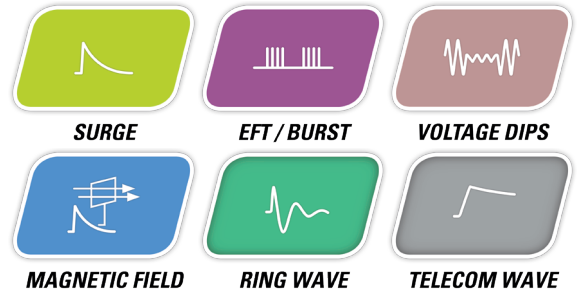




# axos

EXPANDABLE TEST SYSTEMS



# HAEFELY

Current and voltage – our passion



## AXOS SERIES

Welcome to the unique design and concept of modularity designed by HAEFELY.

HAEFELY is recognizing an increasing interest in testing departments to configure the required functions in compact immunity test systems more flexible than ever. For that reason HAEFELY designed a unique concept of modularity which eviscerates large additional investments for customers in the future.

Moreover, constantly reduced product development times call for powerful, easy-to-operate and ready-to-use conducted immunity test systems which can be expanded in a multitude of different test applications. Customer requirements, particularly in the telecommunications and industrial electronics sector, emphasize a test system's accuracy and modularity, thus clearly

pointing to easy to expand T&M equipment that is favourably priced and suitable for most of industries.

The AXOS series has been tailored to exactly meet these requirements, offering special cost advantages for T&M applications in the development, production and servicing of telecommunications, components as well as safety and industrial electronics.

All AXOS test systems come equipped with all the hardware needed for instant upgrades by only entering optional key codes into the licence code manager of the unit. After entering the key code(s) the additional test functionalities like Surge Combination Wave, Ring Wave, Telecom Wave, EFT/Burst or Voltage Dips and Interrupts become available immediately. No direct intervention has to be done by the user at all.



## APPLICATIONS

Take benefit from the most modern and easy to use conducted immunity test system ever built. Welcome to the AXOS series.

### Indoor applications

Domestic	Industrial	Medical	IT
White goods	Robotics	Monitoring	Computers
Brown goods	Welding machines	Scanning	Printers
Household	Packing machines	Analysing	Modems
Lightning devices	Production lines	Pumps	Hubs
Portable tools	Laboratory equipment	Implants	Phones
Home automation			Servers

### Outdoor applications

Renewable energy	Telecom	Transportation	Defense
Solar panels	Outdoor lines	Automotive	Component testing
Windmills	Repeater	Motorcycles	Communications
Turbines	Switching stations	Trucks	Vehicles
Inverters	Data concentrators	Electric vehicles	Aircrafts
Infrastructure	Telecommunication centers	Charging stations	Satellites

**EMC IS ALL ABOUT STANDARDS.**  
**HAEFELY COVERS THEM IN JUST ONE SINGLE BOX.**

## STANDARDS

The standards - are you really familiar with all of them? Whether people talk about generic standards or product specific standards - stipulated by law or demanded from the manufacturer: HAEFELY has integrated many of them.



**SURGE**

IEC/EN 61000-4-5 Surge Combination Wave 1.2/50 $\mu$ s...8/20 $\mu$ s

Surge events can be generated by lightning phenomena, switching transients or the activation of protection devices in the power distribution system. A surge itself is influenced by the propagation path taken so that impulses from the same event may have different forms depending upon where a measurement is taken. Combination Wave Generators (CWG) simulate a surge event in power lines close to or within buildings. Mostly the disturbances are tolerable because they are single events.



**EFT / BURST**

IEC/EN 61000-4-4 Electric Fast Transients, EFT/Burst

Industrial measurement and control equipment nearly always use conventional control units containing relays or other electro-mechanical switching devices. Fluorescent lamp ballast units, insufficiently suppressed motors (hair dryers, vacuum cleaners, drills, etc.) are found everywhere in the public power supply. All of these are primarily inductive loads which generate interference when switched on or off. EFT events, can cause microprocessor units to malfunction or reset, with corresponding disruption to normal operation.



**VOLTAGE DIPS**

IEC/EN 61000-4-11 Voltage Dips and Interrupts

Voltage failures occur following switching operations, short-circuits, response of fuses and when running up heavy loads. The quality of the electrical power supply is increasingly becoming a central topic of discussion. The interference sources in the mains, caused by electronic power control with non-linear components e.g. thyristors are used more frequently in domestic appliances such as hot-plates, heating units, washing machines, television sets, economy lamps, PCs and industrial systems with speed-controlled drives.



**MAGNETIC FIELD**

IEC/EN 61000-4-9 Pulsed Magnetic Field

Under normal operating conditions, an AC current generates a steady magnetic field so that equipment, such as monitors, close to AC power lines could suffer interference. Under fault conditions, a sudden high current level can result in a short duration magnetic field. Lightning strokes or short circuit fault currents in the power network can generate high level short duration magnetic fields.



**RING WAVE**

IEC/EN 61000-4-12 Ring Wave / IEEE C62.41

Ring waves are used to simulate lightning or switching effects in domestic single or three phase supplies within an adequately protected building. The waveform has similar characteristics in both open and short circuit conditions. The ring wave is characterized as a bipolar damped oscillating wave.



**TELECOM WAVE**

IEC/EN 61000-4-5 Telecom Wave 10/700 $\mu$ s / ITU K.20, K.21, K.44, K.45

Telecommunication networks and lines are often disposed to lightning strikes and their associated effects. All telecommunication systems linked with lines installed outdoors therefore require a reliable protection which needs to be tested.

## SOFTWARE

### Reporting Software

The reporting software creates automatically a test report. The main header can be adjusted with the individual company logo or any other text required. The data input can either be supplied directly via the remote control software or when saving the data on a USB drive. Furthermore, the data can be used from the sequence mode menu directly and the report gets generated. Detailed information will be provided with the reporting software tool itself. The reporting software is compatible with Windows 7 and Windows 10 (32- and 64-bit).



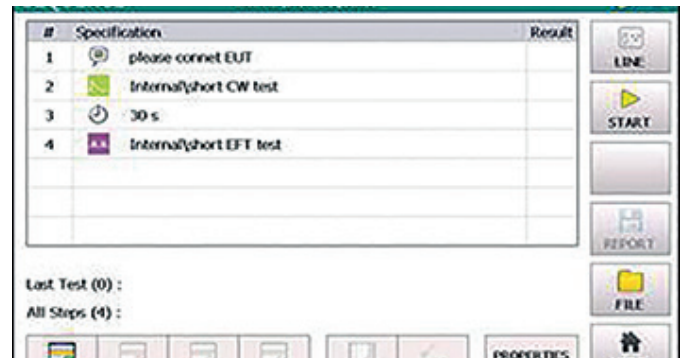
### Remote Control Software

The optionally available remote control software simply enables the user to remote control the AXOS5 and AXOS8 by using a remote device like a standard PC, Tablet or Smartphone. The connection can either be established by putting in a ethernet cable "point to point" or via wifi network (a separate access point will be required).

## SEQUENCER

### Linking test to form a sequence.

Individual tests stored on the PC or in the AXOS5 / AXOS8 itself can be combined to form a complex and fully automated test sequence. This feature enables Surge, EFT/Burst, Voltage Dips, Ring Wave and Telecom Wave tests to be linked and run in a continuous sequence. The already pre-installed IEC and generic standards make programming easier than ever before.





## AXOS 5 EXPANDABLE TEST SYSTEM

The AXOS5 expandable test system integrates all of the best features of several standalone test systems into one single economic solution.

It can be individually combined either with 5 kV Surge Combination Wave, 5 kV EFT/Burst, Dips & Interrupts, along with an integrated single-phase coupling / decoupling network. This allows quick and completely automated testing to the most common IEC, EN, ANSI, IEEE and UL standards.

The AXOS5 can either be operated via front panel by large colour graphic interface or remotely from the PC. The easy to use menu together with the availability of predefined test routines for different standards makes testing easy and reliable, even for less frequently users.

Numerous additional functions such as external start/stop function allows easy integration of the test system also in customer specific test environments.

All the test parameters can be varied in a broad range wide above the requirements of the standards. Together with the ability of changing test parameters during test, AXOS5 is not only the ideal product for compliance and pre-compliance testing, it is useful for monitoring & debugging function during design phase as well.

A wide range of cost-efficient and user friendly coupling / decoupling networks for power lines as well as for symmetrical and asymmetrical data- and signal lines are available as options.

## STANDARDS

- IEC/EN 61000-4-4 EFT / Burst
- IEC/EN 61000-4-5 Surge E. 2&3 (1.2/50µs... 8/20µs)
- IEC/EN 61000-4-5 Surge (10/700µs)
- IEC/EN 61000-4-9 Magnetic Field
- IEC/EN 61000-4-11 AC Dips and Interrupts
- IEC/EN 61000-4-12 Ring Wave
- IEC/EN 61000-4-29 DC Dips and Interrupts
- IEC/EN 61000-6-1 Generic Residential
- IEC/EN 61000-6-2 Generic Industrial
- IEC/EN 60335-1 Household
- IEC/EN 60601-1 Medical
- IEC/EN 60950
- EN 55024
- IEEE C62.41
- ITU K.20, K.21, K.44, K.45

## APPLICATIONS

- Compliance & pre-compliance testing of electrical products
- CE marking
- Product development and debugging
- Compliance testing of telecom and wireless devices
- Overtesting

## FEATURES AND BENEFITS

- ✓ Easy to operate with manual and automated test modes, software assisted test preparation, pre-defined test routines and visual aided test setups
- ✓ Economic & Efficient
- ✓ Touch screen guarantees reduction of time and effort Experience and know-how at a reasonable price
- ✓ Safe and reliable operation by using safety interlock, warning lamp and emergency stop functions
- ✓ Voltage and current monitoring of surge impulses and EUT power provides valuable feedback to the test engineer
- ✓ Automatic generation of test report, including test parameters, test setup and test result

## AXOS 5 EXPANDABLE TEST SYSTEM



**AXOS<sup>5</sup>**  
Compact Test System  
Article no. 2490400

Surge 1.2/50µs...8/20µs  
IEC/EN 61000-4-5

EFT/Burst  
IEC/EN 61000-4-4

Voltage Dips  
IEC/EN 61000-4-11\*\*

Magnetic Field  
IEC/EN 61000-4-9\*\*\*



**AXOS<sup>5</sup>**  
Surge Test System  
Article no. 2490401

Surge 1.2/50µs...8/20µs  
IEC/EN 61000-4-5

EFT/Burst  
IEC/EN 61000-4-4

Voltage Dips  
IEC/EN 61000-4-11\*\*

Magnetic Field  
IEC/EN 61000-4-9\*\*\*



**AXOS<sup>5</sup>**  
EFT/Burst Test System  
Article no. 2490402

Surge 1.2/50µs...8/20µs  
IEC/EN 61000-4-5

EFT/Burst  
IEC/EN 61000-4-4

Voltage Dips  
IEC/EN 61000-4-11\*\*

Magnetic Field  
IEC/EN 61000-4-9\*\*\*



**AXOS<sup>5</sup>**  
Dips Test System  
Article no. 2490403

Surge 1.2/50µs...8/20µs  
IEC/EN 61000-4-5

EFT/Burst  
IEC/EN 61000-4-4

Voltage Dips  
IEC/EN 61000-4-11\*\*

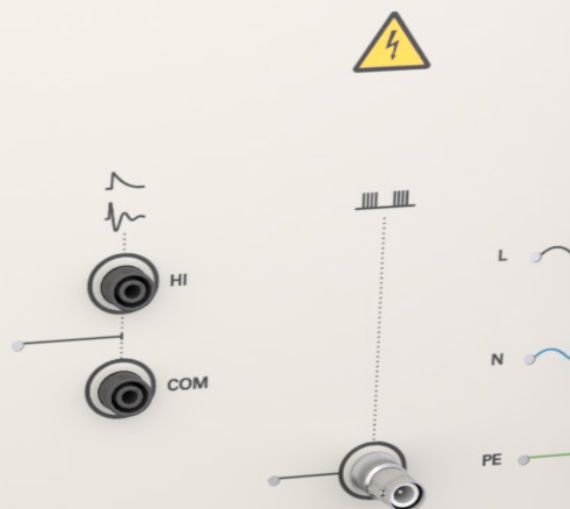
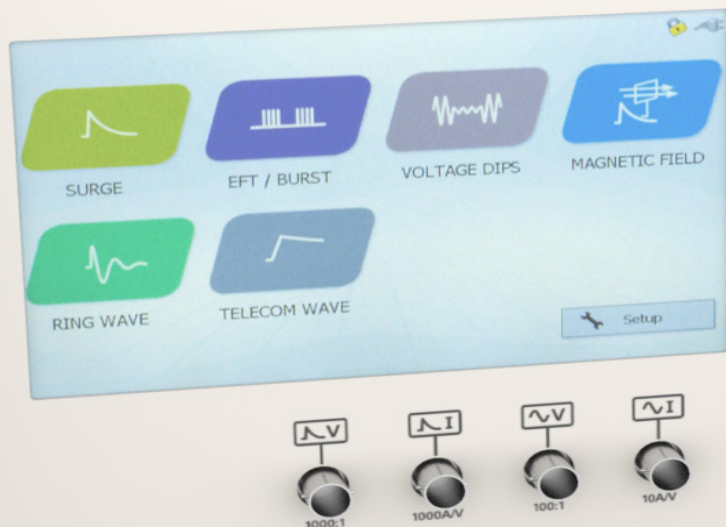
Magnetic Field  
IEC/EN 61000-4-9\*\*\*

- Activated by default
- Optionally available by activation via key code

\*\* External voltage dips transformer „DIP 116“ required

\*\*\*Additional antenna coil „MSURGE-A“ required





## AXOS 8 EXPANDABLE TEST SYSTEM

The AXOS8 expandable test system integrates all of the best features of several stand alone test systems into one single economic solution.

It can be individually combined either with 7 kV Surge Combination Wave, 7 kV Ring Wave, 7 kV Telecom Wave\*, 5 kV EFT/Burst or Dips & Interrupts, along with an integrated single phase coupling / decoupling network. This allows quick and completely automated testing to the most common IEC, EN, ANSI, ITU, IEEE and UL standards.

The AXOS8 can either be operated via front panel by large colour graphic interface or remotely from the PC. The easy to use menu together with the availability of predefined test routines for different standards makes

testing easy and reliable, even for less frequently users. Numerous additional functions such as external start/ stop function allows easy integration of the test system also in customer specific test environments.

All the test parameters can be varied in a broad range wide above the requirements of the standards. Together with the ability of changing test parameters during test, AXOS8 is not only the ideal product for compliance and pre-compliance testing, it is useful for monitoring & debugging function during design phase as well.

A wide range of cost-efficient and user friendly coupling / decoupling networks for power lines as well as for symmetrical and asymmetrical data- and signal lines are available as options.

### STANDARDS

- IEC/EN 61000-4-4 EFT / Burst
- IEC/EN 61000-4-5 Surge E. 2&3 (1.2/50µs... 8/20µs)
- IEC/EN 61000-4-5 Surge (10/700µs)
- IEC/EN 61000-4-9 Magnetic Field
- IEC/EN 61000-4-11 AC Dips and Interrupts
- IEC/EN 61000-4-12 Ring Wave
- IEC/EN 61000-4-29 DC Dips and Interrupts
- IEC/EN 61000-6-1 Generic Residential
- IEC/EN 61000-6-2 Generic Industrial
- IEC/EN 60335-1 Household
- IEC/EN 60601-1 Medical
- IEC/EN 60950
- EN 55024
- IEEE C62.41
- ITU K.20, K.21, K.44, K.45

### APPLICATIONS

- Compliance & pre-compliance testing of electrical products
- CE marking
- Product development and debugging
- Compliance testing of telecom and wireless devices
- Overtesting



## FEATURES AND BENEFITS

- ✓ Easy to operate with manual and automated test modes, software assisted test preparation, pre-defined test routines and visual aided test setups
- ✓ Economic & Efficient. Touch screen guarantees reduction of time and effort - Experience and know-how at a reasonable price
- ✓ Safe and reliable operation by using safety interlock, warning lamp and emergency stop functions
- ✓ Voltage and current monitoring of surge impulses and EUT power provides valuable feedback to the test engineer
- ✓ Automatic generation of test report, including test parameters, test setup and test result

## AXOS 8 EXPANDABLE TEST SYSTEM



**AXOS<sup>8</sup>**  
Compact Test System  
Article no. 2490800

Surge 1.2/50µs...8/20µs  
IEC/EN 61000-4-5

Telecom Wave 10/700µs\*  
IEC/EN 61000-4-5 & ITU

Ring Wave  
IEEE C62.41

EFT/Burst  
IEC/EN 61000-4-4

Voltage Dips  
IEC/EN 61000-4-11\*\*

Magnetic Field  
IEC/EN 61000-4-9\*\*\*



**AXOS<sup>8</sup>**  
Surge Test System  
Article no. 2490810

Surge 1.2/50µs...8/20µs  
IEC/EN 61000-4-5

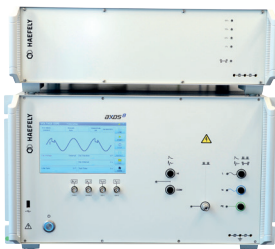
Telecom Wave 10/700µs\*  
IEC/EN 61000-4-5 & ITU

Ring Wave  
IEEE C62.41

EFT/Burst  
IEC/EN 61000-4-4

Voltage Dips  
IEC/EN 61000-4-11\*\*

Magnetic Field  
IEC/EN 61000-4-9\*\*\*



**AXOS<sup>8</sup>**  
Dips Test System  
Article no. 2490840

Surge 1.2/50µs...8/20µs  
IEC/EN 61000-4-5

Telecom Wave 10/700µs\*  
IEC/EN 61000-4-5 & ITU

Ring Wave  
IEEE C62.41

EFT/Burst  
IEC/EN 61000-4-4

Voltage Dips  
IEC/EN 61000-4-11\*\*

Magnetic Field  
IEC/EN 61000-4-9\*\*\*



**AXOS<sup>8</sup>**  
EFT/Burst Test System  
Article no. 2490830

Surge 1.2/50µs...8/20µs  
IEC/EN 61000-4-5

Telecom Wave 10/700µs\*  
IEC/EN 61000-4-5 & ITU

Ring Wave  
IEEE C62.41

EFT/Burst  
IEC/EN 61000-4-4

Voltage Dips  
IEC/EN 61000-4-11\*\*

Magnetic Field  
IEC/EN 61000-4-9\*\*\*

- Activated by default
- Optionally available by activation via key code

\* In combination with external Telecom Wave Modul "TW8"  
\*\* External voltage dips transformer "DIP 116" required  
\*\*\* Additional antenna coil "MSURGE-A" required

## STANDARD PACKAGE

### AXOS<sup>5</sup>

AXOS <sup>5</sup>	Compact Immunity	No. 2490400
AXOS <sup>5</sup>	Surge	No. 2490401
AXOS <sup>5</sup>	EFT/Burst	No. 2490402
AXOS <sup>5</sup>	Voltage Dips	No. 2490403

#### Included accessories

- Mains Cable
- User Manual
- Calibration certificate

### AXOS<sup>8</sup>

AXOS <sup>8</sup>	Compact Immunity	No. 2490800
AXOS <sup>8</sup>	Surge	No. 2490810
AXOS <sup>8</sup>	EFT/Burst	No. 2490830
AXOS <sup>8</sup>	Voltage Dips	No. 2490840
AXOS <sup>8</sup>	Ring Wave	No. 2490820
AXOS <sup>8</sup>	Telecom Wave	No. 2490850

#### Included accessories

- Telecom Wave Modul "TS 8" 10/70µs\*
- Automatic dips single phase transf. "DIP 116" \*\*
- Mains Cable
- User Manual
- Calibration certificate

\*only with AXOS8 Telecom Wave Test System (2490850)

\*\* only with AXOS 8 Dip&Interrupt test (2490840)

## BASIC AXOS SPECIFICATIONS

	AXOS <sup>5</sup>	AXOS <sup>8</sup>
<b>IEC / EN 61000-4-4 EDITION 3 EFT / BURST</b>		
Output Voltage	0.2 – 5.0 kV ±10% at coaxial output	
Rise Time	5 ns ±30%	
Impulse duration	50 ns ±30% at 50 Ohm 50 ns –15 +100 ns at 1000 Ohm	
Burst Mode	normal, continuous, real, random	
<b>IEC / EN 61000-4-5 EDITION 3 SURGE COMBINATION WAVE</b>		
Output Voltage	0.2 – 5.0 kV ±10%	0.2 – 7.0 kV ±10%
Voltage Rise Time / Impulse duration	1.2 µs ±30% / 50 µs ±20%	
Output Current	0.1 – 2.5 kA ±10%	0.1 – 3.5 kA ±10%
Current Rise Time / Impulse Duration	8 µs ±20% / 20 µs ±20%	
<b>IEC / EN 61000-4-5 Telecom Wave / ITU K.20, K.21, K.44, K.45 (external TW 8 module)</b>		
Output voltage	-	0.2 - 7.0 kV ± 10%
Front time OCV / Decay Time OCV	-	10 µs ± 30% / 700 µs ± 20%
Front time SCC	-	5 µs ± 20%
<b>IEC / EN 61000-4-11 EDITION 3 AND IEC / EN 61000-4-29 DIPS &amp; INTERRUPTS</b>		
Max. voltage	264 V AC/DC	
Max. current	16 A AC/DC continuous 20 A for 5 s , 23 A for 3 s , 40 A for 3 s , > 500 A inrush current	
<b>IEC / EN 61000-4-12 EDITION 2 AND ANSI / IEEE C62.41 Ring Wave</b>		
Max. voltage	-	0.2 - 7.0 kV ± 10%
Frequency	-	100 kHz
Rise time OC / Rise time SC	-	5 µs / 1 µs

For complete technical specifications please consult the device datasheet available at [www.haefely.com](http://www.haefely.com)

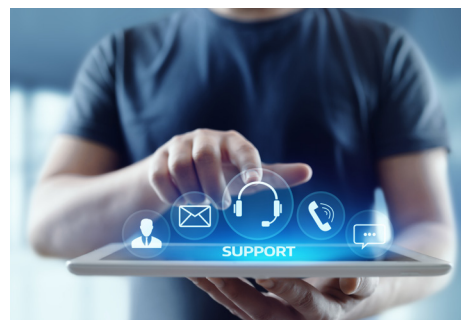
## AXOS<sup>5</sup> & AXOS<sup>8</sup> OPTIONS AND ACCESORIES

		AXOS <sup>5</sup>	AXOS <sup>8</sup>
FP-EFT 32M	3-Phase CDN EFT/Burst 32 A / 690 V		No. 2490170
FP-EFT 100M2	3-Phase CDN EFT/Burst 100 A / 690 V		No. 2495860
FP-COMB 32	3-Phase CDN for Surge, Ring Wave, EFT/Burst 32A / 480 V		No. 2490430
IP4B	Capacitive Coupling Clamp for EFT/Burst		No. 2491300
FP-SURGE 32A	Automatic 3-Phase CDN Surge 32 A / 690 V		No. 2490700
FP-SURGE 100M2	3-Phase CDN Surge 100A / 690 V		No. 2490180
PCD 121	Symmetrical Data & Control Line Coupler		No. 2498010
PCD 126A	Asymmetrical Data & Control Line Coupler		No. 2498030
DEC 5	Symmetrical Data & Control Line Decoupler		No. 2490141
DEC 6	Symmetrical Data & Control Line Decoupler		No. 2490151
DEC 7	Asymmetrical Data & Control Line Decoupler		No. 2490161
DIP 116	Automatic Dips Transformer 16 A 40/70/80%		No. 2490410
MSURGE-A	Magnetic Field Test IEC / EN 61000-4-9		No. 2490441
VTM 15000	Isolation Test 1.2/50 us up to 10 kV		No. 2499960
VTM 15000/05	Isolation Test 1.2/50 us up to 10 kV / 0.5J		No. 2499692
PDP 8000 HV	Differential Probe 1000:1 for Surge		No. 2499911
CP 101	Current Probe Model for Surge		No. 2499931
ES	External Emergency Stop Switch P12		No. 4700751
WL	External Warning Lamp P12		No. 4700750
TW 8	Telecom Wave Modul 10/700µs	-	No. 4700915
Calibration	Accredited Calibration AXOS according to ISO/IEC 17025	No. 2490420	No. 2490900
<b>Key Codes</b>			
Surge Key Code	Key Code for Surge extension AXOS	No. 4700814	No. 4700911
EFT/Burst Key Code	Key Code for EFT/Burst extension AXOS	No. 4700815	No. 4700912
Ring Wave Key code	Key Code for Ring Wave extension AXOS	-	No. 4700913
Dips Key Code	Key Code for Voltage Dips extension AXOS	4700816	4700914
<b>Remote Control and software</b>			
Remote Control	Remote Control Software for AXOS		2490440
Report Software	Reporting Software for AXOS		4700975

## ADDED SERVICES



- Pre- & After Sales Support
- Application Support
- Commissioning
- Warranty Extension
- Calibration (accredited & factory)
- Training and Seminars
- Rental units



## Global Presence

### EUROPE

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This document has been drawn up with the utmost care. We cannot, however, guarantee that it is entirely complete, correct or up-to-date. Subject to change without notice.

V2202



**HAEFELY**

Current and voltage – our passion

HV

HIGH VOLTAGE

IN

INSTRUMENT

EM

EMC

  
reliable.  
precision.