to 8000 VAC and 12000 VDC.

Technical data	Article no.
High-voltage test chamber with manually pivoting acrylic glass protective hood. Contacting with the test device is established by means of a high-voltage cable approx. 2 m long with a special plug connector and a control lead. Installation space is available in the base structure for additional built-in components such as a switching matrix. A German Schuko socket, safety laboratory sockets and an earth plate are incorporated for contacting of the test piece. Overall internal dimensions: D = 590 mm; W = 480 mm; H = 280 mm Optionally available: - other dimensions - alternative drawer - test piece contactings - "empty" version	94-3A
800 mm wide	94-3A ZB 800
1000 mm wide	94-3A ZB1000

Accessories for high-voltage test devices

Test chamber

Technical data	Article no.
High-voltage test chamber with vertical, pneumatically operated protective hood. A start button (closing of the protective hood and start of testing) in addition to a reset button (error acknowledgement) are incorporated in the front. Contacting with the test device is established by means of a high-voltage cable approx. 2 m long with a special plug connector and a control lead. A maintenance unit with a compressed-air connection (5 bars) is incorporated in the rear. Installation space is available in the base structure for additional built-in components such as a switching matrix. Overall internal dimensions: D = 490 mm; W = 480 mm; H = 400 mm Optionally available: - other dimensions - drawer - test piece contactings	94-3B

Technical data	Article no.
Double test chamber for operation on alternate sides with movable protective hood. Owing to the two chambers, it is possible to change the test piece in the second chamber while the test runs in the first. This results in very short cycle times. Contacting with the test device is established by means of a high-voltage cable approx. 2 m long with a special plug connector and a control lead. Installation space is available in the base structure and at the rear for additional built-in components such as a switching matrix. Overall internal dimensions per chamber: D = 380 mm; W = 324 mm; H = 200 mm Optionally available: - other dimensions - test piece contactings - hood locking - exchange adapter system Execution according to specifications!	94-3C Z

High-voltage relay

For construction of switching units, special switching elements must be used for this purpose

Technical data	Article no.
High-voltage relay with two changeover contacts Max. switching voltage 5 kV Max. switching current 10A max. switching output 5000 VA Coil voltage 24 VDC	94-2T
High-voltage relay with NO contact Max. switching voltage 5 kV Max. switching current 10A Max. switching output 5000 VA Coil voltage 24 VDC	94-2S
Conductor card with four high-voltage reed relays Max. switching voltage 10kV Max. switching current 3A Max. switching output 50VA Coil voltage 24 VDC Board also available with one or two relays	94-2U

High-voltage plug connection

For establishment of plug connections, plug elements designed for this purpose must be used.

Technical data	Article no.
Robust 5-pole high-voltage plug connection for voltages of up to 15 KV eff. with a current carrying capacity of up to 25 A	94-2N
7-pole version	94-2N Z002
9-pole version	94-2Q

Mounting socket

Technical data	Article no.
5-pole high-voltage integrated socket for voltages of up to 15 kV eff., current carrying capacity up to 25A	94-2P
7-pole version	94-2P Z002
9-pole version	94-2R

Base load resistor

For contact monitoring by means of base current and for dummy testing, special high-voltage resistors are necessary.

Technical data	Article no.
Cast base load resistor with free cable ends. Resistance value: 1 MOhm Output: 10W Versions with modified resistance and output values available.	94-2M

Calibration and other services

The process is by no means complete once a product from Elabo has been delivered.
Comprehensive services round off the range of facilities provided by Elabo.

Range of services:
- works calibration of the devices on site or at Elabo
- maintenance and customer service
- telephone consultancy
- spare parts service
- BGV A3 inspections

Elabo service hotline
Tel.: +49 07951 / 307 202
Fax: +49 07951 / 307 67
Email: service@elabo.de

Combination test devices

Flawless safety and function

Combination test devices

A large number of different standards must be fulfilled in order to provide proof of product safety. In most cases, these involve performance of several safety tests. A protective earth conductor resistance measurement in addition to the high voltage test is generally required. In addition, appropriate insulating resistance and leakage current measurements are often called for.

The Elabo product range is perfectly adapted to the various different requirements and offers a wide selection of the most diverse devices and additional modules. Elabo makes it possible – all requirements can be optimally fulfilled with a single test device.

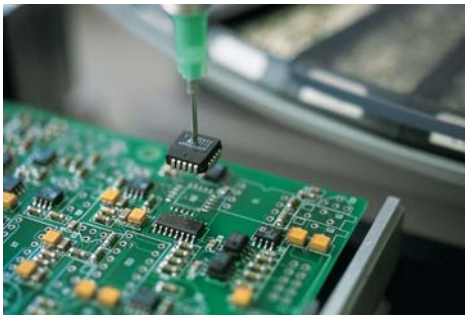
Elabo – a guarantee of reproducible and always absolutely reliable test systems compliant with standards.

Protective earth conductor resistance measurement

The principle of protective earth conductor resistance measurement on products of protection class 1 is extremely simple. From a PELV current source (usually 6 or 12 VAC open-circuit voltage), a current is conducted from the protective earth conductor connection to all contactable metal parts. The resistance is determined based on the voltage drop and the flowing current. Typical limit values are between 100 and 200 mOhm. Other limit values are introduced however depending on the product to be tested. Owing to the low test voltage, no additional safety equipment are necessary during the protective earth conductor test.

Insulation resistance measurement

Insulation resistance measurement assesses the pure effective percentage resistance of insulation. A DC voltage of 500 V is mostly used as the test voltage, which is applied between active and non-active parts of the test piece. The prevailing limit values are mostly within the range of 1 .. 100 mOhm.



High-voltage testing

High-voltage testing serves for verification of the insulation resistance and voltage endurance on devices, machines, components and insulating materials. During the test process, voltages are applied to the test pieces that do not arise during use as intended.

During high-voltage testing, changes in materials such as deteriorating insulating properties for example in addition to faults during processing (e.g. loose terminal clamps or damaged insulation) are detected. Furthermore, proper dimensioning of air gaps and creepage paths in addition to selection of the suitable insulating materials is verified.

Common test voltages lie within the range of 1000 – 2500 V, but may however exceed 10,000 V in specific cases.
High-voltage testing involves considerable risks for the operators. Consequently, it is essential to observe safety precautions, as stipulated in EN 50191(VDE0104) for example.

Elabo offers a comprehensive range of accessories in order to guarantee user protection.

Whether as a single workstation solution or a partly or fully automated test system. In the workshop, in the laboratory or in serial production. Elabo test devices are markedly superior through their widespread and flexible versatility.
All test devices are already equipped in the basic version for the majority of applications and can also be subsequently adapted by appropriate add-on modules to modified and extended requirements.

Elabo – always solutions with a secure future

Sensible design

Versatile in use – robust construction – optimum user-friendliness

Interfaces

Whether via RS232-C or alternatively via Ethernet or USB. The remote controllability of the components allows flexible integration in control systems. The digital I/O interface couples the system to external accessories.

Variants

Two different versions make it possible to achieve the system configuration optimally tailored to the application. Various different accessory modules are available for direct connection to the devices, depending on the purpose.

Service-friendliness

Devices can be replaced in next to no time. Plug connections allow uncomplicated maintenance and calibration.

19" drawer technology

Modularity and versatile use. Systematic execution with 19" drawer technology makes all components universally usable, in a rack or housing. Sturdy handles facilitate handling.

Electronic voltage source

Wear-free voltage setting. Rapid, precise and variable. Parameterisable ramp slopes. Different triggering modes.

TouchMe –
maximum ease of operation

For manual use of the test devices, versions with an ergonomically operated 6.5" touch display are available. An embedded system under Windows CE® forms the core component of this technology.

Interference resistance

Voltages up to 6000 VAC and 8000 VDC. In order to guarantee the highest possible level of interference resistance, optical fibres ensure reliable signal transmission in the device.

Sturdy and robust

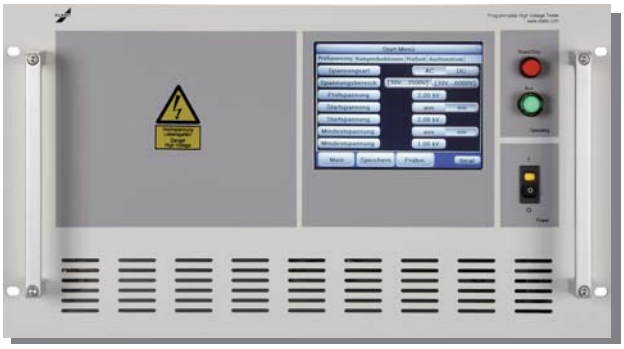
The systematic metal housing design guarantees robustness of the devices. During demanding industrial use, this ensures a long service life and guarantees profitability of the investment.

Access blocking

Parameterisable password levels guarantee effective access protection. Only authorised users can operate the device after switching on.

Test devices and extension modules

Technical data	**F7-1A / F7-1M**
High voltage:	100 .. 2,500 VAC
	200 .. 5,000 VAC
	200 .. 3,000 VDC (option)
	300 .. 6,000 VDC (option)
Protective earth conductor:	0 .. 1.2 Ohms
	6 or 12 VAC
	10 .. 32 A
Interface:	RS 232-C
Mains voltage:	230 V / +/- 10 % / 49 .. 61 Hz
Size:	19“ / 6 HU
Weight:	32 kg



Front view F7-1A

Front view F7-1M

Rear view F7-1A; F7-1M

Modular combination test device
PE / IS / HV with integrated switching field

Depending on the version and equipment status, these devices with an integrated switching field allow configuration of a compact test system for manual and automated protective earth conductor and insulation resistance measurement in addition to high-voltage testing on systems, subassemblies or components.
The system is rounded off by accessories especially configurable for this version.
Please ask for our product datasheet for detailed technical data.

	Description	**Size**	**Article no.**
Combination tester	Incl. TouchMe control unit and integrated switching field	19“/6HU	F7-1A
Combination tester	for automatic use and integrated switching field	19“/6HU	F7-1M

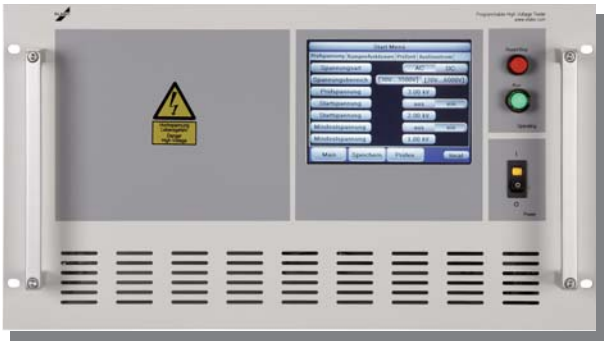
Extension modules for the test devices

	Technical data	**For device type**	**Article no.**
DC voltage	Test voltage: 200 .. 3,000 / 6,000 VDC Tripping current: 0 .. 1 / 10 / 100 mA	F7-1A, F7-1M	F7-1A E01
Insulation resistance	Measurement range: 0 .. 1 / 10 / 100 MΩ	F7-1A, F7-1M	F7-1A E02
Safety current limitation	< 3 mA for AC; < 5 mA for DC	F7-1A, F7-1M	F7-1A E03
Voltage feedback	The module allows a four-wire measurement by feedback of the test voltage. Two high-voltage sockets are additionally incorporated in the back panel of the device.	F7-1A, F7-1M	F7-1A E04
Burn-Mode	Current tripping can be deactivated for troubleshooting.	F7-1A, F7-1M	F7-1A E05
Digital additional outputs	Six additional digital outputs for activation of an external switching matrix.	F7-1A, F7-1M	F7-1A E06
Ethernet	Alternative interface to RS232-C	F7-1A, F7-1M	F7-1A E10
USB	Alternative interface to RS232-C	F7-1A, F7-1M	F7-1A E12
Software package	EHP control software package	F7-1A, F7-1M	F9-9A
Device driver	On request		
Calibration	Supplied with Elabo works calibration protocol	F7-1A, F7-1M	F7-1A E99

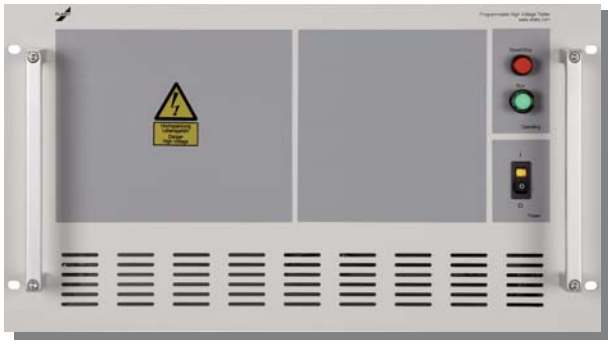
For description of the accessories, please refer to the description on page 36 onwards.
Also note our configuration examples on page 34 onwards.

Test devices and extension modules

Technical data	**F7-1B / F7-1N**
High voltage:	100 .. 2,500 VAC
	200 .. 5,000 VAC
	200 .. 3,000 VDC (option)
	300 .. 6,000 VDC (option)
Protective earth	0 .. 1.2 Ohms
conductor:	6 or 12 VAC
	10 .. 32 A
Interface:	RS 232-C
Mains voltage:	230 V / +/- 10 % / 49 .. 61 Hz
Size:	19“ / 6 HU
Weight:	30 kg



Front view F7-1B



Front view F7-1N

Modular combination test device
PE / IS / HV

Depending on the version and equipment status, this device version allows configuration of a test system for manual and automated protective earth conductor and insulation resistance measurement in addition to high voltage testing on systems, subassemblies or components. Extension modules for switching or for integration of supplementary tests are additionally required for this version.
Please ask for our product datasheet for detailed technical data.

Rear view F7-1B; F7-1N

	Description	**Size**	**Article no.**
Combination tester	Incl. TouchMe control unit	19“/6HU	F7-1B
Combination tester	for automatic use	19“/6HU	F7-1N

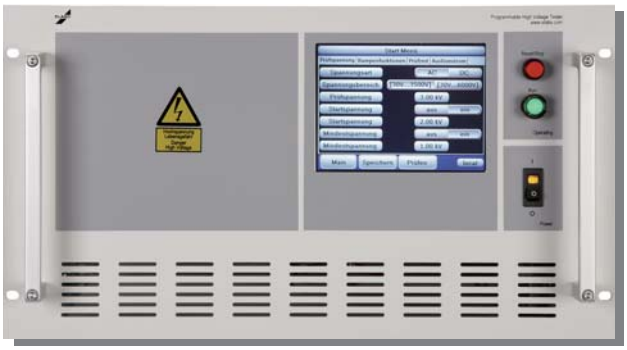
Extension modules for the test devices

	Technical data	**For device type**	**Article no.**
DC voltage	Test voltage: 200 .. 3,000 / 6,000 VDC Tripping current: 0 .. 1 / 10 / 100 mA	F7-1B, F7-1N	F7-1B E01
Insulation resistance	Measurement range: 0 .. 1 / 10 / 100 MΩ	F7-1B, F7-1N	F7-1B E02
Safety current limitation	< 3 mA for AC; < 5 mA for DC	F7-1B, F7-1N	F7-1B E03
Voltage feedback	The module allows a four-wire measurement by feedback of the test voltage. Two high voltage sockets are additionally incorporated in the back panel of the device.	F7-1B, F7-1N	F7-1B E04
Burn-Mode	Current tripping can be deactivated for troubleshooting.	F7-1B, F7-1N	F7-1B E05
Digital additional outputs	Six additional digital outputs for activation of an external switching matrix.	F7-1B, F7-1N	F7-1B E06
Ethernet	Alternative interface to RS232-C	F7-1B, F7-1N	F7-1B E10
USB	Alternative interface to RS232-C	F7-1B, F7-1N	F7-1B E12
Software package	EHP control software package	F7-1B, F7-1N	F9-9A
Device driver	On request		
Calibration	Supplied with Elabo works calibration protocol	F7-1B, F7-1N	F7-1B E99

For description of the accessories, please refer to the description on page 36 onwards.
Also note our configuration examples on page 34 onwards.

Test devices and extension modules

Technical data	**F7-1C / F7-1P**
High voltage:	100 .. 3,000 VAC
	200 .. 6,000 VAC
	100 .. 4,000 VDC (option)
	200 .. 8,000 VDC (option)
Protective earth	0 .. 1.2 Ohms
conductor:	6 or 12 VAC
	10 .. 32 A
Interface:	RS 232-C
Mains voltage:	230 V / +/- 10 % / 49 .. 61 Hz
Size:	19“ / 6 HU
Weight:	38 kg



Front view F7-1C

Front view F7-1P

Rear view F7-1C; F7-1P

Modular combination test device
PE / IS / HV (externally synchronisable)

Depending on the version and equipment status, this device version allows configuration of a test system for manual and automated protective earth conductor and insulation resistance measurement in addition to high voltage testing on systems, subassemblies or components. Extension modules for switching or for integration of supplementary tests are additionally required for this version.
Please ask for our product datasheet for detailed technical data.

	Description	**Size**	**Article no.**
Combination tester	Incl. TouchMe control unit	19“/6HU	F7-1C
Combination tester	for automatic use	19“/6HU	F7-1P

Extension modules for the test devices

	Technical data	**For device type**	**Article no.**
DC voltage	Test voltage: 100 .. 4,000 / 8,000 VDC Tripping current: 0 .. 1 / 10 / 100 mA	F7-1C, F7-1P	F7-1C E01
Insulation resistance	Measurement range: 0 .. 1 / 10 / 100 MΩ	F7-1C, F7-1P	F7-1C E02
Safety current limitation	< 3 mA for AC; < 5 mA for DC	F7-1C, F7-1P	F7-1C E03
Voltage readback	The module allows a four-wire measurement by feedback of the test voltage. Two high voltage sockets are additionally incorporated in the back panel of the device.	F7-1C, F7-1P	F7-1C E04
Burn-Mode	Current tripping can be deactivated for troubleshooting.	F7-1C, F7-1P	F7-1C E05
Digital additional outputs	Six additional digital outputs for activation of an external switching matrix.	F7-1C, F7-1P	F7-1C E06
Ethernet	Alternative interface to RS232-C	F7-1C, F7-1P	F7-1C E10
USB	Alternative interface to RS232-C	F7-1C, F7-1P	F7-1C E12
Software package	EHP control software package	F7-1C, F7-1P	F9-9A
Device driver	On request		
Calibration	Supplied with Elabo works calibration protocol	F7-1C, F7-1P	F7-1C E99

For description of the accessories, please refer to the description on page 36 onwards.
Also note our configuration examples on page 34 onwards.

Device overview and technical data

Device	F7-1A	F7-1B	F7-1C	F7-1M	F7-1N	F7-1P
Application fields						
Automatic use	●	●	●	●	●	●
Manual use	●	●	●			
Operation						
Touch Display 6.5″	●	●	●			
Interface	●	●	●	●	●	●
Start button	●	●	●			
Reset button	●	●	●	●	●	●
Interfaces						
RS 232-C	●	●	●	●	●	●
Ethernet	○	○	○	○	○	○
USB	○	○	○	○	○	○
USB accessory interface	●	●	●			
Digital interface 1	●	●	●	●	●	●
Digital interface 2	○	○	○	○	○	○
2 safety circuits	●	●	●	●	●	●
Connections						
1 HV test probe, rear	●			●		
PE test probe, rear	●			●		
System plug connector, rear	●			●		
2 HV test probes, rear		●	●		●	●
PE measurement sockets, rear		●	●		●	●
Voltage feedback, rear		○	○		○	○
Mains synchronisation input			●			●
Warning lights	●	●	●	●	●	●
Non-heating apparatus socket	●	●	●	●	●	●
Measurement types						
High voltage AC	●	●	●	●	●	●
High voltage DC[2]	○	○	○	○	○	○
Protective earth conductor resistance measurement	●	●	●	●	●	●
Insulation resistance measurement[2]	○	○	○	○	○	○
Power measurement[2]	○	○	○	○	○	○
Current measurement[2]	○	○	○	○	○	○
Voltage measurement[2]	○	○	○	○	○	○
Leakage current measurement[2]		○	○		○	○
Continuity test[2]		○	○		○	○
Resistance measurement[2]		○	○		○	○
Current limitation (EN50191) [1, 2]	○	○		○	○	
Burn-Mode (deact. Tripping) [1, 2]	○	○		○	○	
Voltage feedback[2]	○	○		○	○	

● Standard ○ Option [1] Cannot be combined [2] Extension module required

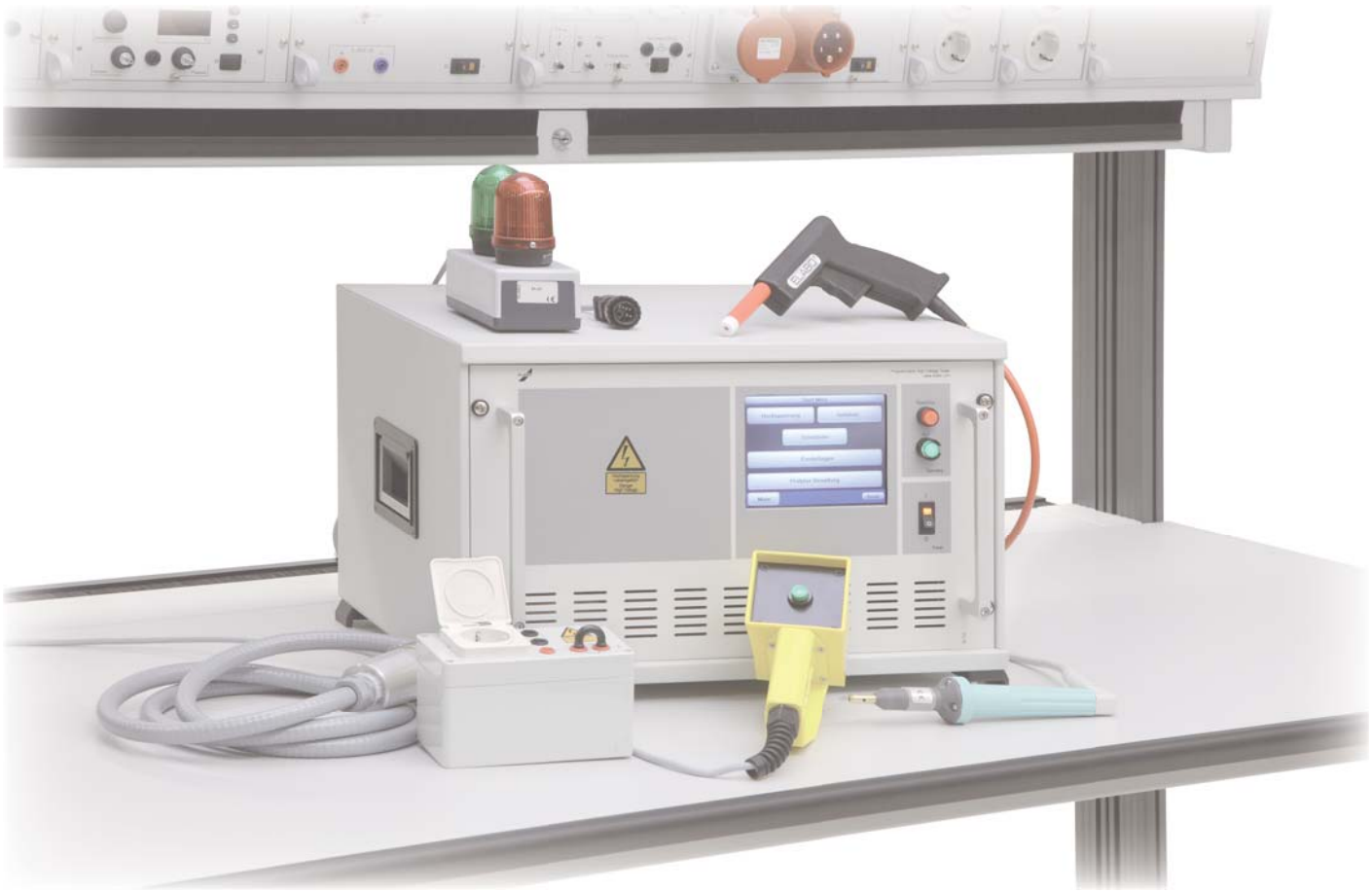
Device overview and technical data

Device		F7-1A	F7-1B	F7-1C	F7-1M	F7-1N	F7-1P
High voltage							
Test voltage AC1		100 .. 2.500 V	100 .. 2.500 V	100 .. 3.000 V	100 .. 2.500 V	100 .. 2.500 V	100 .. 3.000 V
Test voltage AC2		200 .. 5.000 V	200 .. 5.000 V	200 .. 6.000 V	200 .. 5.000 V	200 .. 5.000 V	200 .. 6.000 V
Test voltage DC1[2]		200 .. 3.000 V	200 .. 3.000 V	100 .. 4.000 V	200 .. 3.000 V	200 .. 3.000 V	100 .. 4.000 V
Test voltage DC2[2]		300 .. 6.000 V	300 .. 6.000 V	200 .. 8.000 V	300 .. 6.000 V	300 .. 6.000 V	200 .. 8.000 V
Residual ripple DC[2]		< 3 % with R > 3MΩ	< 3 % with R > 3MΩ	< 3 % with R > 250 kΩ	< 3 % with R > 3MΩ	< 3 % with R > 3MΩ	< 3 % with R > 250 kΩ
Positioning speed for ramp		10 .. 3.500 V/s					
Output frequency mains synchronous		●	●	●	●	●	●
Output frequency synthetic				●			●
Output frequency extern. synchronised				●			●
Adjustment inaccuracy		Typ. 10 V					
Accuracy, voltage		0,5% of rdg. ± 2digit					
Current ranges							
Measurement range 1 / resolution		0 .. 100,0 mA /100µA					
Measurement range 2 / resolution		0 .. 10,00 mA / 10 µA					
Measurement range 3 / resolution		0 .. 1,000 mA / 1 µA					
Current tripping		Active current Apparent current Crest value Delta I					
Accuracy Apparent current	measurement range 1	0,5 % of rdg. +/- 2 digit					
	measurement range 2	0,5 % of rdg. +/- 5 digit					
	measurement range 3	0,5 % of rdg. +/- 20 digit					
Accuracy Peak value	measurement range 1	1,0 % of rdg. +/- 5 digit					
	measurement range 2	1,0 % of rdg. +/- 5 digit					
	measurement range 3	1,0 % of rdg. +/- 20 digit					
Accuracy Active current	measurement range 1	1,0 % of rdg. +/- 8 digit					
	measurement range 2	1,0 % of rdg. +/- 8 digit					
	measurement range 3	1,0 % of rdg. +/- 20 digit					
Accuracy DC	measurement range 1[2]	0,5 % of rdg. +/- 2 digit					
	measurement range 2[2]	0,5 % of rdg. +/- 2 digit					
	measurement range 3[2]	0,5 % of rdg. +/- 2 digit					
Protective earth conductor resistance measurement							
Test voltage		6 / 12 VAC					
Test current		10 .. 32 A					
Measurement range resistance		0 .. 1,2 Ω					
Measurement range Voltage drop		0 .. 12 V					
Measurement method		Four-wire measurement					
Resolution, resistance		0,001 Ω					
Accuracy		1 % of rdg. +/- 3 digit					
Insulation resistance measurement							
Test voltage DC 1[2]		200 .. 3.000 V	200 .. 3.000 V	100 .. 4.000 V	200 .. 3.000 V	200 .. 3.000 V	100 .. 4.000 V
Test voltage DC 2[2]		300 .. 6.000 V	300 .. 6.000 V	200 .. 8.000 V	300 .. 6.000 V	300 .. 6.000 V	200 .. 8.000 V
Measurement range 1 / resolution [2]		0,03 .. 1,00 MΩ / 10 kΩ					
Measurement range 2 / resolution [2]		0,3 .. 10,0 MΩ / 100 kΩ					
Measurement range 3 / resolution [2]		3 .. 100 MΩ / 1 MΩ					
Accuracy at 500 V[2]		3% v.M. ± 1digit					
Accuracy at 1000 V[2]		1% v.M. ± 1digit					

[2] Extension module required

Device	F7-1A	F7-1B	F7-1C	F7-1M	F7-1N	F7-1P
Technical main data						
Nominal power	500 VA					
Short-circuit current	>200 mA					
Mains voltage	230 V +/- 10%					
Mains frequency	49 .. 61 Hz					
Dimensions	19“ / 6 HU Depth 360 mm					
Weight	32 kg	30 kg	38 kg	31 kg	29 kg	37 kg
Permissible relative humidity	25 .. 75 % rel.					
Operating temperature	10 .. 50 °C					
Test time	0.1 ... 999.9 sec. / constant testing					
Burn-Mode current[2]	approx. 200 mA	approx. 200 mA	approx. 200 mA	approx. 200 mA	approx. 200 mA	approx. 200 mA
Feedback threshold[2]						
External extension modules						
Current measurement[2]	On request					
Voltage measurement[2]	On request					
Power measurement[2]	On request					
Leakage current measurement[2]		On request	On request		On request	On request
Continuity test[2]		On request	On request		On request	On request
Resistance measurement[2]		On request	On request		On request	On request
Other test types[2]		On request	On request		On request	On request

[2] Extension module required



Convincing performance
in practical use

Requirement:
Setup of a PE / IS / HV test bench for manual testing. This example shows a typical configuration for this application. Device components and accessories tailored to needs ideally complement each other.

Description	Number	Article no.
Combination tester incl. switching field	1	F7-1A
DC extension module	1	F7-1A E01
IS extension module	1	F7-1A E02
Housing 19" / 6 HU	1	93-1C
Guide rail set	1	93-1F
High-voltage test probes, 1 x 6 m cable length	1	94-2A Z06
Protectiv earth conductor probe 6 m cable length	1	94-4S Z06
Manual start button 6 m cable length	1	94-2W
Connection box 2.5 m cable length	1	F9-7A
Warning lights, tabletop housing 1	1	94-2C

Requirement:
Integration of a combination tester in an automatic system. We offer our partners (OEM) tailored solutions for typical automatic use. You will find other useful components such as plug connectors and relays in our range of accessories.

Description	Number	Article no.
Combination tester incl. switching field	1	F7-1M
Warning lights, column version	1	F9-1A
System plug connector	1	94-2N Z002
Software	1	F9-9A
Calibration	1	F7-1A Z99

Requirement:
Setup of a PE / HV test bench with compulsory protection against contact. In combination with our test chambers, ready-to-plug-in solutions can be produced that increase operating safety to a maximum.

Description	Number	Article no.
Combination tester incl. switching field	1	F7-1A
Housing	1	93-1C
Guide rails	1	93-1F
Test chamber with pivoting protective hood	1	94-3A ZF01

Requirement:
Setup of a computer-controlled mobile test system with integrated safety and functional testing. The system deployment site is highly flexible in combination with our mobile range.

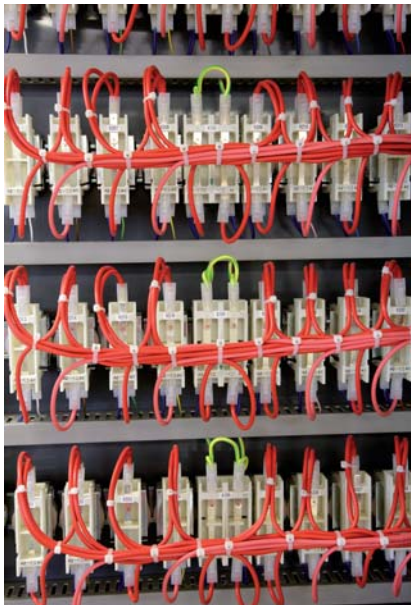
Description	Number	Article no.
Combination tester	1	F7-1N
DC extension module	1	F7-1B E01
IS extension module	1	F7-1B E02
Ethernet extension module	1	F7-1B E10
System drawer	1	F9-7M
Measurement extension module for functionality test	1	F9-7M E11
Housing	1	93-2E
Guide rail set	2	93-2F
Protective earth conductor probe	1	94-4S Z06
Two-hand operation for test mobile	1	F9-1L
Test mobile	1	T0-1T Z11
Panel PC	1	95-1C Z
Keyboard	1	95-1T
Software package	1	99-9A
Warning lights, column version	1	F9-1A
Label printer	1	95-1X Z001

Combination devices – accessories

Made-to-measure additional solutions

Elabo – complete
There are often very wide differences in the requirements to be met. All must always be fulfilled as closely as possible however. This is why we offer you a comprehensive range of accessories with which you can be sure of being equipped for all purposes.

Elabo – extendable
Our products are designed and constructed in such a way that all devices can also be extended at a later date. The advantage to you: investments are only made when actually required.



Elabo – individual
Can't find what you need?
Simply ask us!
We will then also offer you products that meet your specific requirements.

Elabo – details
It is not only in our test devices that we pay attention to fine details, e.g. on installation of optical fibres in test devices for interference-free signal transmission. We take care that you always obtain the best for our accessories too.

Elabo – safety
Safety always occupies a paramount position in high voltage testing: above all for the user. This is why we offer you the accessories required so that the test process can always be performed in absolute safety.

Accessories for combination test devises with switching field F7-1A/F7-1M

High-voltage test probe

Elabo safety test probes with high-voltage cable and special high-voltage plug connector. The test probes are authorised for a voltage of 8 kV AC/10 kV DC. If the test device is operated with an adapter cable, a test probe and a manual start button are additionally required.

Technical data	For device type	Article no.
Cable length: 2 m, 1 item	F7-1A, F7-1M	94-2A Z02m-1Stk
Cable length: 4 m, 1 item	F7-1A, F7-1M	94-2A Z04m-1Stk
Cable length: 6 m, 1 item	F7-1A, F7-1M	94-2A Z06

Protective earth conductor test probe

The test probe is used for adaptation of the test object for protective earth conductor resistance measurement. The test is automatically started upon pressing in the tip. Version with sensor lead for four-wire measurement.

Technical data	For device type	Article no.
Cable length: 2 m, 1 item	F7-1A, F7-1M	94-4S
Cable length: 4 m, 1 item	F7-1A, F7-1M	94-4S Z04m
Cable length: 6 m, 1 item	F7-1A, F7-1M	94-4S Z06

Warning lights

According to EN50191, identification of risks at the test bench is indispensable. The Elabo warning lights can be connected to all test devices and therefore indicate the danger spot.

Technical data	For device type	Article no.
Tabletop housing with connector plug, cable length: 2.5 m	All types	94-2C
Signal column with magnetic foot and connector plug, cable length: 2.5 m	All types	F9-1A

Manual start button

Manual start button for initiation of high-voltage and insulation resistance testing in combination with a test probe and an adapter cable for the PE. Supplied with connection cable (approx. 6 m), wall holder and plug connector for connection to the test device.

Technical data	For device type	Article no.
Cable length: 6 m, 1 item	F7-1A, F7-1M	94-2W

Two-hand control

Two-hand control relay for initiation of the high-voltage and insulation resistance test in combination with a connection box or an all-pole adapter cable. Pursuant to the safety regulations according to EN574 type IIIC, EN954-1 and EN60204-1. The unit serves to safely configure workstations. The unit can be directly connected to the combination testers.
Supplied complete incl. two pushbutton modules

Technical data	For device type	Article no.
Analysis unit with connector plug and two connected operating buttons, cable length: 2.5 m	F7-1A, F7-1M	94-2L
Installation set for TaMo test mobiles	T0-1T Z11, T0-1T Z12	T3-6G

Adapter box

Connection box with 7-pole system plug-in connector for connection of the test piece to the test device. Version with German Schuko socket and safety laboratory sockets. Usually in combination with two-hand control and a PE test probe. Other cable lengths / versions on request.

Technical data	For device type	Article no.
Cable length, 2.5 m	F7-1A, F7-1M	F9-7A

PE adapter cable

Connecting cable with 7-pole plug connector for connecting the test piece to the test device. Usually in combination with a HV test probe or a PE test probe. Two-pole version for adaptation of the protective earth conductor according to the four-conductor measurement principle. Other cable lengths / versions on request.

Technical data	For device type	Article no.
Cable length, 6 m	F7-1A, F7-1M	F9-7D

All-pole adapter cable

Connecting cable with 7-pole plug connector for connecting the test piece to the test device. Usually in combination with two-hand control. Five-pole version for two-side adaptation of the protective earth conductor according to the four-wire measurement and the mains side. Other cable lengths / versions on request.

Technical data	For device type	Article no.
Cable length, 6 m	F7-1A, F7-1M	F9-7E

Connector

7-pole system plug connector for connecting the test device to external adapters. Usual accessories for OEM users in plant engineering and construction.

Technical data	For device type	Article no.
Sturdy 7-pole high-voltage plug connector for voltages up to 15 kV effect.; current up to 25 A.	F7-1A, F7-1M	94-2N Z002

Extension module for functional testing

Extension module for current, voltage and functional testing of single-phase consumers. The extension module is controlled by the test device. Other measuring ranges on request.

Technical data	For device type	Article no.
Extension module for functional testing 19" / 6HU voltage measurement 0.. 250 V Current measurement: 0 .. 16 A : Power measurement 0 .. 4000 VA	F7-1A, F7-1M	F9-7G
Extension module, voltage control 0…250 V	F9-7G	F9-7G E01
Extension module, test piece connections German Schuko socket outlet laboratory connections.	F9-7G	F9-7G E10

Test chamber

Elabo test chambers guarantee maximum user protection. This makes it possible to set up a "test bench with compulsory protection against contact".The combination test device is not started until the test hood is safely closed. The chambers are suitable for tests of up to 8000 VAC and 12000 VDC.

Technical data	For device type	Article no.
High-voltage test chamber with manually pivoting acrylic glass protective hood. Contacting with the test device is established by means of a connecting cable approx. 2 m long with a 7-pole system connector. A German Schuko socket, safety laboratory sockets and an earth plate are incorporated for contacting of the test piece.Overall internal dimensions: D = 590 mm; W = 480 mm; H = 280 mm Optionally available: other dimensions, alternative drawer, version with pneumatically operated pane, special test piece contactings	F7-1A, F7-1M	94-3A ZF01

General accessories for combination test devices

Housing

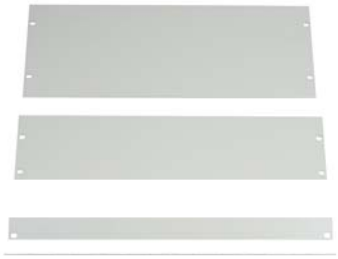
Drawer housings make the 19" drawer devices easy-to-handle modules. Guide rails and blank plates supplement the housings to suit requirements.Sturdy powder-coated steel sheeting housing with folding carrying handles.The housings do not have a back panel. The original back panel of inserted drawers of housings with a depth of 390 mm is directly accessible. For housings with a depth of 600 mm there is rear space for wiring, additional back panels must however be configured.

Technical data	Article no.
19"/6 HU drawer housing; depth = 390 mm	93-1C
19"/12 HU drawer housing; depth = 390 mm	93-1E
19"/16 HU drawer housing; depth = 390 mm	93-1G
19"/6 HU drawer housing; depth = 660 mm	93-2C
19"/12 HU drawer housing; depth = 660 mm	93-2E
19"/16 HU drawer housing; depth = 660 mm	93-2G

Guide rails

Technical data	Article no.
1 pair of guide rails Length 340 mm for steel sheeting housing 390 mm deep. Made of chrome-plated steel sheeting, including fixings. A set of guide rails is necessary for each drawer.	93-1F
1 pair of guide rails Length 540 mm for steel sheeting housing 600 mm deep. Made of chrome-plated steel sheeting, including fixings.A set of guide rails is necessary for each drawer.	93-2F

Blank plates



Technical data	Article no.
Elabo blank plate 19"/1 HU RAL 7035 3 mm aluminium	51-1A
19"/1 HU with ventilation slots	51-1L
19"/2 HU	51-1B
19"/3 HU	51-1C
19"/4 HU	51-1E
19"/6 HU	51-1D
19"/8 HU	51-1F

Test mobile

Elabo offers a comprehensive range of test mobiles for every application. The modular system allows design of the mobile unit to suit needs. The following design represents a exemplary conguration.

Technical data	Article no.
Elabo test mobile to receive 19" test devices and the corresponding accessories. Equipment: - TaMo basic mobile 1600 mm - drawer element - support shelf - test gun holder - Function carrier covers - brush rails - cable holder	T0-1T Z12
Elabo test mobile to receive 19" test devices, a PC and the corresponding accessories. Equipment: - TaMo basic mobile 1600 mm - drawer element - support shelf - traverse incl. TFT?? holder - test gun holder - cable holder - Function carrier covers - brush rails - keyboard support - cable holder - support element - board rail The illustrated components such as test device, PC panel, housing, printer, keyboard; PE test probe, two-hand control and warning light set must be ordered separately.	T0-1T Z11

Cordon

According to EN50191, the test bench is to be delimited from other workplaces and passages, etc. This serves primarily to protect the user and the latter's surroundings. Elabo cordoning posts with the corresponding plastic chain allow flexible test bench setup.

Technical data		Article no.
Cordoning posts, plastic material, red/white with sturdy stand, height 1.1 m		94-2H
PVC link chain, red/white, for cordoning off the test bench and hanging on cordoning posts. Please indicate required length		94-2F

Warning sign

According to EN50191, warning signs are to be displayed at the test bench. Warning sign, yellow, with black print according to DIN 40 008 part 3 with supplement part 3. Required for test installations with voltages higher than 1 kV.

Technical data		Article no.
Plastic warning sign according to DIN 40008 Dimensions: 240 x 200 mm		94-2E
PVC glue-on warning sign according to DIN 40008 Dimensions: 120 x 100 mm		94-2F

Prohibition sign

A prohibition sign is to be displayed at the accesses to test fields or electrical switchgear if no adequate protection against direct or indirect contact of life-threatening voltage potentials exists.

Technical data		Article no.
Prohibition sign, round, in PVC film, self-adhesive, according to DIN 40 008 part 2, diameter 200 mm		94-2D

Calibration and other services

The process is by no means complete once a product from Elabo has been delivered. Comprehensive services round off the range of facilities provided by Elabo.

Range of services:
- works calibration of the devices on site or at Elabo
- maintenance and customer service
- telephone consultancy
- spare parts service
- BGV A3 inspections

Elabo service hotline
Tel.: +49 07951 / 307 202
Fax: +49 07951 / 307 67
Email: service@elabo.de

Accessories for combination test devices

HV Connecting cable

ELABO high-voltage cable with special high-voltage plugs for connecting the high-voltage outputs to an external switching device. Other cable lengths / versions on request.

Technical data	For device type	Article no.
Cable length: 2 m, 2 items	F7-1B, F7-1C, F7-1N, F7-1P	94-2B

PE connecting cable

ELABO cable set with 4 mm laboratory plugs for connection to an external switching field for PE testing. 4-pole version for control according to the four-wire measuring principle. Other cable lengths / versions on request.

Technical data	For device type	Article no.
Cable length: 2 m, 4-pole	F7-1B, F7-1C, F7-1N, F7-1P	94-5E Z01

High-voltage relay

For construction of switching units, special switching elements must be used for this purpose

Technical data	Article no.
High-voltage relay with two changeover contacts Max. switching voltage 5 kV Max. switching current 10A Max. switching output 5000 VA Coil voltage 24 VDC	94-2T
High-voltage relay with NO contact Max. switching voltage 5 kV Max. switching current 10A Max. switching output 5000 VA Coil voltage 24 VDC	94-2S
Conductor card with four high-voltage reed relays Max. switching voltage 10kV Max. switching current 3A Max. switching output 50VA Coil voltage 24 VDC Board also available with one or two relays	94-2U

Protective earth conductor test probe

The test probe is used for adaptation of the test object for protective earth conductor resistance measurement. The test probe cannot directly be connected to the test device. The unit can be connected via the built-in set 94-4 S ZES to an external switching field or directly to the system drawer F9-7M.The test is automatically started upon pressing in the tip. Version with sensor lead for four-conductor measurement.

Technical data	For device type	Article no.
Cable length: 2 m, 1 item	94-4S ZES	94-4S
Cable length: 4 m, 1 item	94-4S ZES	94-4S Z04m
Cable length: 6 m, 1 item	94-4S ZES	94-4S Z06
Built-in set for test probe connection consisting of: - built-in laboratory socket 4 mm, red - 5-pole build-in socket,	94-4S	94-4S ZES

High-voltage test probes

Elabo safety test probes with high-voltage cable and special high-voltage plug connector. The test probes are authorised for a voltage of 8 kV AC/10 kV DC. The test probes cannot directly be connected to the test device. The probes can be connected via the built-in sockets 94-2A ZEB to an external switching field or directly to the system drawer F9-7M.All test probes can also be obtained as single items.

Technical data	for device type	Article no.
Cable length: 2 m, 2 items	94-2A ZEB	94-4S
Cable length: 4 m, 2 items	94-2A ZEB	94-4S Z04m
Cable length: 6 m, 2 items	94-2A ZEB	94-2A Z06
Mounting socket for test probe	94-2A	94-2A ZEB

Warning lights

According to EN50191, identification of risks at the test bench is indispensable. The Elabo warning lights can be connected to all test devices and therefore indicate the danger spot.

Technical data	for device type	Article no.
Tabletop housing with connector plug, cable length: 2.5 m	All types	94-2C
Signal column with magnetic foot and connector plug, cable length: 2.5 m	All types	F9-1A

Two-hand control

Two-hand control relay for initiation of the high-voltage and insulation resistance test in combination with a connection box or an all-pole adapter cable. Pursuant to the safety regulations according to EN574 type IIIC, EN954-1 and EN60204-1. The unit serves to safely configure workstations. The unit can be directly connected to the combination testers.
Supplied complete incl. two pushbutton modules

Technical data	for device type	Article no.
Analysis unit with connector plug and two connected operating buttons, cable length: 2.5 m	Alle Typen	94-2L

High-voltage plug connection

For establishment of plug connections, plug elements designed for this purpose must be used.

Technical data	Article no.
Robust 5-pole high-voltage plug connection for voltages of up to 15 KV eff. with a current carrying capacity of up to 25 A	94-2N
7-pole version	94-2N Z002
9-pole version	94-2Q

Mounting socket

Technical data	Article no.
5-pole high-voltage integrated socket for voltages of up to 15 kV eff., current carrying capacity up to 25A	94-2P
7-pole version	94-2P Z002
9-pole version	94-2R

Accessories for combination test devices

System drawer extension module

The “System drawer” extension module for the realisation of a complete system.
The drawer is used to interconnect the individual tests PE, ISO and HV to the test piece connection.
In addition, the safety elements and mains connection for test combination are integrated.
Optional extension modules enable individual extension of the system.
Front panel equipment:
- key on-button
- off button
- emergency-off switch with yellow signal ring
- automatic circuit-breaker, 1 pole, C16A for mains supply
- main switchgear

Rear panel equipment:
- mains lead with earthing pin angular plug, 5 m long
- PG11 threaded joint for connection to an external emergency-off circuit
- socket outlet with earthing contact and hinged lid for mains connection of the test device
- modular plug connector for test piece connections
- openings for individual extensions

Typically in combination with a two-hand control and a PE test probe

Technical data	For device type	Article no.
System drawer 19” /6 HE	F7-1B, F7-1C, F7-1N, F7-1P	F9-7M

Extension module for system drawer

The system drawer F9-7M can be individually extended with additional modules. According to the size of the extensions the system drawer increases in overall height. The following modules are merely example configurations. Contact us for your individual requirements. We definitely can offer a solution.

Technical data	For device type	Article no.
Extension front connection 1~ In addition the following components are integrated: - German Schuko socket outlet - 4 mm safety laboratory sockets L, N, PE, PE sensor	F9-7M	F9-7M E01
Extension front connection 3~ In addition the following components are integrated: - socket 16A CEE - 4 mm safety laboratory sockets L1,L2, L3, N, PE, PE sense	F9-7M	F9-7M E03
Extension for functional testing 1~ - voltage measurement: 0 .. 250 V - current measurement: 0 .. 16A - power measurement: 0 .. 4000 VA	F9-7M	F9-7M E11
Extension for voltage control 1~ output voltage: 0 .. 250 V	F9-7M	F9-7M E12
Extension for functional testing 3~ - voltage measurement: 3 x 0 .. 450 V - current measurement: 3 x 0 .. 16A - output measurement: 0 .. 10000 VA	F9-7M	F9-7M E13
Extension for voltage control 3~ output voltage: 3 x 0 .. 450 V	F9-7M	F9-7M E14
Extension for connection sockets for high-voltage test probes in the rear panel incl. switching	F9-7M	F9-7M E81
Extension for leakage current measurement 1~ Measurement of the housing or earth leakage current according to standards, e.g. EN60335-1. Please ask for the availability of other standards.	F9-7M	F9-7M E41
Extension for leakage current measurement 3~ Measurement of the housing or earth leakage current according to standards, e.g. EN60335-1. Please ask for the availability of other standards.	F9-7M	F9-7M E42
Extension for leakage current “Medicine” connection possibility of an external leakage current test device 92-4A/D to perform leakage current measurements according to EN60601 standard.	F9-7M	F9-7M E43

Test chamber

Elabo test chambers guarantee maximum user protection. This makes it possible to set up a "test bench with compulsory protection against contact".The combination test device is not started until the test hood is safely closed. The chambers are suitable for tests of up to 8000 VAC and 12000 VDC.

Technical data	For device type	Article no.
High-voltage test chamber with manually pivoting acrylic glass protective hood. Contacting with the test device is established by means of a connecting cable approx. 2 m long with a 7-pole system connector. A German Schuko socket, safety laboratory sockets and an earth plate are incorporated for contacting of the test piece. Overall internal dimensions: D = 590 mm; W = 480 mm; H = 280 mm Optionally available: - other dimensions - alternative drawer, - version with pneumatically operated pane - special test piece contactings	F7-1B, F7-1C, F7-1N, F7-1P	94-3A Z

Computer accessories

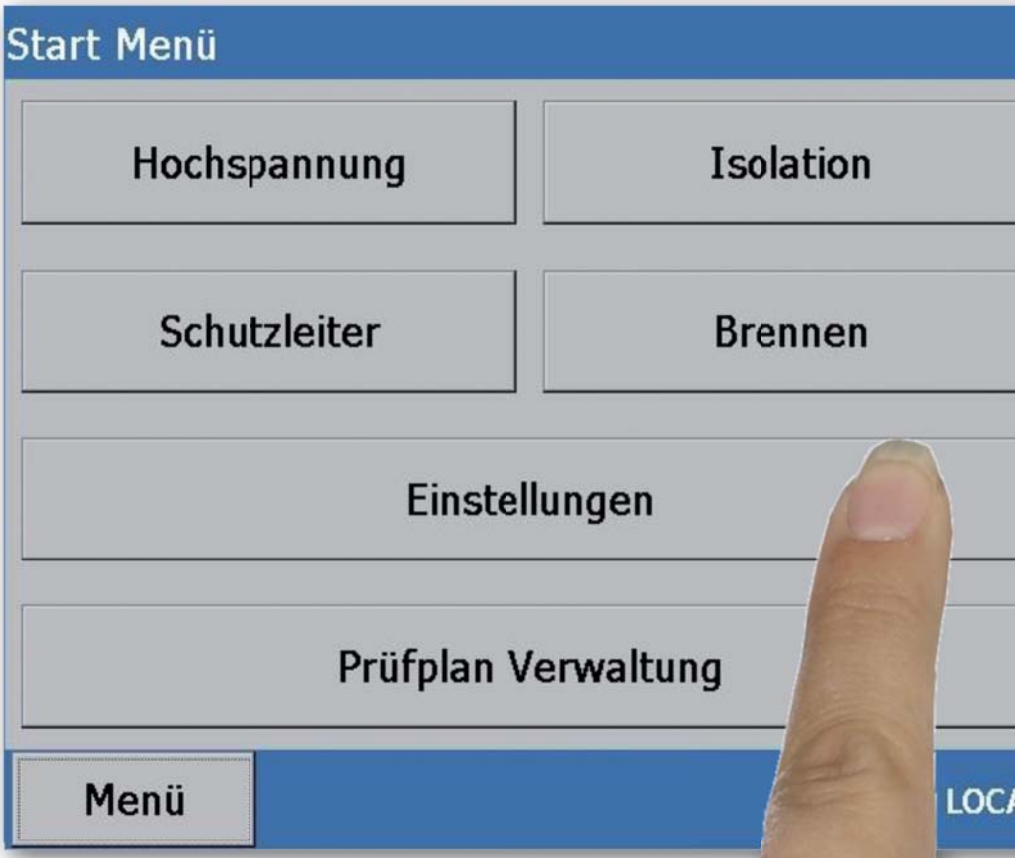
Elabo designs individual test systems completely tailored to the respective applications. Computer controls are used for automation.

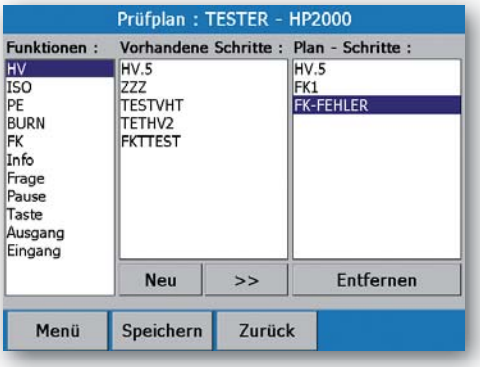
Technical data	For device type	Article no.
PC panel • current CPU • 1 GM RAM • motherboard with Ethernet and graphics • module slots 2 x PCI • 80 GB min. hard disk • internal power supply unit • 15" TFT display • operating system Windows XP Professional Optional incl. touch screen	Alle Geräte	95-9C ZPanel
Keyboard	PCs	95-1T
Mouse	PCs	95-1Q
Label printer	PCs	95-1X Z001

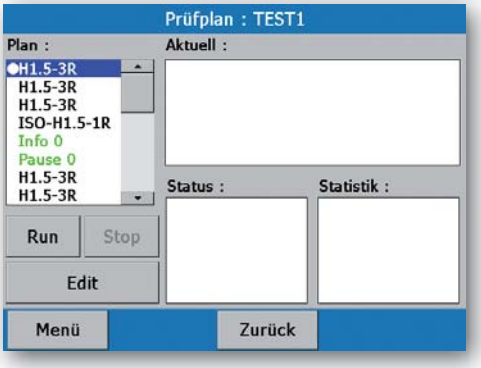
TouchMe – control module

Control at its perfection

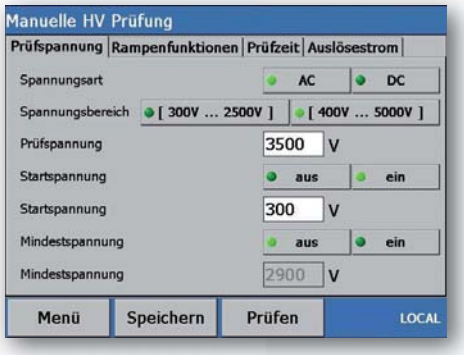
Fingertip sensitivity in detail
The device versions equipped with the modern TouchMe control module can be operated ergonomically by touching the display with the finger. An embedded system under Windows CE© forms the core component of this technology. A clearly arranged menu-controlled user interface with large touch buttons ensures that operation of the HighPerformance equipment series is child's play. The individual areas are safeguarded against unauthorised operation by multistage password protection. Consequently, only authorised users are capable of changing parameter settings, equipment settings or test plans for example.





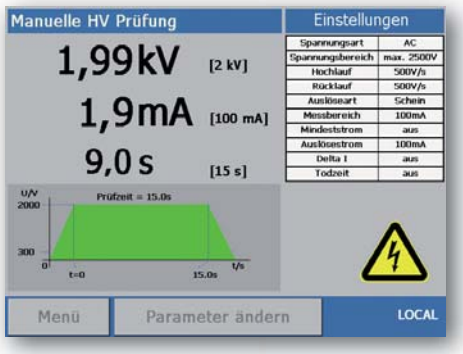


Integrated test plan management
In addition to the possibility of being able to run tests individually, the control concept offers a convenient editor for preparing product-specific test plans. Alongside the basic test types, additional stages such as issue of user instructions or inquiries and activation of an external switching matrix can be integrated in the test sequence.
The number, sequence and contents of the individual test stages can be individually parameterised by the user. This functionality which was formerly reserved above all for PC-controlled systems makes the tester a genuine test computer.
The additional possibility of being able to define global test stages considerably facilitates preparing of test plans.

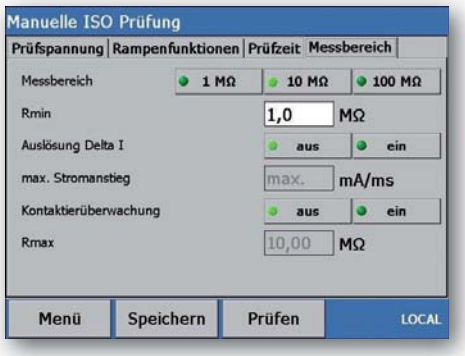


Individual testing

The test devices can also of course run individual tests in manual mode. Individual settings for the test parameters can be made for this purpose. Parameterised individual tests can also be saved and are available as a global test stage in the test plan editor.



Detailed information concerning the test parameters and test status are displayed in test mode.



National languages

The language of the user interface can be changed to different national languages. In addition to German and English, a selection of other languages is available on request.

Extensions

In addition to the integrated remote control interface, a further Ethernet interface allows creation of an intrasystem equipment network for integration of additional extensions such as leakage current or functional test modules. Likewise, the number of additional inputs and outputs can be increased by connection of an external coupler. Through the latter, system extensions are almost unlimited.

Additional equipment

In addition to the test-specific settings, the system manages additional useful functions.
It is possible to both produce protocol printouts and save measured values on a USB stick for further processing on a PC. For this purpose, a USB accessory interface allowing integration of external components is incorporated in the device.

Examples:

- USB memory stick
- USB keyboard
- USB mouse

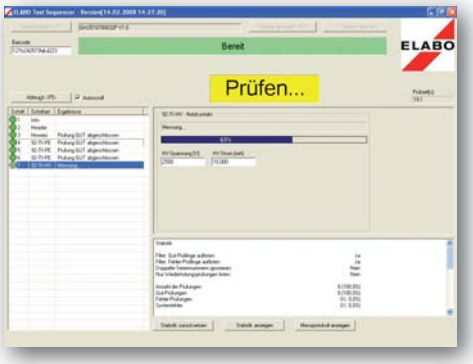
High-performance software

perfectly tailored to your individual testing duties

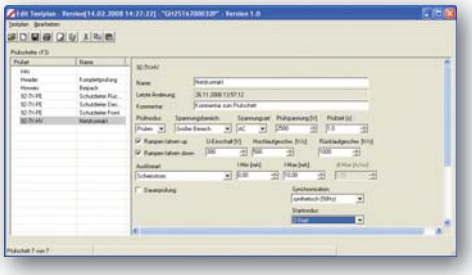
Elabo test devices are characterised by their high level of hardware quality. In addition, Elabo offers comprehensive software solutions for computer-controlled testing. The EHP control software package specially developed for this purpose offers solutions for typical applications from the basic version upwards.
The entire software system is structured in such a way that all testing duties – ranging from the manual test desk with individual devices to the complex, fully automatic system within an assembly line – can be dealt with. In addition, any individual requirements can be fulfilled by customer-specific additions to the modules.

The software naturally allows connection to existing ERP systems.

The **EHP control software** is designed as a control and administration element for automated quality assurance.
One of the advantages in this case lies in standardisation and simplification of the test procedure.
The user-friendly user surface and the self-explanatory icon-based menu structure ensure simple operation.

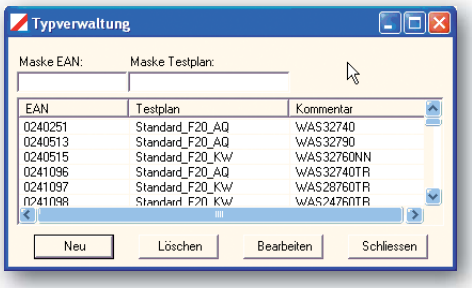


The actual test sequence is controlled fully automatically by means of the **test sequencer.**
The respective test plans can be loaded automatically by integration of appropriate ident systems. Current test results are clearly documented and archived.
Modifications in the test plans can be made directly in the application by an appropriately authorised user.

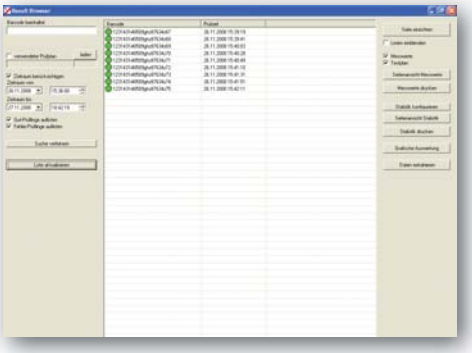


Test specifications are changing. This is why the **Test Plan Editor** was developed. All test parameters can be simply and rapidly adjusted. Test plans are archived in an SQL database.

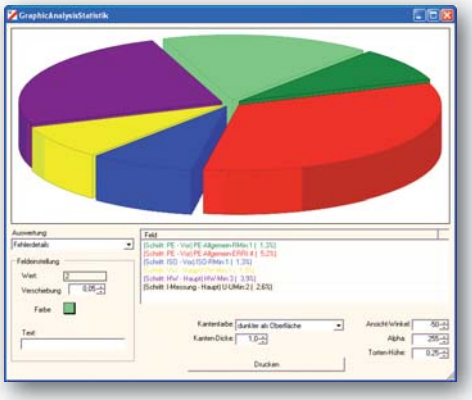
The same test plans can be assigned to technically identical test piece variants using the optional **Variant Manager**.
The advantage to you – less expenditure in terms of time, since all linked test piece variants inherit modifications in the basic test plan.



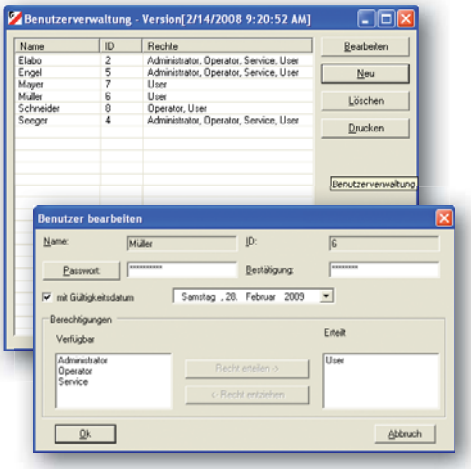
The **Test Result Browser** is the absolutely reliable aid for generating individual proof of testing and for selective evaluation of archived streams of data.



Statistics management using the **Test Statistics** module makes it possible to access at any time archived test results of any desired periods or serial number ranges. All data can of course be exported (e.g. SQL, CSV, Text).

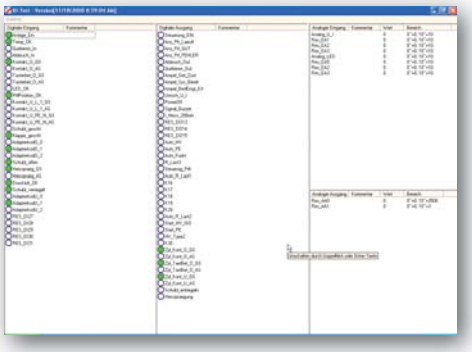


The **Test Protocol** module allows outputting of the test protocols from the **Test Result Browser** module, the statistics from the **Test Statistics module** and the test plans from the **Test Plan Editor** module on a printer or in a file. Drafting of documentation at any time is therefore child's play.



The **User Manager** guarantees security of the test process. The system can be operated solely by duly authorised users according to precisely defined rights.

The **I/O test** makes our software service and maintenance-friendly. This tool makes it easy to locate any hardware faults at integrated inputs and outputs.



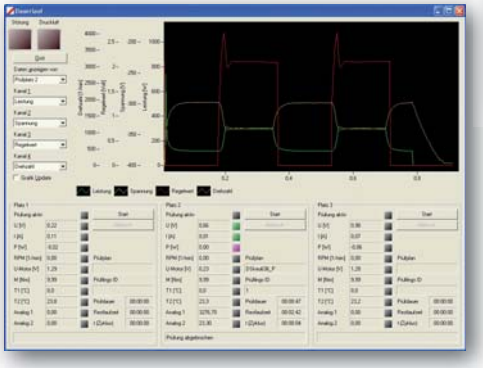
Impressive in detail

Software solutions for all test duties

We develop the software ourselves, because only then can we guarantee that everything perfectly goes together. We set new standards in the field of test and inspection software with our software for safety and functional test systems and for process automation. Advantages and a greater benefit demonstrated above all by sensible detailed solutions. The economic viability and profitability of the entire test process is considerably enhanced.

The software package presented on the previous pages can be individually tailored to your requirements. The test systems can therefore be integrated for example in the customer's respective ERP environment by means of appropriate interfaces.

The following connections can be made for example to:
- SAP R3
- Navision
- Microsoft SQL server
- FTP data transfer
- Oracle



Data management/test results
We pay attention to details in compiling archive databases. Extensive standard functions are available to the user, in order to allow uninterrupted documentation and therefore traceable proof of testing at any time.
- Subsequent access to archived test results
- Drafting of test protocols in variable protocol models
- Traceability of the test results
- Preparation of statistics on the runtime from the test results
- Archiving of limit/actual values
- Archiving of the inspector ID
- Archiving of the date stamp
- Archiving of the serial number
- Archiving of the tester number
- Export functions (SQL/CSV/Text)

Special report forms, e.g. output as graphic for long-term measurements can be individually offered.

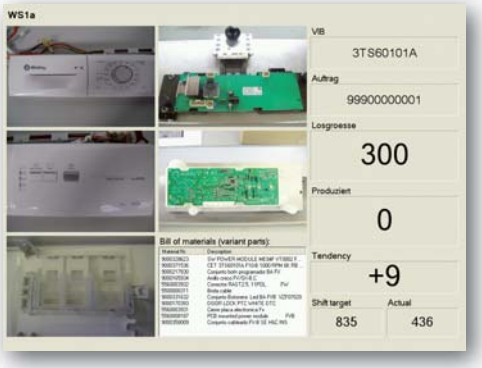
Test program/test sequencer
The type of visualisation in the test program for individual systems depends on the respective functionality.
The duties of the test program often extend far beyond mere process control in this case.
- Test sequence control
- Measured value recording
- Automatic or manual test plan selection
- Partly and fully automatic test sequences
- Control of adaptation and handling units
- Output of interactive user instructions and subjective test directions to the user
- Output of status messages
- Output of fault messages
- Display of the current measured values
- Test piece identification
- Visualisation of parameters
- Direct access to test plan management
- Display of approval/fault statistics

Additional functions
Additional functions may be required depending on the application and degree of automation. Elabo possess an extensive wealth of experience from a large number of completed projects and has a large number of additionally configurable software modules.

Examples
- Automated optical inspection functions
- Noise analysis
- Integration of labelling systems
- Integration of identification systems (barcode, data matrix code, RFID…)
- Integration of marking systems (laser, ink jet printers, embossers…)
- Automated dummy test
- Software-controlled calibration operation
- Handling control
- Production control
- Variant management
- Lot data management

Production control
Interlinked assembly and test systems from a single source. Elabo produces turnkey systems, including the corresponding connection to the ERP system and control of the conveyor technology
- visualisation
- belt control
- labelling
- production control
- process flow control
- outward transfer of random samples
- plausibility testing
- readiness notification
- evaluation software
- system networking
- data management
- office connection
- production statistics

Limitless modularity to your advantage



Elabo service

Comprehensive, competent, rapid and reliable!

We do many things differently from other companies!
We attach great importance to being at your disposal. For us, this is a matter of course, since even during ongoing operation, problems may arise that you can no longer solve yourself. This is when we are on hand.
Products from Elabo fulfil the highest demands in terms of quality; nevertheless, faults may occur over the years.
Your operating staff trained by us can fall back on us at any time by telephone in order to get production rolling again as quickly as possible.
Our service team is always at your disposal. Even directly on site on your premises if necessary, as fast as possible.
Our service also however covers your being able to deliver the test device to be repaired to us and wait for the repair.

Repair service
Elabo test devices are used in demanding production sequences, often 24 hours a day and 7 days a week.
All our products are characterised by the highest quality, reliability and durability and guarantee smooth functioning.
Should however the eventuality arise, you are in good hands at Elabo. Nobody is better acquainted with our devices than ourselves. Consequently, repairs by Elabo as the manufacturers have considerable advantages over outside repairs.

Calibration service
We consider we have a duty as manufacturers of safety testing devices and test systems. It is exactly for this reason that we have set up a works calibration laboratory. Above all individual devices are restored to "normal" here.
Nobody is better acquainted with our devices than ourselves. Consequently, calibration by Elabo as the manufacturers has considerable advantages over outside calibration.

So that you do not need to worry if the worst comes to the worst, we offer maintenance/calibration contracts.

Hire/lease equipment service
In order to ensure that you are still able to guarantee the necessary quality assurance and documentation in case of a repair or calibration, we maintain a pool of hire and lease equipment. These are above all HV, PE, IS and LC devices that we make available to you during the repair/calibration on our premises.

Our aim is to offer you the best possible quality assurance!
This is why we recommend regular performance of dummy testing over and beyond calibration.
This can be used to check both individual test devices and complex test installations for perfect functional status (=guaranteeing fault assessment).
At the same time, verification of measured value recording is performed.
Dummy testing ensures that the faults occurring in the test pieces are detected and recorded.

Elabo offers various dummy modules for this purpose.

What we can also do for you!
Firmware or hardware updates are installed automatically during a repair on our premises.
You will therefore always have a device that is up to date.

Do you have any further enquiries or require additional information? Call us. We are at your disposal!
Email: service@elabo.de
Tel: + 49 7951 - 307-202
Fax: + 49 7951 - 307-67

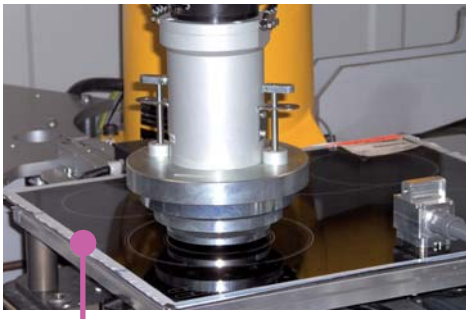
Elabo test systems

professional solutions in the most diverse areas

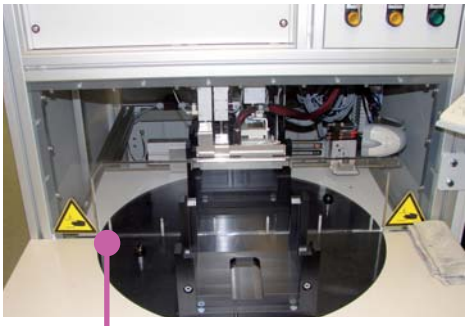
Individual
In addition to the measuring and test devices, Elabo test systems **offers** innovative test systems for the widest range of applications.

For more than 30 years now, Elabo has been a recognised partner of the industry and the test and certification bodies.

Finding perfect solutions to suit your requirements is a matter of course for us and represents a constant incentive and daily challenge.

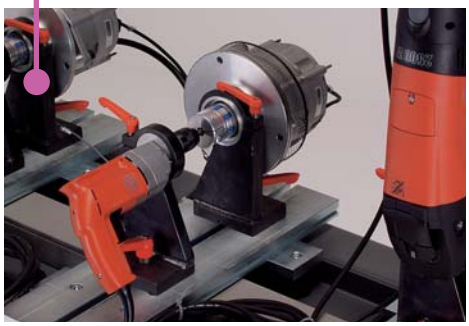


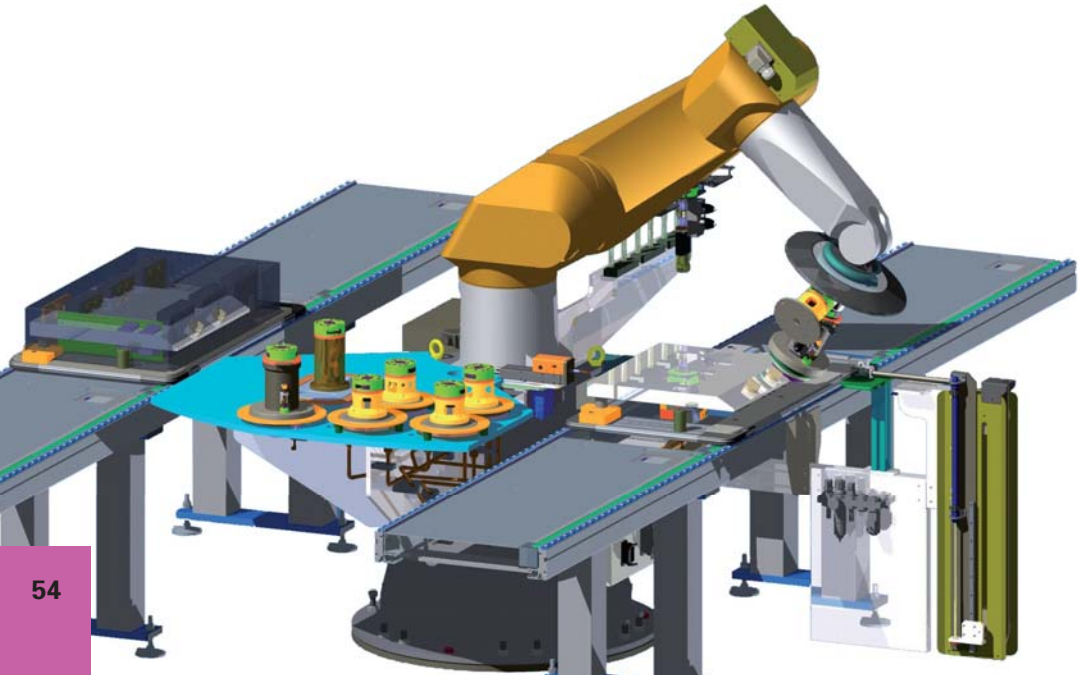
Hobs

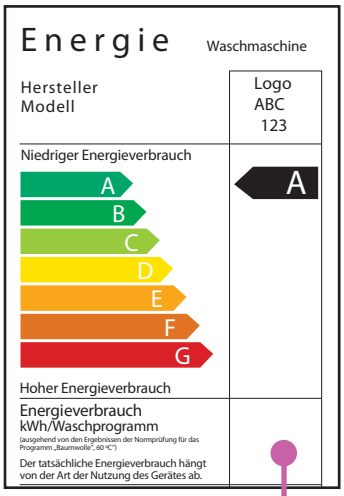


Power supply units

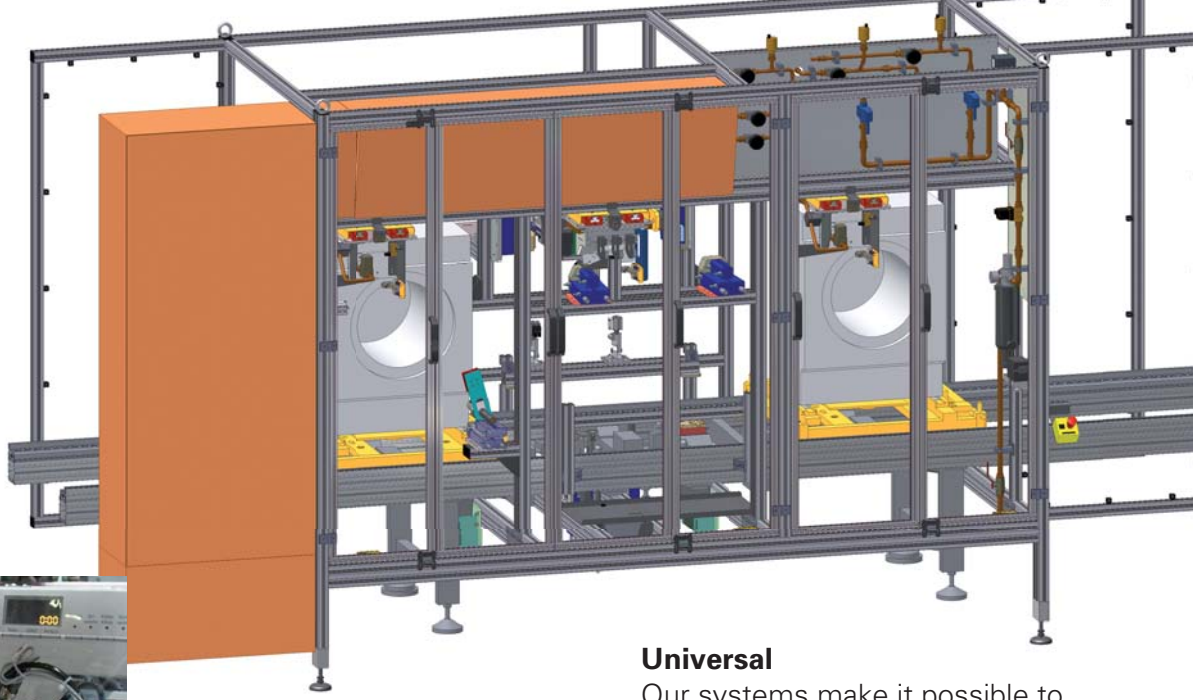
Electric power tools







Energy labelling

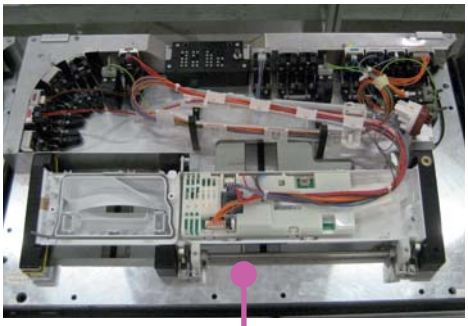


Washing machines,
dishwashers, dryers

Universal
Our systems make it possible to conduct complete functional and safety testing. The smooth integration in existing production data systems guarantees clear and efficient control in this case in addition to monitoring of the entire production process.

Ovens, cookers
and refrigerators

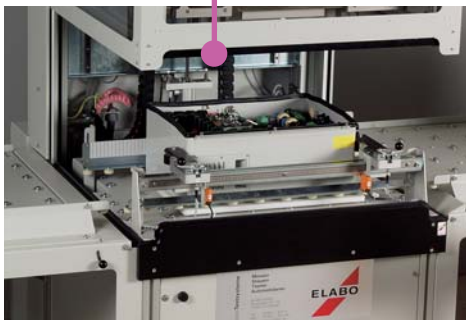
Solution-oriented
One aspect always occupies a forefront position in developing our systems:
finding the best possible solution to suit your needs, without losing sight of what is essential for you.



Controls,
control panels

Components

Solar panels,
power inverters



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Elabo GmbH.
Highly flexible solutions.
Efficient and cost-effective

Elabo is the partner for companies and organisations that manufacture, install or use electric and electronic products and components for quality assurance purposes. Elabo develops modular, custom designed, highly flexible and very cost-effective solutions for these customers. The range of products and services extends from the design and equipping of specialist rooms – electrical laboratories for example – right through to customer-specific engineering and the construction of complex quality assurance facilities.

Elabo's capability is based on its comprehensive know-how in the field of electrical and electronic engineering, mechanics, ergonomics, process management and logistics, combined with expert knowledge of industrial safety regula-tions and technical standards. Elabo is a hardware-producing knowledge service provider that focuses its services on the specific requirements of the particular customer. The company's manufacturing is largely completed in-house. Elabo has the capability and technical manufacturing resources to facilitate the high-quality implementation of concepts.

Established in 1972, Elabo today numbers 160 employees and is European market leader in its field.

Elabo LaboratorySystems specialises in the turnkey installation of electrical laboratories for quality assurance, research, development and trials, prototype construction and for service centre workshop applications.

Elabo Electronic develops and manu-factures measurement, test and power supply equipment together with modular software solutions for a wide range of test applications. In addition Elabo Electronic also provides calibration services for test equipment as well as handling their adaptation to EN standards.

Elabo TrainingSystems is your leading partner for education and further training in the field of electrical engineering, electronics and associated fields. Services range from the planning and complete equipping of classrooms to the preparation of teaching aids and seminars for trainers.

Elabo AssemblySystems develops and produces assembly workstations and product lines – that also include integrated quality, function and safety testing sys-tems – for manual and partly automated production.

Elabo TestSystems provides the engineering and realisation of compact teststations, complex test systems and process-integrated testing of networks for a comprehensive quality assurance in the electrical industry and in lines of business which utilise electronic components.

Elabo ProcessControlSystems produces process control centres for the monitoring and control of processes in industry, the power supply sector, EDP and computer centres, traffic management, facility man-agement and safety engineering and a wide variety of other industries.

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