

# *in*touch

Heavy Duty & Special Vehicles • Edition 28/2022



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product variants.

# Functional safety.

## Editorial

Dear customers and partners

*The past year was eventful and turbulent for all of us. Drastic measures to combat COVID-19 made face-to-face contact impossible, unfortunately including contact with you, our valued customers. Unluckily, the current situation gives rise to fears that this situation will continue. It is all the more important to us that we remain in intensive and close contact with you through other channels.*

*This edition of intouch reflects EAO's continued focus on the heavy duty and special vehicle market and customers – from the field of functional safety and the TOBROCO-GIANT customer story, to EAO's centre of expertise for HMIs in off-road and on-road vehicles, as well as the latest products for this focus market.*

Have fun discovering!

Yours, Reinhard Kalla  
Head of Product Marketing

## A safety strategy for reliable components.

### *What is it? What do you need to know?*

Anyone producing heavy duty or special vehicles in Europe needs a safety strategy for interaction between the subsystems and electronic components, whether for on-road or off-road vehicles. Designating a safety level for each safety-relevant application will enable you to ensure functional safety right across your supply chain – and the key to doing this lies in risk analyses that are performed in accordance with the appropriate standards. As ex-

pert partner, EAO prioritises functional safety in all of its customer relationships, as there are great advantages in this area for users and manufacturers alike.

Functional safety reduces unacceptable risks caused by random electronic system errors to a level that is acceptable. The risks in question here are those that may cause injury to persons, i.e. not damage to property. Functional

safety means applying and observing certain standards to ensure that the correct operation of safety functions is monitored. In the event of an error, the system will respond and switch the application to a safe state – for example by stopping it or by alerting the user.

It is important that companies now hone their awareness with respect to functional safety, and apply the standards that are required. At EAO, functional safety has been integrated into our development processes in the form of smart components. Customers are increasingly requesting components with defined safety levels. As expert partner, EAO

has always thought from the perspective of its customers and as a result has ensured that they all have functional safety on their radar, as well as the related risks.

Further information is available in the technical article on “Functional Safety” at [www.eao.com/download](http://www.eao.com/download)



## International trade fairs 2022

Meet our experts and see the latest HMI technologies and solutions. Here you will find all information about our participation in international trade fairs: [www.eao.com/trade-fairs-and-exhibitions](http://www.eao.com/trade-fairs-and-exhibitions)



*Functional safety –  
A safety strategy for  
reliable components  
and applications.*





Typical HMI mounting locations on a combine harvester.

# EAO HMIs for agricultural equipment.

The innovative, configurable and rugged HMIs from EAO fit perfectly for numerous applications in agricultural machinery and vehicles.

### Typical product/application combinations

#### Driver's cab primary functions

Control of sophisticated machine functions

1. CAN Keypads  
Series 09 In-Cabin Keypads
2. Precise menu control  
Series 09 In-Cabin Rotary Cursor Controller
3. Accurate control of machine function  
Series 09 Joysticks
4. Easily readable information  
HMIS Multi-Legend Alarm Indicator

#### Driver's cab general functions

Essential functions like light and heater controls

5. Simple functionally grouped switches  
Series 09 Universal Switches
6. Pushbuttons with automotive styling  
Series 09 LIN Switch Panel
7. Smartphone (inductive) interface and charging  
EAO Passenger Interface

#### Vehicle exterior

Components with high level of protection from water and dust ingress

8. Emergency stop function  
Series 61 E-Stop switch compact
9. Light switches and service access  
Series 82 pushbuttons
10. Outdoor Keypads  
Series 09 Rugged Keypads
11. Exterior menu controls  
Series 09 Rugged Rotary Cursor Controller



Further information is available at [www.eao.com](http://www.eao.com)

# EAO HMIs for construction equipment.

EAO's wide range of heavy duty vehicle HMIs is designed to suit their rugged applications. They give any operator durability, reliability and absolute control.

Construction vehicles and equipment have to work in the toughest environments: dust, mud, water, snow and more. Temperatures can range from the cold of the Arctic through to the heat of the hottest desert. Whatever the conditions, the machine operator must perform quickly, accurately and safely at any time. From hard-wired solutions all the way through to CAN-based systems with integrated RGB illumination feedback, EAO has an HMI match for every application.

#### In-cabin solutions

- CAN control of sophisticated machine functions:  
Series 09 In-Cabin Keypads
- Accurate menu controls:  
Series 09 In-Cabin Rotary Cursor Controller
- Simple functionally grouped switches like lights and wiper controls:  
Series 09 Universal Switches
- Easily readable information:  
HMIS Multi-Legend Alarm Indicator

- Smartphone (inductive) interface and charging:  
EAO Passenger Interface
- Precision controls for several functions:  
Series 09 Joysticks
- HMIs with automotive styling:  
Series 09 LIN Switch Panel

#### Exterior applications

- CAN controls with clear feedback:  
Series 09 Rugged Keypads
- Exterior menu controls:  
Series 09 Rugged Rotary Cursor Controller
- Light switches and service access:  
Series 82 Pushbuttons
- Emergency stop functions:  
Series 84 E-Stop switches

Further information is available at [www.eao.com/off-road-construction](http://www.eao.com/off-road-construction)



Excavator loading a truck in a quarry.



# HMI solutions for refuse trucks.

HMI solutions for refuse trucks are far more complex than they first appear, as they need to operate in and cope with harsh conditions.

Both outside and in the interior, rugged and reliable HMIs are a vital component of waste disposal vehicles. Safe operation and a reliable way of stopping the refuse press, loading system or bin cleaner in an emergency must be guaranteed at all times. Regardless of whether the operator is wearing gloves, the weather conditions, the ambient lighting – dawn's low light to bright sunshine – or whether the HMI is dirty or clean. Heavy impacts and shocks or persistent vibrations also have an effect on HMIs.

Series 09, 14, 45, 61 and 84 offer a range of HMI functions, from pushbuttons to emergency stop switches, keypads, and rotary cursor controllers, which are specifically designed for outdoor applications. Protective shrouds to prevent unintentional activation, intuitive symbols and different lens colours are available as options, as they are sometimes necessary to meet the relevant standards or to incorporate into your customer-specific designs. Additionally, a driver's

cab emergency stop switch for the refuse press is a standard feature these days. EAO provides ergonomic Series 09 Universal Switches and LIN Switch Panels to control driver comfort functions, while innovative keypads and rotary cursor controllers have been developed for the increasingly important area of functional safety. Combined with versatile illumination and customised or ISO symbols, HMIs can be configured for almost any interior applications in rear, front, and side loaders.

Further information is available at [www.eao.com/special-vehicles](http://www.eao.com/special-vehicles)



Left:  
Typical HMI use in a refuse truck.  
Right:  
Refuse truck panel with Series 09 and 61 HMIs.



# In motion – with TOBROCO and EAO.

With the new GT5048 model, TOBROCO-GIANT has taken the technology of their GIANT telescopic handlers to the next level.

*For their control, they rely on the robust and flexible Series 09 Keypads.*

**25 years TOBROCO-GIANT developed in the Netherlands, build for the world.**

In 2021, TOBROCO-GIANT celebrated 25 years in business. What started in 1996 as a small company trading in decorative fencing and fertiliser injectors, has grown through the further development and production of GIANT machines into an international business with three sites and the ambition to grow significantly in the coming years to produce 9500 machines/year in 2025.

*Series 09 Keypad –  
Precisely configured  
for the GT5048  
TOBROCO-GIANT.*



Director and owner Toine Brock: “This milestone wouldn’t have been possible without the efforts and engagement of employees, dealers and suppliers. And of course, of our customers around the globe, who use our machines daily, and who are impressed by the quality of GIANT machines and attachments.”

One of these machines is the new GT5048. TOBROCO-GIANT has elevated the design of this GIANT telescopic handler to a higher level. The comprehensive knowledge of the 4548 TENDO and the latest technologies have been used to develop a modern telescopic handler in the 2x2 metre class. This means that the compact telescopic handler is only 1.91 metres high and 1.65 metres wide. With a lift height of 4.8 metres, the GT5048 is ideally suited for working at height.

#### **New intuitive operation with EAO modules**

The operation interface has also been completely redesigned and modernised – with the Rugged Keypads of EAO Series 09. The replaceable symbols make the design very flexible, so it can be adapted at the last moment to any customer requirements. The connection to the J1939 bus protocol and the intuitive illumination align perfectly with the modern communication of the GIANT GT5048.

#### **Benefits in use**

- Symbols that can be positioned flexibly according to the end customer’s preferences
- Savings on wiring using J1939 bus system
- Modern look with intuitive operation in the cab as an additional sales argument

#### **HMI product advantages**

- Water resistance IP6K7 front and rear protection
- Long service life, up to 1 million switching cycles
- Halo ring and symbol illumination for intuitive feedback
- Robust quality

The robust, modular design with IP6K7 protection and the option to freely adjust and easily replace the keypad texts or symbols makes these high-quality keypads ideally suited for use in heavy agricultural vehicles and special vehicles.

Further information is available at [www.eao.com/09](http://www.eao.com/09)



The Series 09 Rugged Keypads offer excellent reliability: The modules have been designed for E1 applications with functional safety according to ISO 26262 ASIL B and EN ISO 13849 PL d, as well as intelligent operation with CAN bus inte-

*The new GT5048 TOBROCO-GIANT model with Series 09 Keypads.*





EAO Automotive HMI Centre of Excellence in Auerbach, Germany.

## EAO's Centre of Excellence for HMIs in off- / on-road vehicles.

Hardly any other market combines technology, design, and safety to such a degree as the automotive industry. Specialising in this complex market, EAO Automotive is leveraging its HMI expertise to develop solutions for the heavy duty, special vehicle, truck and bus markets.

EAO Automotive GmbH in Auerbach, Germany, has been part of the EAO Group since 1991. There, around 100 employees develop and produce customised HMI solutions for the automotive industry. Here they produce high-quality HMI products such as switches, handbrake modules, and boot lids for the Volkswagen Groups Premium brands. The Audi, Porsche and Bentley cockpits all use EAO HMI. The high-volume production lines produce HMI products such as switches, handbrake modules, and switches for boot lids, which are used in almost all volume models manufactured by the Volkswagen Group. The second major production group includes contact switches, for exam-

ple seat belt buckle and glove compartment switches. EAO Automotive is the ideal expert partner for the automotive industry:

- Expertise in large HMI volumes
- High degree of standardisation
- Flexible production of low volume and high mix HMI
- Expertise in premium haptics and brilliant illumination
- Electronic J1939 and CAN connectivity

### Our IATF 16949 production process

Due to the wide range of variants, we manufacture our products in flexibly automated production plants. Assembly workstations linked to



Example of a customised automotive solution.

delivery systems provide a considerable degree of flexibility and efficiency. At the end of each production line there are test areas where full outgoing goods inspection is performed, while guaranteeing complete traceability of each component – in full compliance to ISO 14001 environmental management systems.

### The highest standards of product development

At EAO Automotive, product and process development, quality planning and supply chain management are closely interconnected in order that customer requirements can be implemented in full in the framework of a systematic product development process. The test laboratory provides support for product testing and regular validation to ensure that our customers' high quality standards are met.

### Bringing you our HMI Automotive expertise

With decades of experience in the automotive industry, expertise regarding safety-related modules, as well as design and quality awareness, EAO Automotive is dedicated to developing advanced solutions for the heavy duty, special vehicles, truck and bus markets at the HMI Centre of Expertise. Typical applications include, for example, construction and forestry machines, fire and refuse trucks, as well as heavy goods vehicles and buses.

The new Series 09, which was developed with the needs of this market firmly in mind, is typically used in these sectors. Alongside applica-

tions in the vehicle interior, Series 09 Rugged Keypads are ideal for safe switching in even the harshest of conditions.

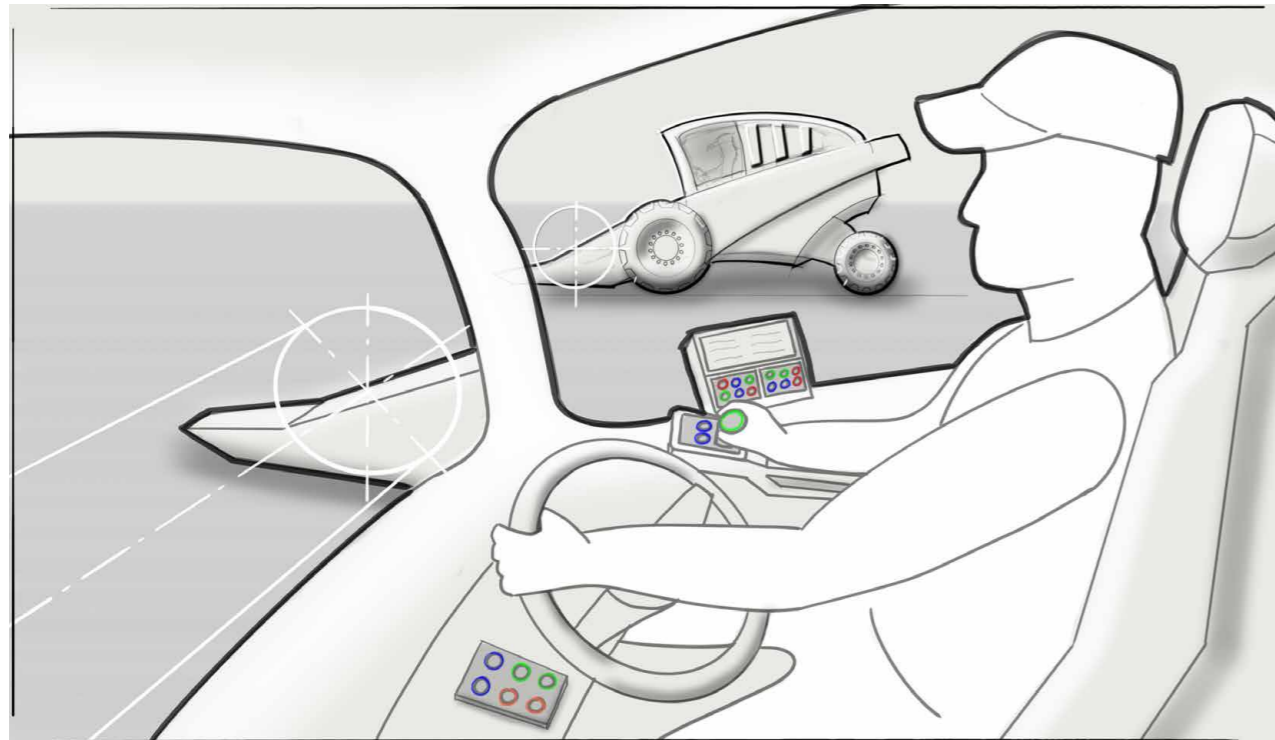
The Automotive team, consisting of product managers as well as development and application engineers, works closely with our customers to find out how best to meet their specific needs and requirements and to update the product range accordingly.

### EAO – Your Expert Partner for Human Machine Interfaces

Further information is available at [www.eao.com](http://www.eao.com)



**30** Years  
EAO Automotive  
GmbH & Co. KG  
1991 – 2021



Concept design.

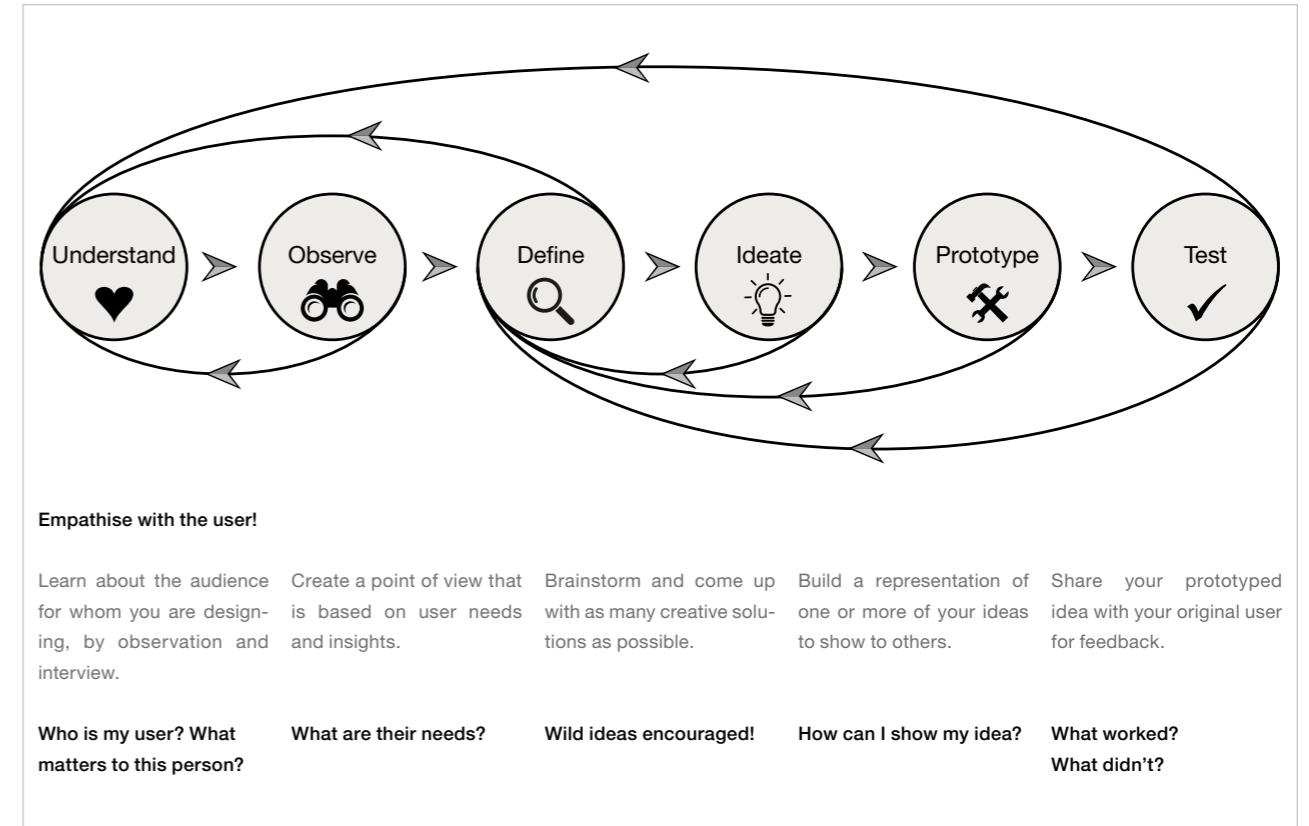
# Industrial/UX-Design: Better in process and designed products.

**EAO now supports customers in their search for the optimal customised HMIs even better** – thanks to the additional competences in industrial and user experience design.

The industrial design process is the basis for good design and superior product performance in terms of function, aesthetics and usability. It includes all the necessary steps and phases that a design project passes through until the desired result is achieved. The design service is not merely the creation of a two- or three-dimensional result. Rather, design decisions are increasingly becoming strategy decisions for a company.

Companies that have difficulty differentiating themselves from their competitors through technology or functionality require distinguishing features. One of the essential criteria can be the design of a product, a service, a brand experience, or even entire processes. Consequently, the design process is a fundamental component of a company's value creation process, and it requires corresponding expertise.

At EAO, we develop ideas, solution approaches and concepts for product functions or products based on market-driven or customer-specific requirements. A key component of industrial design is user-centred design thinking that leads to the creation of hands-on prototypes



and design mock-ups to verify customer benefits. In turn, these lead to more inspired user products that are then tested to shape the ultimate product. The success of a product often depends on its ergonomics and usability.

With this new in-house industrial design service, EAO is closer to customers, and we can respond to the needs of your users and market. This enables us to design and develop, from the start, products that provide added value to you.

### UX design in an industrial design context

The phrase User eXperience is typically associated with the design of websites, apps, software or IT systems. It also comprises any kind of product interaction, including non-digital, physical use. It describes all aspects of a user's sensual impressions and experience when interacting with a product, service, environment or facility. We can accomplish this through the design thinking process.

Incorporating UX into industrial design helps to design a new product in a way that it brings added value to the end user and simultaneously helps your product stand out from the competition. UX is the expectation, satisfaction and the fulfilment of the usage – before, during and after.

### Building in the design thinking process

As shown in the illustration below, design thinking is an innovation approach that fosters creativity and constantly focuses on customer needs and consistently makes the user the centre of attention. And because it's an iterative process, design thinking leads to problem solving and the development of new ideas that ultimately generate new or better products and services.

We have now installed a new, internal process that will enable our sales people to receive design support in the initial design phase. This can take the form of advice on design topics or the creation of concept sketches as a basis for discussion with the customer. Visualised thoughts are very helpful in capturing and implementing the customer's needs.

Further information is available at [www.eao.com/id-ux](http://www.eao.com/id-ux)





Optimal for your application – Series 09 product variants.

## Series 09 product variants.

**Optimal for your application** – EAO enhanced its robust, modular and reliable Series 09 modules with innovative product variants that offer IP6K7 front protection and flexible halo ring illumination.

The Series 09 Keypads and Rotary Cursor Controllers are available in a range of different variants. They all have the flexibility of interchangeable legends, but come with a choice of different halo illumination features, communication protocols and connector types, for example.

This wide choice allows designers to specify only the HMI features they actually need for their vehicle application, therefore minimising hardware costs and optimising the scope of their software development – optimal for your application.

### Typical applications

- Roadmaking vehicles
- Loaders, dozers and excavators
- Cranes and dump trucks
- Fire-fighting and rescue vehicles
- Road sweepers, cleaning vehicles and refuse trucks
- Snow removers and groomers
- Agricultural and forestry vehicles and equipment

Robust and innovative construction is a feature of the Rugged Keypads design. The actuators and indicators are protected up to IP6K7 and work reliably at operating temperatures from

–40°C to +85°C. The low back panel depth and robust clip-in or screw-in mounting allow easy, flexible installation, either vertically or horizontally.

Further information is available at [www.eao.com/09](http://www.eao.com/09)



UX  
DESIGN  
AWARDS

product  
2021



PLUS variant of the Series 09 Rotary Cursor Controller.





# Series 09 In-Cabin Keypads.

The configurable HMIs are developed according to IATF 16949 and can be combined within a modular design – for reliable and safe E1 applications in the interiors of heavy duty and special vehicles.

Technological advances and high-tech vehicle design are of growing importance for heavy duty and special vehicles too. This trend is reflected by the Series 09 In-Cabin Keypads with their high-quality modular automotive design, which provides up to IP5K4 front protection. The durable HMIs are developed according to internationally recognised automotive standard IATF 16949. Production follows very strict quality guidelines, which provide for a 100% end-of-line inspection and 100% traceability.

### Advantages

- Programmable RGB halo ring and symbol illumination (can be controlled separately)
- High-quality modular automotive design with IP5K4 front protection
- Reliable HMI developed according to recognised automotive standard IATF 16949
- Available with CAN Bus connection or as hard-wired variants
- Interchangeable ISO 7000 or customer-specific symbols

*In-Cabin Keypads for use inside heavy duty and special vehicles.*



The HMIs provide freely configurable and separately controllable RGB halo ring or single LED symbol illumination. Continuously lit, slowly or rapidly flashing, or pulsing illumination can be programmed as illumination functions. The symbol inserts for the pushbuttons can be chosen exactly according to the requirements of the application and can be precisely mounted in 90-degree steps – whether they are ISO 7000 or customer-specific symbols.

Further information available soon at [www.eao.com/09](http://www.eao.com/09)



Available from mid-2022.

## New EAO E-Stop Switch Configurator.

*Intuitive use. Fast delivery time.*

### IP-Rating

How resistant should your E-Stop be?

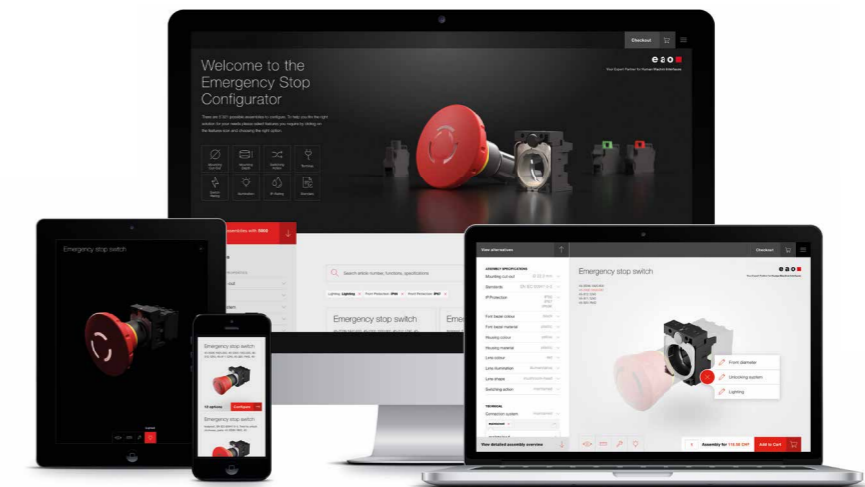
IP66 X IP67 X

View 2 Assemblies with 15 Variants






Configure now your individual E-Stop Switch at [hmi.eao.com](http://hmi.eao.com)

- Intuitive use
- More than 2000 product combinations
- Responsive user interface
- Photorealistic 3D representations
- 3D CAD data and datasheets
- 24 h ordering – fast delivery



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[www.eao.com](http://www.eao.com)

**eao** ■  
Your Expert Partner for Human Machine Interfaces





*Easy configuration for a wide range of HMI specifications.*

## Series 09 LIN / CAN Evaluation Kit.

Use this intuitive accessory to utilise and experience *the versatile configuration opportunities of HMIs with LIN or CAN interfaces – without the need to integrate the HMI into an application.*

Charge. Connect.  
Communicate.  
*EAO Passenger Interface.*



 **Enhances journey experience** and opens up completely new possibilities.

[www.eao.com/passenger-interface](http://www.eao.com/passenger-interface)

[www.eao.com](http://www.eao.com)

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Your Expert Partner for Human Machine Interfaces

Using the Evaluation Kit, which consists of hardware and software, you can easily connect a LIN/CAN-capable HMI to your computer or laptop (Windows) without having to integrate the HMI into an application. Fast installation and an intuitive user interface make it easy to configure a wide range of HMI specifications, to test them out yourself on the spot, or to provide a live demonstration. This accessory is also designed for component selection processes for a LIN/CAN application on behalf of a customer.

#### Configuration options

- Brightness and colour selection for button lighting
- Light function of (four-segment) halo ring illumination: colour changes, flashing, pulsing or rotation

#### Advantages

- Live demo of LIN/CAN functionality on non-fitted HMIs
- Easy to set up, configure and test all product functions
- Free-to-use, intuitive EAO software
- Suitable for all LIN/CAN-capable HMIs

Thanks to the many connections, the kit is highly flexible in use and can be easily set up for a variety of configurations and systems. EAO developed the kit to work with EAO software and Vector CAN interfaces, but the kit can also be used with an alternative CAN software and a suitable interface.

Further information is available at [www.eao.com/09](http://www.eao.com/09)



# EAO Contact.

## *Your centre of excellence.*

### Headquarters

**EAO Holding AG**  
Tannwaldstrasse 88  
CH-4600 Olten  
Telephone +41 62 286 92 00  
info@eao.com

### Manufacturing Companies

**Switzerland**  
**EAO AG**  
Tannwaldstrasse 88  
CH-4600 Olten  
Telephone +41 62 286 91 11  
info@eao.com

**EAO Systems AG**  
Tannwaldstrasse 88  
CH-4600 Olten  
Telephone +41 62 286 91 11  
sales.esy@eao.com

**China**  
EAO (Guangzhou) Ltd.  
3/F, Block G4, South China  
New Materials Innovation Park  
31 Kefeng Road  
Guangzhou Science City  
CN-Guangzhou, PRC  
Telephone +86 20 3229 0390  
sales.ecn@eao.com

**Germany**  
EAO Automotive GmbH & Co. KG  
Richard-Wagner-Straße 3  
DE-08209 Auerbach/Vogtland  
Telephone +49 3744 8264 0  
sales.esa@eao.com

**North America**  
EAO Corporation  
One Parrott Drive  
Shelton  
US-CT 06484  
Telephone +1 203 951 4600  
sales.eus@eao.com

### Sales Companies

**China**  
EAO (Guangzhou) Ltd.  
3/F, Block G4, South China  
New Materials Innovation Park  
31 Kefeng Road  
Guangzhou Science City  
CN-Guangzhou, PRC  
Telephone +86 20 3229 0390  
sales.ecn@eao.com

**EAO (Shanghai) Office**  
Rm.401, Lihpao Plaze,  
NO.159 Shenwu Road,  
Minhang District,  
CN-Shanghai, 201106.  
PRC  
Telephone +86 21 6095 0717  
sales.ecn@eao.com

**France**  
EAO France SAS  
Bâtiment Silex  
15 rue des Cuirassiers  
CS 33821  
FR-69487 Lyon Cedex O3  
Telephone +33 9 74 18 93 41  
sales.efr@eao.com

**Germany, Austria, Czech Republic, Poland, Slovakia**  
EAO GmbH  
Langenberger Straße 570  
DE-45277 Essen  
Telephone +49 201 8587 0  
sales.ede@eao.com

**Hong Kong (Asia Pacific)**  
EAO (Far East) Ltd.  
Unit A1, 1/F, Block A  
Tin On Industrial Building  
777 Cheung Sha Wan Road  
Lai Chi Kok, Kln  
HK-Hong Kong  
Telephone +852 27 86 91 41  
sales.ehk@eao.com

**Italy**  
EAO Italia S.r.l.  
Centro Direzionale Summit –  
Palazzo C1  
Via Brescia 26  
IT-20063 Cernusco sul Naviglio (MI)  
Telephone +39 029 247 0722  
sales.eit@eao.com

**Japan**  
EAO Japan Co. Ltd.  
Net 1 Mita Bldg. 3F  
3-1-4 Mita Minato-ku  
JP-Tokyo 108-0073  
Telephone +81 3 5444 5411  
sales.ejp@eao.com

**Netherlands, Belgium**  
EAO Benelux B.V.  
Kamerlingh Onnesweg 46  
NL-3316 GL Dordrecht  
Telephone +31 78 653 17 00  
sales.enl@eao.com

**North America**  
EAO Corporation  
One Parrott Drive  
Shelton  
US-CT 06484  
Telephone +1 203 951 4600  
sales.eus@eao.com

**Switzerland**  
EAO Schweiz AG  
Tannwaldstrasse 86  
CH-4600 Olten  
Telephone +41 62 286 95 00  
sales.ech@eao.com

**United Kingdom, Denmark, Finland, Ireland, Norway, Sweden**  
EAO Ltd.  
Highland House  
Albert Drive  
Burgess Hill  
GB-West Sussex RH15 9TN  
Telephone +44 1444 236 000  
sales.euk@eao.com

### Editor

intouch –  
the EAO customer magazine

EAO AG  
Tannwaldstrasse 88  
CH-4600 Olten  
Telefon +41 62 286 91 11  
communication@eao.com  
www.eao.com