KUFFERATH

Testing Technology GROUP

HK UniTest

by KUFFERATH GROUP

Product Overview

Deutschland / *Germany* (Hauptsitz / *Headquarter*)

Slowakei / *Slovakia* • USA / *US* • Mexiko / *México* • Nicaragua / *Nicaragua* • Brasilien / *Brazil*
Tunesien / *Tunisia* • China / *China* • Marokko / *Morocco*
Tschechien / *Czech Republic* • Bulgarien / *Bulgaria* • Rumänien / *Romania*
Polen / *Poland* • Ukraine / *Ukraine* • Türkei / *Turkey*
Spanien / *España* • Paraguay / *Paraguay*

ABOUT US

Who we are and what we do

We are a medium-sized, international company with our headquarters in Moers, North Rhine-Westphalia, and have been a reliable and innovative company for our customers around the world since our establishment in 1995.

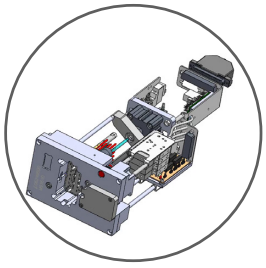
Tradition and innovation – two pillars of our corporate philosophy that have ensured constant growth as well as a global network.

Our core business is testing engineering for precision technologies in the automotive industry, while we are also committed to meticulously fulfilling requirements from other sectors – always with a focus on our customers.

We, the Kufferath Group, have set ourselves the task of becoming the world's leading provider in the field of testing technology for the automotive industry.

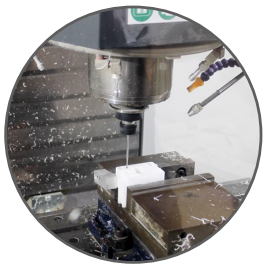
Kufferaths main target is to satisfaction our customers every day with our best service and support to their growing demands.

Dependent from the hugh numbers of changes and requirements in the automotive market our strength is defined in short reaction times and providing our best solutions developed near to the customers needs.

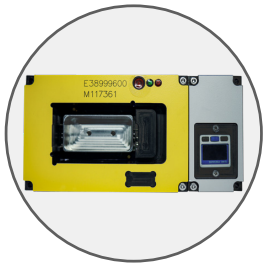


Design

Manufacturing



Programming



Assembly and quality control

TEST TABLES

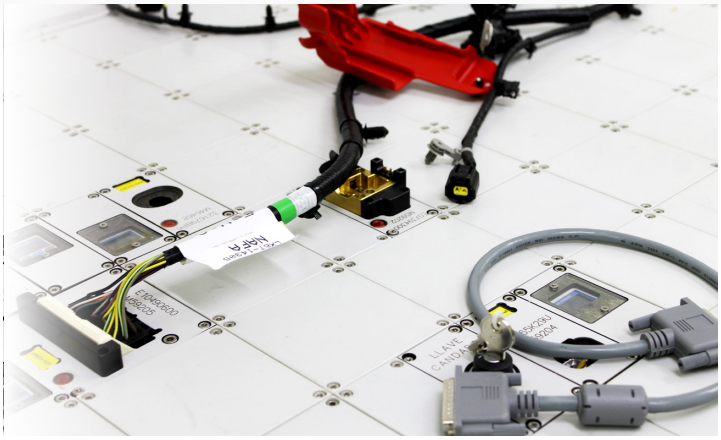
Wire Harness

Test panels and test benches form the basis of every test system: test modules, test point cards, cable testers, PCs, testing software and test benches are assembled to form a test unit.

The “foundation” of the test system, i.e. the test bench, may have a completely different design depending on the requirement and the setup of the workpiece to be tested. The size and shape of the test bench as well as its equipment depends on the relevant requirements.

Design and function as per customer requirement:

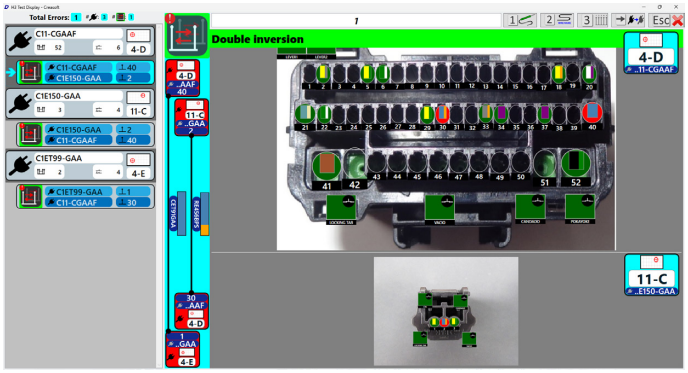
- Modular design.
- Different model »shapes«.
- Standard design in aluminium profile.
- Maintenance openings in the front and back.
- Rollers with parking brake.
- Height adjustable.
- Many accessories such as touchscreen, label printer, barcode scanner available.

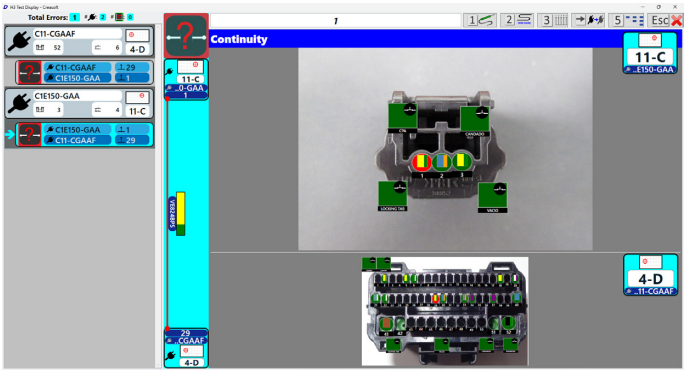


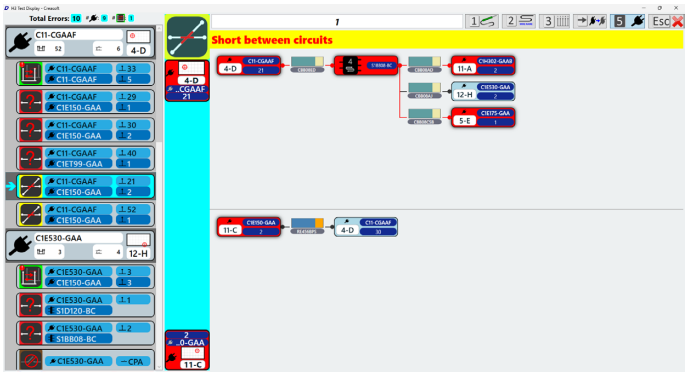
Our test benches are designed to ensure that the test unit can be expanded or scaled-down as required, similar to the modular design principle. Our test benches and panels can also be used to expand existing systems or components produced by different manufacturers.

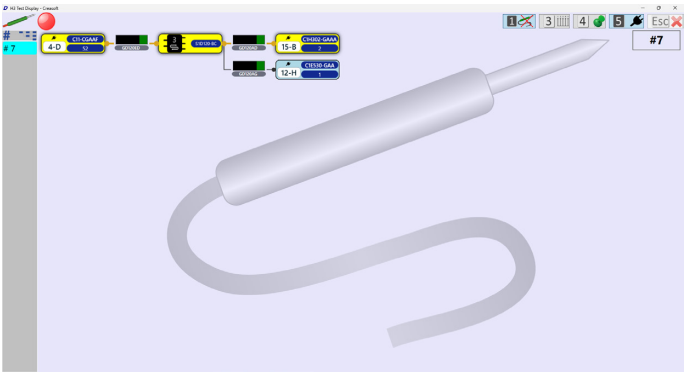
Our designs are based on the latest technical standards as well as ergonomic findings and focus on extensibility, precision and quality.

Software



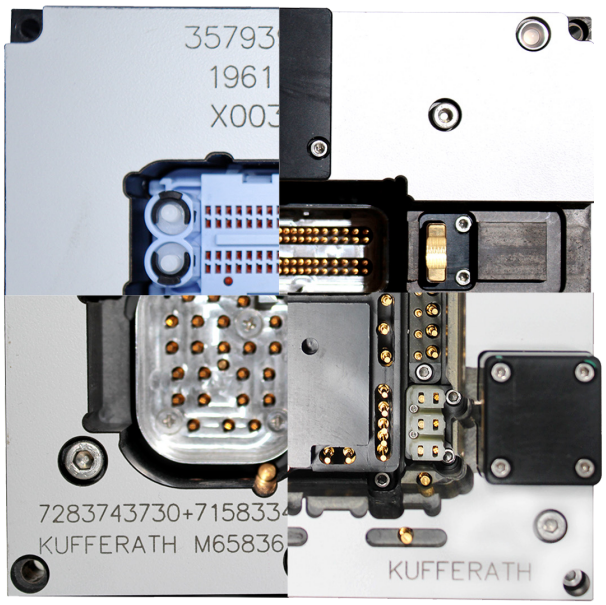






MODULES

Wire Harness



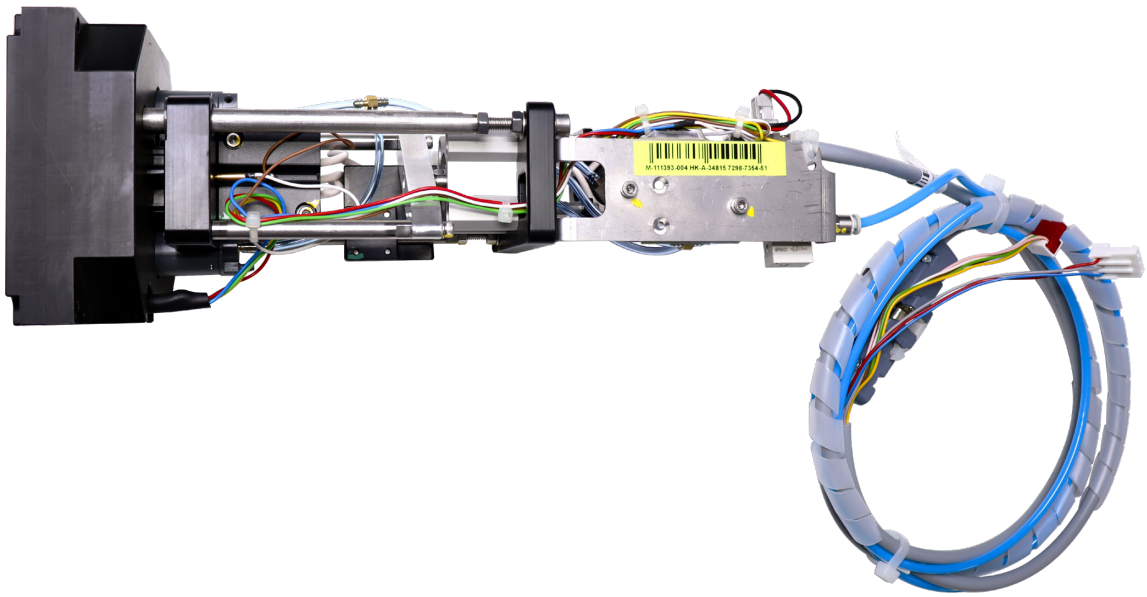
The test modules are the link between the test piece and the test system.

The basic design of the test benches and panels generally have three standard sizes (50x50 mm / 50x100 mm / 100x100 mm), but a customised adjustment to other formats is not an unusual or demanding challenge for the Kufferath Group.

Design and function as per customer requirement, inspection of components for*:

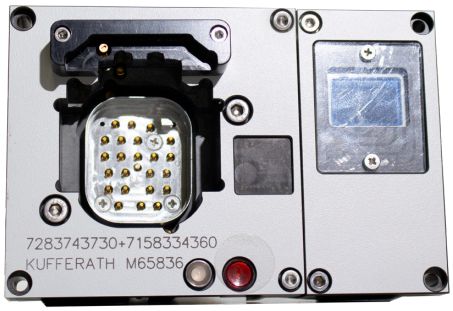
- Function, seat, interlocking.
- Correct assembly of the test piece.
- Leak / pressure and vacuum test.
- Defective connections.
- Continuity test.
- Use of the correct plug.

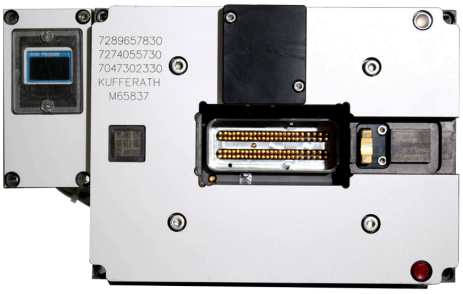
The test piece is either removed automatically or at the touch of a button after a successful test. The test result is issued as a print-out (e.g. as a label) and stored.

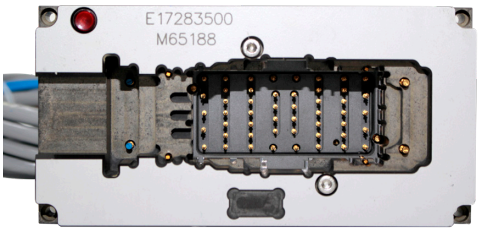


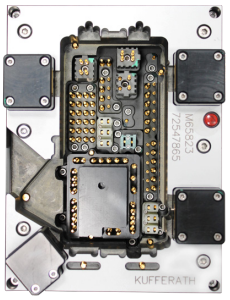
Various modules tailored to meet all our colleagues'

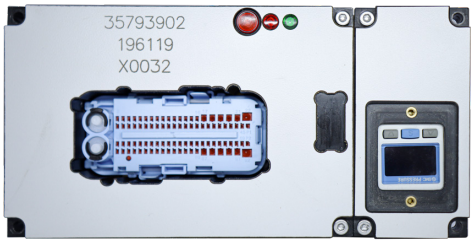
The Kufferath Group quality standard ensures that the tests performed by our modules are just as reliable after a large number of tests, i.e. after inserting and removing the test plugs a large number of times, that they display no/negligible wear as well as outstanding durability and quality, while they are also user-friendly.

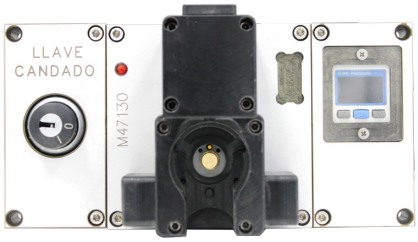


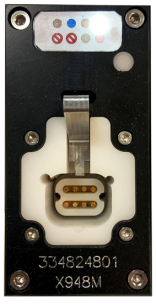








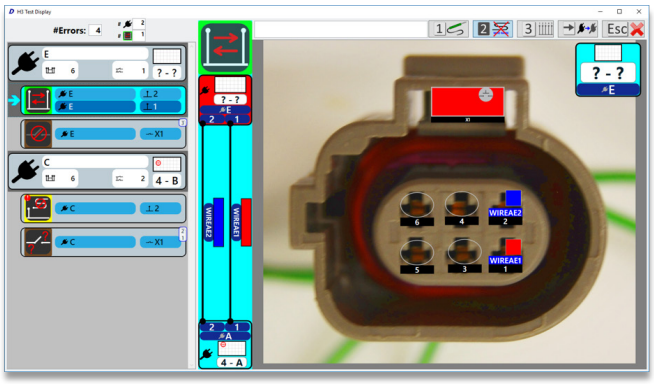


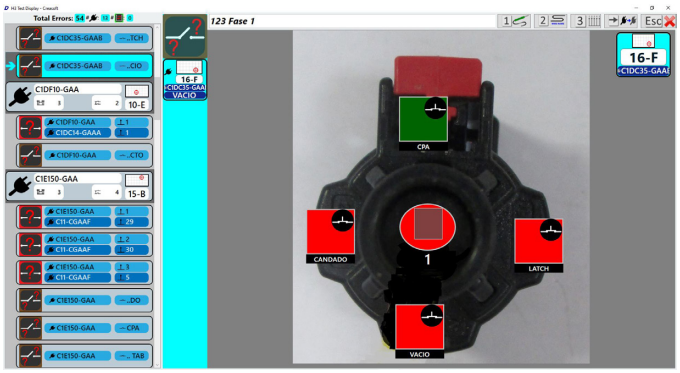


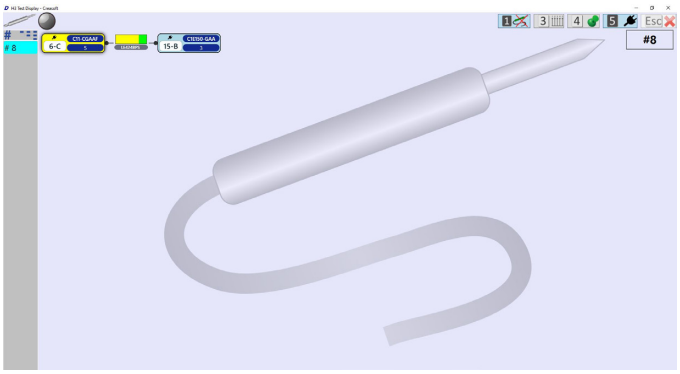
HETOS
Wire Harness Software

Harness Electrical Test Open System (HETOS) is a system designed primarily to test electrical wiring.

One of the most innovative feature is that the system allows several terminals (also called displays).







Main features

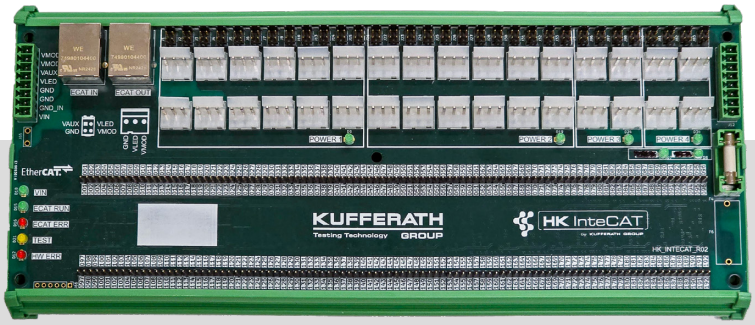
• Fast test software, working together with our Wire Harness Testers INTE.
• Very easy and visual user interface. Full list of all the errors found in the harness.
- Errors list refreshed fastly in a continuous test scan. Errors grouped by Connector.
• Advanced Error Deduction minimizes error-repairing time.
• Various test terminals within the same system.
• Advanced alarms system, to prevent fault production from its beginnings.
• Full test events log.

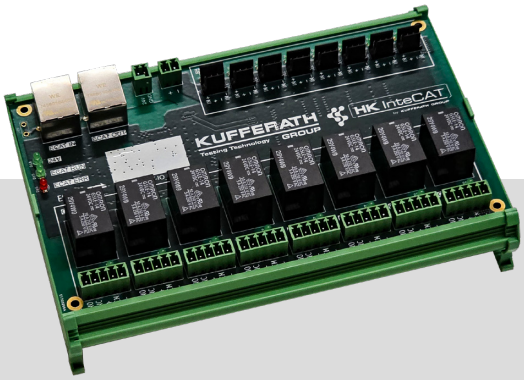
The system allows various testing terminals in a test board. Every terminal shows the harness errors closer to that terminal, so operators can work at the same time repairing the errors.

Advanced AI software helps with this process and the operators are not affected with the connector manipulation of other operators.

All terminals are connected via LAN connection and works autonomously, updating data from server when necessary.

InteCAT
Low Voltage Tester



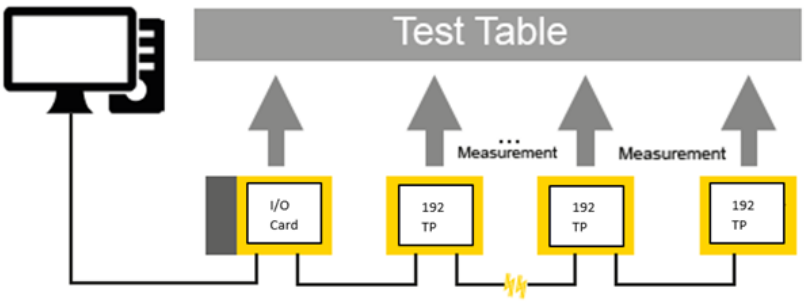


Smart and Scalable Low Voltage Testing

The HK InteCAT LV System is a versatile and efficient solution designed for comprehensive low-voltage testing in harnesses.

Its modular design allows flexible test point distribution while maintaining outstanding precision, reliability, and speed.

Based on EtherCAT communication, it ensures seamless integration into existing systems, no IP configuration, no flat cables, just plug and test.



Key Features

• Flexible Architecture: Modular test cards can be placed meters apart, optimizing test coverage wherever needed.

• High-Speed EtherCAT Communication: No need for IP addresses, simple daisy-chain connection for synchronized measurements.

• Parallel Data Acquisition: All boards perform simultaneous, cycle-by-cycle measurements for real-time accuracy.

• Comprehensive Diagnostics: Automatic calibration, self-diagnostics, and LED event indicators for quick troubleshooting.

• Plug-and-Play Integration: Works seamlessly with any other InteCAT module (I/O, HV, TM, etc.)

InteCAT
Low Voltage Tester
TECHNICAL SPECIFICATIONS

Controller Module

- **Resistance**
- Resolution: 4.9 Ω
- Range: 4.9 Ω – 1 MΩ

- **Voltage**
- Resolution: 12 mV
- Range: 0 V – 18.8 V

- **Capacitance**
- Minimum measurable: 100 nF

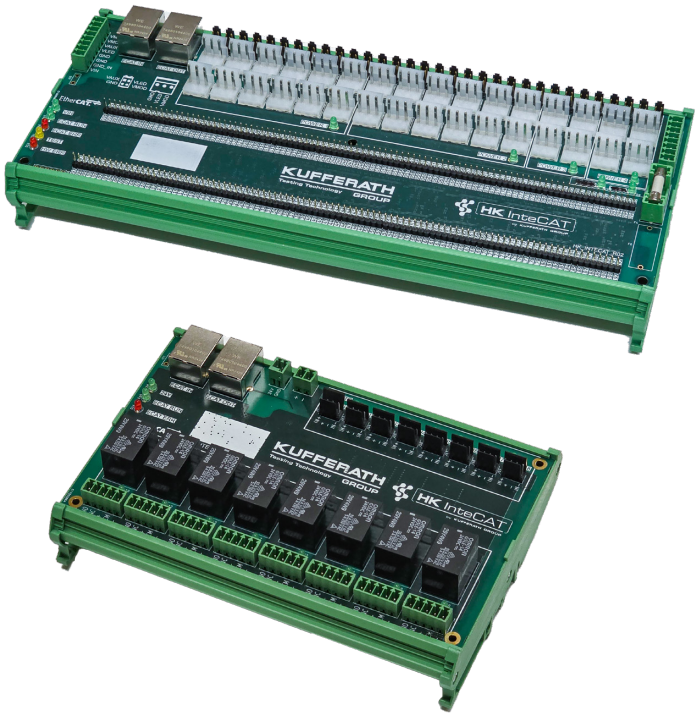
- **Test Points**
- 192 test points with ESD and overcurrent protection.
- Detection and feedback for up to 50 mA sink per pin.
- Voltage measurement: 0 – 18 V.

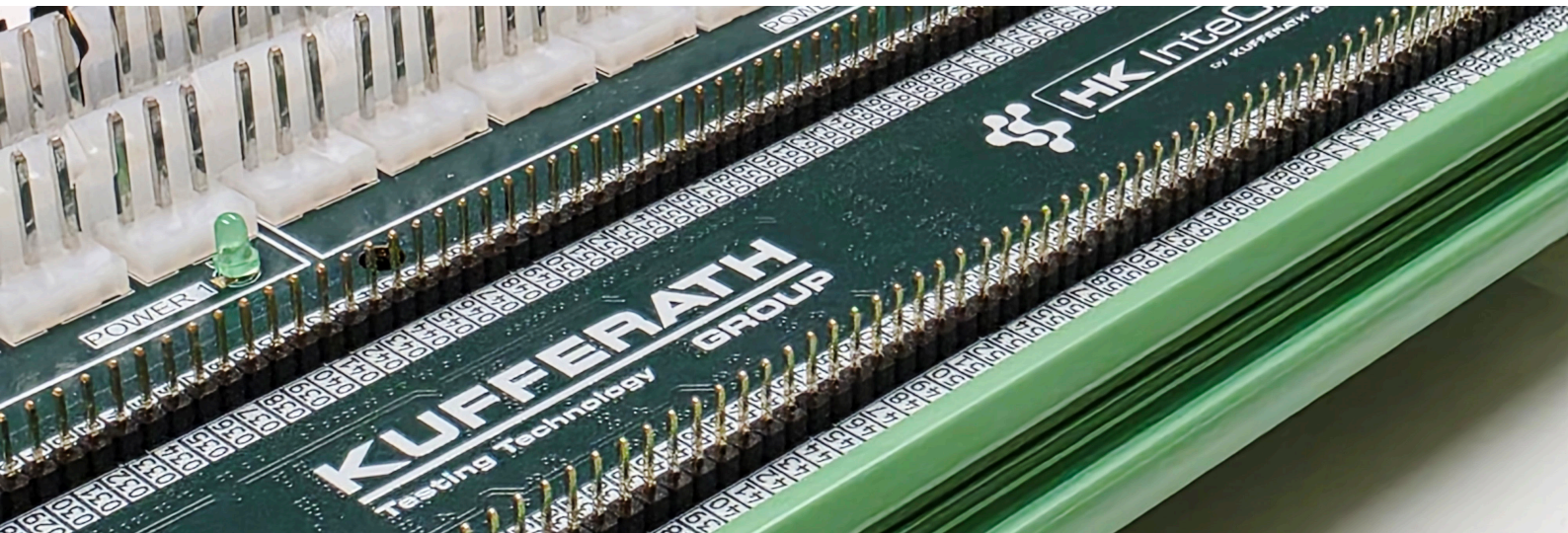
- **LV Testing Capabilities**
- Measure resistance, capacitance, and diodes.
- Detect opens, shorts.
- Integrated 4 independent module power groups with digital control.
- Fuses and fuse feedback integrated on-board.

- **Power & Communication**
- Single-card system: only EtherCAT and power required.
- All boards include internal measurement.
- Fully compatible with HV Tester to reduce high-voltage test points.

- **EtherCAT Interface**
- Plug-and-play connection: No IP address setup required
- Works in the same EtherCAT network with other InteCAT modules

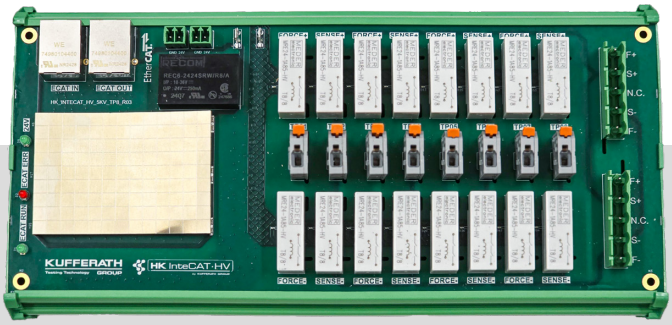
- **Diagnostics & I/O**
- Automatic calibration at startup.
- Built-in self-diagnostics.
- Custom LED signaling.
- 8 digital inputs and 8 digital outputs.

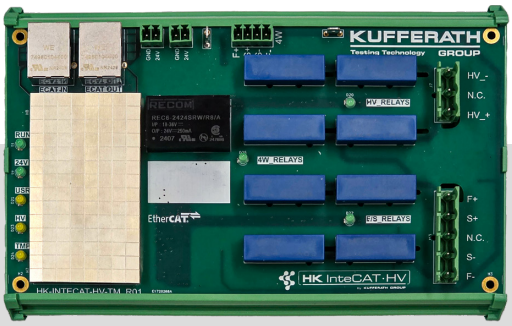




InteCAT HV

AC/DC High Voltage Tester

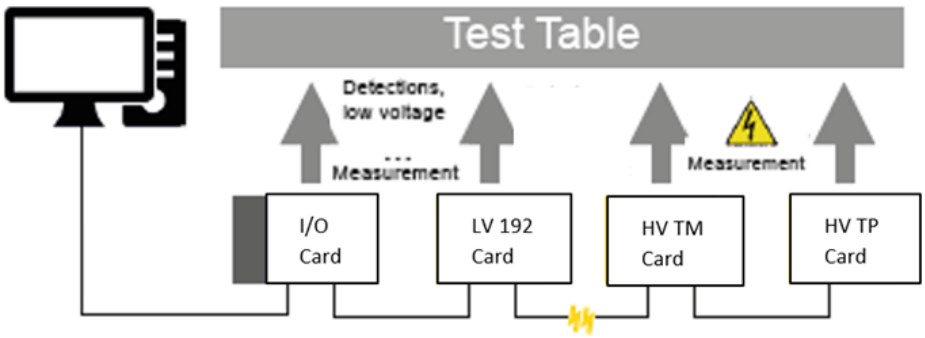




High-Voltage Testing - Up to 6 kV DC

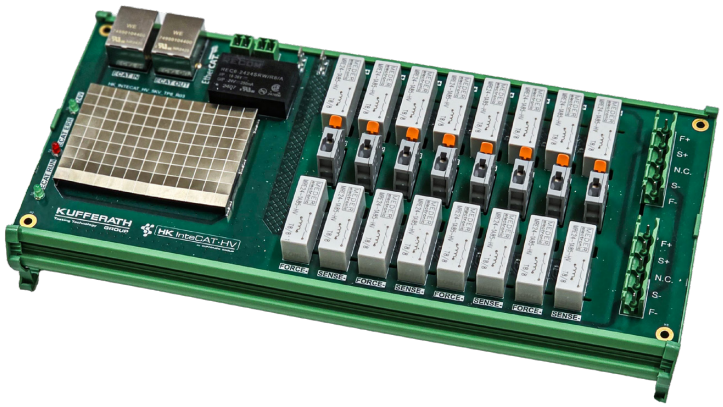
The HK InteCAT HV System redefines what's possible in automated high-voltage testing. Designed for applications up to 6 kV DC and 4.2 kV AC, it delivers the power and precision required for even the most demanding insulation and dielectric tests, far beyond what conventional systems offer.

This industry-leading voltage capability sets the HK InteCAT HV on top, providing exceptional flexibility for manufacturers who need both safety and accuracy in one robust EtherCAT-based platform.



Key Features

- Up to 6 kV DC and 4.2 kV AC test capability.
- Seamless EtherCAT Communication: no IP configuration, no complex wiring.
- Mixable with LV System: Combine both systems to reduce total HV test points.
- Parallel Measurement: Simultaneous cycle-by-cycle data acquisition across all boards.
- Distributed System: HV cards can be placed apart for maximum flexibility.
- Full Compatibility: Easily connects with any InteCAT board (IO, LV, TM…).



InteCAT HV

AC/DC High Voltage Tester

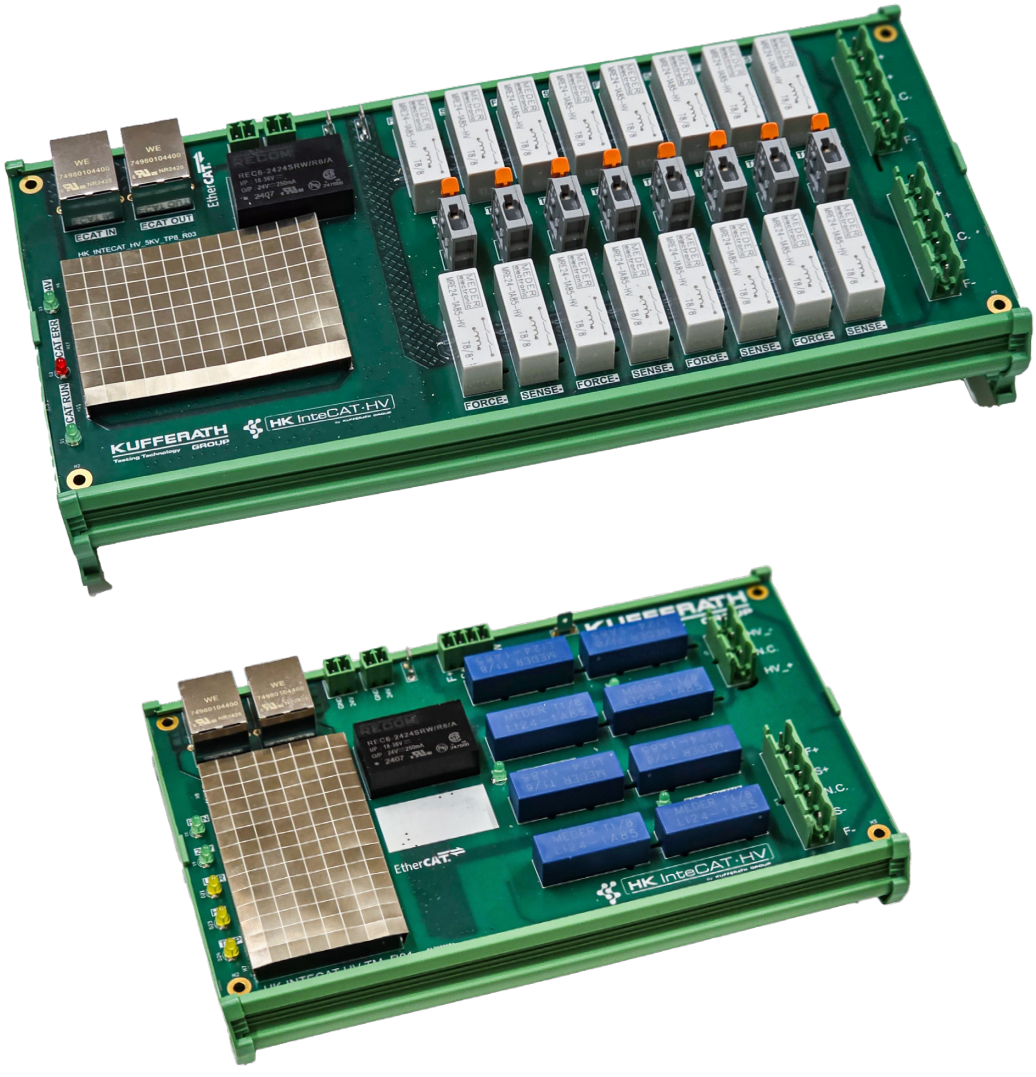
TECHNICAL SPECIFICATIONS

- **HV Test Point Card**
- 8 HV Test Points per card.
- Maximum voltage: 6 kV DC and 4.2 kV AC.
- 4-Wire Kelvin measurement for optimal precision.

- **Controller Module**
- External micro-ohmmeter interface for ultra-precise LV measurements.
- Same EtherCAT-based communication and diagnostics as LV modules.

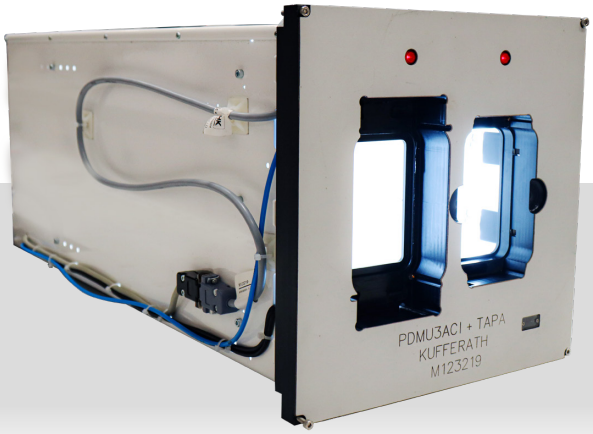
Why Choose the InteCAT Family

- 6 kV Capability: unmatched high-voltage range that outperforms standard testers.
- Unified Platform: LV and HV systems operate on the same EtherCAT backbone.
- Scalable & Modular: expand your setup easily with additional boards.
- Time-Efficient: fast test cycles and real-time diagnostics.
- User-Friendly: plug-and-play configuration, easy maintenance.
- Reliable & Proven: industrial-grade design for demanding test environments.



EV4

Vision inspection for fuse boxes



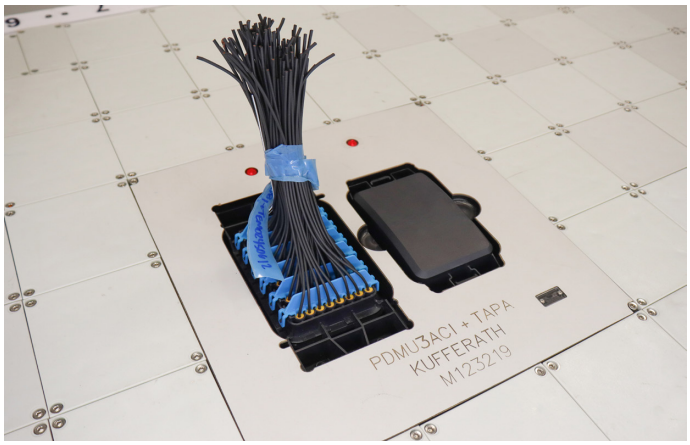
EV4: Advanced Precision in Fuse Box Identification and Analysis

EV4 is expertly designed to identify fuse boxes either through direct reference or KSK wiring, providing seamless support for various illumination systems to perform comprehensive image analysis across multiple physical parameters.

Our system records detailed test results, including all parameters, allowing you to revisit and review acquired images at any time.

EV4 is easily integrated into automated production lines, enabling fully autonomous testing without the need for manual intervention.

Additionally, EV4 comes equipped with an accessory for precise component height measurement, delivering extremely accurate results in a remarkably short testing period.



Main Features:

• Powerful identification methods of characters OCR, shapes, color classifications, deformations and dimensions.

• Supports different illumination systems to carry out analyses with different physical parameters.

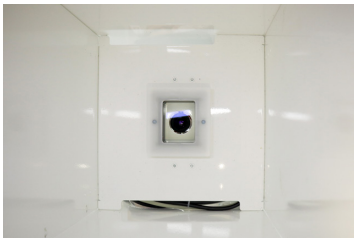
• The system can be integrated in automatic lines, permitting test without personal intervention.

• The system fully integrates into the EV viewer environment.

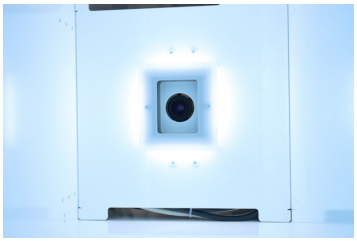
• The system measure the height of components with an accuracy of less than 0.01 mm.

• Very high speed test, approximately 2 seconds for a medium size box.

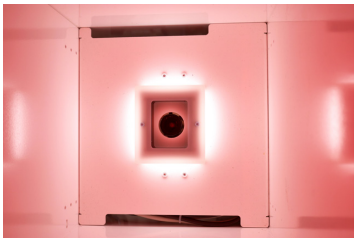
RGB Color System



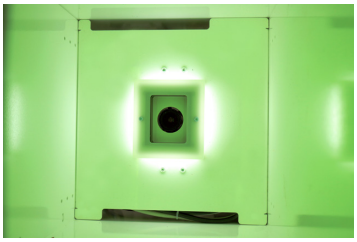
LIGHT OFF



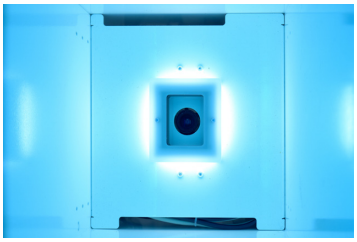
WHITE LIGHT



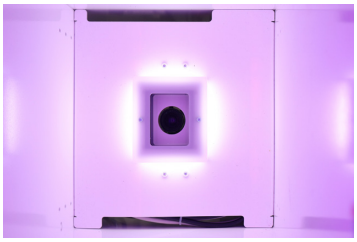
RED LIGHT



GREEN LIGHT



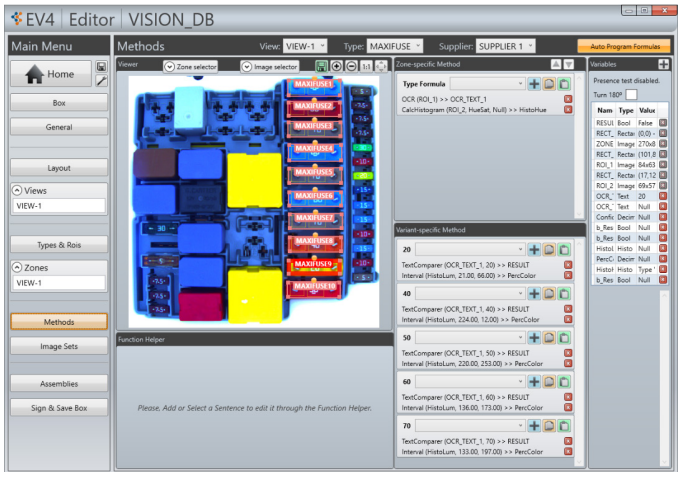
CYAN LIGHT

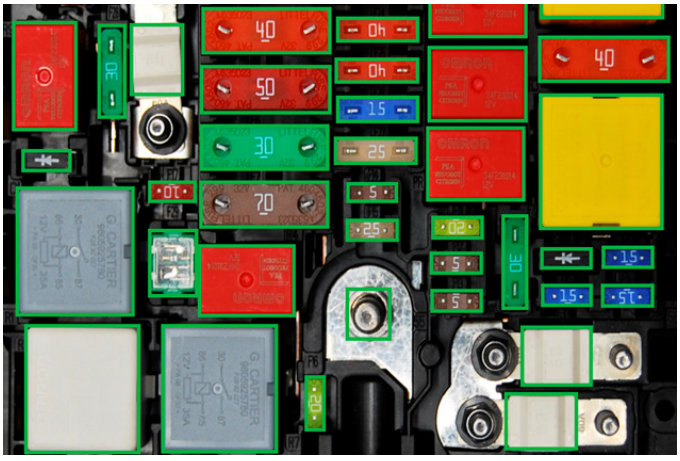


MAGENTA LIGHT

Compatible with various lighting systems to perform analyses under different physical parameters. Offers a selection of RGB colors including red, cyan, white, magenta, and green, which effectively reduce shadows by 90%.

Software:

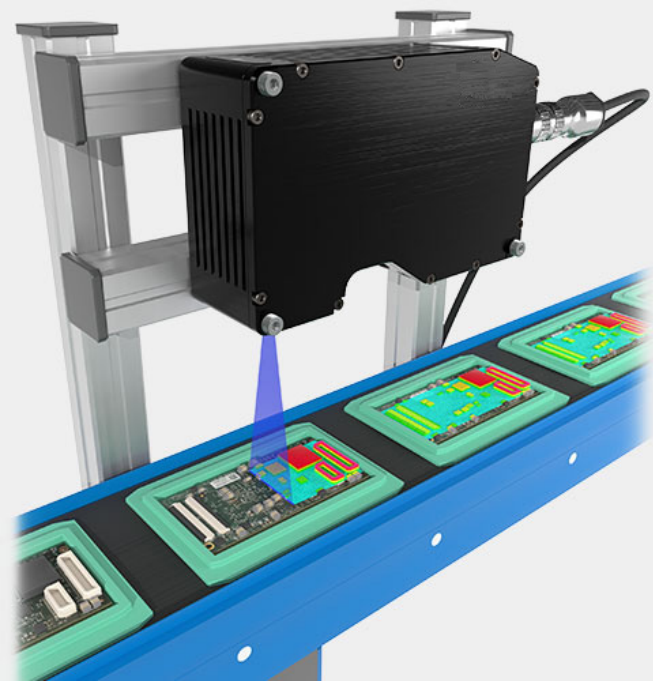


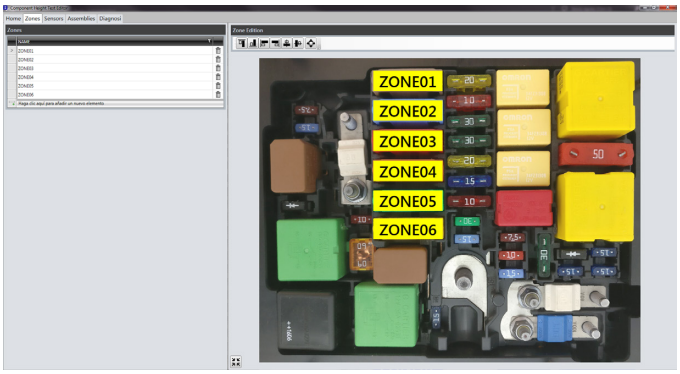


CHT

EV4 add-on. Component Height Test

CHT is a system for verifying the correct insertion of the components of a fuse box, measuring the height of the elements with laser system.





• Hardware

The CHT hardware is based on a 3D modeling system through a laser reading.

With the 3D model of the fusebox, the system test the different components by height and relief, measuring its height with an accuracy of less than 0.05 mm.

Small and compact, it can be mounted on a harness test board or on a structure together with an EV4 Vision system. Can be adapted for any size of fusebox.

The Component Height Test can work together with the EV4 Vision. It is a way to validate the good insertion of the elements tested by EV4 vision.

The system is robust against small deformations of the fuse box.

Very high speed test, approximately 2 seconds for a medium size box.

• Software

CHT comes with two applications: one for editing and the other for carrying out the test. The editing and test environments are completely graphic.

The system fully integrates into the EV4 viewer environment; a second CHT test can be requested if during the viewing test any of the components have been manipulated.

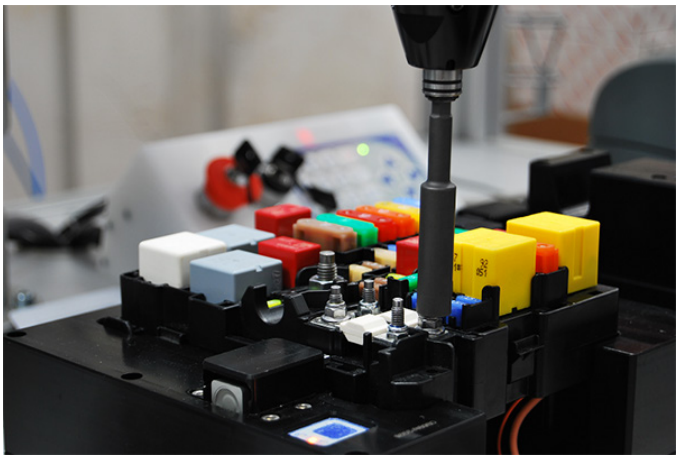
Register of the height of each component in correct and incorrect test, integrated with the register of data of the viewing test.

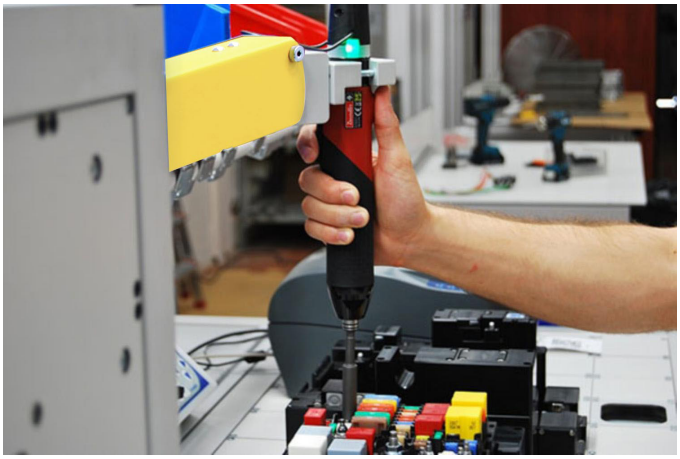
Simple programming and very fast calibration of the system.

Integrates fully into the HETOS system.

NR2
Screwing System

A complete solution for screwing control with a robust 3-axis arm.
Reliable and compatible with all existing tightening controllers.
The screw control software (NutRunner) is used to perform a tightening in a controlled and safe way.





Main features

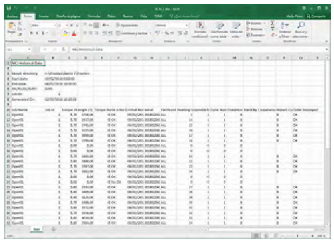
- 3-axis control arm of own design.
- Sound feedback accelerates production.
- Full operation data log.
- Navigation system: Guide the operator following prefixed steps.
- KSK software.
- Full integration with Creasoft products.

Compatible with several tightening controllers

Complete navigation system guides operator to follow prefixed steps. LED lights indicates from where to pick next cable, where to connect it and which screw has to be tightened.

- **Excel files**

Detailed documentation in .xml files.
Options to export graphs and results to PDF and Excel.



Nutrunner editor

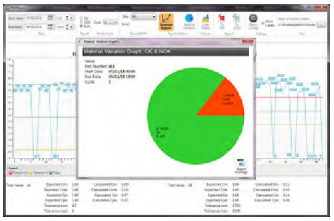
The software editor of the test databases allows to configure all the parameters of the screw test in a very visual, easy and intuitive way.

To program a new screwing zone, it is only necessary to position the mobile arm in the area and click on a button.

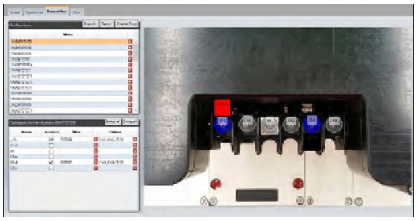
- **Process statistics**

NR2Report is an application that is part of the standard installation of the NutRunner software.
NR2Report also monitors the production process in real time, notifying the operator when the CPK of the last n pieces is lower than the established one. This system avoids a high defective production since a possible problem is detected in its beginnings.

Export options of graphics and results to PDF and Excel.



Statistics process



Nutrunner editor

Presence Test

Wired & Wireless clip checker

Presence Test is a complete clip presence test solution.
It allows splitting the test board in several areas, assigning each area to a workplace or operator.
The system can work both with wired fixtures and with the RF fixtures (wireless detection system).

• Test software

All operators can work at the same time since each one of them has an area assigned to the screen, showing specific instructions for each of the operators working. The standard operation is to show the following clip that they must insert.

The system is fully integrated with HETOS.
- Possibility of using N monitors and the necessary subdivisions.
- Full information on screen:
- Detection points and its current status.
- Current status of every clip on the test board.
- Additional info to be added above the clip image.
- All the texts that are shown to the operator are translatable.
- All colors are easily configurable.

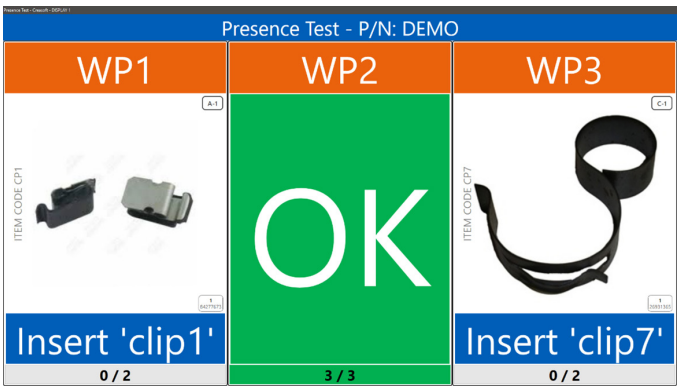
• Editions

Software with the latest technology. It allows to easily and quickly edit a test database.

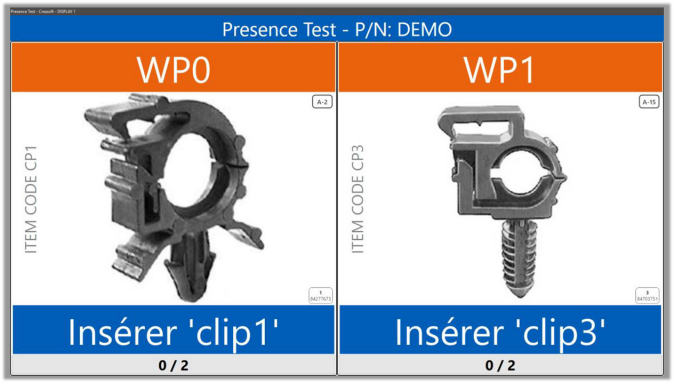
- Connection to the rack to test programmed points and detection points with a single touch of the probe.
- Drag&drop feature to assign each clip to each operator in a very easy and fancy way.
- Export and import the database in Excel format.

Easily edit with Excel and import again.

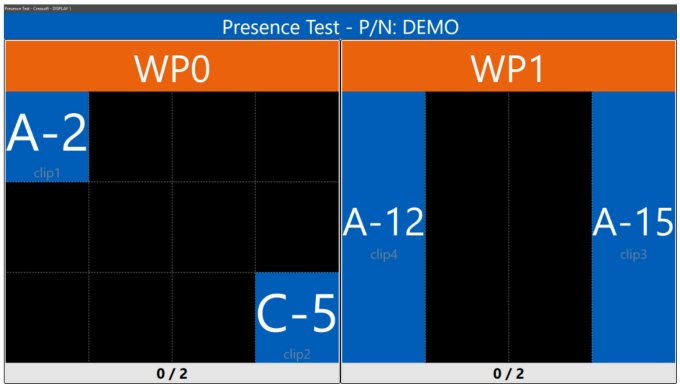
• MULTI-DISPLAY SOFTWARE



Clip images



Testboard schema



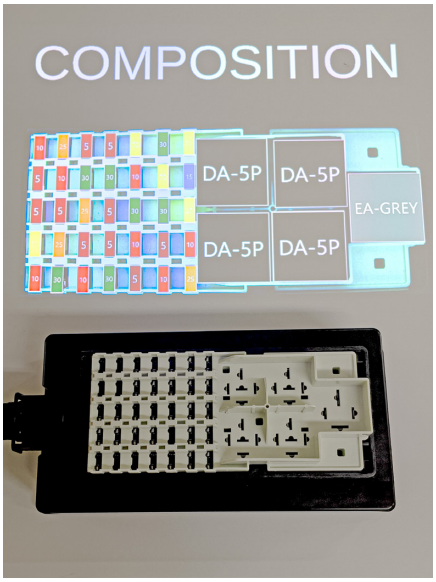
Harness Image Layout

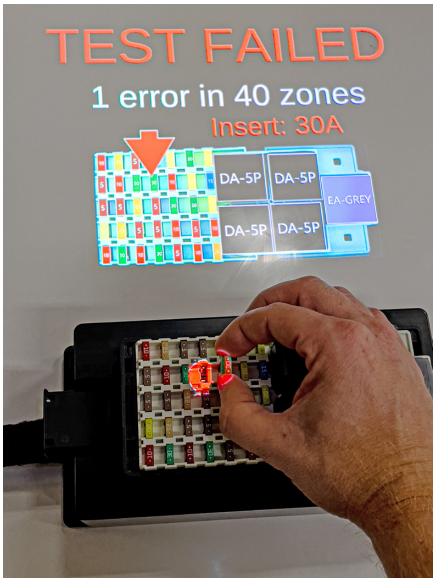
ARS
Augmented Reality System

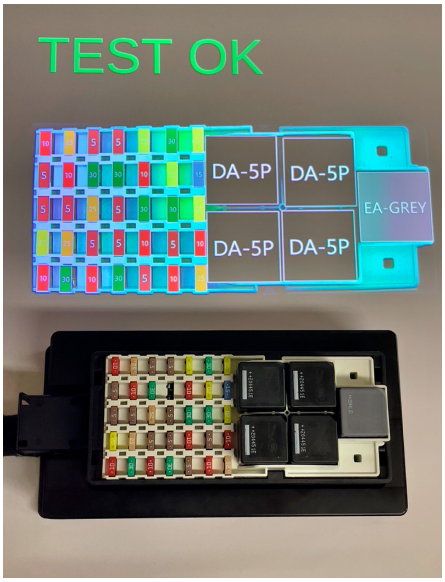
HK UniTest by KUFFERATH GROUP

Description

The Virtual Aids System is a navigation system that guides operator by projecting clear instructions over the workbench.
Different types of information are projected on the working surface, giving instructions and useful information to the operator.

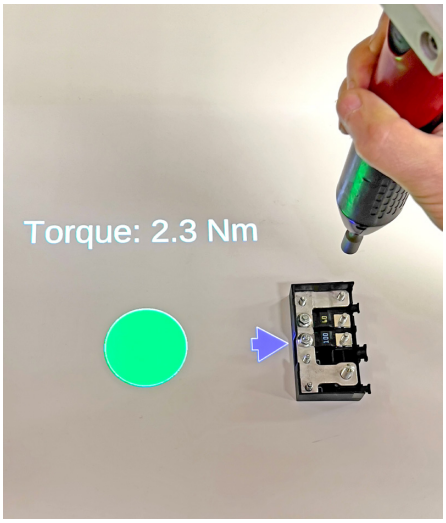






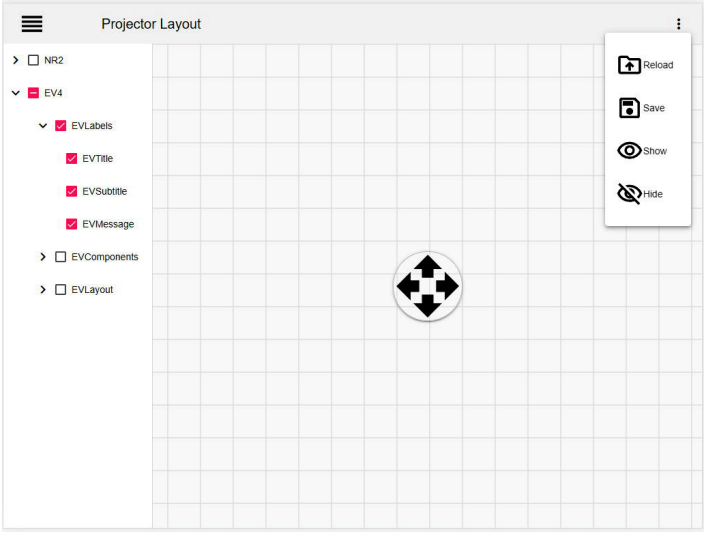
• Key points

Work efficiency is improved because operator is guided at all times in an easy and visual way.
All our products integrates this virtual aids system.



• Easy edition

Easy layout editor that allows to easily moving and place the different projected elements to find the best location over the working surface.
Possibility of in-situ editing from mobile devices.

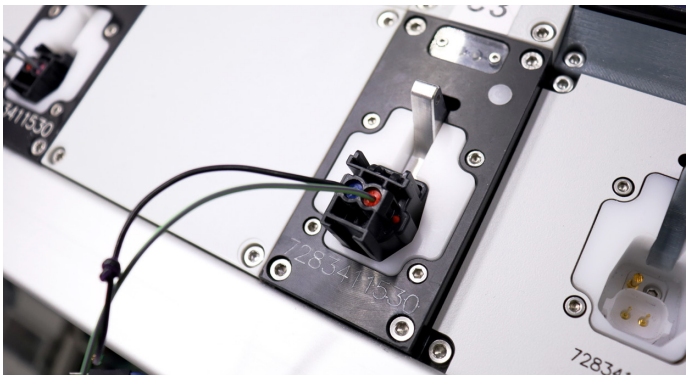


PULL SYSTEM

Guided Terminal Insertion

What is a pull- system module?

Is a Kufferath Group design module with mechanical or pneumatical clamping in order to guide an electrical sequence process of harness circuits to reduce wrong cavity cable insertion and unlocked terminals due to a push-pull mechanical process during electrical test.

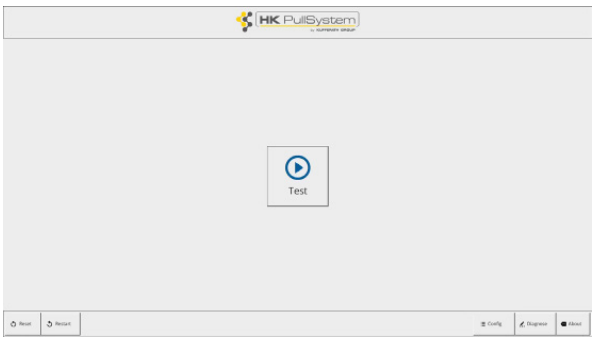


- **Software**

The Special Pull Test is used when a Customer specified minimum or maximum terminal pull force is required. The force values can be adjusted depending on the Customer's needs.

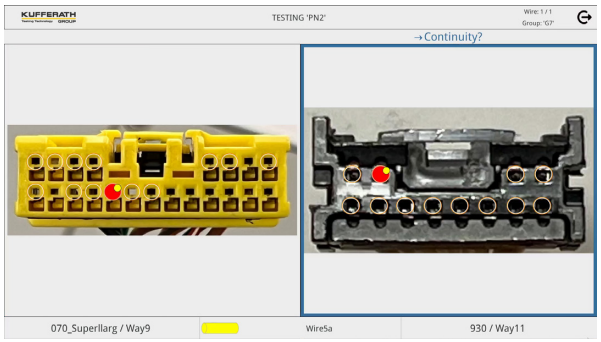
The plant will be responsible for providing the pull force to the supplier.

When doing the pull test on the PullSystem, if the test does not meet or exceed the required pull force, the test will be stopped.

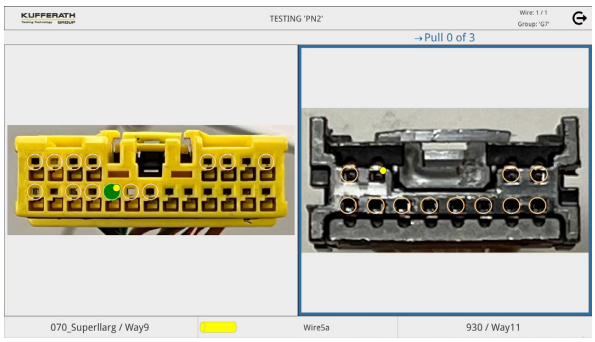


Home screen

Cable and cavity color sample



Pull



Continuity

•Module categories and specifications

The PullSystem Modules are classified based on three levels of assurance “A”, “B” and “C” defined in the MPPS information, the characteristics of each of them are described below.

- Category “A”. Aids in proper circuit selection, insertion of the circuit into the correct connector cavity performs TPO detections to further ensure continuity/detection of circuits to the guided position.

- Category “B”. Assists correct circuit selection, circuit insertion into the correct connector cavity and TPO detections.

- Category “C”. Supports circuit insertion by means of visual aids (decals) and TPO detections.

Category “A”

Category “B”

Category “C”

•Connector detection

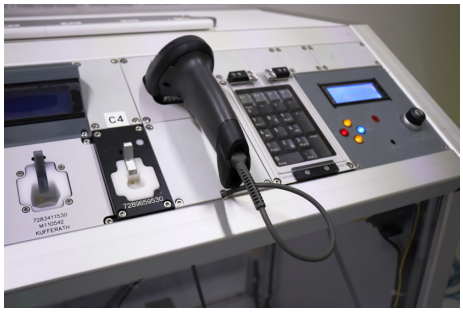
The Connector Detection Switch consists of detecting the presence of a connector inserted in the module.

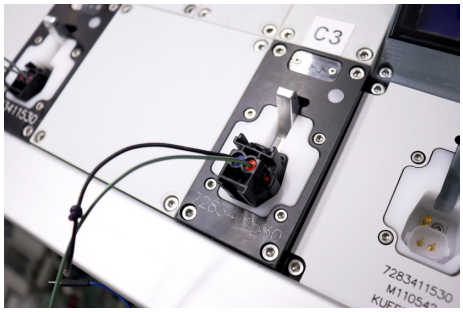
•Continuity detection with grounding point

Detection with ground point, like the previous tests, consists of detecting the continuity of a circuit.
Unlike the others, in this test the continuity of the circuit terminal is detected until the opposite endmakes contact with a brass or bronze pin to ground.
(Applies only to category A).

•Different pullsystem modules

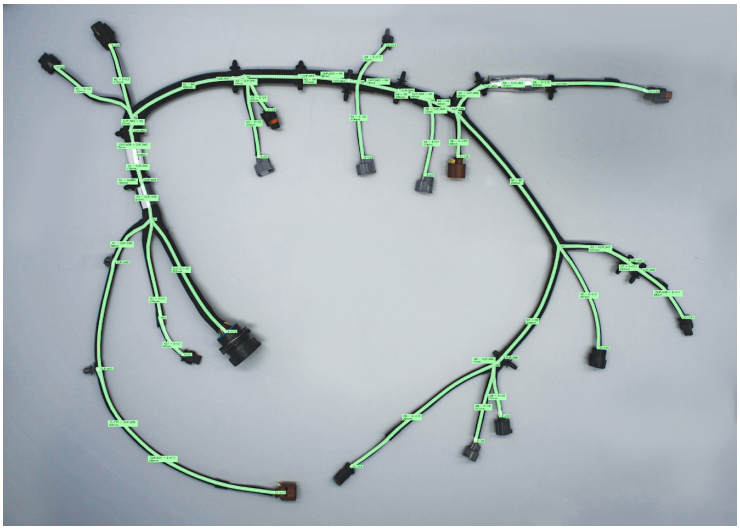
Operator follows the process indicated by the Pull System equipment. Each wire is requested in a predefined sequence according to programmed database.





Quality Control for Wiring Harnesses

AI-Powered



Intelligent solution to guarantee quality in wiring harness manufacturing.

Using Artificial Intelligence and advanced computer vision, the system checks in real time the position, length, and connections of each wire, detecting any error before it reaches the customer.

Key Features

- 100% automated control of distances, segments, and connections
- Instant error detection, with clear visual validation (green = OK, red = NOK)
- Flexible configuration for any reference or part number
- Easy integration into existing production lines and systems
- Time and cost savings, avoiding rework and customer complaints
- Reliability and traceability, every inspection is stored with images and results

Technical Specifications

- System resolution: 1–2 mm precision
- High-performance industrial camera
- AI inference powered by NVIDIA processors

Commercial Highlights

Vision AI transforms wiring harness inspection from a manual, error-prone task into a fast, precise, and fully objective process.

Suggested strong taglines:

- “Zero Errors in Wiring Harness Inspection”
- “AI-Powered Quality Control for Harness Manufacturing”

Key benefits to highlight:
- Speed
- Accuracy
- Simplicity
- Traceability

Call to action: Discover how Vision AI can improve your production

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