

elobau 

*creating
sustainable
solutions*



**Modular and ergonomic
operator controls**





Top notch – customised and sustainable – made in Germany

Included on our delivery notes are components, systems and solutions for off-highway vehicles, machine safety and level measurement. Everything based on contactless sensor technology. Everything customised. Everything of high quality.

What doesn't appear on our delivery notes: future security. Our expertise is included in the purchase of every product. Everything that our company does is focused on being a reliable partner for the long term – for our customers, employees and for our ecological and social environment. From the way in which we develop and produce our products to our view of the holistic responsibility of a company.

Our products can be designed to fit your needs. Please contact us for more information.

sales@elobau.de

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Domestic offices Germany



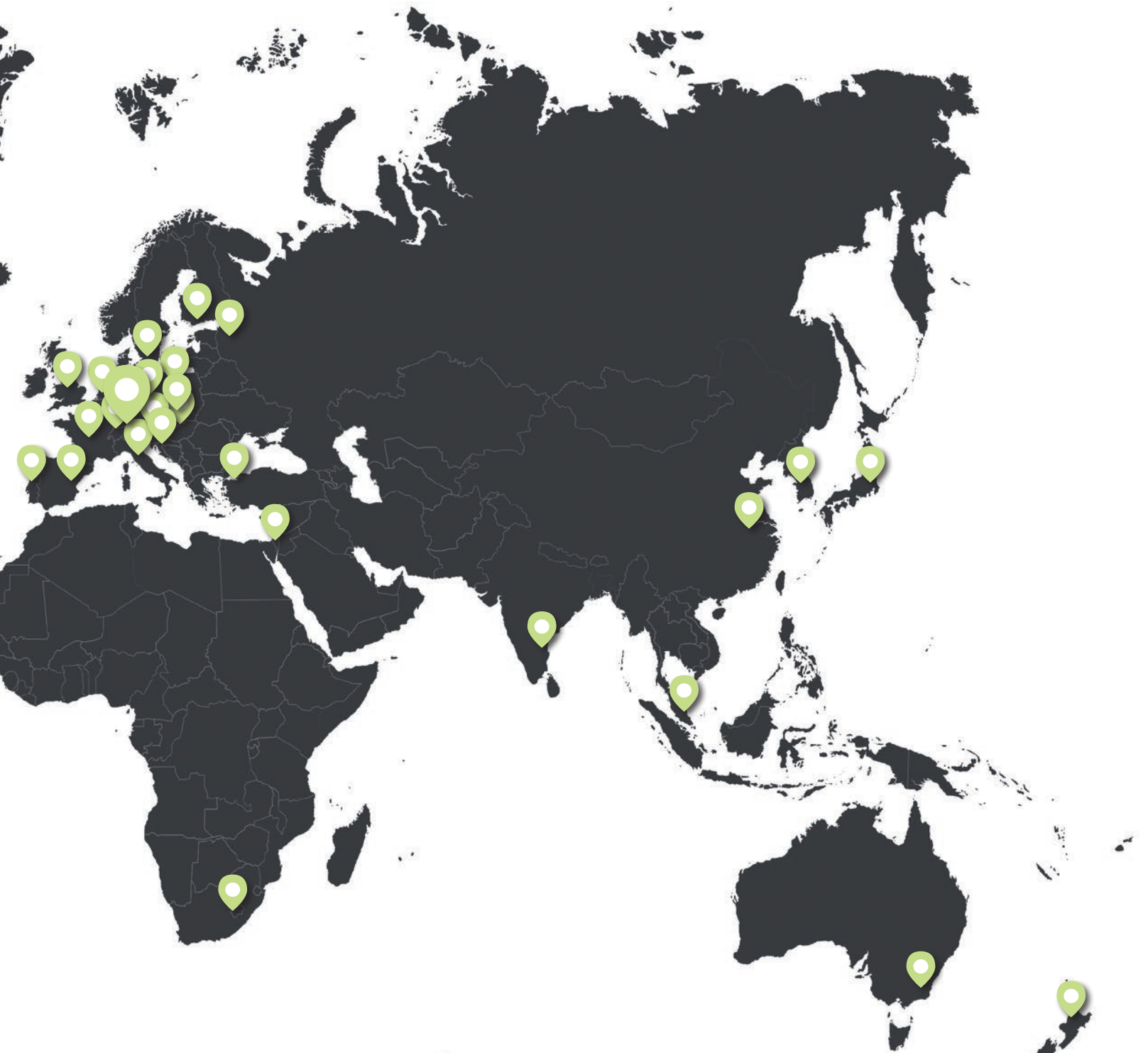
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MODULAR AND ERGONOMIC OPERATOR CONTROLS

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elobau is one of the world's leading providers of contactless sensor technology and supplies internationally-renowned companies with systems and components for mobile machinery, machine safety and fluid level measurement. We combine 45 years of industry experience with an undiminished enthusiasm for new ideas. This is how we, as a reliable development partner, create customised solutions which set standards in performance, operating comfort, safety and quality.

High vertical integration, flexibility and reliability

With a high vertical integration level of over 90 percent, and almost all of the production and development processes being carried out in house, we achieve optimum speed, flexibility and reliability with a guaranteed "made in germany" quality.

This means that the mechanical construction, hardware and software development as well as a testing and inspection laboratory are all brought together under one roof. And during product development, we ensure that all quality and production-related aspects are considered as early in the process as possible through close, interdepartmental collaboration.

An innovative and ongoing partner to our customers

We are passionate about innovative solutions, and our enthusiasm and flexibility guarantee our position on the market now and in the future. That is why we think long-term and not in terms of quarterly results. We invest an above average 10% of our sales in research and development. As a family-run foundation company with more than 800 employees, we value not only innovation, but also



Future-proof thanks to all-encompassing sustainability

stability. Our success stems from the many years of experience of our highly qualified employees and their commitment to every single project, which is facilitated by an attractive work environment. Our low turnover rate of 1.53% is an indication of our long-term, partnership like relationships with our employees, which yields an immediate benefit to our customers.

For elobau, the key to long-term success lies in an overall sustainable concept. In addition to assuming social responsibility for employees and society as a whole, this also includes economic stability and careful use of resources. We consider sustainability issues such as ease of repair during the product development phase.

Additionally, since 2010 we have been committed to manufacturing in a carbon-neutral manner, and even produce more power from renewable energy than we consume. We ensure our economic independence on the market through our four business areas of sensors, operator controls, level measurement and machine safety.



Our first operator control – an M30 push button – was manufactured in 1982. This simple push button allowed users to switch the PTO shaft on tractors on and off. We continued to develop our product range over the following years. Today, we are proud of our highly functional and ergonomically well-engineered armrests with direct bus connection, which can perform 68 functions simultaneously. Our "Swabian virtues" of diligence, ingenuity, quality awareness and persistence in the development of our products got us to where we are today.

This first operator control is still in demand today, which highlights the level of reliability, robustness and longevity of our operator controls.

It set a benchmark that has been unsurpassed in many areas of application despite the many high-tech innovations that have been made since then.

Why elobau?

elobau is a service partner who will deliver you products of a technical quality that will surpass your expectations. Our proficiency is achieved through our high vertical integration level of 90%, allowing us to customise our products for you. Our aim is to create a long-term relationship with our customers. The customer journey starts at the design phase with expert advice in terms of the design and ergonomics. It is vitally important to us to work closely throughout all stages of the process.

We make sure that the product you receive blends seamlessly into the functional and ergonomic concept of your vehicle in terms of look, feel and operating comfort and contributes to optimum interaction of the human-machine interface.

The first step is our in-house design department, which uses state-of-the-art machinery and 3D CAD technology to produce prototypes. The next step is where elobau's proprietary modular system, which allows us to integrate and adapt individual products in complex systems, comes into play. We produce almost all the components for our products ourselves, including injection moulding. Electronics development, PCB layout and embedded software programming are also carried out in-house.

OPERATOR CONTROLS



elobau products are manufactured in a carbon-neutral manner, are TÜV-certified and ISO 9001:2008 compliant. Our energy management is ISO 5001:2001 certified, and ISO 14001:2015 compliant environmental audits have been carried out since 2010. It doesn't stop there though. Our demands for our products are higher than the standard. For example, we inspect all incoming goods in our test laboratory with 3D measurement methods.

We use automotive QA processes as our benchmark, which includes continuous monitoring and optimising our manufacturing processes. All products undergo a final inspection and sub-assemblies undergo regular checks.

elobau's expectations are that when a customer's order has been completed, their requirements, wishes and expectations have been completely fulfilled.

Since elobau's founding in 1972, the company has continuously developed and it has become a worldwide leader in the industry. But we won't rest on our laurels. Quite the opposite is the case. To further strengthen our position, we work closely with universities to ensure that we are always on the cutting edge and a driving force in terms of researching and developing future technologies and operating concepts.

This work is supplemented by our own predevelopment department, guaranteeing our innovative strength for the future. The sustainability philosophy of elobau's management and found throughout elobau's products is also further expanded, because continuous improvements are only possible if the goals are set high.

Custom operating systems

elobau can provide exclusive, customised operating technology solutions for your mobile machinery applications. We design and produce one-of-a-kind products that are tailored to your needs. The concept is ergonomically designed entirely to your requirements using complex 3D surface calculations to ensure a flawless finish.

The electronic hardware and software of the operating system is developed specifically for your application from the start of the project.

With our ongoing research and constant further development, we can offer you the latest and most innovative materials and technologies.



2. Custom operating systems

Multifunctional armrest
for Deutz-Fahr
Page 10



Multifunctional
operating system for Still
Page 11



**Your machines deserve more than just standard solutions.
Set new standards with your custom operating systems in
terms of design, ergonomics, and functionality.**



Multifunctional armrest
for Deutz-Fahr,
in series production since 2013.
Used in series 6, 7 and
9 Agrotron tractors

Whether in cooling chambers or tropical heat, extreme loads, difficult terrain, or millimetre precision: the requirements on mobile machinery are extremely high. Construction machinery, agricultural and industrial trucks are increasingly becoming high-performance, communicating high-tech devices with extensive functionality.

To ensure that your operators can work expediently despite increasing complexity, operating controls such as joysticks or control panels must have optimum functionality and an ergonomic design.

An operating concept that is specifically tailored to the respective machine thus plays an increasingly important role when making purchasing decisions in the off-highway sector.

Six reasons why elobau sets new standards for your machinery in terms of operational safety, comfort, design and functionality >>



Multifunctional operating system for Still counterbalanced and reach trucks, in series production since 2014.



In-depth industry knowledge and years of know-how from developing customised operating concepts

Regardless of whether you are looking for a special design to distinguish yourself from the competition, need to run your machine under extreme environmental conditions, or whether we are tasked with designing an entire concept for a custom operating system with precisely defined functions for you: you can rest assured that we will do so by keeping in mind your machine's entire driver's cab. We will consider electronic and mechanical connections as well as the ergonomic arrangement of the overall operating logic from the start. You will benefit from the know-how in ergonomics and usability that we have accumulated over the course of many years through various projects, and which we continuously expand through joint research projects with universities.

During the process we will show you the various model options, advise you with the future in mind, and support you with further developments of your operating concept.

90% vertical integration means flexibility and quality. Development, tool manufacturing, production and test laboratory all under one roof

As well as development, tool manufacturing, production engineering and testing are all carried out at a single location. This gives us the flexibility to respond quickly and efficiently to your design requirements. With our own mechanical shop for prototypes and small series, as well as optional 3D printing, we can provide proportional models at short notice during the development phase or



make changes to the finished prototype. The transition from development to series production is also seamless with close co-operation between departments. On-site laboratory tests during the development phase minimise the risk of requiring potentially expensive modifications later on. Our above average

vertical integration of 90%, ensures you can expect the final product to be of real "Made in Germany" quality. Everything, from injection moulding, cable manufacture to SMD fitting, is carried out in-house. Our specialists can also implement software adaptations in a straightforward manner. This includes modifications to delay and response times, which means that your products can be adapted to the specific market conditions even more individually.

Expertise in machine safety: End of line checks and certificates are part of all projects at elobau

At elobau, a project isn't complete until it reaches market maturity. For this reason, we use the highest validation standards and actual measurements from our in-house test laboratory instead of just calculations, for example for switching cycles. Your product will not leave our factory until all the safety and quality certificates and tests are completed. In addition to operator controls, machine safety is one of our core competencies. All standards and specifications for the production of intrinsically safe products are considered during the development phase. Afterwards, cost-efficient end of line checks are carried out on the final product in the manufacturing cell. We will advise you regarding the necessity and relevance of the various checks and can define the test criteria with you.





Co-operative and efficient development process through a collaborative working process with industry experts

To us, the key to a successful project is in sharing our knowledge and working together. At elobau, around 50 developers are focused solely on mobile machinery and use their expertise in designing customised operator controls. Every project is assigned a core team of mechanical development, electronics, software and production planning specialists. This team will develop your product from start to finish. A contact person who understands the technical aspects, and also what you need from the project will always be available. And the various departments will have regular meetings to keep updated. Our employees have a high degree of commercial and technical decision making authority so can quickly arrive at solutions on site.

As a long time partner of international companies, inter-cultural expertise is also one of our strengths: not only are we familiar with the regulations, laws and specific requirements of international markets, our employees are also trained specifically to communicate with developers abroad.



STILL Specialist Spokesman Jürgen Wrusch: *“Our partnership with elobau is very open and solution-oriented. We are delighted with the result. I’m sure that visitors to our trade fair booth who get to hold the new elobau joystick in their hands will share in this excitement.”*

Innovation for end customers based on proven and solid technology

elobau has been developing operator controls for mobile machinery with contactless sensor technology and a long service life since 1996. Innovation for end customers is what drives us: we talk directly to the operators of construction and agricultural machinery and industrial trucks so we can determine what is needed direct from the operator. Based on real market requirements, and with an eye on future developments, we go beyond simply optimising our products on an ongoing basis. We also strive to develop new industry concepts which we regularly present at trade fairs.

One such example is a joystick handle from elobau with tactile vibration feedback and display buttons. With this passion for innovation together with our expertise in ergonomics, design, hardware and software that has been accumulated over many years, we are by your side as your development partner. Working together with you, we will create custom operating systems that will delight your customers. We can also cost-effectively produce small quantities based on our extensive standard product range.

We look forward to hearing from you

Our development, tool manufacturing, production engineering and testing technology specialists are ready for your unique challenge. We would be happy to welcome you to an initial meeting at our main plant in Leutkirch in Allgäu, where you can take a look behind the scenes, learn more about our sustainable corporate philosophy and our high standards of production quality.



**Customised in series –
the operating system that adapts
to your machine**



3. Modular operating systems

With the new modular armrest 225MA midi, elobau sets a new standard on the world market. This premium product opens entirely new possibilities for all manufacturers of mobile machines who are no longer satisfied with their existing operator controls.

State-of-the-art technologies and perfectly ergonomically designed operator controls have been the standard to achieve for all mobile machinery manufacturers for years. With this configurable, multifunction armrest, everyone can benefit from our expertise in the areas of functionality, ergonomics and design. Carefully developed and intensively tested operating elements, which have been meeting the expectations of the most demanding customers for years, can – thanks to the innovative, modular design of the new armrest – now be arranged to create a custom operating system for the functions required for the respective vehicle model. Individual variants can be manufactured without any additional engineering and tooling costs.

For agricultural machinery manufacturers, there is an additional benefit. The operating system was developed in accordance with the EU regulation 167/2013 "Mother Regulation", and has safety level AGPL c in accordance with ISO 25119 to meet the high functional safety requirements.

The modular design principle allows you to select just the right the operating elements to control your vehicle's functions from elobau's broad range of standard products. The focus here is on "plug and play". You focus on the vehicle construction and we focus on the operation. For easy system integration, the modular armrest is configured with industry standard plug connections and CAN protocol SAE J1939.

The armrest reflects elobau's 30 years of experience in developing custom operating systems. It has been ergonomically designed for user-friendliness, comfort and fatigue-free operation for the operator. The individual and ergonomic arrangement of the operator controls enables intuitive control of the vehicle functions. Additionally, to fit with our goal of future-oriented and sustainable product development, the plastics used for the modular armrests are 75 % bio-based.

Do you need an operating system that is designed to fit your needs? Choose the elobau modular armrest 225MA midi.



Use our online configurator to specify
your modular armrest
at www.elobau.com → Operator controls →
Modular operating systems



Modular armrest 225MA midi



JOYSTICKS & HAND THROTTLE MODULE

1 Robust joystick and joystick grip

The robust joystick is available with various mechanical options, whether no-detent or detent, with friction brake, whether single-axis or dual-axis – with this joystick you can optimally perform all of your machine functions.

The ergonomically designed joystick handle 361G has been specially shaped for the right hand to enable fatigue-free operation. The push buttons and thumbwheel switches are available with night illumination. The buttons are available in various colours and with different symbols, and the thumbwheel switches also come in a range of colours. This ensures the efficient and reliable operation of all machine functions. Safety level AgPL c is achieved through the use of a two-channel analogue signal design in combination with the Namur wiring of the push buttons. With the use of Hall sensor technology in the joysticks, thumbwheel switches and push buttons, the installed electronics are extremely durable. Additionally, the joystick is optionally available with a capacitive presence detection system to prevent unintentional actuation.



The combination of robust joystick and multi function grip is ideal for performing driving functions.

2 Compact joystick with new handle

The newly designed multi-function joystick handle also enables fatigue-free operation and is a unique combination of function and ergonomics. It can be configured with up to six push buttons or with four push buttons and one thumbwheel switch and ensures precise operation of front-end loader and other hydraulic functions. Of course, all operating elements can be flexibly configured with this joystick as well and also offer the safety level AgPL c.



3 Hand throttle

The hand throttle is designed for controlling the engine speed. The inlay in the top cover is available with various symbols for clearly marking the function. Instead of the hand throttle, three nano push buttons can optionally be installed.

Modular armrest 225MA midi

OPERATING UNIT MODULE

1 Push buttons

The push buttons can be assigned as required to actuation functions such as all-wheel drive or differential lock. Thanks to Hall sensor technology, the push buttons are extremely durable. The button inlays are available in various colours and with abrasion-resistant, back-printed symbols as well as with function and night illumination.

2 Encoders

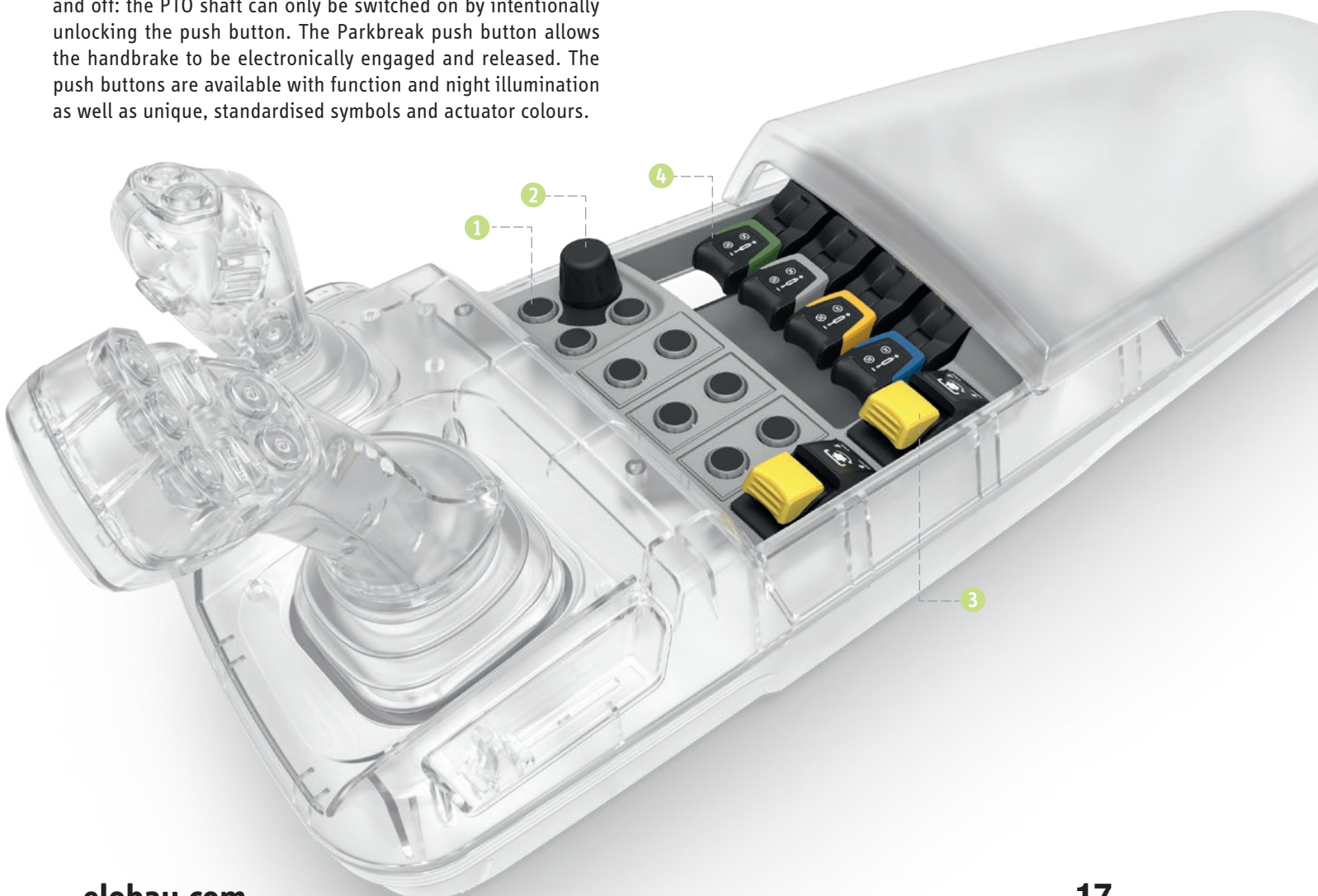
The encoder push button module is ideally suited for navigating in the display control menu.

3 PTO and Parkbreak push button

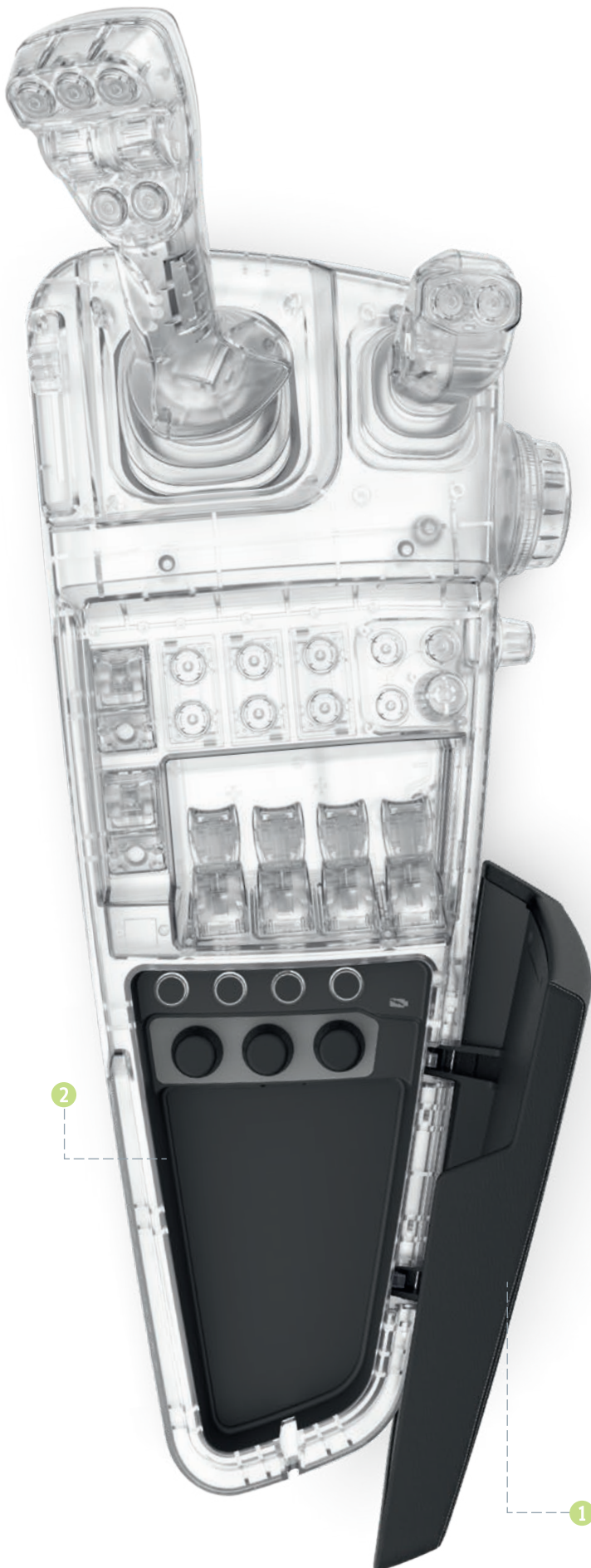
Power take-off push button for safely switching the PTO shaft on and off: the PTO shaft can only be switched on by intentionally unlocking the push button. The Parkbreak push button allows the handbrake to be electronically engaged and released. The push buttons are available with function and night illumination as well as unique, standardised symbols and actuator colours.

4 Fingertip joysticks

Angled actuators with soft-touch finger rest ensure maximum operating comfort. The actuator caps are colour-codeable and can be configured with various symbols for optimum user-friendliness and to clearly indicate function. The finger-tip joysticks are ideal for operating hydraulic controlling devices.



Modular armrest 225MA midi



- Sustainable: 75% of the plastics used are bio-based
- Safe: Safety level AgPL c (ISO 25119)
- Practical: Storage compartment with USB charging socket for smartphones
- Conforms to standards: Mother Regulation compliant (EU 167/2013)
- Plug & Play: CAN bus (SAE J1939)
- Clearly designed: Colours, symbols, function and night illumination

ARMREST & STORAGE COMPARTMENT MODULE

1 Armrest

Maximum operating comfort thanks to padded armrest covered with organically produced, environmentally friendly and high-quality apple leather. This material is just as wear-resistant as chemically produced cover materials, but is free of harmful plasticisers.

2 Storage compartment under the armrest

The storage compartment contains further operating elements for additional functions. Additionally, up to 4 push buttons and up to 3 potentiometers are available as well as a USB socket for charging smartphones. A cable opening is provided at the rear end of the storage compartment to allow a smartphone to be positioned in a holder in the operator's field of view and charged simultaneously.

Modular armrest 225MA midi

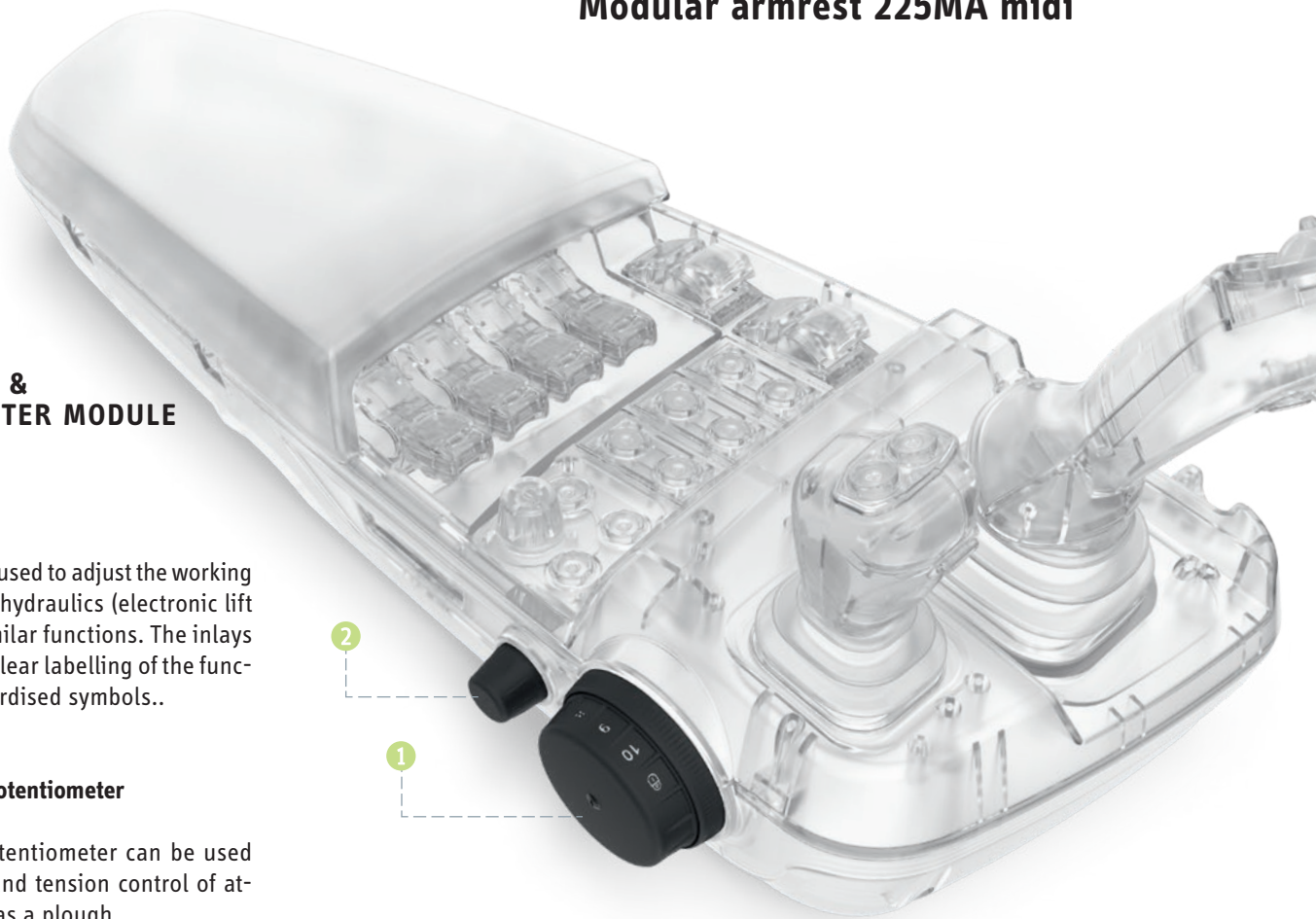
HITCHWHEEL & POTENTIOMETER MODULE

1 Hitchwheel

The hitchwheel is used to adjust the working depth of the rear hydraulics (electronic lift control) or for similar functions. The inlays are available for clear labelling of the functions with standardised symbols..

2 Hitchwheel potentiometer

An additional potentiometer can be used for the position and tension control of attachments, such as a plough.



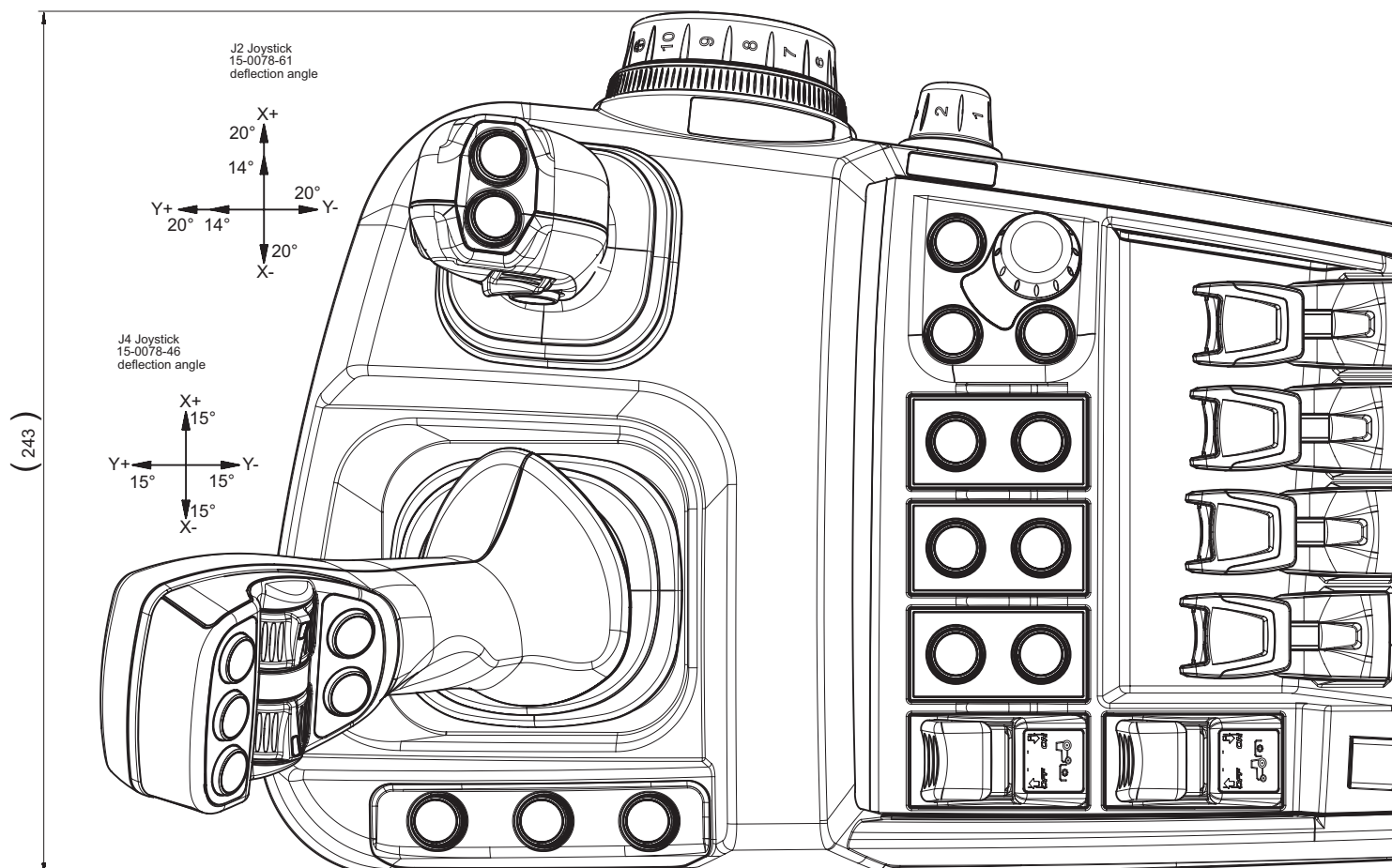
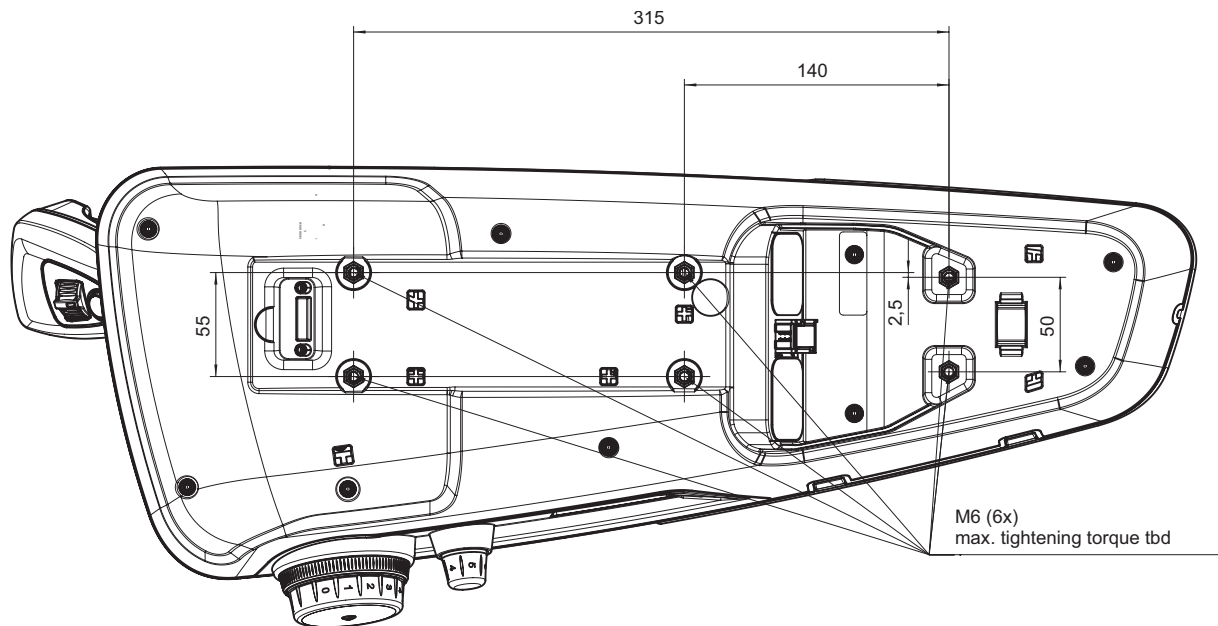
CONNECTION FIELD MODULE

1 Connector connection

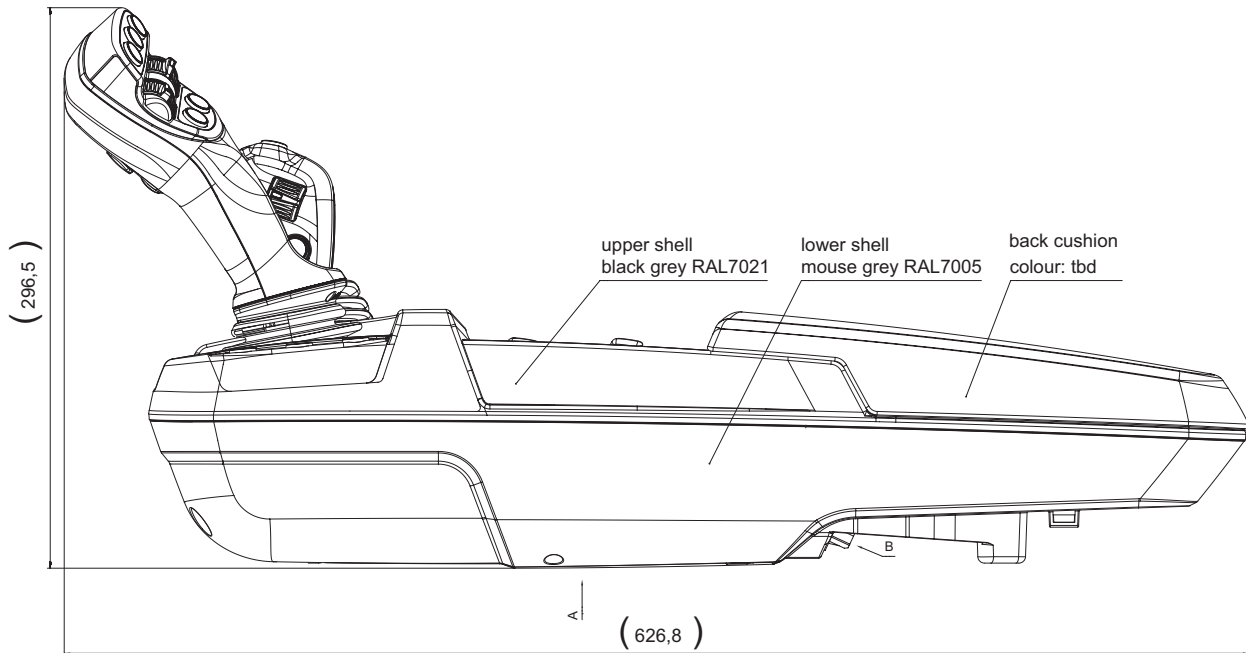
Convenient and direct connection via connectors integrated in the housing. The signals of all operating elements are collected as standard on the motherboard in the armrest and are communicated to the outside via CAN bus using a 6-pin Tyco Junior Power Timer.

The armrest can be equipped with two additional connectors of the same type. These are a 12-pin and a 15-pin connector. The driving function or the PTO function can then be optionally wired directly to the outside.

Modular armrest 225MA midi

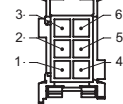


Modular armrest 225MA midi

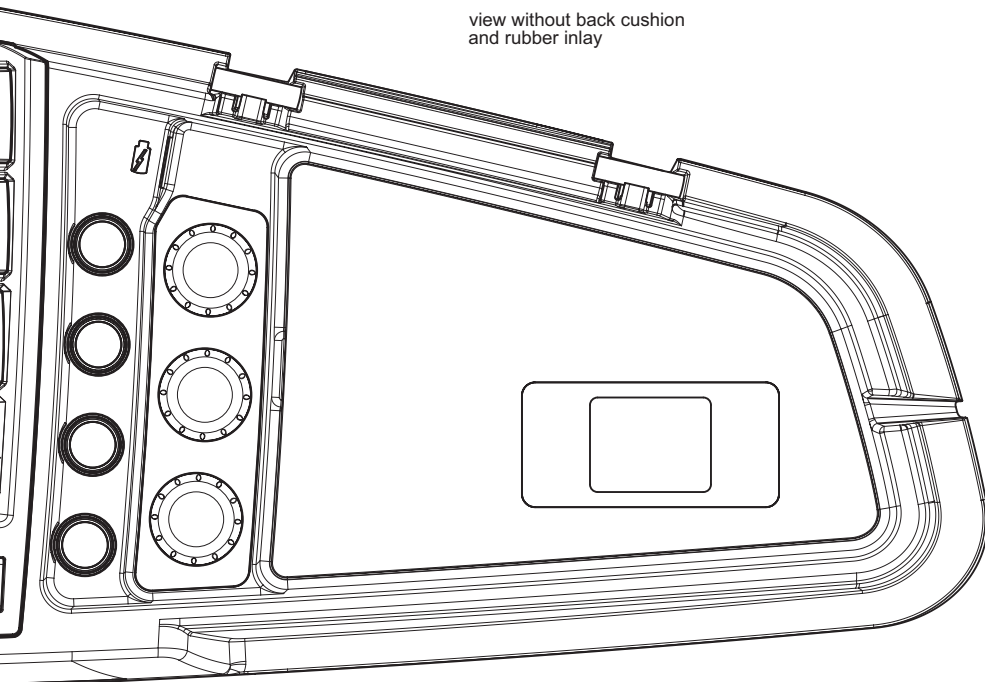


connector

Tyco Junior Power Timer
Housing 965641-3
Locking plate 968271-1
Terminal ...



view without back cushion
and rubber inlay



Modular armrest 225MA midi

ELECTRICAL DATA

	225MA midi
Polarity reversal protection	Yes
EMC immunity (standard)	DIN EN 13309:2010, EN ISO 14982:2009, ISO13766:2006
EMC emission (standard)	DIN EN 13309:2010, EN ISO 14982:2009, ISO13766:2006
Operating voltage min./max.	8.00...36.00 V DC
Current consumption	5000 mA
Short-circuit resistance to GND	Yes
Short-circuit resistance to supply	No
Fieldbus system	CAN
Protocol	J1939
Node ID / Source Address	Adjustable
Transmitting cycle	Adjustable ms
Baud rate	250 kBit/s or 500 kBit/s
Bus terminating resistor	No

PROPERTIES

	225MA midi
Housing colour	Top cover black grey RAL7021 Bottom cover mouse grey RAL7005

MATERIAL INFORMATION

	225MA midi
Housing material	PA610GF30

ENVIRONMENTAL CONDITIONS

	225MA midi
Protection class, mechanical	IP44 EN 60529
Protection class, electronic	IP53 EN 60529
Operating temperature min./max.	-25...85 °C
Storage temperature min./max.	-40...85 °C

INSTALLATION

	225MA midi
Mounting type	Screwed
Thread	M6

CONNECTION

	225MA midi
Connector type	AMP Junior Power timer

Modular armrest 225MA midi

ORDERING KEY

225MA midi	Modular armrest
	To order this product, please use the elobau online configurator at www.elobau.com → Operator controls → Modular operating systems



Operate & control

elobau offers an extremely attractive and broad range of standardised products for operating and controlling mobile machinery.

The extensive options of our modular system allow you to quickly and easily find the right solution for you with the elobau product configurators – economically and even for small quantities.

In addition to elobau's always up-to-date design standard, the sensor technology which was refined over decades and has proven itself time and again guarantees maximum reliability and efficient, ergonomic operation.

4. Operate & control

Joystick grips
from page 26



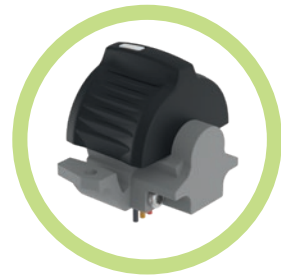
Multi axis joysticks
from page 38



Single axis joysticks
from page 66



Thumbwheels
from page 82



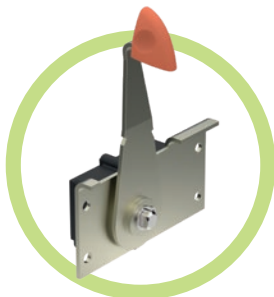
Push button switches
from page 92



Steering column
switches
from page 132



Hand throttle
from page 152



Accessories
from page 156



Joystick grip 361G / 362G

Ergonomic actuation for right or left hand users

PRODUCT CHARACTERISTICS

- The joystick grip 361G has been ergonomically designed for right handed operation, and 362G for left handed operation
- Night and function illumination for push buttons and thumbwheels
- The CAN controller integrated in the handle facilitates a simple bus connection (CANopen / SAE J1939), optionally with an integrated termination resistor
- Optionally available with capacitive presence detection
- Handle available with micro push button switches for use outside of the cabin
- Various colour choices are available for the mounted operator controls



The modular design of the ergonomic joystick grip allows it to be flexibly configured to suit many applications. With up to three thumbwheels and five push buttons or up to ten button positions, the handle offers numerous additional operating functions.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

Use our online configurator to specify your joystick grip
at www.elobau.com → Operator controls → Joystick grips



Joystick grip 361G / 362G
 Ergonomic actuation for right or left hand users



Optional FNR
 Thumbwheel on rear



With integrated
 CAN interface

Various
 mounting adapters
 and bellows



Push button 145MG see page 104, nano push button switch
 145NT see page 98, thumbwheel 175D see page 82

Integrated capacitive
 presence detection and
 electronics



Colours and
 symbols can be
 selected



Fully
 illuminated



Optionally, two push
 button positions on
 rear instead of thumb-
 wheel and push button



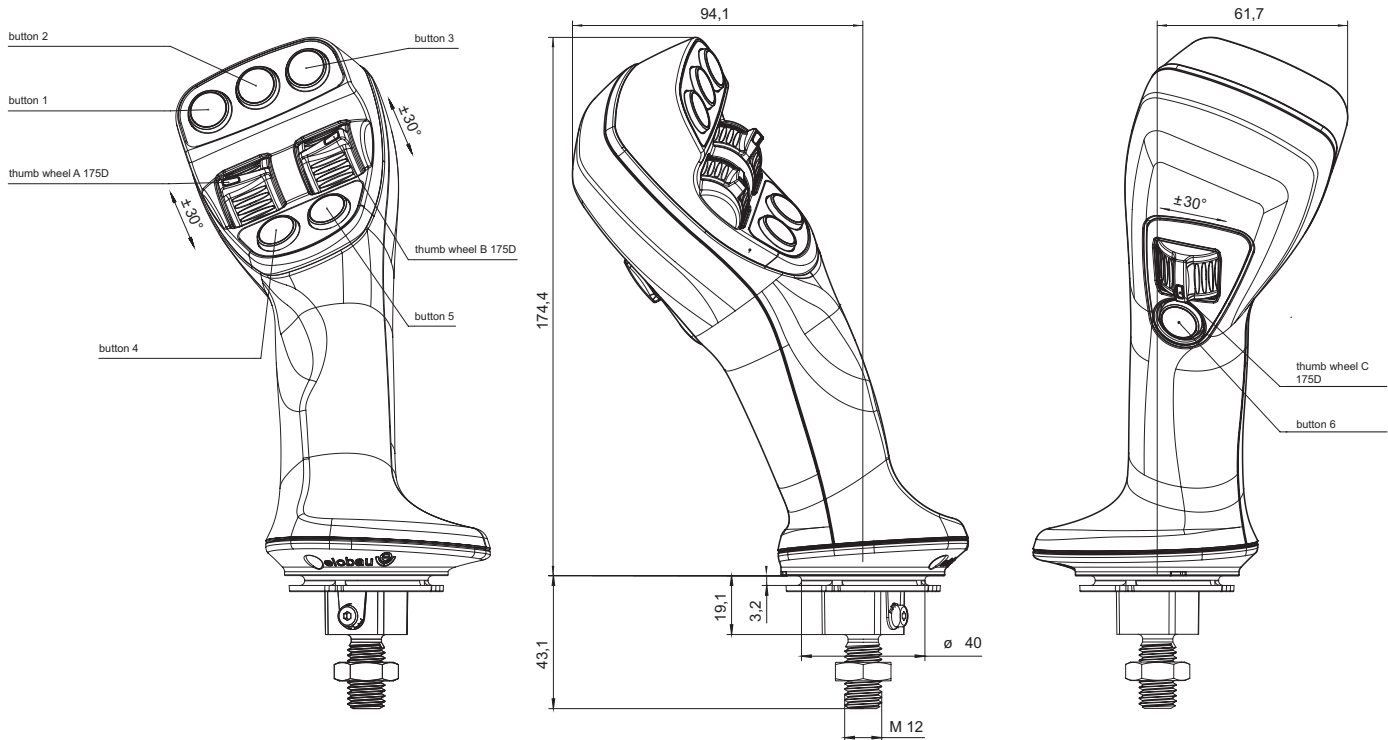
Left-hand
 version



Can be installed on all
 common joystick types
 and hydraulic pilot valves

Joystick grip 361G / 362G

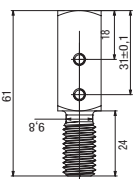
Ergonomic actuation for right or left hand users



Installation adapter

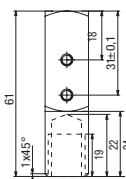
Standard

Handle axis
External thread M12

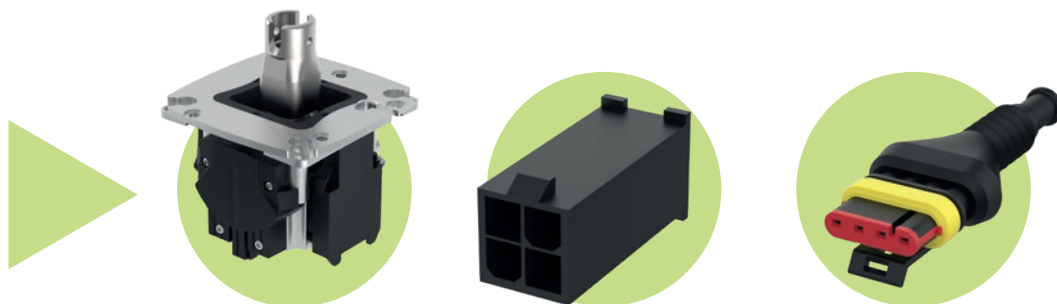
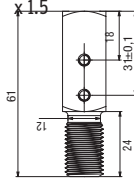


Optional

Handle axis
Inner thread M12

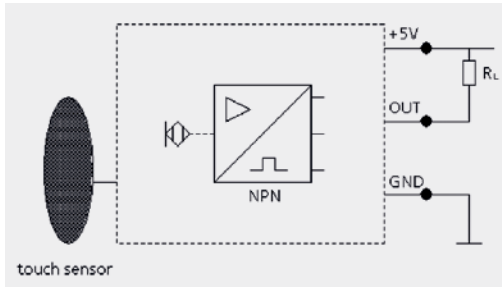


Handle axis
External thread M14



Suitable joystick base: robust joystick J4 top mounted, page 38, robust joystick J5 bottom mounted, page 38. Suitable cable sets can be found on page 163.

Joystick grip 361G / 362G Ergonomic actuation for right or left hand users



Capacitive presence detection

The 361G/362G is optionally available with a capacitive touch sensor to detect when operators are touching the handle.

Capacitive presence detection is not permissible for safety-critical applications!

ENVIRONMENTAL CONDITIONS

	36.G...
Operating temperature min./max.	-25...85 °C
Storage temperature min./max.	-40...85 °C
Shock resistance (standard)	EN 60068-2-27

CONNECTION

	36.G...
Cable length	0.50 m

ORDERING KEY

361G	Ergonomic joystick grip right hand
362G	Ergonomic joystick grip left hand
<p>To order this product, please use the elobau online configurator at www.elobau.com → Operator controls → Multi axis joysticks</p>	

Joystick grip 351G

Straight handle shape allows ambidextrous operation

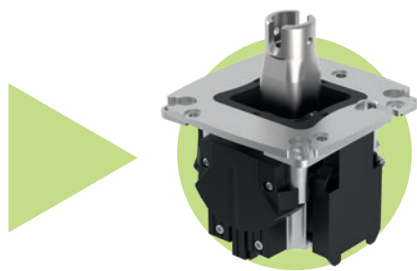
PRODUCT CHARACTERISTICS

- Available with up to 8 push button switches
- Up to 2 thumbwheels can be implemented
- Illuminated push button switches available if required
- Optionally available with activation push button switch on the rear of the handle
- Up to two additional LEDs possible on front
- Various colour choices are available for the actuator covers
- Ergonomic operation with either right or left hand



Joystick grip 351G has an ergonomic, robust design and is equipped with micro push button switches for function control. Joystick grip 351G can be equipped with function illumination by means of LED, activation push button and thumbwheels to suit operational requirements. Micro push buttons in various colours.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

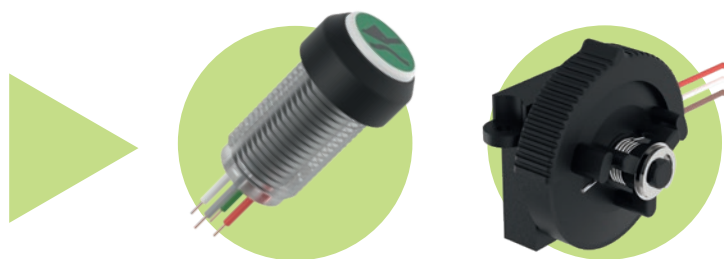
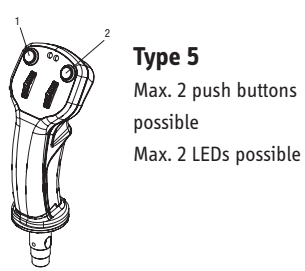
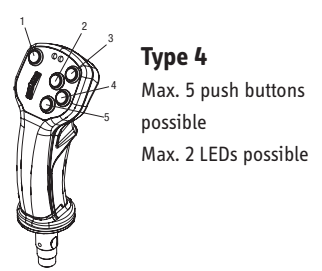
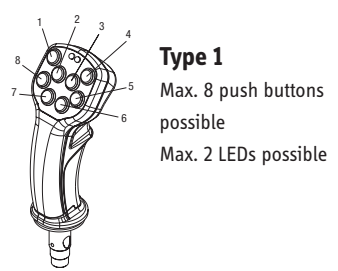
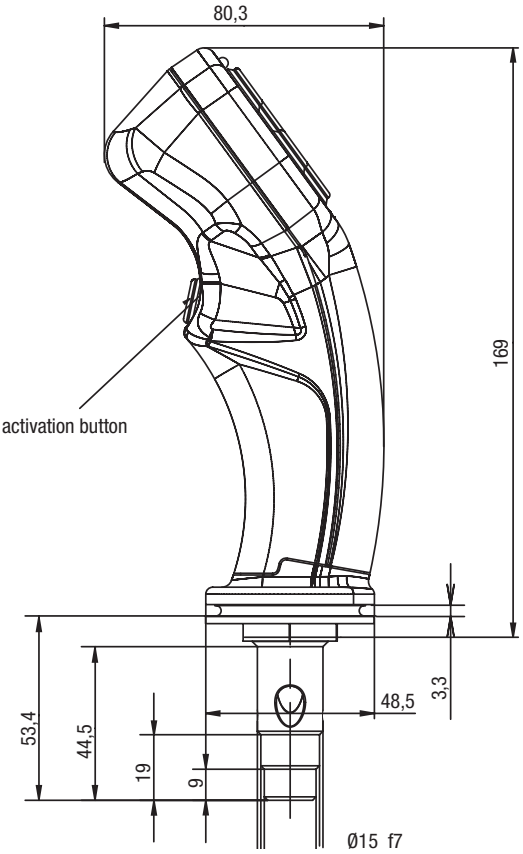
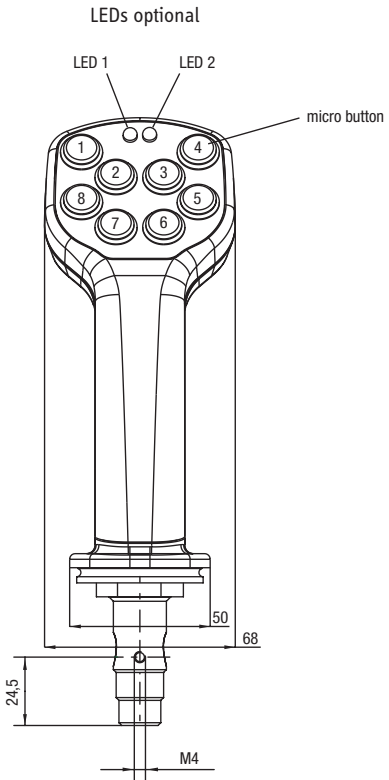


Suitable joystick base:
J4 top mounted, see page 38,
J5 bottom mounted, see page 38.

Use our online configurator to
specify your joystick grip
at www.elobau.com →
Operator controls → Joystick grips



Joystick grip 351G
 Straight handle shape allows ambidextrous operation



Suitable push button can be found on page 104,
 Thumbwheels can be found on page 88.

Joystick grip 351G

Straight handle shape allows ambidextrous operation

ENVIRONMENTAL CONDITIONS

	351G...
Operating temperature min./max.	-25...85 °C
Storage temperature min./max.	-40...85 °C

CONNECTION

	351G...
Cable length	0.50 m

Joystick grip 351G

Straight handle shape allows ambidextrous operation

ORDERING KEY

351G	Joystick grip
	<p>To order this product, please use the elobau online configurator at www.elobau.com → Operator controls → Multi axis joysticks → Joysticks configurator → Select standard</p>

Joystick grip 341G / 342G

Ergonomic actuation for right or left hand users

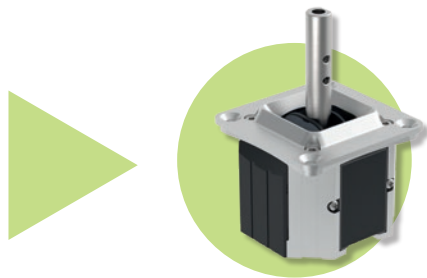
PRODUCT CHARACTERISTICS

- The joystick grip 341G has been ergonomically designed for right handed operation, and 342G for left handed operation
- Night and function illumination for push buttons and thumbwheels
- The CAN controller integrated in the handle facilitates a simple bus connection (CANopen / SAE J1939), optionally with an integrated termination resistor
- Handle available with micro push button switches for use outside of the cabin
- Optionally available with capacitive presence detection
- Various colour choices are available for the mounted operator controls



The modular design of the ergonomic joystick grip allows it to be flexibly configured to suit many applications. The handle offers numerous additional operating functions with one thumbwheel and 3 push buttons or one thumbwheel and up to 6 push button positions.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

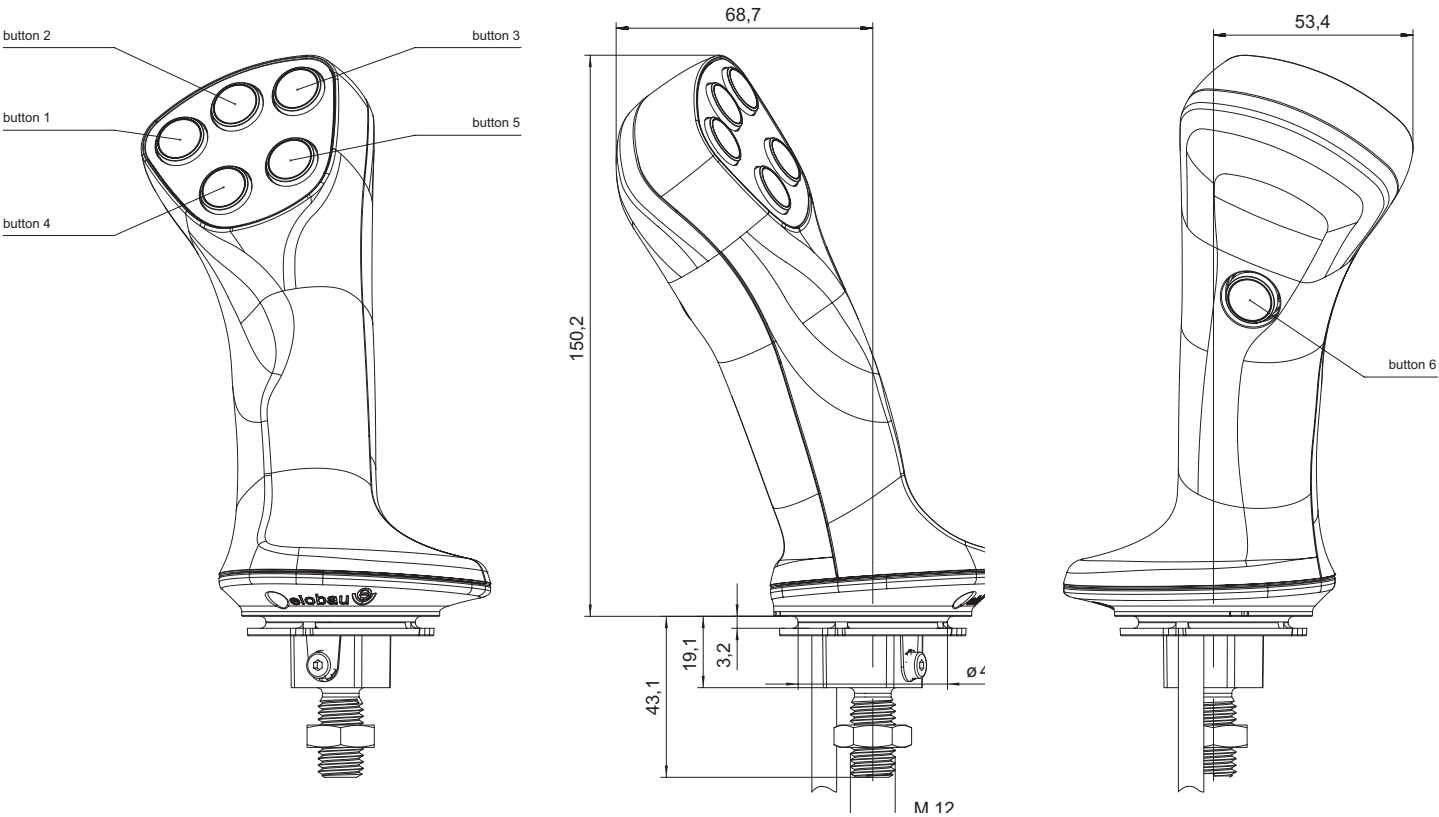


Suitable joystick base:
J4 top mounted, see page 38,
J5 bottom mounted, see page 38,
J6 top mounted, see page 48.

Use our online configurator to
specify your joystick grip
at www.elobau.com →
Operator controls → Joystick grips



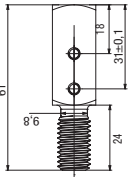
Joystick grip 341G / 342G
Ergonomic actuation for right or left hand users



Installation adapter

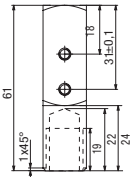
Standard

Handle axis
External thread M12

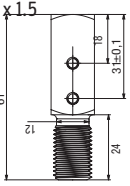


Optional

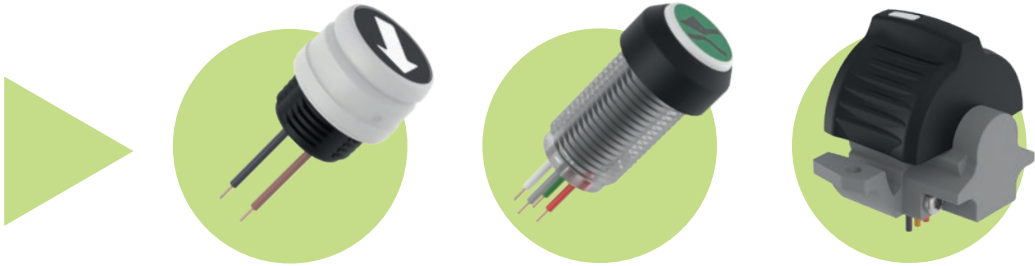
Handle axis
Inner thread M12



Handle axis
External thread M14



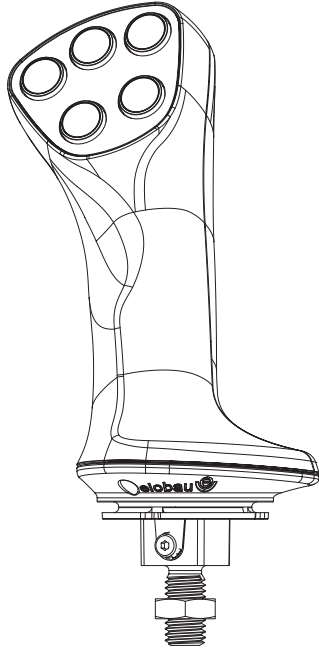
Handle variants also available with micro push buttons for use outside the cabin.



Suitable nano push buttons can be found on page 98, suitable micro push buttons on page 104. Thumbwheels can be found on page 82.

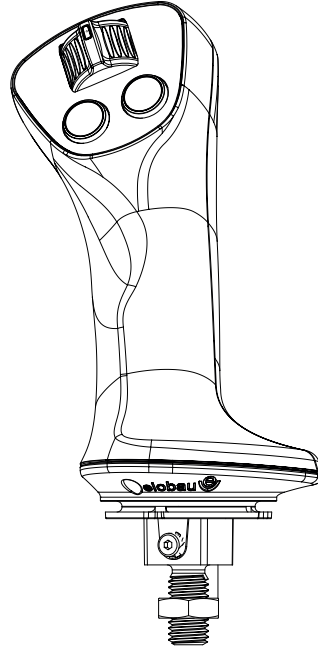
Joystick grip 341G / 342G

Ergonomic actuation for right or left hand users



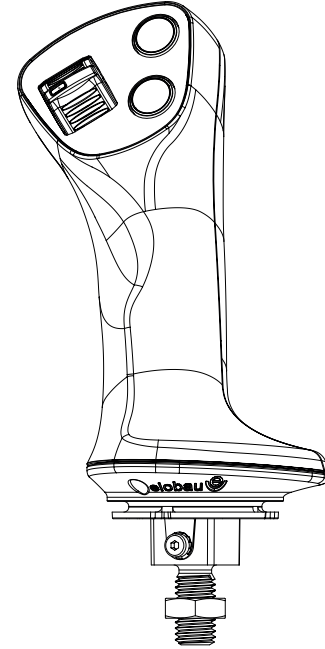
Type 1

Max. 6 push buttons with night and function illumination possible



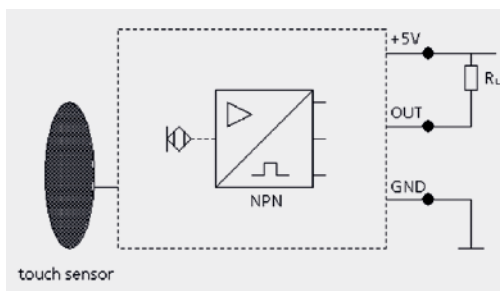
Type 2

Max. 3 push buttons with night and function illumination possible.
Max. one thumbwheel with illumination



Type 3

Max. 3 push buttons with night and function illumination possible.
Max. one thumbwheel with illumination



Capacitive presence detection

The 341/342G is optionally available with a capacitive touch sensor to detect when operators are touching the handle.

Capacitive presence detection is not permissible for safety-critical applications!

Joystick grip 341G / 342G Ergonomic actuation for right or left hand users

ENVIRONMENTAL CONDITIONS

	34.G...
Operating temperature min./max.	-25...85 °C
Storage temperature min./max.	-40...85 °C
Shock resistance (standard)	EN 60068-2-27

CONNECTION

	34.G...
Cable length	0.50 m

ORDERING KEY

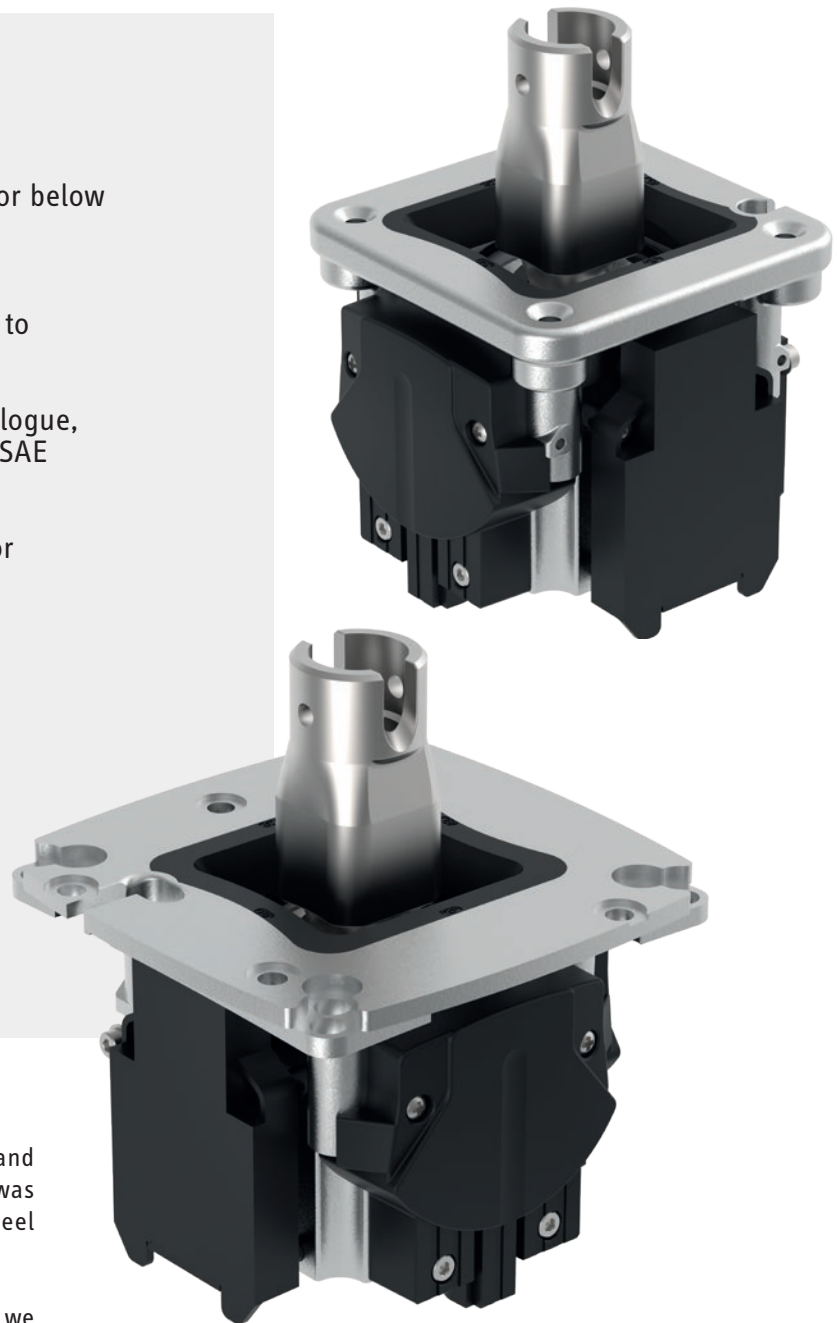
341G	Ergonomic joystick grip right hand
342G	Ergonomic joystick grip left hand
	To order this product, please use the elobau online configurator at www.elobau.com → Operator controls → Multi axis joysticks

Robust joystick J4 / J5 base

J4 top mounted and J5 bottom mounted

PRODUCT CHARACTERISTICS

- Robust joystick for installation from above or below
- Space-saving design
- High reliability and long service life thanks to contactless Hall-effect and reed technology
- Available with different output signals: analogue, redundant, CAN bus connection (CANopen/SAE J1939) or with switching output
- IP67 protection class of electronics, ideal for harsh environmental conditions
- Deflection J4 $\pm 20^\circ$, J5 $\pm 25^\circ$
- Available with various actuation types: no-detent, detent, with friction brake or centre position interlock, any function can be optimally operated
- Designed for extremely heavy loads (x-/y-axis: 2000 N, z-axis: 700 N at 190 mm lever length each)



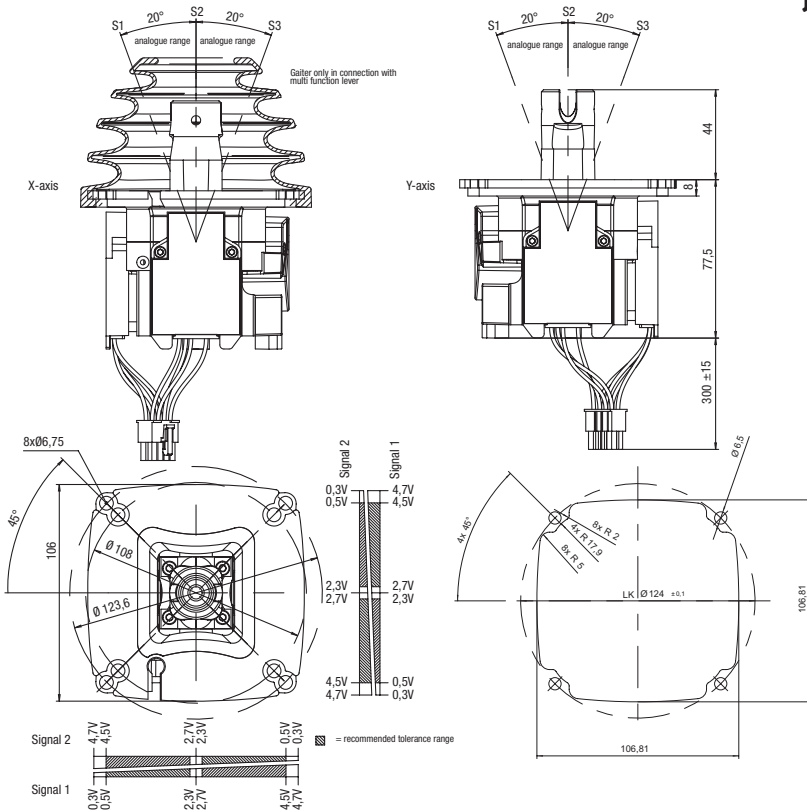
The J4 / J5 robust joystick is ideal for high-stress and high-frequency use thanks to its robust design. It was designed for use in mobile machinery, such as wheel loaders for operating the bucket functions.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

Use our online configurator to specify your J4 / J5 joystick base at www.elobau.com → Operator controls → Multi axis joysticks



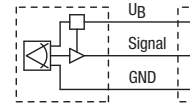
J4 (top mounted)



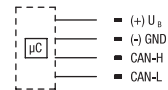
Robust joystick J4 / J5 base J4 top mounted and J5 bottom mounted

Standard

Analogue each X- and Y-axis

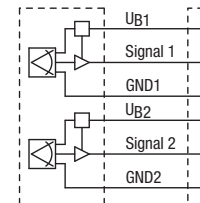


CAN

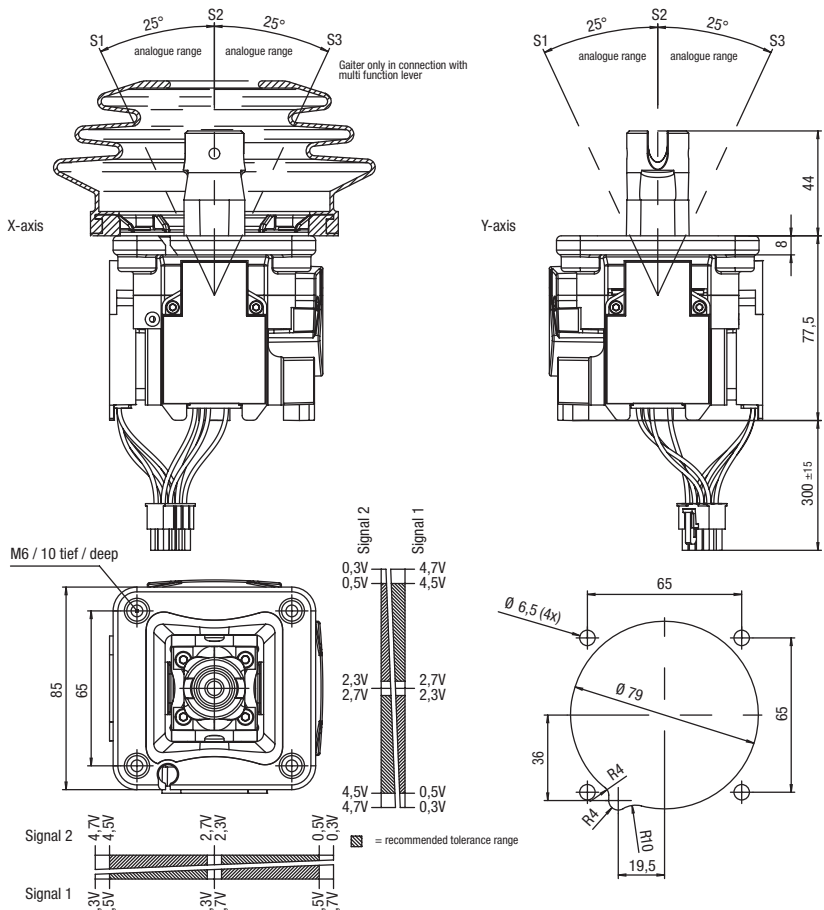


Optional

Redundant each X- und Y-axis

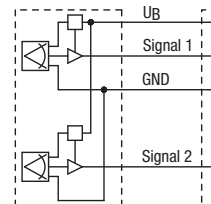


J5 (bottom mounted)

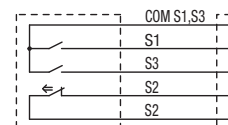


Installation opening only in combination
with gaiter

Semi-redundant each X- and Y-axis



Switching output each X- and Y-axis

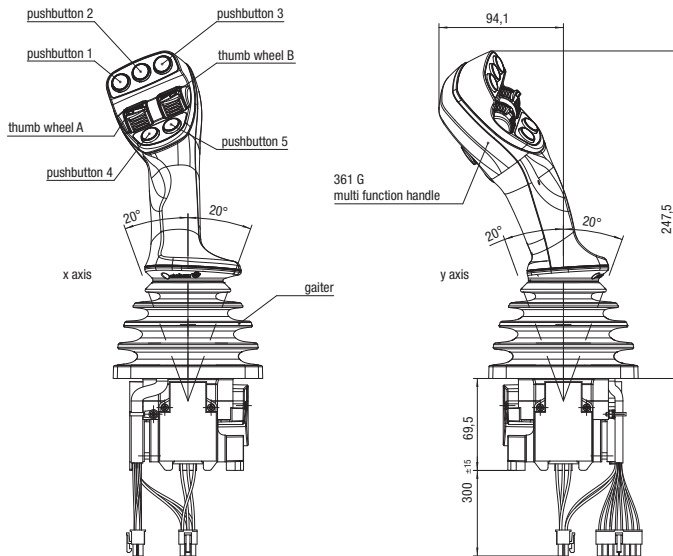


Shown in
centre position (S2
actuated)

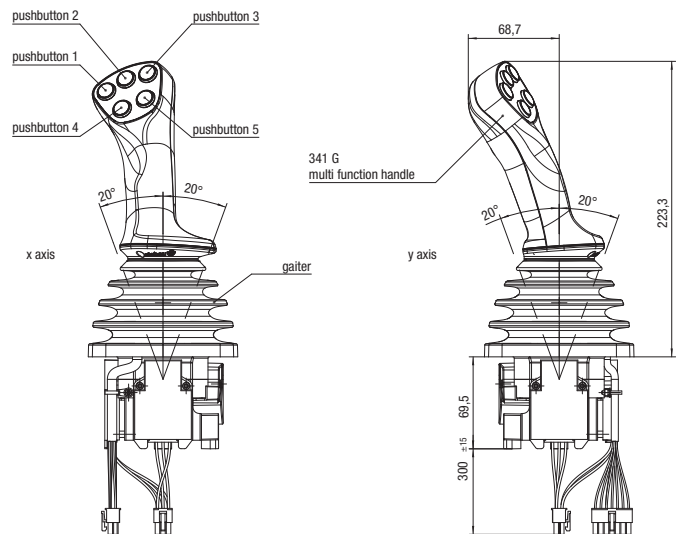
Robust joystick J4 / J5 base

J4 top mounted and J5 bottom mounted

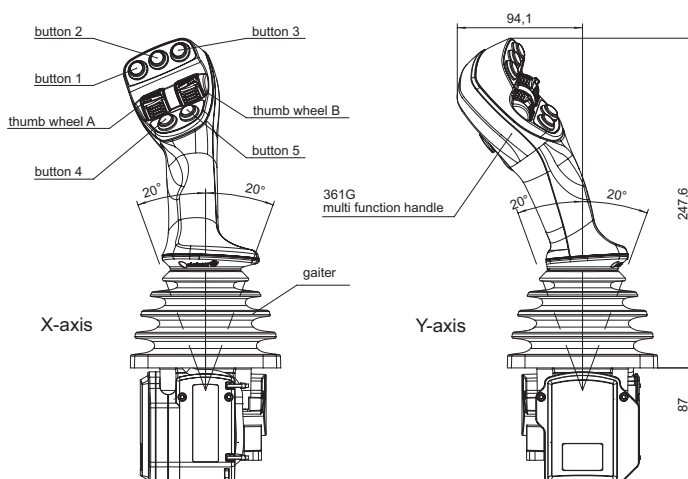
J4 joystick with joystick grip 361G...



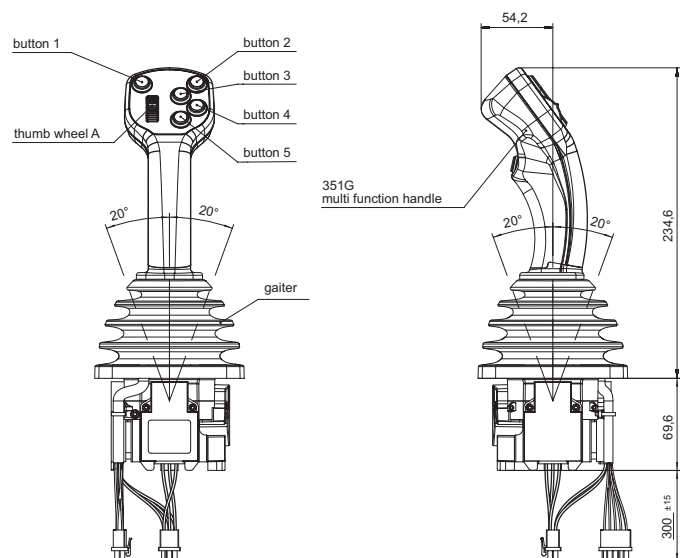
J4 joystick with joystick grip 341G...



J4 joystick with CAN electronics und joystick grip 361G



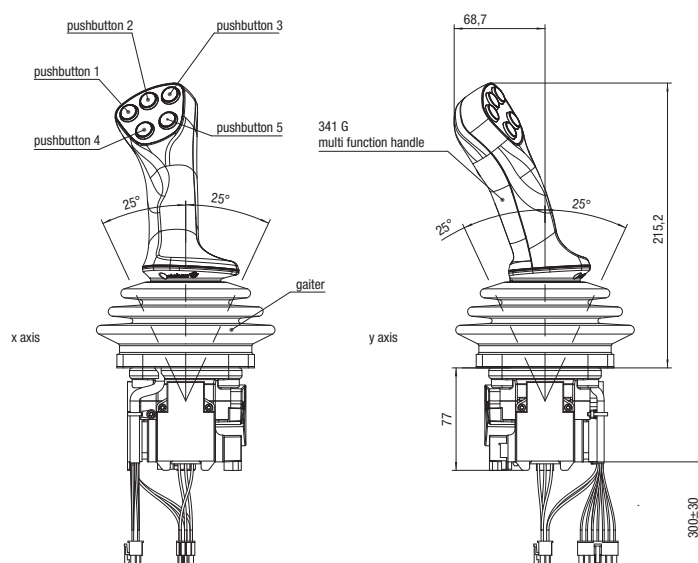
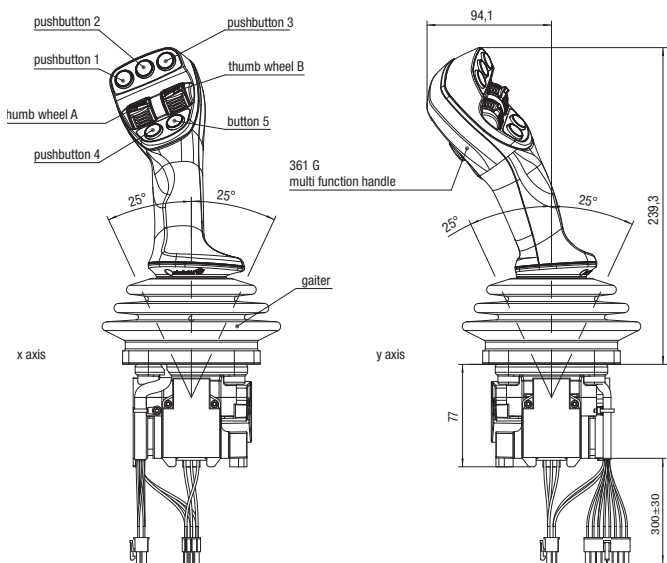
J4 joystick with joystick grip 351G



Robust joystick J4 / J5 base J4 top mounted and J5 bottom mounted

J5 joystick with joystick grip 361G...

J5 joystick with joystick grip 341G...



Suitable joystick grips 361G / 362G can be found on page 26, 351G can be found on page 31, 341G / 342G can be found on page 34, suitable cable sets can be found on page 159.

Robust joystick J4 / J5 base

J4 top mounted and J5 bottom mounted

ELECTRICAL DATA

	J4/J5A1...	J4/J5A6...	J4/J5A7...	J4C6... CANopen	J4C6... SAE_J1939	J4/J5D8...
Max. switching voltage						48.00 V DC
Max. switching current						0.30 A
Switching power max.						10 W
Switching power max.						10 VA
Contact form						N.O.
Polarity reversal protection	Yes					
Output signal min./max.	-	0.50...4.50 V DC	0.50...4.50 V DC			
Output signal min./max.	4.00...20.00 mA					-
Output signal	Analogue			-	-	Digital
Output signal - centre position - zero position	-	2.50 V DC	2.50 V DC			
Output signal - centre position - zero position	12.00 mA					-
EMC immunity (standard)	DIN EN 13309, DIN EN ISO 14982					
EMC emission (standard)	DIN EN 13309, DIN EN ISO 14982					
Operating voltage min./max.	10.00...30.00 V DC	4.50...5.50 V DC	10.00...30.00 V DC	9.00...36.00 V DC	9.00...36.00 V DC	...48,00 V DC
Current consumption	max. 18 mA	Max. 15 mA	Max. 15 mA	< 120 mA	< 120 mA	-
Load resistance min.	-	20000 Ohm	20000 Ohm			
Load resistance at 10V max.	250 Ohm					-
Load resistance at 30V max.	1250 Ohm					-
Short-circuit resistance to GND	No	Yes	No			
Short-circuit resistance to supply	No	Yes	No			
Outputs (quantity, type)						6
Technology	Hall					Reed
Protocol				CANopen	J1939	-
Transmitting cycle				100 ms	100 ms	-
Baud rate				250 kbit/s	250 kbit/s	-
Bus terminating resistor				No	No	-

MECHANICAL DATA

	J4/J5A1...	J4/J5A6...	J4/J5A7...	J4C6... CANopen	J4C6... SAE_J1939	J4/J5D8...
Max. lever load with specified lever length	2000N at 190mm					
Deflection	J4 = 20 ° / J5 = 25°					
Service life, mechanical (cycles)	2000000					

MULTI AXIS JOYSTICKS

Robust joystick J4 / J5 base J4 top mounted and J5 bottom mounted

MATERIAL INFORMATION

	J4/J5A1...	J4/J5A6...	J4/J5A7...	J4C6... CANopen	J4C6... SAE_J1939	J4/J5D8...
Housing material	Die-cast zinc Z410					
Shaft material	Die-cast zinc Z410					
Gaiter material	J4 = EPDM / J5 = CR					

ENVIRONMENTAL CONDITIONS

	J4/J5A1...	J4/J5A6...	J4/J5A7...	J4C6... CANopen	J4C6... SAE_J1939	J4/J5D8...
Protection class, electronic	IP67 EN 60529					
Operating temperature min./max.	-25...85 °C					
Storage temperature min./max.	-40...85 °C					

INSTALLATION

	J4A1...	J4A6...	J4A7...	J4C6... CANopen	J4C6... SAE_J1939	J4D8...
Installation	From above					
Mounting type	Screwed from above					

	J5A1...	J5A6...	J5A7...			J4/J5D8...
Installation	From below					
Mounting type	Screwed from above					

CONNECTION

	J4/J5A1...	J4/J5A6...	J4/J5A7...	J4C6... CANopen	J4C6... SAE_J1939	J4/J5D8...
Connector type	Mini-Fit Jr.			-	-	Mini-Fit Jr.
Cable type	FLRY			FLRY	FLRY	FLRY
Cable length	0.30 m			-	-	0.30 m

ORDERING KEY

J4 / J5	Robust joystick top or bottom mounted
	To order this product, please use the elobau online configurator at www.elobau.com → Operator controls → Multi axis joysticks

Robust joystick J4F

With safety electronics, top mounted

PRODUCT CHARACTERISTICS

- Joystick and thumbwheel signals SIL 2 / PL d (cat. 3), push button SIL 1 / PL c in accordance with the latest Machinery Directive
- High reliability and long service life thanks to contactless reed and Hall-effect technology
- Joystick CAN module robust with IP67 electronics protection class, ideal for outdoor use
- Direct mounting of electronics module onto joystick ensures minimum space requirement
- Handle available with micro push button switches for use outside of the cabin
- Modular construction of the handle enables application-specific modification
- Ergonomic handle shape ensures fatigue-free operation



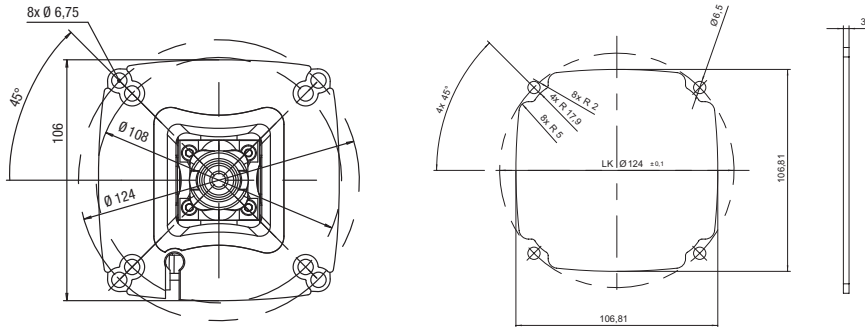
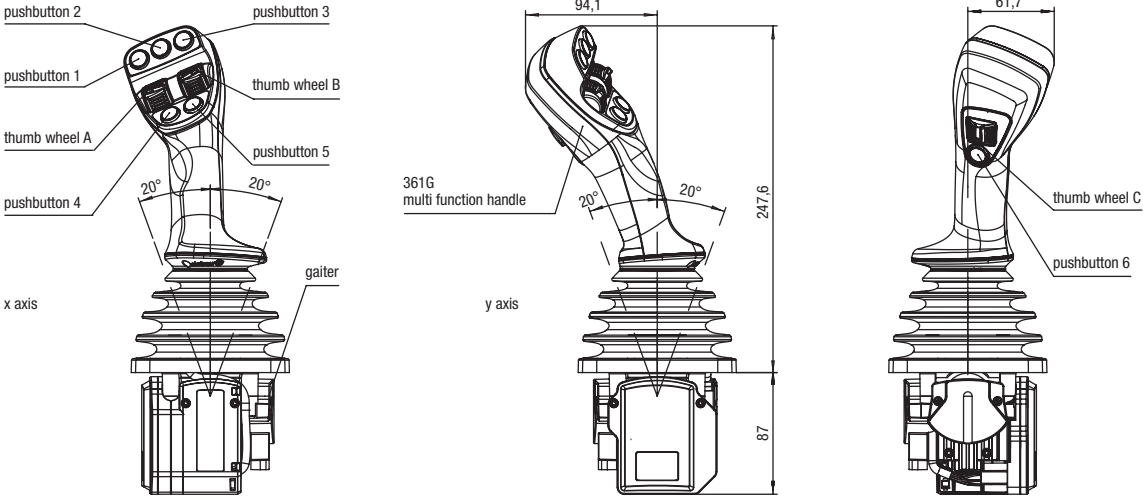
The robustly designed Heavy duty joystick J4F with safety electronics has been developed and certified in accordance with DIN ISO 13849-1:2008 PL d and in accordance with DIN EN IEC 61508:2010 SIL 2. This allows manufacturers of municipal vehicles and off-highway vehicles such as agricultural and construction machinery to avoid additional risk and failure probability calculations, and can reduce their documentation requirements as a result. Even safety-critical vehicle functions such as the direction of travel can be controlled.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

Use our online configurator to specify your J4F
at www.elobau.com → Operator controls → Multi axis joysticks



Robust joystick J4F
With safety electronics, top mounted



Installation opening only in combination with gaiter

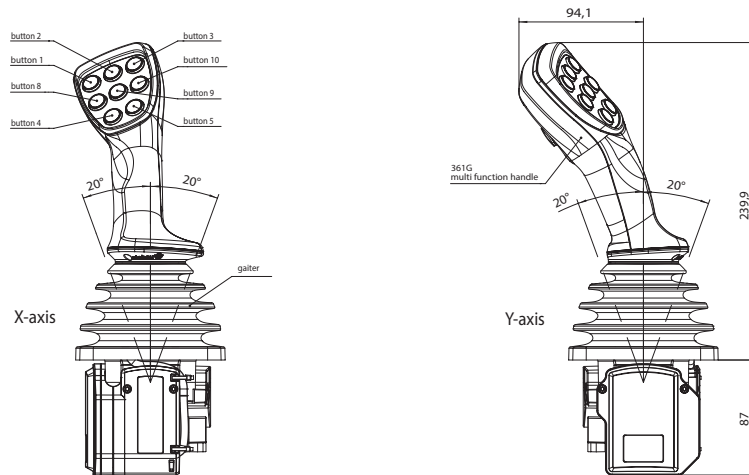


Suitable joystick grips 341G / 342G can be found on page 34, 351G on page 31 and 361G / 362G on page 26. Suitable cable sets can be found on page 159.

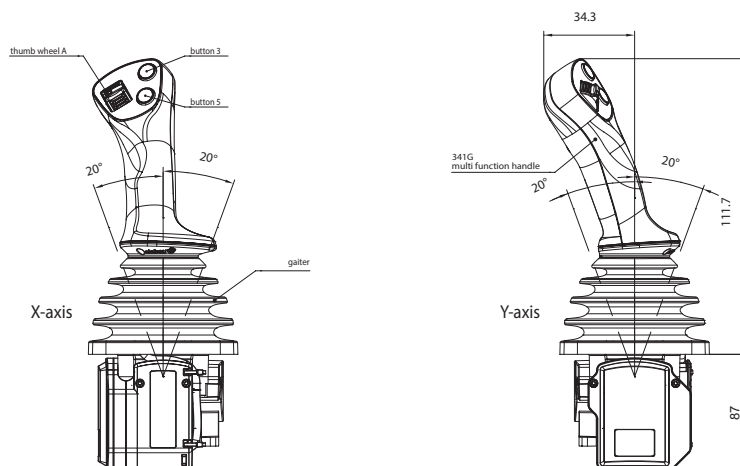
Robust joystick J4F

With safety electronics, top mounted

J4F with joystick grip 361G, front control module with 8 push buttons



J4F with joystick grip 341G, front control module with thumbwheel and 2 push buttons



Robust joystick J4F With safety electronics, top mounted

ELECTRICAL DATA

	J4F
Operating voltage min./max.	9.00...32.00 V DC
Current consumption	400 mA
Fieldbus system	CAN
Protocol	J1939
Baud rate	250 kbit/s

MECHANICAL DATA

	J4F
Max. lever load with specified lever length	2000N at 190mm
Deflection	± 20 °
Service life, mechanical (cycles)	2000000

MATERIAL INFORMATION

	J4F
Housing material	Die-cast zinc Z410
Shaft material	Die-cast zinc Z410
Gaiter material	EPDM

ORDERING KEY

Robust joystick J4F	Top mount
To order this product, please use the elobau online configurator at www.elobau.com → Operator controls → Multi axis joysticks	

ENVIRONMENTAL CONDITIONS

	J4F
Operating temperature min./max.	-25...85 °C
Storage temperature min./max.	-40...85 °C

INSTALLATION

	J4F
Installation	From above
Mounting type	Screwed from above

CONNECTION

	J4F
Connector type	Deutsch DT04-6P

Robust joystick J6 base

Space-saving, top mounted

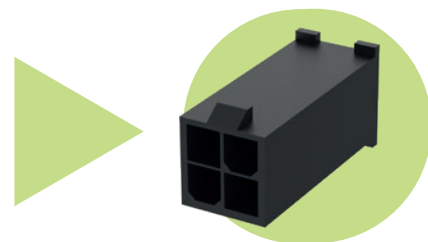
PRODUCT CHARACTERISTICS

- High reliability and long service life thanks to contactless Hall-effect and reed technology
- Available with different output signals: analogue, redundant, CAN bus connection (CANopen / SAE J1939) or with switching output
- IP67 protection class of electronics, ideal for harsh environmental conditions
- Deflection $\pm 20^\circ$ or $\pm 25^\circ$
- Single or dual-axis
- Robust joystick J6 can withstand very high loads despite its compact design (x-/y-axis: 750N, Z-axis: 500N with 150 mm lever length)
- Straight handle with up to 3 push buttons or ergonomic joystick grip that can be adapted for left or right handed operation



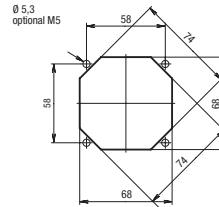
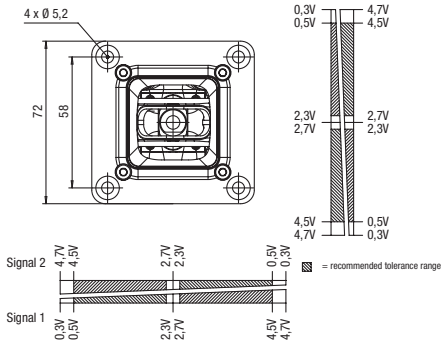
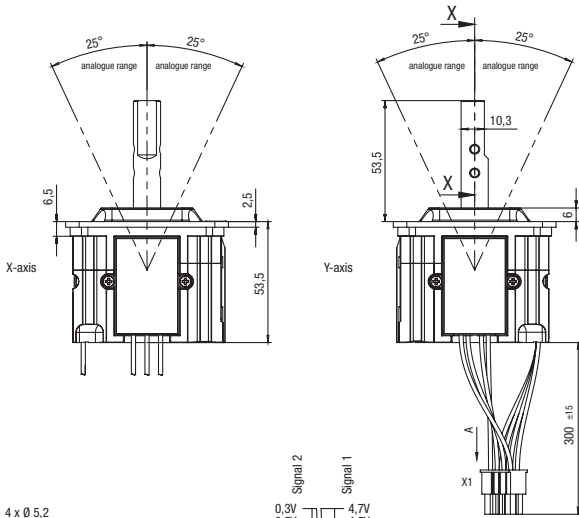
Due to its compact design, the robust joystick J6 is ideally suited for use in control panels and armrests in off-highway vehicles, construction and agricultural machinery industries. Due to high electronics protection class IP67, it can also be used in adverse environmental conditions.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

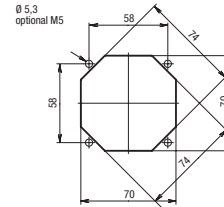


Suitable cable sets can be found on page 160.

Robust joystick J6 base Space-saving, top mounted



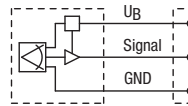
Installation opening
analogue version (J6A...)



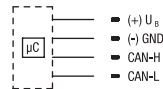
Installation opening switching
output version (J6D...)

Standard

Analogue each X- and Y-axis

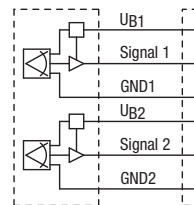


CAN

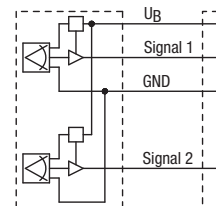


Optional

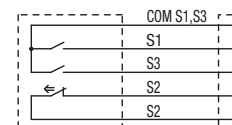
Redundant each X- und Y-axis



Semi-redundant each X- and Y-axis



Switching output each X- and Y-axis



Shown in centre position (S2 actuated)

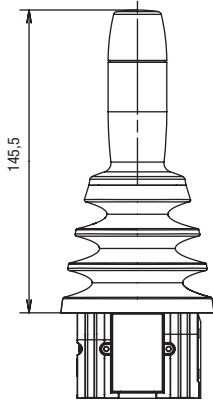


Suitable joystick grips
341G / 342G can be found on page 34.

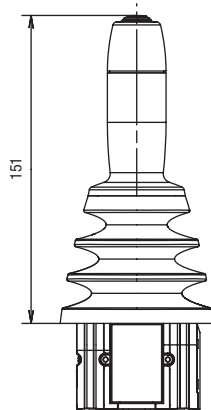
Robust joystick J6 base

Space-saving, top mounted

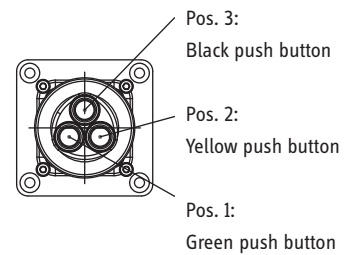
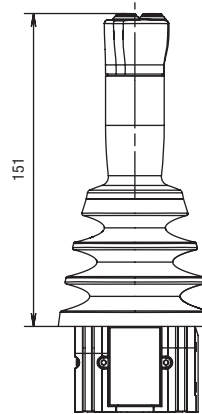
Standard handle without micro push button



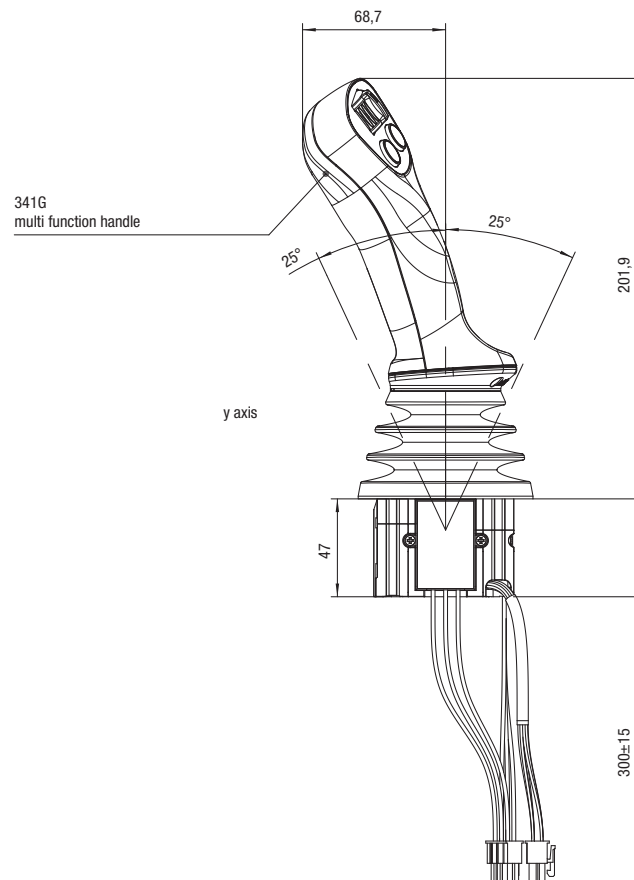
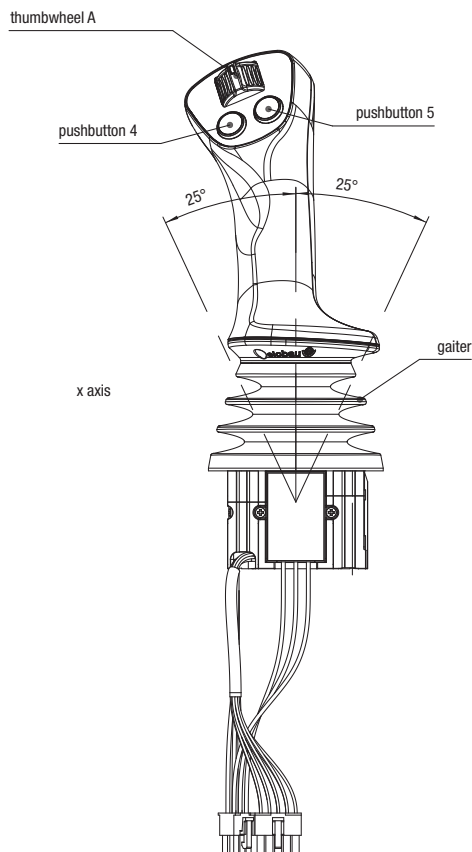
Standard handle with micro push button



3-button handle – max. 3 micro push buttons



J6 joystick with joystick grip 341G...



Robust joystick J6 base Space-saving, top mounted

ELECTRICAL DATA

	J6A1...	J6A6...	J6A7...	J6C6... CANopen	J6C6... SAE_J1939	J6D8...
Max. switching voltage						48.00 V DC
Max. switching current						0.30 A
Switching power max.						10 W
Switching power max.						10 VA
Contact form						N.O.
Output signal min./max.	-	0.50...4.50 V DC	0.50...4.50 V DC			-
Output signal min./max.	4.00...20.00 mA					-
Output signal	Analogue	Analogue	Analogue			-
Output signal Centre position Zero position	-	2.50 V DC	2.50 V DC			-
Output signal Centre position Zero position	12.00 mA					-
Operating voltage min./max.	10.00...30.00 V DC	4.50...5.50 V DC	10.00...30.00 V DC	9.00...36.00 V DC	9.00...36.00 V DC	-
Current consumption	at 12 V max. 18 mA	Max. 15 mA	at 12 V max. 15 mA	< 120 mA	< 120 mA	-
Load resistance min.	-	20000 Ohm	20000 Ohm			-
Load resistance at 10V max.	250 Ohm					-
Load resistance at 30V max.	1250 Ohm					-
Technology	Hall					Reed
Protocol				CANopen	J1939	-
Transmitting cycle				100 ms	100 ms	-
Baud rate				250 kbit/s	250 kbit/s	-
Bus terminating resistor				No	No	-

MECHANICAL DATA

	J6A1...	J6A6...	J6A7...	J6C6... CANopen	J6C6... SAE_J1939	J6D8...
Max. lever load with specified lever length	750N at 150mm					
Deflection	± 25 °					
Service life, mechanical (cycles)	2000000					

Robust joystick J6 base

Space-saving, top mounted

ENVIRONMENTAL CONDITIONS

J6A1...	J6A6...	J6A7...	J6C6... CANopen	J6C6... SAE_J1939	J6D8...	J6D8...
Protection class, electronic	IP67 EN 60529					
Operating temperature min./max.	-25...85 °C					
Storage temperature min./max.	-40...85 °C					

INSTALLATION

J6A1...	J6A6...	J6A7...	J6C6... CANopen	J6C6... SAE_J1939	J6D8...	J6D8...
Installation	From above					
Mounting type	Screwed					

CONNECTION

J6A1...	J6A6...	J6A7...	J6C6... CANopen	J6C6... SAE_J1939	J6D8...	J6D8...
Connector type	Mini-Fit Jr.					
Cable type	FLRY					
Cable length	0.30 m					

Robust joystick J6 base
Space-saving, top mounted

ORDERING KEY

Robust joystick J6 base	Top mount
	To order this product, please use the elobau online configurator at www.elobau.com → Operator controls → Multi axis joysticks

Compact joystick J2

With up to 3 push button switches, bottom mounted

PRODUCT CHARACTERISTICS

- Space-saving design
- High reliability and long service life thanks to contactless Hall-effect and reed technology
- Available with different output signals: analogue, redundant, CAN bus connection (CANopen / SAE J1939) or with switching output
- IP67 protection class of electronics, ideal for harsh environmental conditions
- Deflection $\pm 20^\circ$
- Available with various actuation types: no detent, detent or centre position interlock

Compact joystick J2 is used in tractors for effective front loader control or in industrial trucks for controlling the forks. Integrated push buttons in the handle enable the operation of additional functions.

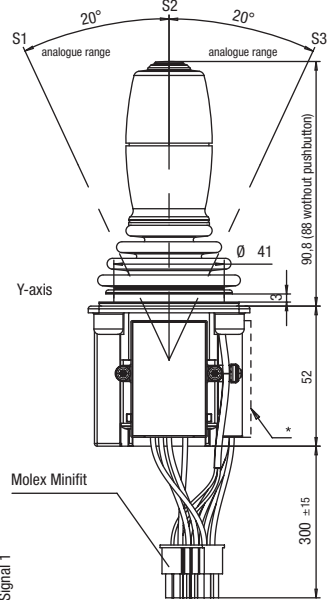
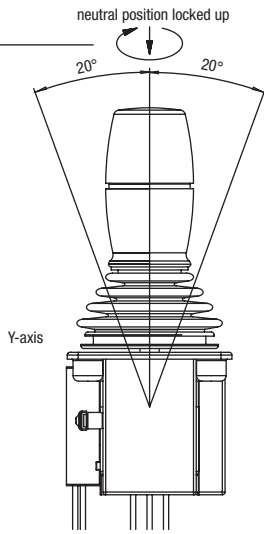
Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.



Suitable micro push button switch 145MT can be found on page 108, suitable cable sets can be found on page 160.

Compact joystick J2 With up to 3 push button switches, bottom mounted

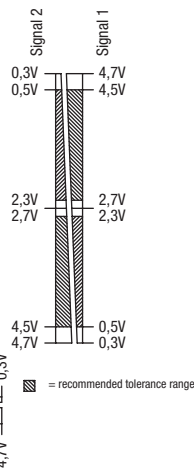
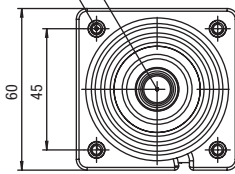
Locking device
Optional



* panel thickness for execution Switching output / redundant / CAN

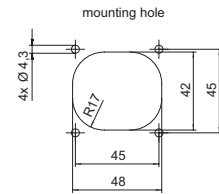
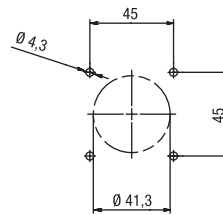
button

M4 / 8,5 deep



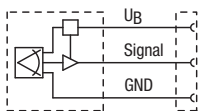
Installation opening for standard handle

Installation opening for 321G

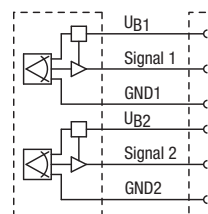


Standard

Analogue each X- and Y-axis

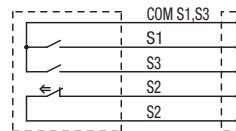


Redundant each X- and Y-axis



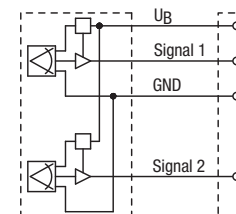
Optional

Switching output each X- and Y-axis

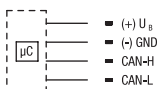


Shown in centre position
(S2 actuated)

Semi-redundant each X- and Y-axis



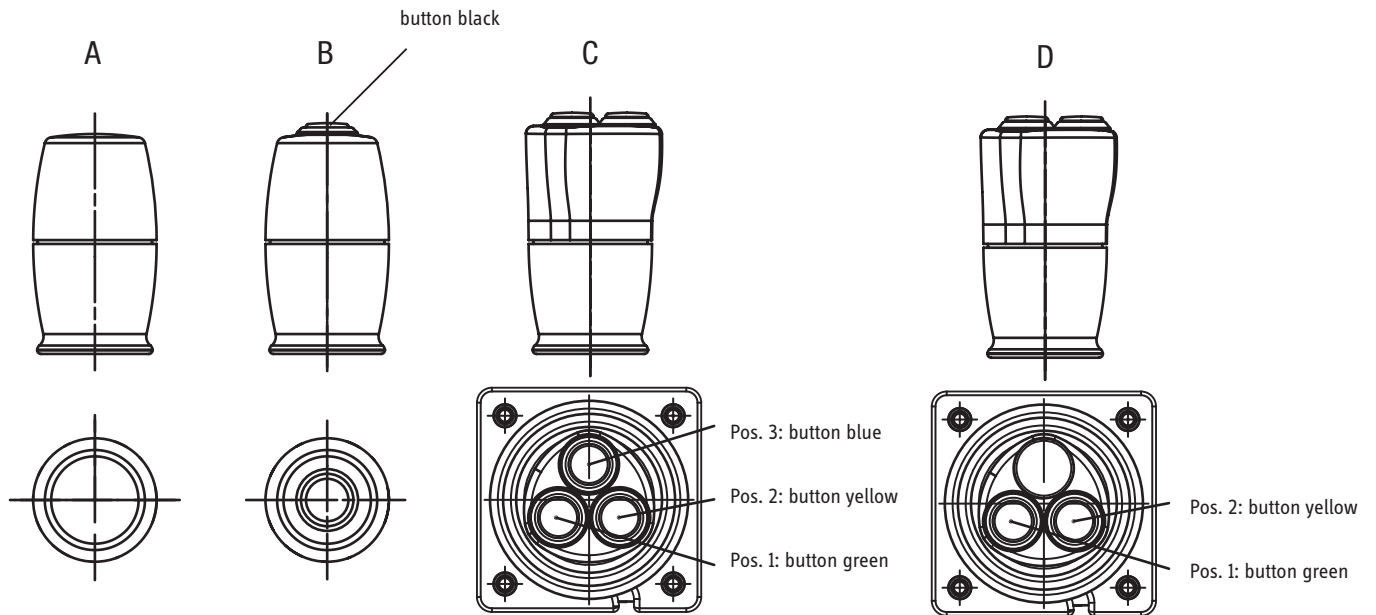
CAN



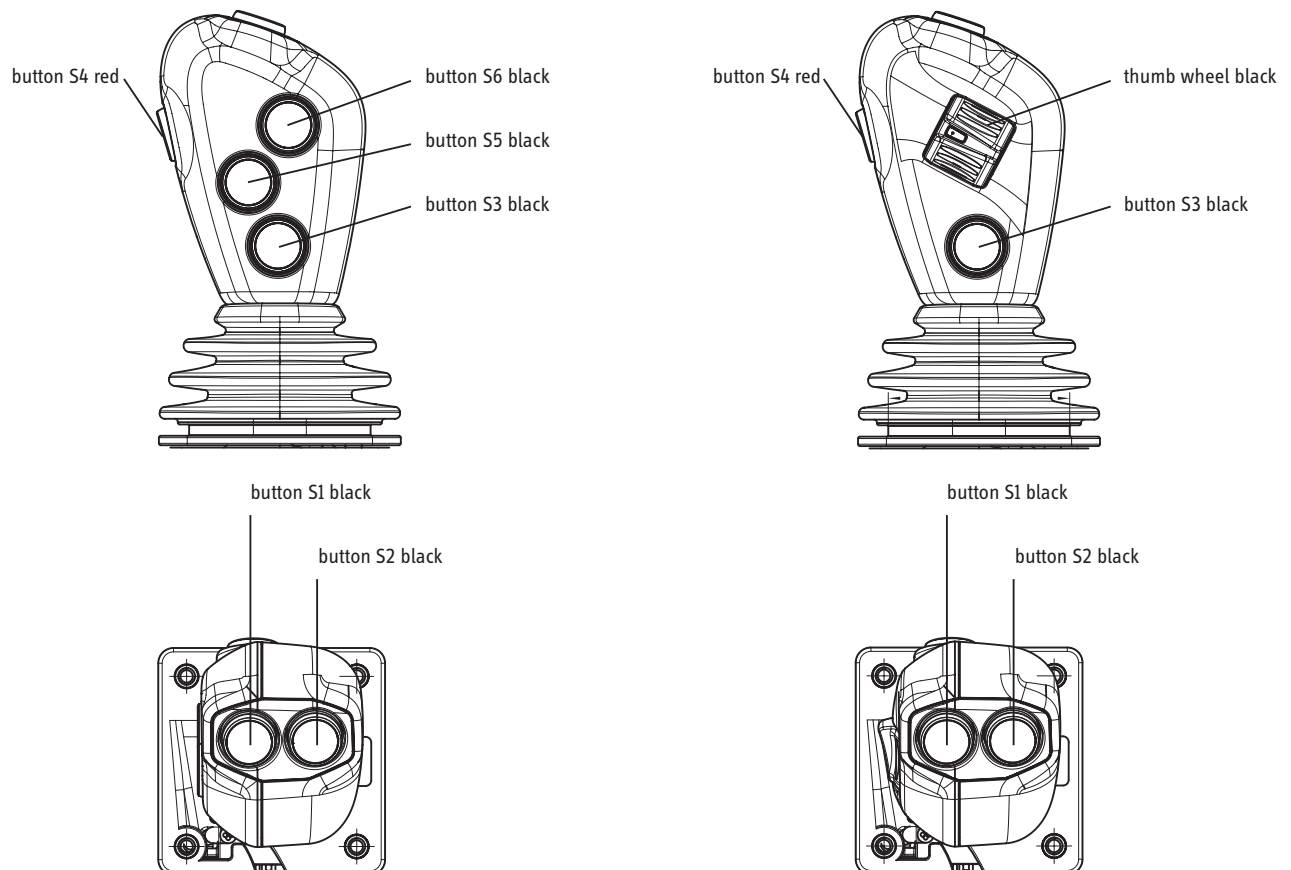
Compact joystick J2

With up to 3 push button switches, bottom mounted

Standard handle version



Optional handle versions



Compact joystick J2 With up to 3 push button switches, bottom mounted

ELECTRICAL DATA

	J2A1...	J2A6...	J2A7...	J2CJ	J2C0...	J2D8...
Max. switching voltage						48.00 V DC
Max. switching current						0.30 A
Switching power max.						10 W
Switching power max.						10 VA
Contact form						N.O.
Polarity reversal protection	Yes					-
Output signal min./max.	-	0.50...4.50 V DC	0.50...4.50 V DC			-
Output signal min./max.	4.00...20.00 mA					-
Output signal	Analogue					-
Output signal Centre position Zero position	-	2.50 V DC	2.50 V DC			-
Output signal Centre position Zero position	12.00 mA					-
EMC immunity (standard)	DIN EN 13309, DIN EN ISO 14982, ISO 13766, DIN EN 12895					-
EMC emission (standard)	DIN EN 13309, DIN EN ISO 14982, ISO 13766, DIN EN 12895					-
Operating voltage min./max.	10.00...30.00 V DC	4.50...5.50 V DC	10.00...30.00 V DC	9.00...36.00 V DC	9.00...36.00 V DC	-
Current consumption	at 12 V max. 18 mA	Max. 15 mA	at 12 V max. 15 mA	< 120 mA	< 120 mA	-
Load resistance min.	-	20000 Ohm	20000 Ohm			-
Load resistance at 10V max.	250 Ohm					-
Load resistance at 30V max.	1250 Ohm					-
Short-circuit resistance to GND	No	Yes	No	Yes	Yes	No
Short-circuit resistance to supply	No	Yes	No	Yes	Yes	No
Protocol				J1939	CANopen	-
Node ID / Source Address				0x70	0x11	-
Transmitting cycle				100 ms	100 ms	-
Baud rate				250 kbit/s	250 kbit/s	-
Bus terminating resistor				No	No	-

MECHANICAL DATA

	J2A1...	J2A6...	J2A7...	J2C0... CANopen	J2CJ... SAE J1939	J2D8...
Max. lever load with specified lever length	250N at 70mm					
Deflection	± 20 °					
Actuation type	Multi axis					
Service life, mechanical (cycles)	1000000					

Compact joystick J2

With up to 3 push button switches, bottom mounted

MATERIAL INFORMATION

	J2A1...	J2A6...	J2A7...	J2C0... CANopen	J2CJ... SAE J1939	J2D8...
Housing material	PBT					
Shaft material	1.4305					
Gaiter material	NBR 438.40					

ENVIRONMENTAL CONDITIONS

	J2A1...	J2A6...	J2A7...	J2C0... CANopen	J2CJ... SAE J1939	J2D8...
Protection class, electronic	IP67 EN 60529					
Operating temperature min./max.	-25...85 °C					
Storage temperature min./max.	-40...85 °C					

INSTALLATION

	J2A1...	J2A6...	J2A7...	J2C0... CANopen	J2CJ... SAE J1939	J2D8...
Installation	From below					
Mounting type	Screwed from above					

CONNECTION

	J2A1...	J2A6...	J2A7...	J2C0... CANopen	J2CJ... SAE J1939	J2D8...
Connector type	Mini-Fit Jr.					
Cable length	0.30 m					

Compact joystick J2 With up to 3 push button switches, bottom mounted

ORDERING KEY

J2								Joystick
								Electronics
A	1							Analogue 4-20 mA DC
A	6							Analogue 0.5-4.5 V DC, ratiometric
A	7							Analogue 0.5-4.5 V DC
R	1							Redundant 4-20 mA DC
R	6							Redundant 0.5-4.5 V DC, ratiometric
R	7							Redundant 0.5-4.5 V DC
C	0							CANopen
C	J							CAN J1939
								Function X and Y-axis
		A	A	A				No detent
								Actuation
					0			Multiaxial actuation
								Locking device
						0		Centre position cannot be locked mechanically
								Handle version
							A	Standard handle
							B	Standard handle with push button
							C	Handle with 3 push buttons
							D	Handle with 2 push buttons

Optional		
Electronics	Semi-redundant electronics module	
	CAN (CANopen/J1939)	Baud rate
		Node ID (CANopen)
		Source Address (J1939): 0x70...0x79
	Digital switching points	
Mechanics	Actuation type	Front detent only
		Detent forward and to the right
		Detent forward and backwards
		Detent left and right
		Detent in end positions
		Detent forward
		Single axis
	NSWO crank	
	Centre position mechanically lockable Twist lock	
Handle	Handle J2 with up to 3 push buttons	Various pushbutton configurations s. 145MT...
	Joystick grip 321G	321G with 4 push buttons and 1 thumbwheel
		321G with 6 push buttons

Mini joystick J1

With optional Z-axis and top or bottom installation

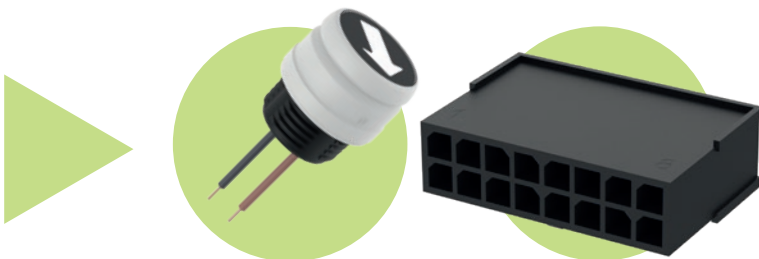
PRODUCT CHARACTERISTICS

- Space-saving design
- Highly reliable and long lifetime due to contactless Hall Effect technology
- Integrated third axis or push button switch in the handle enables the operation of additional functions and reduces the number of additional operator controls
- Ratiometric output signal
0.5 to 4.5 VDC
- Optional redundant/semi-redundant output signal for safety-critical applications
- IP67 protection class for harsh environmental conditions



Thanks to its compact design, the Mini joystick J1 is ideally suited for use in small control panels and remote control consoles. The application areas range from remote crane control, microscopy and robot control to medical technology.

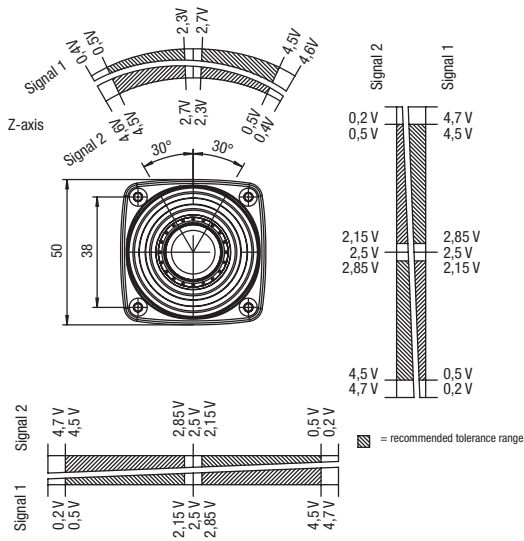
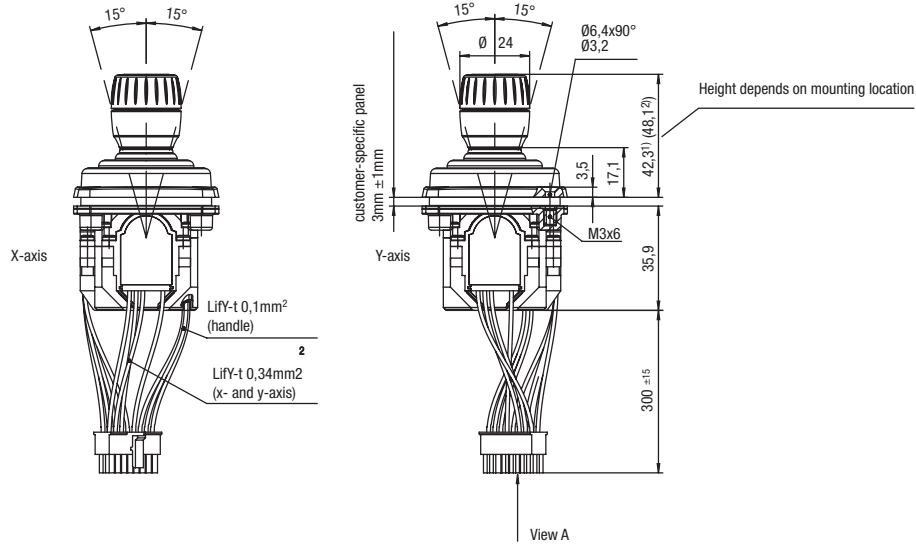
Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.



The suitable nano push button switch 145NTG can be found on page 98, suitable cable sets can be found on page 161.

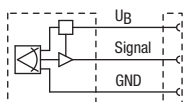
Mini joystick J1

With optional Z-axis and top or bottom installation

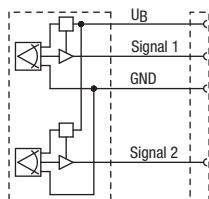


Standard

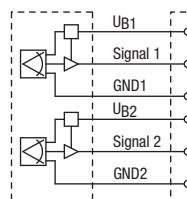
Analogue each X- and Y-axis



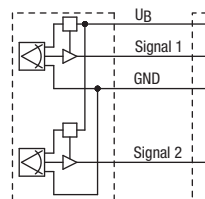
Semi-redundant each X- and Y-axis



Redundant each X- and Y-axis

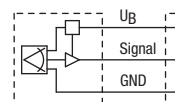


Semi-redundant Z-axis



Optional

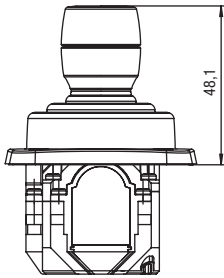
Analogue Z-axis



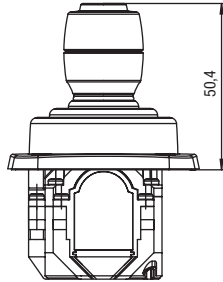
Mini joystick J1

With optional Z-axis and top or bottom installation

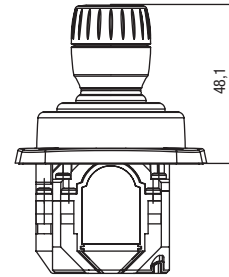
J1 with grip



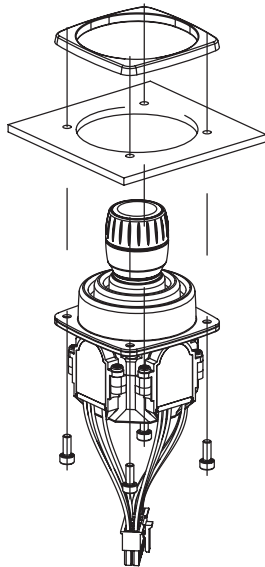
J1 with grip and integrated push button



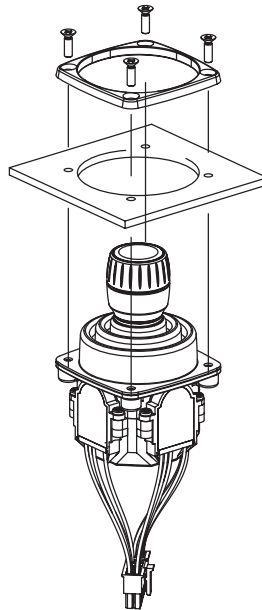
J1 with grip and Z-axis



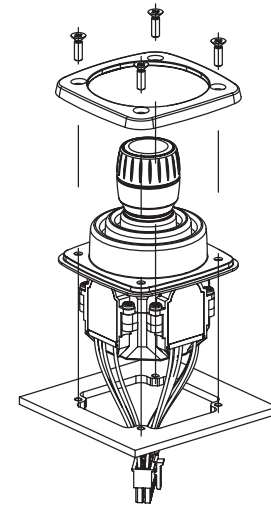
Bottom mounted,
screw connection from below



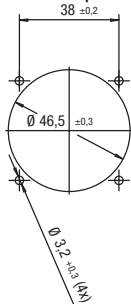
Bottom mounted,
screw connection from above



Top mounted,
screw connection from above

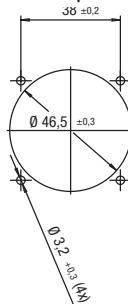


Installation opening



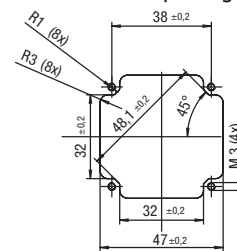
Torque 0.3 Nm

Installation opening



Torque 0.3 Nm

Installation opening



Torque 0.3 Nm

Mini joystick J1 With optional Z-axis and top or bottom installation

ELECTRICAL DATA

	J1...
Polarity reversal protection	Yes
Output signal min./max.	0.50...4.50 V DC
Output signal	Analogue
Output signal Centre position Zero position	2.50 V DC
Output polarity	Opposite
EMC immunity (standard)	DIN EN 13309, DIN EN ISO 14982
EMC emission (standard)	DIN EN 13309, DIN EN ISO 14982
Operating voltage min./max.	4.50...5.50 V DC
Current consumption	Per signal max. 10 mA
Load resistance min.	20000 Ohm
Short-circuit resistance to GND	Yes
Short-circuit resistance to supply	Yes
Outputs (quantity, type)	-
Technology	Hall

MECHANICAL DATA

	J1...
Deflection	$\pm 15^\circ$
Actuation type	Multi axis
Service life, mechanical (cycles)	1500000

MATERIAL INFORMATION

	J1...
Housing material	PA12 GF30
Shaft material	Peek
Gaiter material	EPDM

ENVIRONMENTAL CONDITIONS

	J1...
Protection class, electronic	IP67 EN 60529
Operating temperature min./max.	-25...85 °C
Storage temperature min./max.	-40...85 °C

INSTALLATION

	J1...
Installation	-
Mounting type	-
Torque for fastening screws	0.30 Nm

CONNECTION

	J1...
Connector type	Micro-Fit 3.0 43025-1600 16-pin
Cable type	Lify-t
Cable length	0.30 m

Mini joystick J1

With optional Z-axis and top or bottom installation

ORDERING KEY

J1										Mini joystick
										Electronics
A	6									Analogue 0.5-4.5 V DC, ratiometric
H	6									Semi-redundant 0.5-4.5 V DC, ratiometric
R	6									Redundant 0.5-4.5 V DC, ratiometric
										Function X and Y-axis
			A	A						No detent
										Actuation
					0					Multiaxial actuation
										Installation type
						A				Top mounted, screw connection from above
						B				Installation from below, screw connection from below
						C				Top mounted, screw connection from above
										Handle version
							K	1		Handle without additional function
							T	S	1	Handle with nano push button (contact form: N.O.)
							Z	H	1	Handle with Z-axis, semi-redundant 0.5-4.5 V DC, ratiometric

Optional		
Handle	Different push button configurations 145NT...	Inlay colours and icons
		Namur wiring
	Module Z-axis single-channel	

Fingertip joystick JFT

Ergonomic, top mounted

PRODUCT CHARACTERISTICS

- Parallel arrangement is possible in the smallest of installation spaces
- Angled actuator with soft-touch finger rest for the best possible ergonomics
- Colour-coded actuator cap and customised symbol imprint for optimum user-friendliness
- High reliability and long service life thanks to contactless, shielded Hall-effect technology



The JFT is available with single and dual channel, ratiometric-analogue output signals. The detent or no-detent end positions allow a broad range of mobile machinery functions to be implemented.

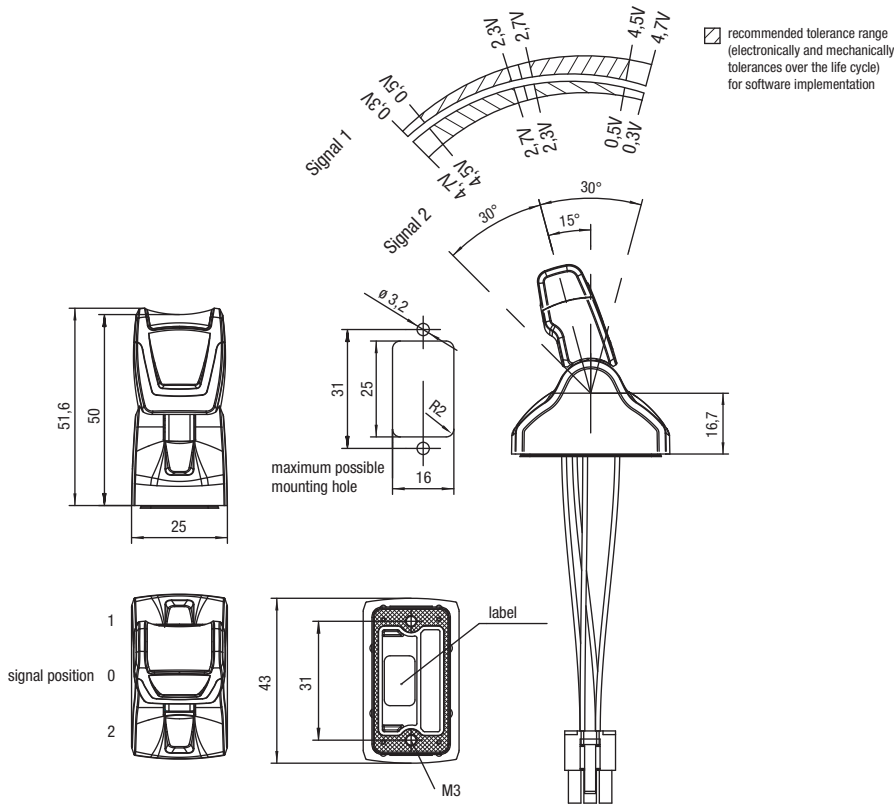
The JFT with its easy "on top" installation and unique ergonomic design is the optimum solution for controlling functions in forklifts, tractors and wheel loaders.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

Use our online configurator to specify your Finger Tip joystick
at www.elobau.com → Operator controls → Single axis joysticks

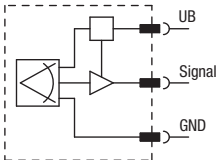


Fingertip joystick JFT Ergonomic, top mounted

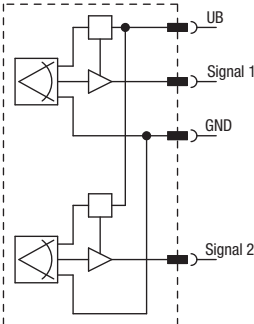


Standard

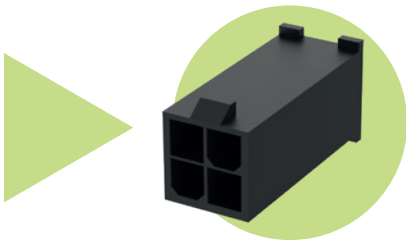
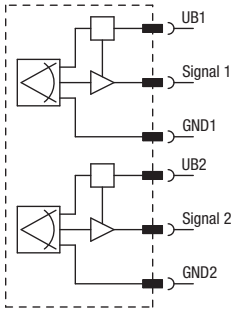
Analogue



Analogue semi-redundant



Analogue redundant

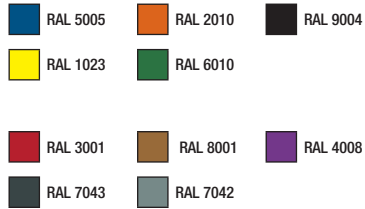


Suitable cable sets can be found on page 160.

Fingertip joystick JFT

Ergonomic, top mounted

Standard actuator colours



Icons



Icon no.

01

02

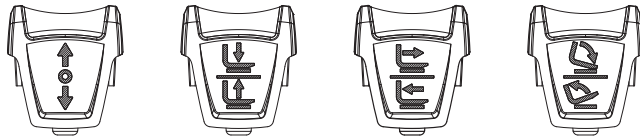
03

04

05

06

07



Icon no.

08

09

10

11

SINGLE AXIS JOYSTICKS

Fingertip joystick JFT Ergonomic, top mounted

ELECTRICAL DATA

	JFT...
Polarity reversal protection	Yes
Output signal min./max.	0.50...4.50 V DC
Output signal	Analogue
Output signal Centre position Zero position	2.50 V DC
EMC immunity (standard)	DIN EN 12895, DIN EN 13309, DIN EN ISO 14982, ISO 13766
EMC emission (standard)	DIN EN 12895, DIN EN 13309, DIN EN ISO 14982, ISO 13766
Operating voltage min./max.	4.50...5.50 V DC
Current consumption	Max. 15 mA
Load resistance min.	20000 Ohm
Short-circuit resistance to GND	Yes
Short-circuit resistance to supply	Yes
Technology	Hall

MECHANICAL DATA

	JFT...
Max. lever load with specified lever length	200 N at 35 mm
Deflection	± 30 °
Actuation type	Single axis
Service life, mechanical (cycles)	Detent 4 million Detent 5 million

MATERIAL INFORMATION

	JFT...
Housing material	PBT+ASA / PA12
Shaft material	GRIVORY GVX-5H

ORDERING KEY

JFT	Fingertip joystick
<p>To order this product, please use the elobau online configurator at www.elobau.com → Operator controls → Single axis joysticks</p>	

ENVIRONMENTAL CONDITIONS

	JFT...
Protection class, electronic	IP69K EN 60529
Operating temperature min./max.	-40...85 °C
Storage temperature min./max.	-40...105 °C

INSTALLATION

	JFT...
Installation	From above
Mounting type	Screwed from below

CONNECTION

	JFT...
Connector type	Mini-Fit Jr.
Cable type	Lify-t
Cable length	0.30 m

Fingertip joystick J3

Bottom mounted

PRODUCT CHARACTERISTICS

- Four actuation types: no-detent / detent, with friction brake or centre position interlock
- High reliability and long service life thanks to contactless Hall-effect and reed technology
- Available with different output signals: analogue, redundant, CAN bus connection (CANopen / SAE J1939) or with switching output
- Various handle options, available with up to one push button switch
- IP67 protection class of electronics, ideal for harsh environmental conditions
- Deflection $\pm 20^\circ$ or $\pm 25^\circ$

The single axis Hall-effect, J3 Fingertip joystick, is ideal for use in control panels and armrests of industrial trucks and municipal vehicles, as well as in agricultural and construction machinery thanks to its compact and robust design.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

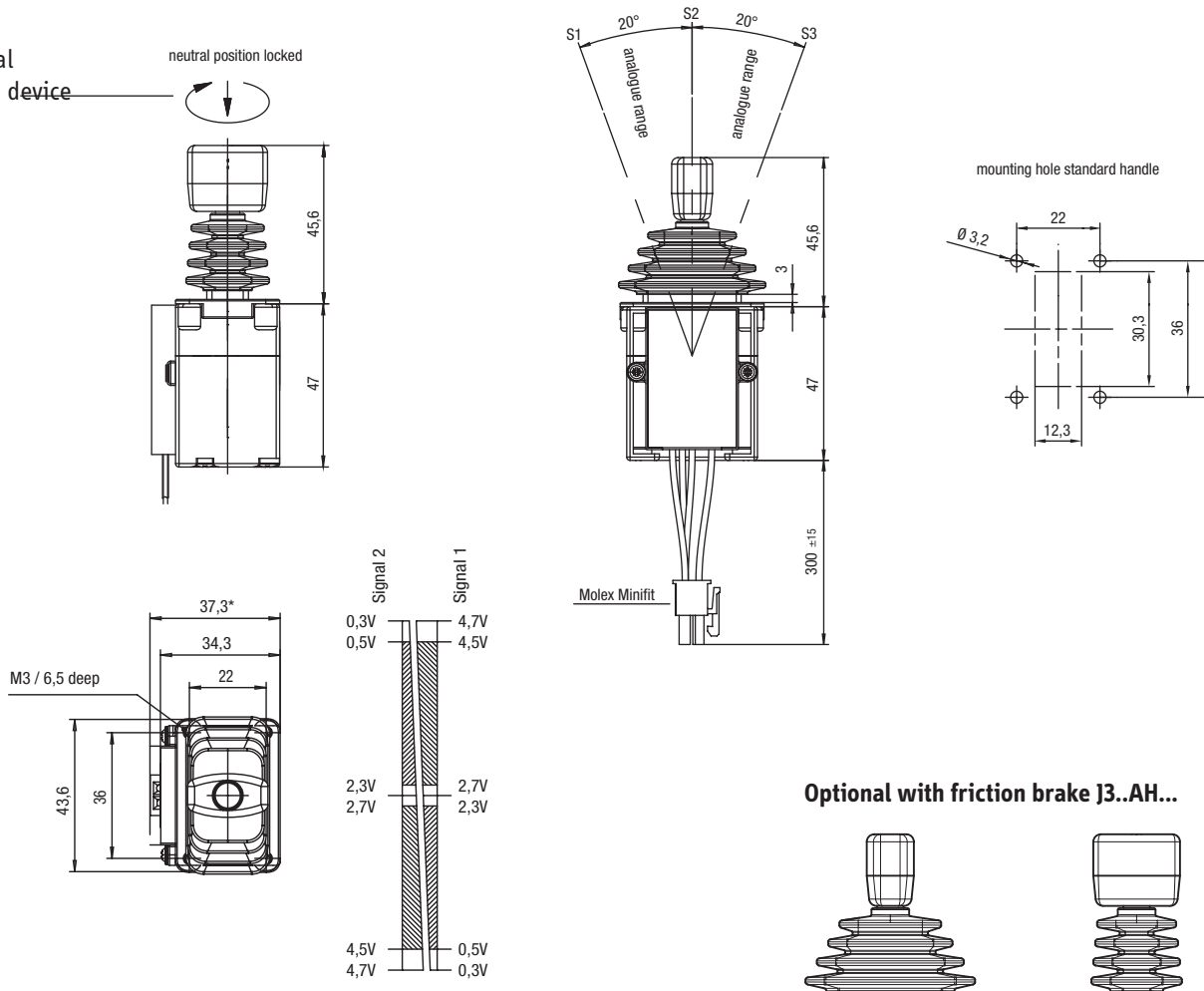


The suitable micro push button switch 145MT can be found on page 108, suitable cable sets can be found on page 160.

Fingertip joystick J3 Bottom mounted

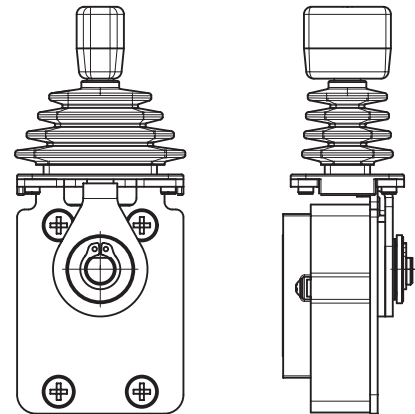
Optional locking device

neutral position locked



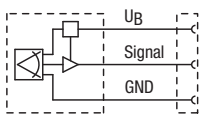
* panel thickness for execution Switching output / redundant / CAN
 ▨ = recommended tolerance range

Optional with friction brake J3..AH...

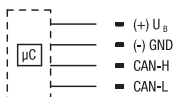


Standard

Analogue

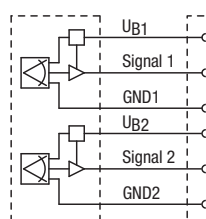


CAN

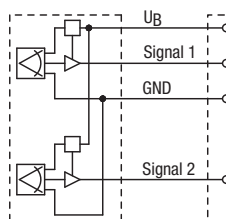


Optional

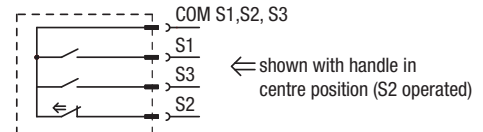
Redundant



Semi-redundant



Switching output



Fingertip joystick J3

Bottom mounted

ELECTRICAL DATA

	J3A1...	J3A6...	J3A7...	J3CJ...	J3C0...	J3D8...
Max. switching voltage						48.00 V DC
Max. switching current						0.30 A
Switching power max.						10 W
Switching power max.						10 VA
Contact form						N.O.
Polarity reversal protection	Yes					
Output signal min./max.	-	0.50...4.50 V DC	0.50...4.50 V DC			-
Output signal min./max.	4.00...20.00 mA					-
Output signal	Analogue					
Output signal Centre position Zero position	-	2.50 V DC	2.50 V DC			-
Output signal Centre position Zero position	12.00 mA					-
EMC immunity (standard)	DIN EN 13309, DIN EN ISO 14982, ISO 13766, DIN EN 12895					-
EMC emission (standard)	DIN EN 13309, DIN EN ISO 14982, ISO 13766, DIN EN 12895					-
Operating voltage min./ max.	10.00...30.00 V DC	4.50...5.50 V DC	10.00...30.00 V DC	9.00...36.00 V DC	9.00...36.00 V DC	-
Current consumption	at 12 V max. 18 mA	Max. 15 mA	at 12 V max. 15 mA	< 120 mA	< 120 mA	-
Load resistance min.	-	20000 Ohm	20000 Ohm			
Load resistance at 10V max.	250 Ohm					-
Load resistance at 30V max.	1250 Ohm					-
Short-circuit resistance to GND	No	Yes	No	Yes	Yes	No
Short-circuit resistance to supply	No	Yes	No	Yes	Yes	No
Outputs (quantity, type)	1				-	3
Technology	Hall					Reed
Protocol				J1939	CANopen	-
Node ID / Source Address				0x70	0x11	-
Transmitting cycle				100 ms	100 ms	-
Baud rate				250 kbit/s	250 kbit/s	-
Bus terminating resistor				No	No	-

MECHANICAL DATA

	J3A1...	J3A6...	J3A7...	J3CJ...	J3C0...	J3D8...
Max. lever load with speci- fied lever length	X-axis: 150N at 50mm / Y-axis: 100N at 50mm					
Deflection	± 20 °					
Actuation type	Single axis					
Service life, mechanical (cycles)	2000000					

Fingertip joystick J3 Bottom mounted

MATERIAL INFORMATION

	J3A1...	J3A6...	J3A7...	J3CJ...	J3C0...	J3D8...
Housing material	PBT					
Shaft material	PBT					
Gaiter material	CR 45					

ENVIRONMENTAL CONDITIONS

	J3A1...	J3A6...	J3A7...	J3CJ...	J3C0...	J3D8...
Protection class, electronic	IP67 EN 60529					
Operating temperature range Min./max.	-25...85 °C					
Storage temperature Min./max.	-40...85 °C					

INSTALLATION

	J3A1...	J3A6...	J3A7...	J3CJ...	J3C0...	J3D8...
Installation	From below					
Mounting type	Screwed from above					

CONNECTION

	J3A1...	J3A6...	J3A7...	J3CJ...	J3C0...	J3D8...
Connector type	Mini-Fit Jr.					
Cable length	0.30 m					

Fingertip joystick J3

Bottom mounted

ORDERING KEY

J3						Single axis joystick
						Electronics
	A	1				Analogue 4-20 mA DC
	A	6				Analogue 0.5-4.5 V DC, ratiometric
	A	7				Analogue 0.5-4.5 V DC
	R	1				Redundant 4-20 mA DC
	R	6				Redundant 0.5-4.5 V DC, ratiometric
	R	7				Redundant 0.5-4.5 V DC
	C	0				CANopen
	C	J				CAN J1939
						Function
			A	A		No detent
			A	B		Detent
						Locking device
					0	Centre position cannot be locked mechanically
						Handle version
					A	Standard handle

Optional		
Electronics	Semi-redundant electronics module	
	Electronics module switching output	
	CAN (CANopen/J1939)	Baud rate
		Node ID (CANopen): tbd.
		Source Address (J1939): 0x70...0x79
Mechanics	Actuation type	No detent 25°
		No detent 25°
		Front detent only 20°/25°
		Friction brake, J3 handle on hand-throttle module
	Centre position mechanically lockable	
	Twist lock	
Handle	Handle J2 with up to 1 push button	Various push button configurations s. 145MT...

Robust joystick J7 / JS

Bottom mounted

PRODUCT CHARACTERISTICS

- Developed for adverse environmental conditions, IP67 protection class (electronics)
- For forces up to 1000 N in x and y direction (with 112 mm lever length)
- Space-saving design allows ergonomic arrangement in armrests
- High reliability thanks to shielded, contactless Hall technology
- Friction brake, overpressure points and no-detent actuation enables the operation of various functions

Robust joystick J7 / JS was developed primarily for installation in the armrests of mobile machinery. The JS single axis joystick is a lightweight variant of the J7 joystick. The design combines a high level of robustness, safety and reliability in a compact space. It is ideally suited for high load and high use applications.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

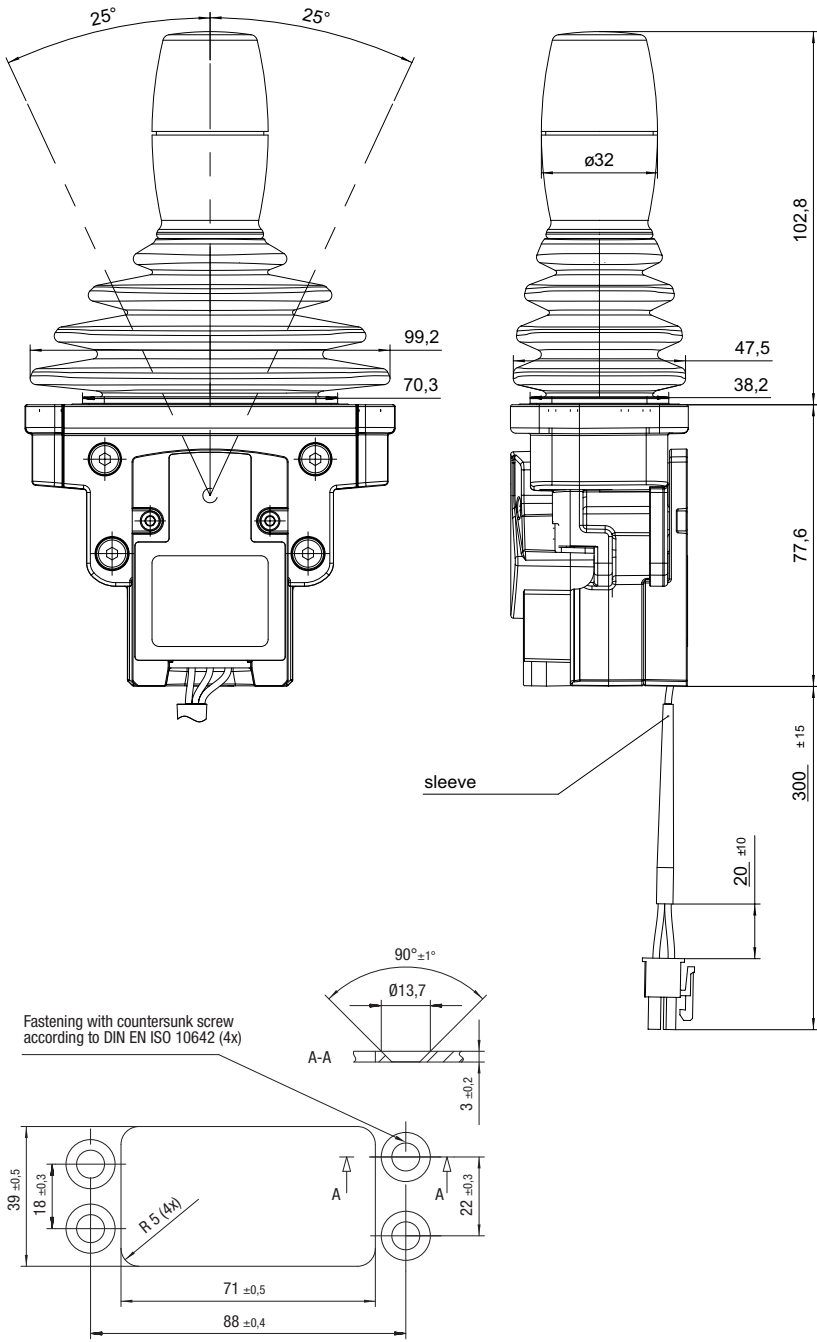


Use our online configurator to specify your J7/JS
at www.elobau.com → Operator controls → Single axis joysticks

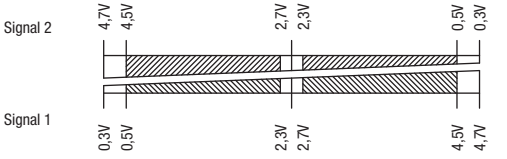
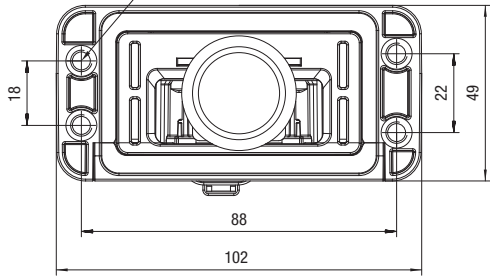


SINGLE AXIS JOYSTICKS

Robust joystick J7 / JS Bottom mounted



view without gaiter
(4x) M6x16 tief / deep / prof.



▨ = recommended tolerance range (electrical and mechanical tolerances over the life cycle) for software implementation



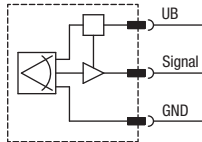
Suitable micro push button switch 145MG can be found on page 104,
suitable cable sets can be found on page 160.

Robust joystick J7 / JS

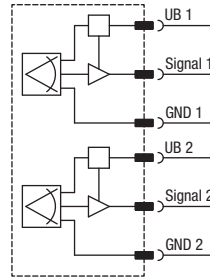
Bottom mounted

Standard

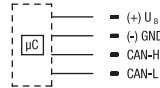
Analogue



Analogue redundant

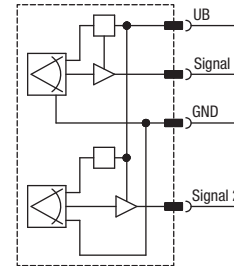


CAN



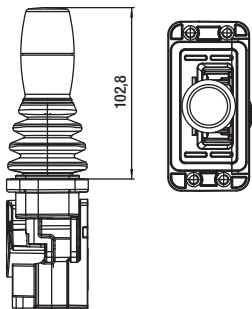
Optional

Analogue semi-redundant



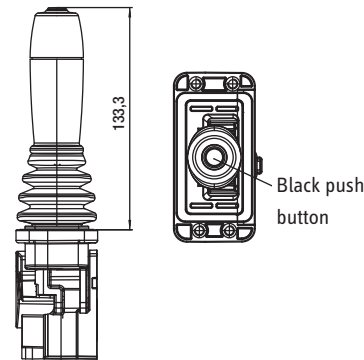
Short handle

Without micro push button switch



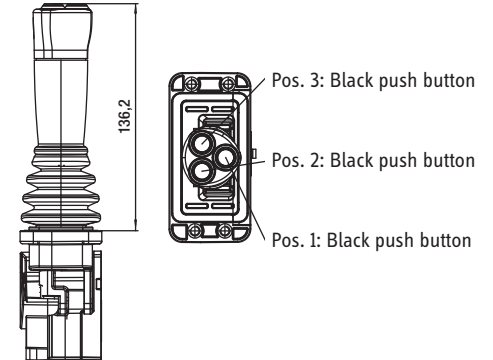
Long handle

With micro push button switch



3 push buttons handle long

with max. 3 micro push buttons



Robust joystick JS



The JS single axis joystick is a lightweight variant of elobau's J7 joystick that was developed to meet the challenges of future installation situations in mobile machinery.

The use of fibreglass-reinforced polymers makes the JS joystick extremely robust yet very lightweight at only 500 grams.

The weight saving of 40% is supported by a slim design which simplifies the design of control panels.

Use our online configurator to
specify your JS
at www.elobau.com →
Operator controls → Joystick grips



SINGLE AXIS JOYSTICKS

Robust joystick J7 / JS Bottom mounted

ELECTRICAL DATA

	J7A6... / JSA6...	J7CJ... / JSCJ...	J7CO... / JSCO...	J7H6... / JSH6...	J7R6... / J7S6...
Polarity reversal protection	Yes				
Output signal min./max.	0.50...4.50 V DC	-	-	0.50...4.50 V DC	0.50...4.50 V DC
Output signal	Analogue	-	-	Analogue	Analogue
Output signal - centre position - zero position	2.50 V DC	-	-	2.50 V DC	2.50 V DC
Output polarity	-			Opposite	Opposite
Operating voltage min./max.	4.50...5.50 V DC	9.00...36.00 V DC	9.00...36.00 V DC	4.50...5.50 V DC	4.50...5.50 V DC
Current consumption	Max. 15 mA	< 120 mA	< 120 mA	Per signal max. 15 mA	Per signal max. 15 mA
Load resistance min.	20000 Ohm	-	-	20000 Ohm	20000 Ohm
Short-circuit resistance to GND	Yes				
Short-circuit resistance to supply	Yes				
Technology	Hall				
Protocol	-	J1939	CANopen	-	-
Node ID / Source Address	-	0x70	0x11	-	-
Transmitting cycle	-	100 ms	100 ms	-	-
Baud rate	-	250 kbit/s	250 kbit/s	-	-
Bus terminating resistor	-	No	No	-	-

MECHANICAL DATA

	J7A6... / JSA6...	J7CJ... / JSCJ...	J7CO... / JSCO...	J7H6... / JSH6...	J7R6... / J7S6...
Max. lever load with specified lever length	1000N at 112mm				
Deflection	± 25 °				
Service life, mechanical (cycles)	4000000				

MATERIAL INFORMATION

	J7A6... / JSA6...	J7CJ... / JSCJ...	J7CO... / JSCO...	J7H6... / JSH6...	J7R6... / J7S6...
Gaiter material	CR				

ENVIRONMENTAL CONDITIONS

	J7A6... / JSA6...	J7CJ... / JSCJ...	J7CO... / JSCO...	J7H6... / JSH6...	J7R6... / J7S6...
Protection class, electronic	IP67 EN 60529				
Operating temperature min./max.	-25...85 °C				
Storage temperature min./max.	-40...85 °C				

Robust joystick J7 / JS

Bottom mounted

INSTALLATION

	J7A6... / JSA6...	J7CJ... / JSCJ...	J7CO... / JSCO...	J7H6... / JSH6...	J7R6... / J7S6...
Installation	From below				
Mounting type	Screwed from above				

CONNECTION

	J7A6... / JSA6...	J7CJ... / JSCJ...	J7CO... / JSCO...	J7H6... / JSH6...	J7R6... / J7S6...
Connector type	Mini-Fit Jr.				
Cable type	FLRY				
Cable length	0.30 m				

Robust joystick J7 / JS Bottom mounted

ORDERING KEY

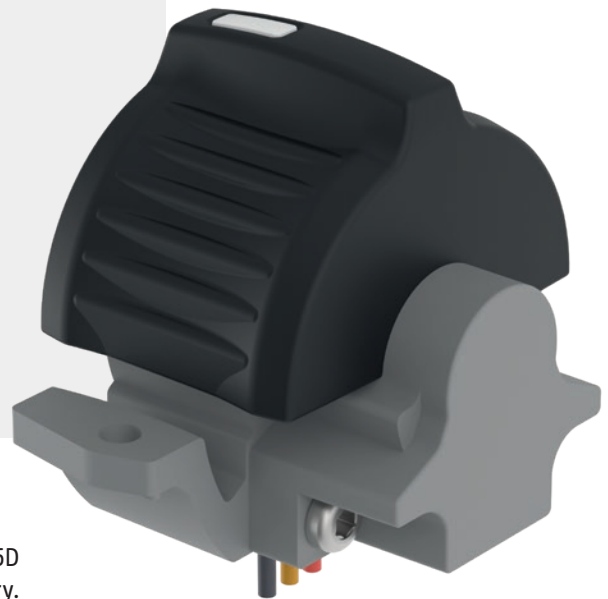
J7... / JS...	Robust joystick
	To order this product, please use the elobau online configurator at www.elobau.com → Operator controls → Single axis joysticks

Thumbwheel 175D

Ergonomic actuation, illuminated

PRODUCT CHARACTERISTICS

- Optional LED illumination of various colours
- Ergonomically adaptable by means of various actuator types
- High reliability thanks to shielded, contactless Hall technology
- IP67 electronics protection class
- Deflection: $\pm 10^\circ$ or $\pm 30^\circ$ no-detent, $\pm 20^\circ$ detent
- For wiring and signal form, select between ratiometric analogue, semi-redundant analogue and redundant analogue or digital



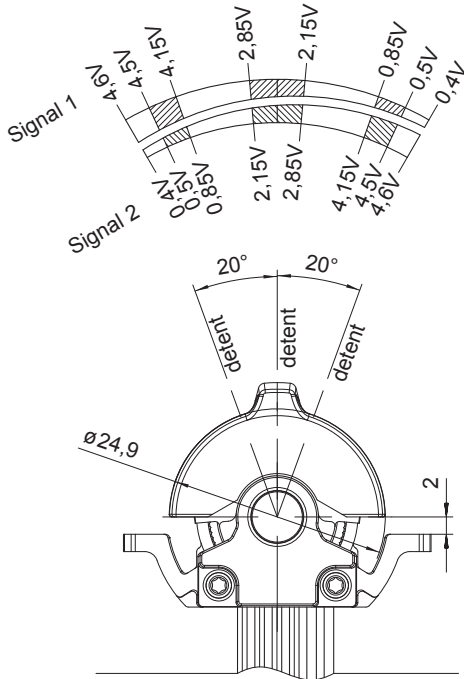
Due to its flat, miniature design, illuminated thumbwheel switch 175D is ideal for use in joystick grips and the keypads of mobile machinery.

The thumbwheel can be mounted in our joystick grips 361G / 362G and 341G / 342G, for the control of operational functions, such as those on wheel loaders.

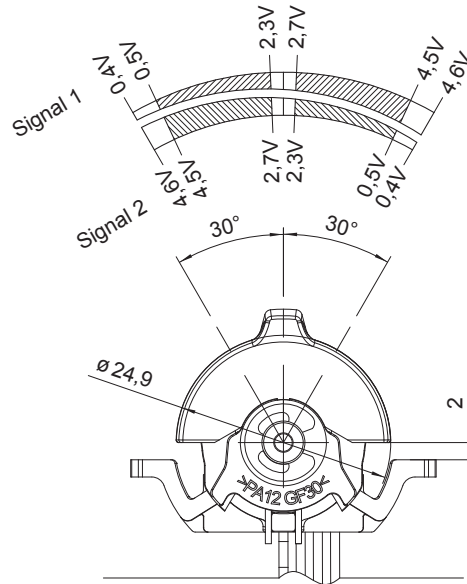
Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

Thumbwheel 175D Ergonomic actuation, illuminated

Detent

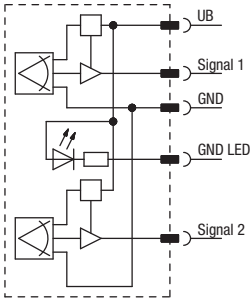


No detent



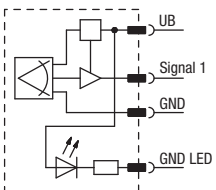
Standard

Analogue semi-redundant

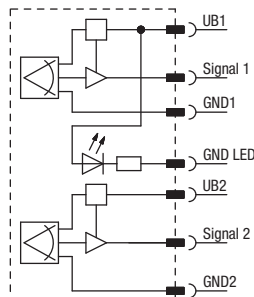


Optional

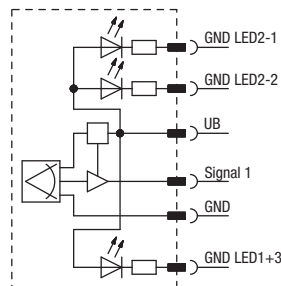
Analogue



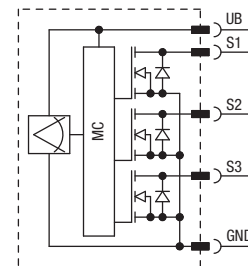
Analogue redundant



Analogue multi-colour



Switching output



Thumbwheel 175D

Ergonomic actuation, illuminated

Standard

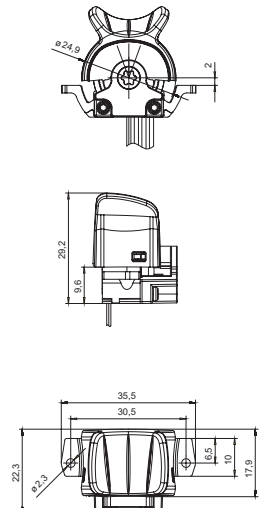
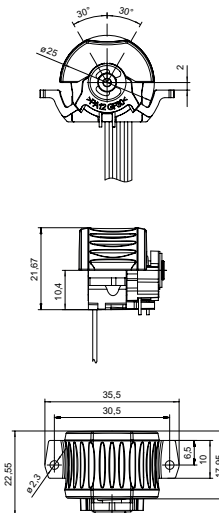
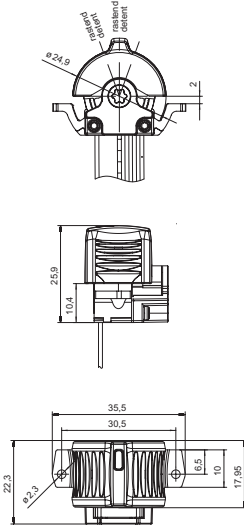
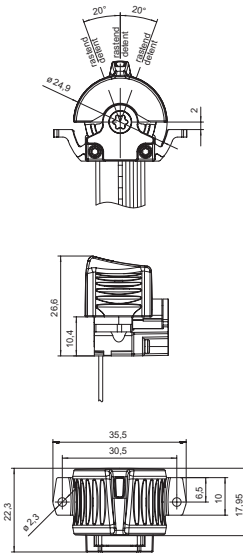
Optional

Actuator type A

Actuator type B

Actuator type C

Actuator type D



Illumination

Illumination is generally provided by 3 LEDs. An optional multi-colour LED (red-green) is available for the centre position, which maintains its illumination colour until a signal position change takes place. Optionally also available without illumination.



Actuator colors Standard

- RAL 2010, signal orange
- RAL 9004, signal black

Illumination colours LED

- White

Actuator colors Optional

- RAL 7043, traffic grey
- RAL 3001, signal red

Illumination colours LED Optional

- Red
- Orange
- Green

Red/green for multi-colour LEDs

Thumbwheel 175D Ergonomic actuation, illuminated

ELECTRICAL DATA

	175DD...	175DR...	175DT...
Max. switching voltage	24.00 V DC	-	-
Max. switching current	0.10 A	-	-
Polarity reversal protection	No		
Output signal min./max.	-	0.50...4.50 V DC	0.50...4.50 V DC
Output signal	Open drain	Analogue	Analogue
Output signal Centre position Zero position	-	2.50 V	2.50 V
Output polarity	-	Opposite	Opposite
Operating voltage Min./max.	4.50...5.50 V DC		
Current consumption	Per signal max. 15 mA		
Load resistance min.	-	20000 Ohm	20000 Ohm
Short-circuit resistance To GND	Yes		
Short-circuit resistance To supply	Yes		
Technology	Hall		

MECHANICAL DATA

	175DD...	175DR...	175DT...
Deflection	30 °	20 °	30 °
Service life, mechanical (cycles)	2000000		

ENVIRONMENTAL CONDITIONS

	175DD...	175DR...	175DT...
Protection class, electronic	IP67 EN 60529		
Operating temperature min./max.	-25...85 °C		
Storage temperature min./ max.	-40...85 °C		
Shock resistance (stan- dard)	Frequency 50Hz - 100Hz - 50Hz, acceleration 5g, amplitude 15mm peak		

INSTALLATION

	175DD...	175DR...	175DT...
Installation	from below		

Thumbwheel 175D

Ergonomic actuation, illuminated

CONNECTION

	175DD...	175DR...	175DT...
Cable length		0.75 m	

ORDERING KEY

175D									Thumbwheel
									Actuation type detent, +/-20°
	R	1	B	1	S	W	0	9	Actuator type B, LED colour white, cap colour black
	R	1	B	1	0	R	0	3	Actuator type B, LED colour white, cap colour orange
	R	1	A	1	S	W	0	6	Actuator type A, LED colour white, cap colour black
	R	1	A	1	0	R	0	9	Actuator type A, LED colour white, cap colour orange
									Actuation type no detent, +/-30°
	T	1	B	1	S	W	3	0	Actuator type B, LED colour white, cap colour black
	T	1	B	1	0	R	0	5	Actuator type B, LED colour white, cap colour orange
	T	1	A	1	S	W	4	1	Actuator type A, LED colour white, cap colour black
	T	1	A	1	0	R	1	6	Actuator type A, LED colour white, cap colour orange

OPTIONS

Optional	
Electronics	Analogue single-channel
	Analogue redundant
	Analogue multi-colour LED
	Switching output
	Various LED illumination colours
Mechanics	Actuation type no detent, +/-10°
Handle	Actuator type C, RAL 9004, signal black
	Actuator type D, RAL 9004, signal black
	Actuator type A / B, RAL 7043, traffic grey
	Actuator type A / B, RAL 3001, signal red

Thumbwheel 151DT01

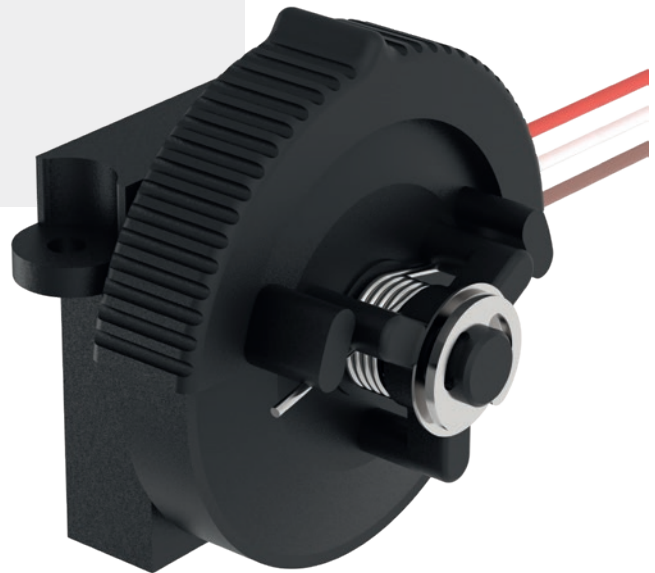
Robust, compact design

PRODUCT CHARACTERISTICS

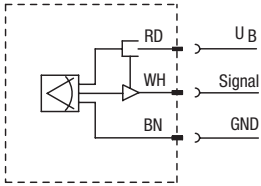
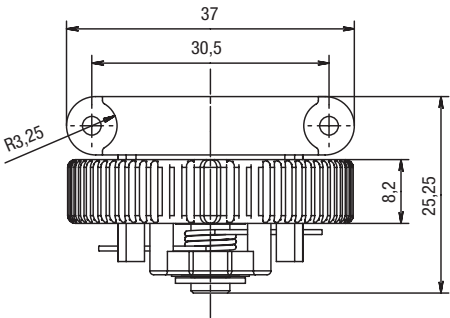
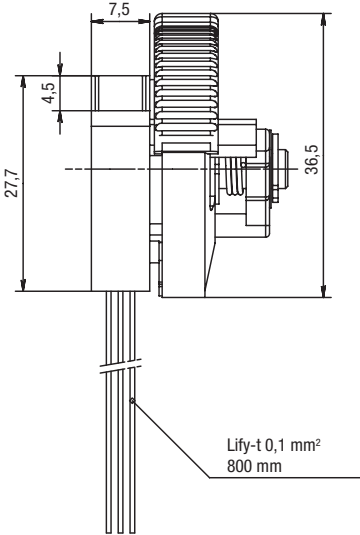
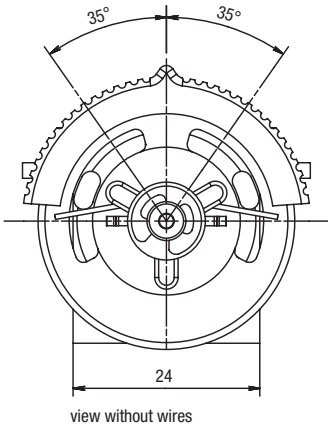
- High reliability and long lifetime thanks to contactless hall technology
- Actuation type: No-detent
- Output signal: Ratiometric analogue
- High temperature range from -25 °C to +85 °C
- IP67 electronics protection class

Thumbwheel 151DT01 is used in joystick grips and control panels of mobile machinery. It can also be installed in our Joystick grip 351G and used to control various analogue functions of e.g. construction machinery.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.



Thumbwheel 151DT01
Robust, compact design



Thumbwheel 151DT01

Robust, compact design

ELECTRICAL DATA

	151DT01
Polarity reversal protection	No
Output signal min./max.	0.50...4.50 V DC
Output signal	Analogue
Output polarity	Opposite
Operating voltage min./max.	4.50...5.50 V DC
Current consumption	Per signal max. 15 mA
Load resistance min.	20000 Ohm
Short-circuit resistance to GND	Yes
Short-circuit resistance to supply	Yes
Technology	Hall
Output signal - centre position - zero position	2.50 V

MECHANICAL DATA

	151DT01
Lever length	15.0 mm
Deflection	±35 °
Service life, mechanical (cycles)	1000000

ENVIRONMENTAL CONDITIONS

	151DT01
Protection class, electronic	IP67 EN 60529
Operating temperature min./max.	-25...85 °C
Storage temperature min./max.	-25...85 °C

INSTALLATION

	151DT01
Installation	From below

CONNECTION

	151DT01
Cable length	0.80 m

ORDERING KEY

151DT01	Thumbwheel, no detent
---------	-----------------------

Thumbwheel 151DT01
Robust, compact design

Push button 145

With AMP Superseal/Deutsch connector and M30 thread

PRODUCT CHARACTERISTICS

- Long service life thanks to the magnetic actuation principle
- Wear-free reed contacts for low switching currents
- Developed for harsh operating conditions with internal electronics sealed to IP67 protection class
- Various push buttons colours and symbols are available
- Various connector types available for a wide range of uses

This robust push button switch is designed for applications that are exposed to adverse environmental conditions. The M30 push button switch is ideally suited for use in the mobile machinery sector, for example for controlling hydraulic functions.

The switching element, which is completely separated from the mechanics resists dust, dirt and moisture, thanks to its IP67 protection class.

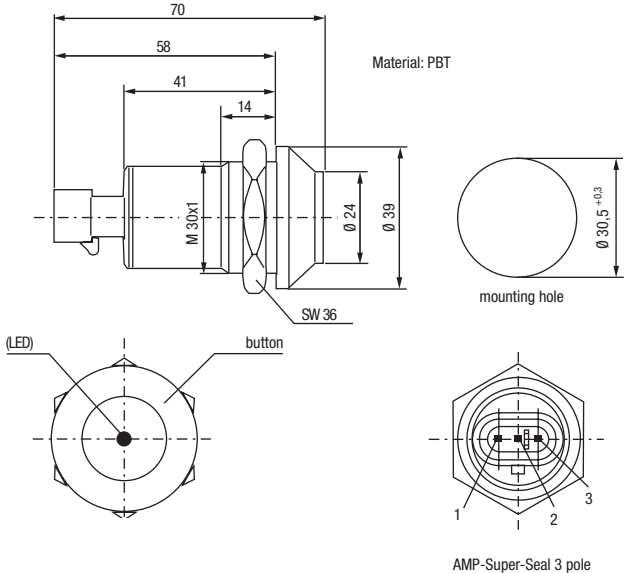
Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.



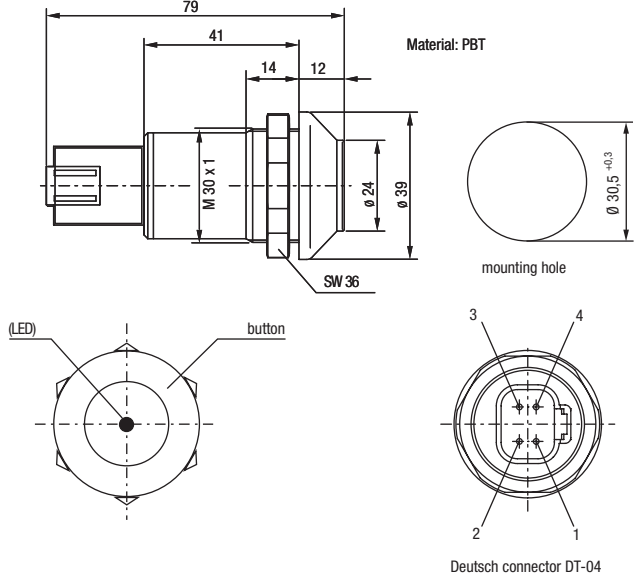
PUSH BUTTON SWITCH

Push button 145 With AMP Superseal/Deutsch connector and M30 thread

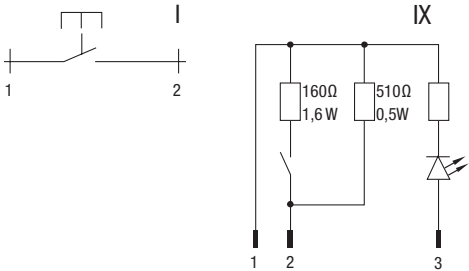
145...AB with Superseal connector



145...AE with Deutsch connector



Standard



Optional



Other circuitry available on request.



Suitable cable sets can be found on page 163 and page 159.

Push button 145

With AMP Superseal/Deutsch connector and M30 thread

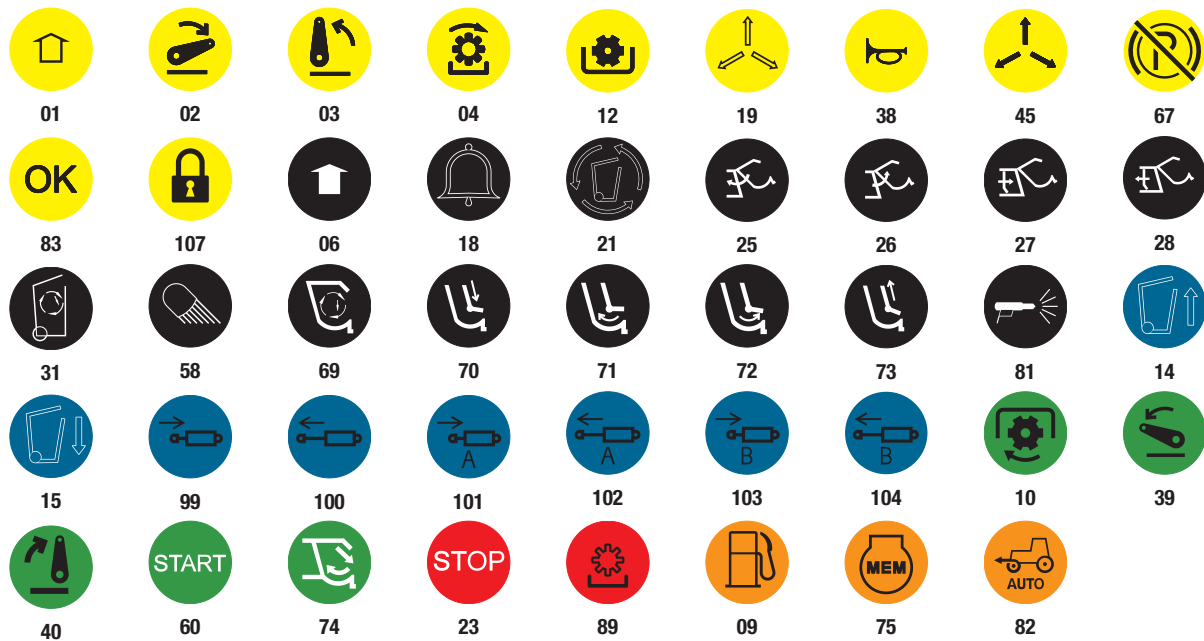
Actuator colors Standard
 RAL 1018
 RAL 3000
 RAL 6017
 Black

Illumination colours LED Standard
 Red

Actuator colors Optional
 RAL 2003
 RAL 5019

Illumination colours LED Optional
 Green
 Blue
 Yellow
 White

Optional icons for push button 145 ... AB



Additional icons according to DIN ISO 7000:2008-12 available on request.

Push button 145 With AMP Superseal/Deutsch connector and M30 thread

ELECTRICAL DATA

	145...AB.	145...AE.
Max. switching voltage	48V DC	
Switching power max.	10W	
Switching power max.	10VA	

MECHANICAL DATA

	145...AB.	145...AE.
Service life, mechanical (cycles)	2000000	

ENVIRONMENTAL CONDITIONS

	145...AB.	145...AE.
Protection class, electronic	IP67 EN 60529	
Operating temperature min./max.	-20...100 °C	
Storage temperature min./max.	-40...100 °C	

INSTALLATION

	145...AB.	145...AE.
Installation	From above	
Mounting type	Screwed	
Thread	M30	

CONNECTION

	145...AB.	145...AE.
Connector type	AMP Superseal 3-pin	Deutsch DT-04

Push button 145

With AMP Superseal/Deutsch connector and M30 thread

ORDERING KEY

145										Push buttons	
										Circuit diagram	
0	0	0	A	B						Circuit I, N.O., with AMP Superseal connector	
1	0	5	A	B						Circuit IX, LED colour red, Namur with AMP Superseal connector	
0	0	0	A	E						Circuit I, N.O., with Deutsch connector	
1	0	5	A	E						Circuit IX, LED colour red, Namur with Deutsch connector	
										Colour	
										6 0	Black
										2 1	Yellow
										1 0	Green
										4 0	Red

SW36 nut included with delivery

Nano push button switch 145NT

With M12 thread

PRODUCT CHARACTERISTICS

- Compact design with maximum switching reliability
- Tactile behaviour over the entire service life
- Patented design principle with encapsulated switch housing, IP67 protection class
- Function and night illumination
- Shock and vibration resistant in accordance with DIN IEC 68 Part 2
- Service life > 2 million operating cycles
- Optionally available with NAMUR wiring

The compact design of the nano push buttons ensures they are ideal for installation in many applications such as joystick grips and mobile machinery keypads.

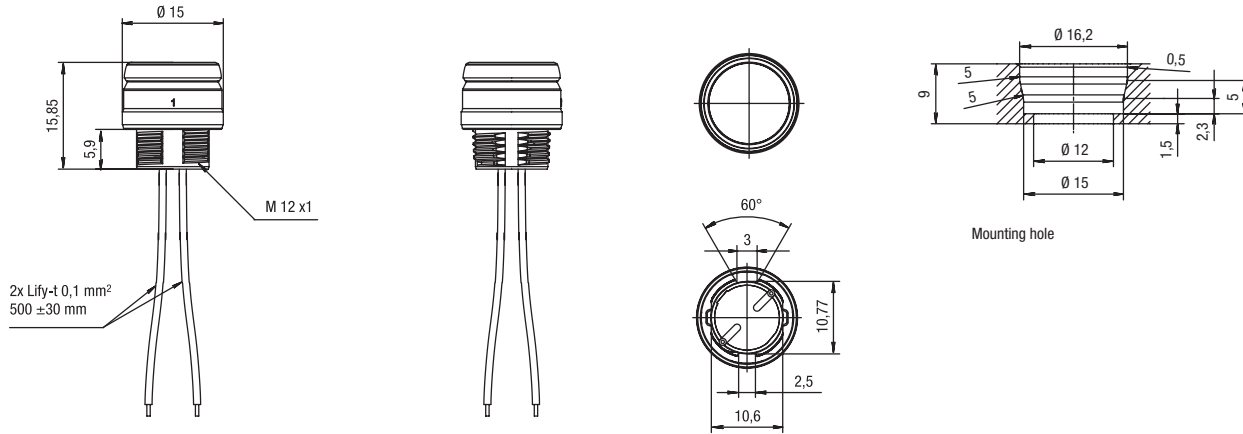
The design features of the 145NT push button allows for maximum functionality in a compact space.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

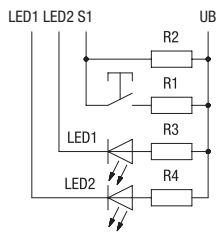


PUSH BUTTON SWITCH

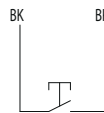
Nano push button switch 145NT With M12 thread



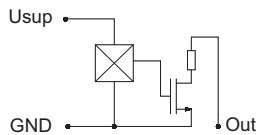
Reed NAMUR circuit with LED



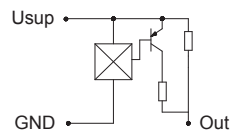
Reed N.O. circuit







Hall switch open drain circuit








Optional: Hall switch high-side circuit



Actuator colors	 RAL 5005	 RAL 9004
	 RAL 6024	
	 RAL 2003	

Illumination colours LED	 Green
	 White

Actuator colors Optional	 RAL 3020	 RAL 8001
	 RAL 7015	 RAL 1023
	 RAL 7042	

Illumination colours LED Optional	 Red	 Blue
	 Yellow	

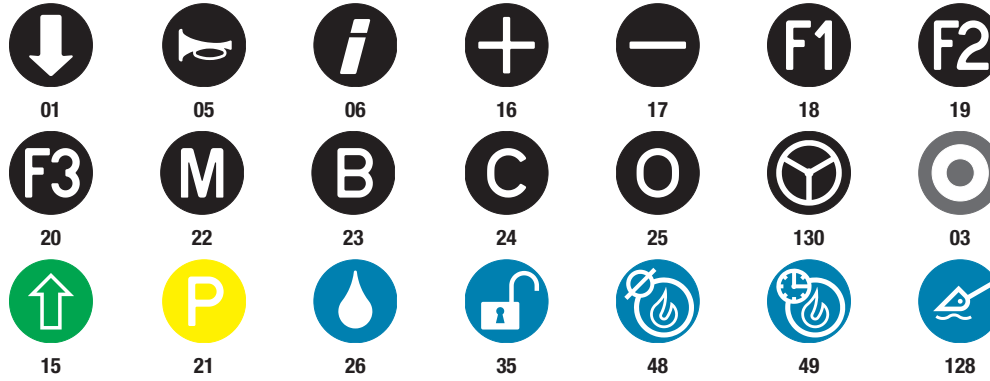
Additional versions are available on request. The push button caps can optionally be printed with symbols. (symbol Ø max. 10 mm).

Nano push button switch 145NT

With M12 thread

Optional icons for push button 145 NT

Icon colour: white translucent



Icon colour: red translucent



Icon colour: black



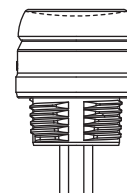
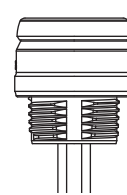
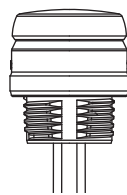
Additional symbols in accordance with DIN ISO 7000:2008-12 are available on request.

**Optional:
2K nano push button**

Convex push button

Flat push button

Concave push button



**Optional icon for
2K push button**



01



02



03



04



05

**Optional
actuator colours**



PUSH BUTTON SWITCH

Nano push button switch 145NT With M12 thread

ELECTRICAL DATA

	145NTG...	145NTH...
Max. switching voltage	30:00 V DC	
Max. switching current	0.30 A	
Switching power max.	3 W	
Switching power max.	3 VA	-
Contact form	N.O.	-
Operating voltage min. (Usup)	-	4.5 V DC
Operating voltage max. (Usup)	-	5.5 V DC
Max. current consumption	-	2.5 mA
Max. voltage drop with actuated button (Iout < 20 mA)	-	1.20V
Max. switching current (Iout)	-	0.20 A
Max. switching voltage (Uout)	-	16V DC

MECHANICAL DATA

	145NTG...	145NTH...
Service life, mechanical (cycles)	2000000	

ENVIRONMENTAL CONDITIONS

	145NTG...	145NTH...
Protection class, electronic	IP67 EN 60529	
Operating temperature min./max.	-40...85 °C	
Storage temperature min./max.	-40...85 °C	

INSTALLATION

	145NTG...	145NTH...
Installation	From above	
Mounting type	Screwed	
Thread	M12	

CONNECTION

	145NTG...	145NTH...
Cable length	0.50 m	

Nano push button switch 145NT

With M12 thread

ORDERING KEY

145 NT								Nano push button switch
	G	0	0	B	L	1	2	Reed N.O. circuit, inlay colour blue
	G	0	0	G	N	1	3	Reed N.O. circuit, inlay colour green
	G	0	0	S	W	5	2	Reed N.O. circuit, inlay colour black
	G	0	0	0	R	3	3	Reed N.O. circuit, inlay colour orange
	G	2	1	B	L			Reed-NAMUR circuit with LED 1 white, LED 2 green, inlay colour blue
	G	2	1	G	N			Reed-NAMUR circuit with LED 1 white, LED 2 green, inlay colour green
	G	2	1	S	W			Reed-NAMUR circuit with LED 1 white, LED 2 green, inlay colour black
	G	2	1	0	R			Reed-NAMUR circuit with LED 1 white, LED 2 green, inlay colour orange
	H	0	0	B	L			Hall switch open drain circuit, inlay colour blue
	H	0	0	G	N			Hall switch open drain circuit, inlay colour green
	H	0	0	S	W			Hall switch open drain circuit, inlay colour black
	H	0	0	0	R			Hall switch open drain circuit, inlay colour orange

Note: Please specify the power supply of the LED (5 V, 12 V, 24 V) when ordering.

Please select the mounting type and order separately:



Knurled screw type no. 856107

or



Nut SW 17 type no. 871840

PUSH BUTTON SWITCH

Nano push button switch 145NT
With M12 thread

Micro push button switch 145MR / MG

With night and function illumination

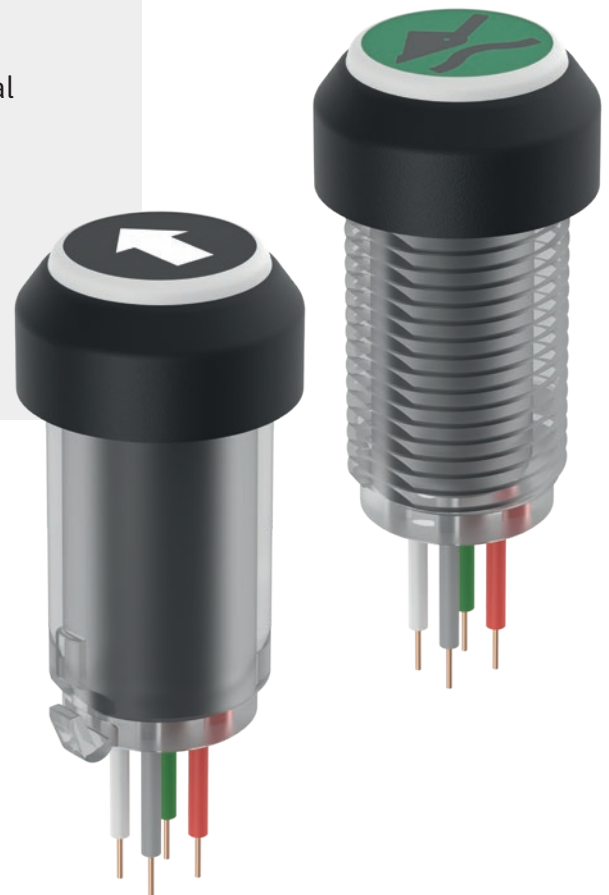
PRODUCT CHARACTERISTICS

- 2 illumination colours can be controlled
- Function and night illumination
- Long service life ensured through magnetic actuation
- Various push buttons colours and symbols are available
- Wear-free reed contacts for low switching currents
- Developed for harsh operating conditions with internal electronics sealed to IP67 protection class
- With NAMUR wiring
- Standard without pressure point with smooth-running spring

Micro push button switch 145MR/MG with function and night illumination is equipped with either practical snap-in mounting or M12 thread with locknut. The push button switch is designed for applications in which only low currents flow and a mechanical switch cannot therefore be used.

Micro push button switch 145MR/MG, supported by the two-colour illumination function, is ideally suited for use in joystick grips or armrests. The switching element, which is completely separated from the mechanics resists dust, dirt and moisture, thanks to its IP67 protection class.

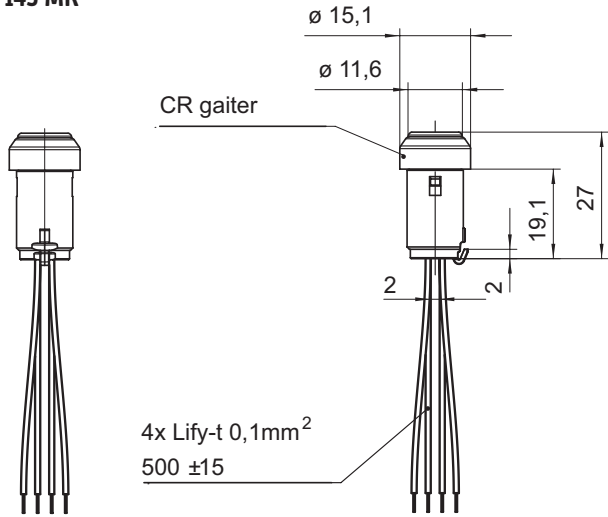
Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.



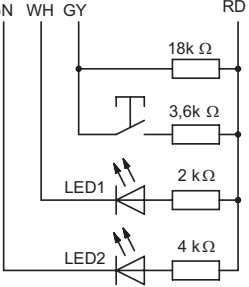
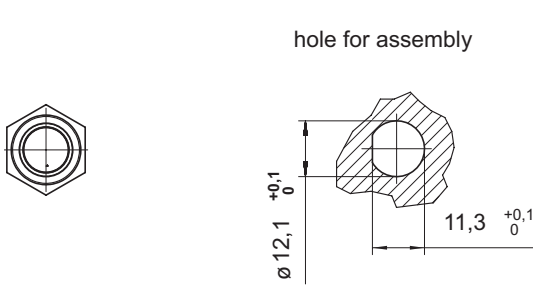
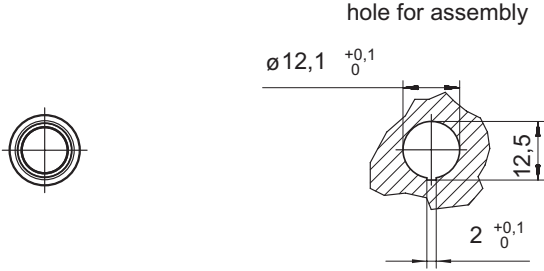
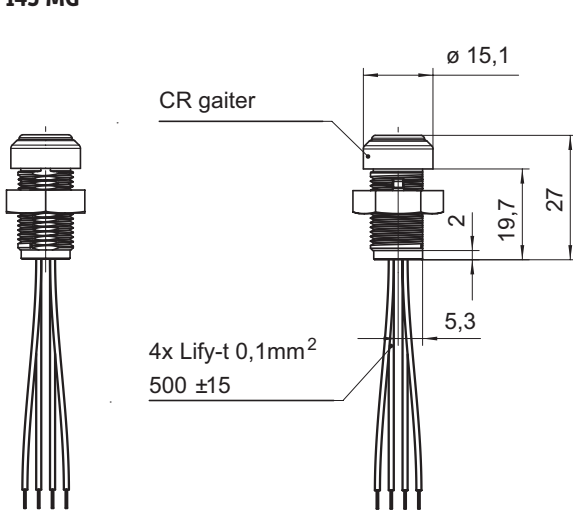
PUSH BUTTON SWITCH

Micro push button switch 145MR/MG With night and function illumination

145 MR



145 MG



LED1 function illumination
LED2 night illumination

- Actuator colors**
- RAL 9004
 - RAL 6024
 - RAL 3020
 - RAL 5005

- Night and function illumination**
- Green
 - White

- Actuator colors Optional**
- RAL 2009
 - RAL 7042

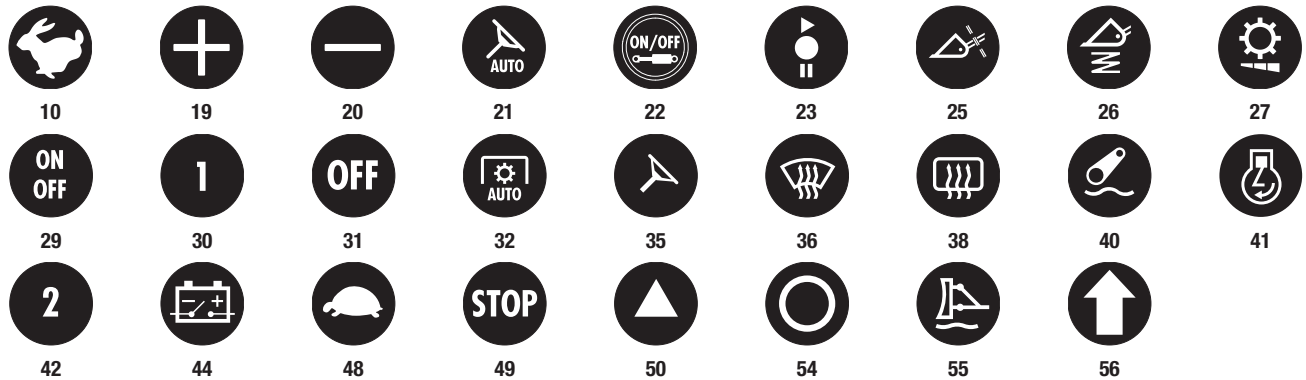
- Night and function illumination optional**
- Red
 - Blue
 - Yellow

Micro push button switch 145MR / MG

With night and function illumination

Icons for push button 145 MR/MG

Icon colour: translucent



Icon colour: black



Additional symbols in accordance with DIN ISO 7000:2008-12 are available on request.

Additional versions are available on request. The push button caps can optionally be printed with symbols.

ELECTRICAL DATA

	145MR...	145MG...
Max. switching voltage	24.00 V DC	
Max. switching current	0.10 A	
Switching power max.	1 W	
Switching power max.	1 VA	

MECHANICAL DATA

	145MR...	145MG...
Service life, mechanical (cycles)	2000000	

ENVIRONMENTAL CONDITIONS

	145MR...	145MG...
Protection class, electronic	IP67 EN 60529	
Operating temperature min./max.	-40...85 °C	
Storage temperature min./max.	-40...85 °C	

PUSH BUTTON SWITCH

Micro push button switch 145MR/MG With night and function illumination

INSTALLATION

	145MR...	145MG...
Installation	From above	From above
Mounting type	Latching detent	Screwed
Thread	-	M12

CONNECTION

	145MR...	145MG...
Cable length	0.50 m	

ORDERING KEY

145 MG								Micro push button switch with M12
145 MR								Micro push button switch with latching detent
								Connection type
	0							Strand output, 500mm
								Contact form
		A						N.O. (NAMUR)
								Colour of LED 1
			W					White
								Colour of LED 2
				G				Green
								Push button colour
					1	9	0	Black
					1	9	3	Red
					1	9	4	Green
					1	9	5	Blue

SW17 nut included with delivery

Micro push button switch 145MT..A / ..D

With M12 thread or latching detent

PRODUCT CHARACTERISTICS

- Long service life thanks to the magnetic actuation principle with reed contacts
- Various push buttons colours and symbols are available
- Wear-free reed contacts for low switching currents
- Developed for harsh operating conditions with internal electronics sealed to IP67 protection class
- Standard with pressure point

Micro push button switch 145MT..A is equipped with a thread and locknut for simple top mounting. Micro push button switch 145MT..D is equipped with a latching detent. These micro push button switches are designed for applications in which only low currents flow and therefore a mechanical switch cannot be used.

This micro push button switch 145MT is ideal for control panels or joystick grips in mobile machinery. The switching element, which is completely separated from the mechanics resists dust, dirt and moisture, thanks to its IP67 protection class.

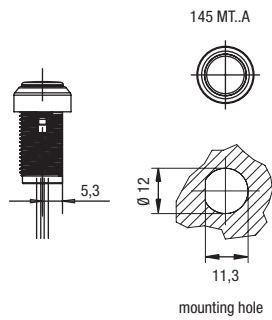
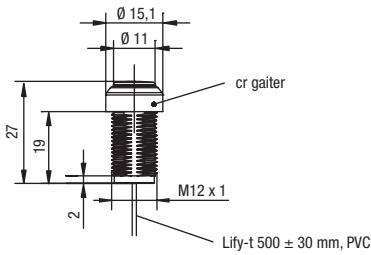
Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.



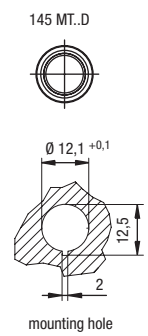
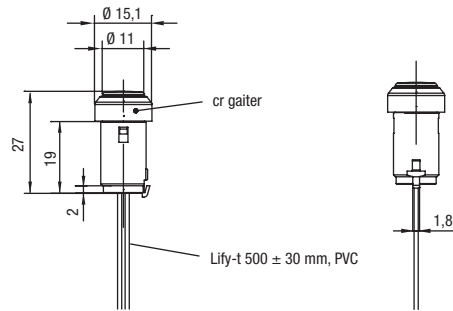
PUSH BUTTON SWITCH

Micro push button switch 145MT..A / ..D With M12 thread or latching detent

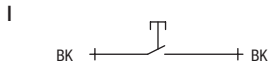
145MT..A with thread M12







145MT..D with latching detent



Standard



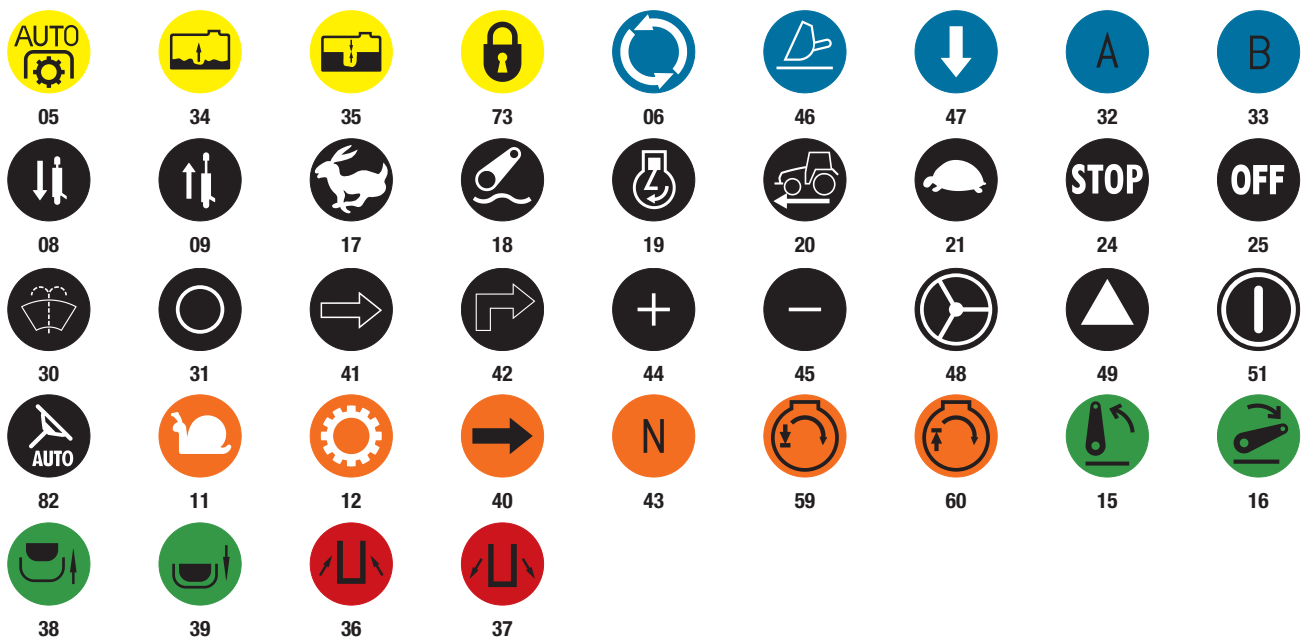
Actuator colours

 RAL 3020	 RAL 6018
 RAL 1021	 Black

Actuator colours Optional

 RAL 2004	 RAL 5017
 RAL 7015	

Optional symbols for push button 145MT



Additional symbols in accordance with DIN ISO 7000:2008-12 are available on request. Additional versions are available on request. The push button caps can optionally be printed with symbols.

Micro push button switch 145MT..A / ..D

With M12 thread or latching detent

ELECTRICAL DATA

	145MT..A	145MT..D
Max. switching voltage	48.00 V DC	
Max. switching current	0.50 A	
Switching power max.	10 W	
Switching power max.	10 VA	

MECHANICAL DATA

	145MT..A	145MT..D
Service life, mechanical (cycles)	2000000	

ENVIRONMENTAL CONDITIONS

	145MT..A	145MT..D
Protection class, electronic	IP67 EN 60529	
Operating temperature min./max.	-40...85 °C	
Storage temperature min./max.	-40...85 °C	

INSTALLATION

	145MT..A	145MT..D
Installation	From above	
Mounting type	Screwed	Latching detent
Thread	M12	-

CONNECTION

	145MT..A	145MT..D
Cable length	0.50 m	

Micro push button switch 145MT..A / ..D With M12 thread or latching detent

ORDERING KEY

145 MT						Micro push button switch	
						Connection type	
	0					Strand output, 500mm	
						Contact form	
		0				N.O.	
						Housing and push button colour	
			A	9	7	M12x1, push button colour black	
			A	1	1	5	M12x1, push button colour green
			A	1	1	4	M12x1, push button colour red
			A	1	1	3	M12x1, push button colour yellow
			D	2	0		Latching detent, push button colour black
			D	1	3		Latching detent, push button colour green
			D	1	2		Latching detent, push button colour red
			D	1	1		Latching detent, push button colour yellow

Please select the mounting type and order separately:



Knurled screw type no. 856107

or



Nut SW 17 type no. 871840

Micro push button switch 145MA

Analogue, robust with M12 thread

PRODUCT CHARACTERISTICS

- 0.5...4.5 V DC analogue output at 5 ± 0.5 V DC operating voltage
- Output signal can optionally be adapted within the voltage ranges
- Contactless function through shielded Hall element
- Various push button colours and symbols are available
- Developed for harsh operating conditions with internal electronics sealed to IP67 protection class

The analogue Micro push button switch 145MA was developed for harsh environmental conditions and is equipped with an M12 thread. This micro push button switch is designed for applications where a simple on/off switch function is not sufficient and a linear output signal is required.

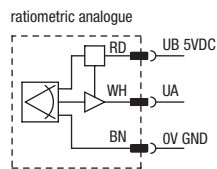
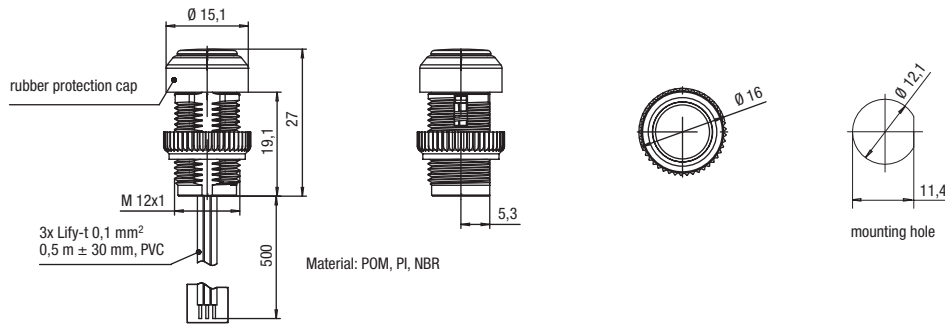
This push button is ideal for controlling moving devices on machines and systems or hydraulic valves in mobile machinery. The switching element, which is completely separated from the mechanics resists dust, dirt and moisture, thanks to its IP67 protection class.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.



PUSH BUTTON SWITCH

Micro push button switch 145MA Analogue, robust with M12 thread



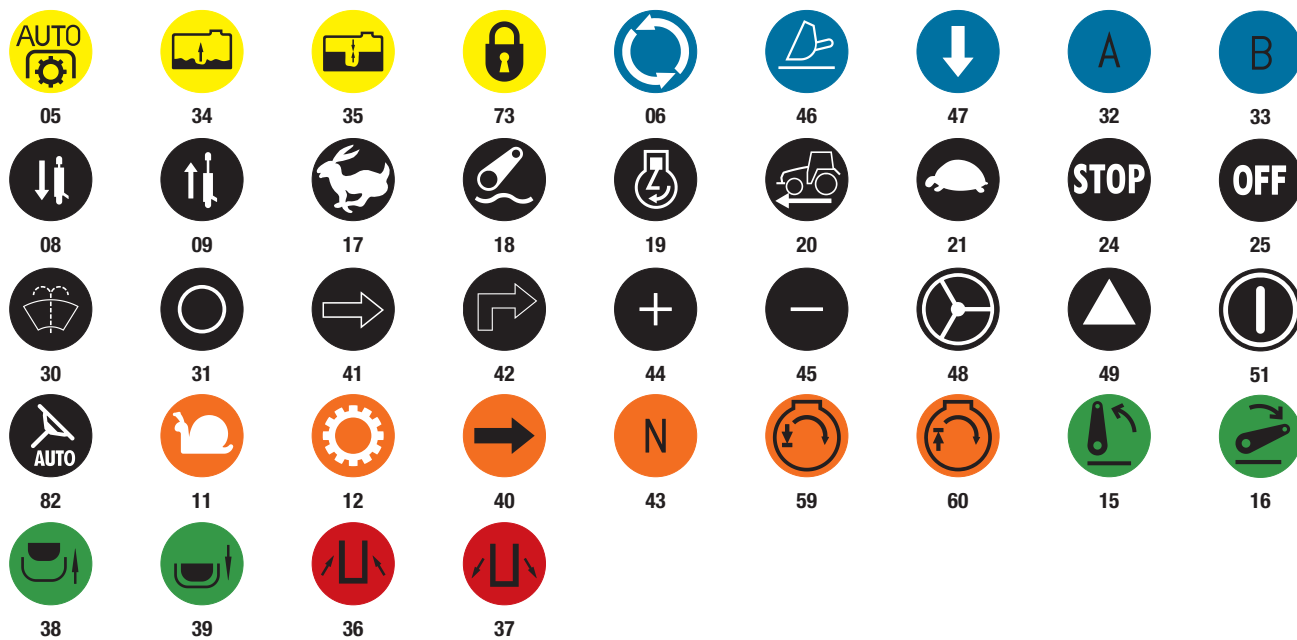
Actuator colours

 RAL 3020	 RAL 6018
 Black	 RAL 1021

Actuator colours

 RAL 7015	 RAL 5017
Optional	 RAL 2004

Optional symbols for push button 145MA



Additional symbols in accordance with DIN ISO 7000:2008-12 are available on request.

Additional versions are available on request. The push button caps can optionally be printed with symbols.

Micro push button switch 145MA

Analogue, robust with M12 thread

ELECTRICAL DATA

	145MA...
Output signal min./max.	0.50...4.50 V DC
Output signal	Analogue
Operating voltage min./max.	4.50...5.50 V DC
Current consumption	Max. 15 mA

ENVIRONMENTAL CONDITIONS

	145MA...
Protection class, electronic	IP67 EN 60529
Operating temperature min./max.	-40...85 °C
Storage temperature min./max.	-40...85 °C

INSTALLATION

	145MA...
Installation	From above
Mounting type	Screwed
Thread	M12

CONNECTION

	145MA...
Cable length	0.50 m

Power take-off switch 151PTO

For intuitive operation, with illumination

PRODUCT CHARACTERISTICS

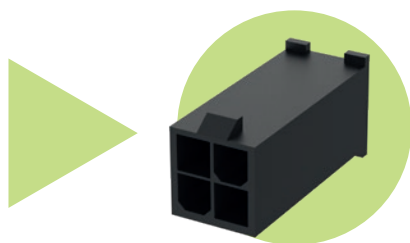
- Optionally available with function and night illumination
- Contactless switching principle through reed technology
- For standard installation openings 44 x 22 x 1.5 mm
- Additional circuitry and illuminated symbols optionally available
- Simple installation with latching detent
- Developed for harsh operating conditions with internal electronics sealed to IP67 protection class



Power take off switch 151PTO is a robust, intuitive push button with switch-off function. It is used primarily in agricultural machinery for safely switching the front or rear PTO shaft on and off.

To prevent unintentional actuation, the required function can only be switched on by unlocking the button.

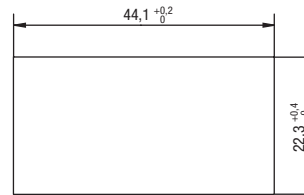
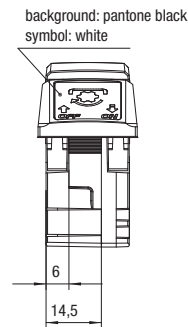
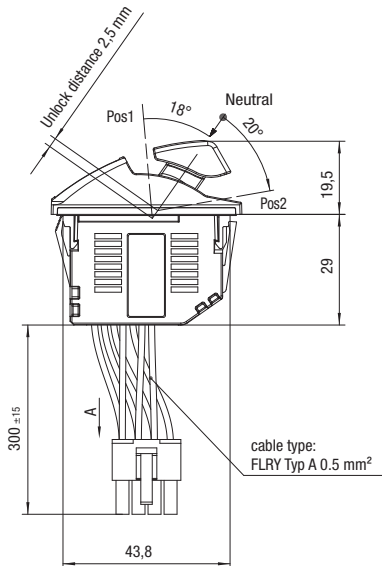
Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.



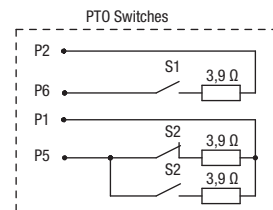
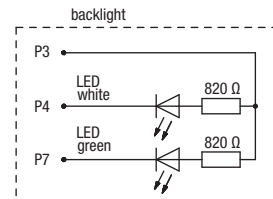
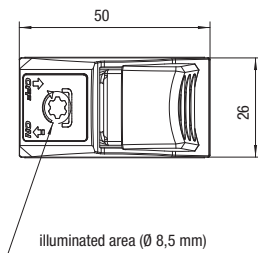
Suitable cable sets can be found on page 160.

PUSH BUTTON SWITCH

Power take-off switch 151PT0 For intuitive operation, with illumination



sheet thickness $1,6 \pm 0,1$ mm
mounting hole



connector view "A"



MOLEX Mini-Fit
Housing 39-01-2080
Terminal 39-00-0059

connector

PIN	colour	function	A
1	WH 1	S2	1
2	WH 2	S1	2
3	WH 3	Common UB+ LED	3
4	WH 4	GND- LED white	5
5	WH 5	S2	4
6	WH 6	S1	6
7	WH 7	GND- LED green	7
8	-	-	-

Power take-off switch 151PT0

For intuitive operation, with illumination

ELECTRICAL DATA

	151PT016
Max. switching voltage	48.00 V DC
Max. switching current	0.30 A
Switching power max.	5 W / 5VA
Contact form	N.O.
Series resistor	3.90 Ohm
Operating voltage LED	12 V

MECHANICAL DATA

	151PT016
Service life, mechanical (cycles)	300000

ENVIRONMENTAL CONDITIONS

	151PT016
Protection class, electronic	IP67 EN 60529
Operating temperature min./max.	-40...85 °C
Storage temperature min./max.	-40...85 °C

INSTALLATION

	151PT016
Installation	From above
Mounting type	Inserted/latched

CONNECTION

	151PT016
Connector type	Molex Mini-Fit 39-01-2080 8-pin
Cable type	FLRY A
Cable length	0.30 m

PUSH BUTTON SWITCH

Power take-off switch 151PT0
For intuitive operation, with illumination

ORDERING KEY

151 PT0 16

Power take-off switch

Power take-off switch 145PTO

M30 thread, with cable or Superseal connector

PRODUCT CHARACTERISTICS

- Contactless switching principle through reed technology
- Operating temperature -40 °C to + 85 °C acc. to DIN IEC 68
- Simple installation
- Developed for harsh operating conditions with internal electronics sealed to IP67 protection class

Power take off switch 145PTO is a robust, intuitive push button with switch-off function. It is used primarily in agricultural machinery for safely switching the front or rear PTO shaft on and off.

To prevent unintentional actuation, the required function can only be switched on by unlocking the button.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

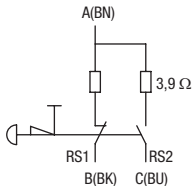
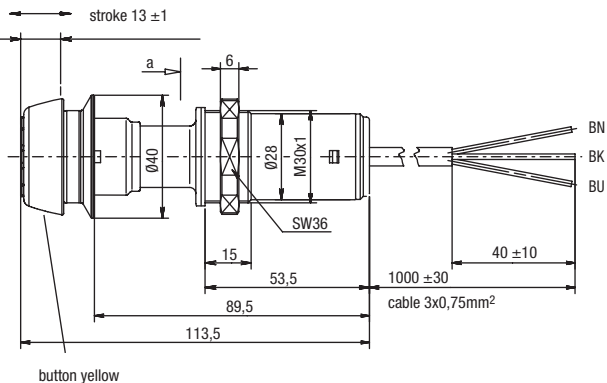


Suitable cable sets can be found on page 163.

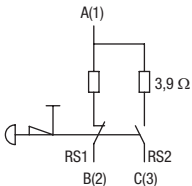
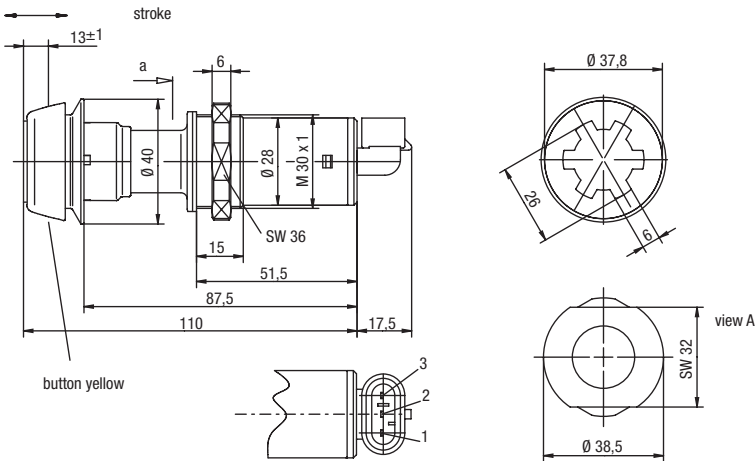
PUSH BUTTON SWITCH

Power take-off switch 145PT0 M30 thread, with cable or Superseal connector

145PT010A00 power take-off switch with cable



145PT010B00 power take-off switch with AMP Superseal connector



Power take-off switch 145PT0

M30 thread, with cable or Superseal connector

ELECTRICAL DATA

	145PT010A00	145PT010B00
Max. switching voltage	48.00 V DC	
Max. switching current	0.50 A	
Switching power max.	10 W / 10 VA	
Contact form	N.O.	
Series resistor	3.90 Ohm	

ENVIRONMENTAL CONDITIONS

	145PT010A00	145PT010B00
Protection class, electronic	IP67 EN 60529	
Operating temperature min./max.	-40...85 °C	
Storage temperature min./max.	-40...85 °C	

INSTALLATION

	145PT010A00	145PT010B00
Installation	From above	
Mounting type	Screwed	
Thread	M30	

CONNECTION

	145PT010A00	145PT010B00
Cable type	BOY11Y PUR	-
Cable length	1.00 m	-
Connector type	-	AMP Superseal 1.5 282105-1 3-pin

PUSH BUTTON SWITCH

Power take-off switch 145PT0 M30 thread, with cable or Superseal connector

ORDERING KEY

145PT010A00	Power take-off switch 48V/0.3A/10W/VA	1m cable
145PT010B00	Power take-off switch 48V/0.3A/10W/VA	AMP Superseal connector, angled



SW36 nut included with delivery

Rocker switch 145DW

With Superseal connector, 3-pin

PRODUCT CHARACTERISTICS

- Long service life thanks to the magnetic actuation principle with reed contacts
- Available with various symbols to suit the application
- Wear-free reed contacts for low switching currents
- Developed for harsh operating conditions with internal electronics sealed to IP67 protection class
- Fast and simple installation by means of snap-in mountings
- Connection with 3-pin Superseal connector; robust and sealed



The rocker switches are designed for applications with low currents and where a mechanical switch cannot be used. Rocker switch 145DW4.A is ideal for control panels and armrests in agricultural and construction machinery.

The switching element, which is completely separated from the mechanics resists dust, dirt and moisture, thanks to its IP67 protection class.

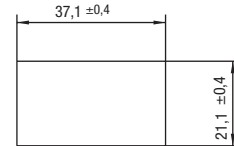
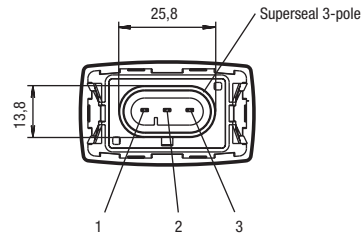
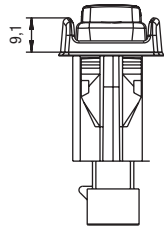
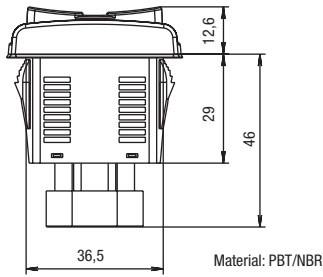
Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.



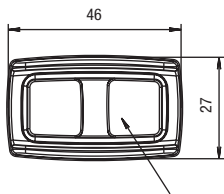
**Suitable cable sets
can be found on page 163.**

PUSH BUTTON SWITCH

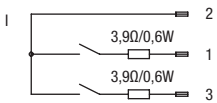
Rocker switch 145DW With Superseal connector, 3-pin



sheet thickness 3-5 mm
mounting hole



Push button cap colour black – Symbol according to customer request



Rocker switch 145DW

With Superseal connector, 3-pin

ELECTRICAL DATA

	145DW40A...
Max. switching voltage	48.00 V DC
Max. switching current	0.50 A
Switching power max.	10 W / 10 VA
Contact form	N.O.

ENVIRONMENTAL CONDITIONS

	145DW40A...
Protection class, electronic	IP67 EN 60529
Operating temperature min./max.	-35...70 °C
Storage temperature min./max.	-35...70 °C

INSTALLATION

	145DW40A...
Installation	From above
Mounting type	Inserted/latched

CONNECTION

	145DW40A...
Connector type	AMP Superseal 3-pin

PUSH BUTTON SWITCH

Rocker switch 145DW
With Superseal connector, 3-pin

ORDERING KEY

145DW40A00

Rocker switch, black, without symbol

Double push button switch 145MD

With Superseal connector, 3-pin

PRODUCT CHARACTERISTICS

- Long service life thanks to the magnetic actuation principle with reed contacts
- Available with various symbols to suit the application
- Wear-free reed contacts for low switching currents
- Developed for harsh operating conditions with internal electronics sealed to IP67 protection class
- Fast and simple installation by means of snap-in mountings
- Connection with 3-pin Superseal connector; robust and sealed



The double push button switches are designed for applications with low currents and a mechanical switch cannot be used. Double push button switch 145MD is ideal for control panels and armrests in agricultural and construction machinery.

The switching element, which is completely separated from the mechanics resists dust, dirt and moisture, thanks to its IP67 protection class

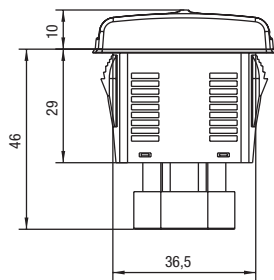
Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.



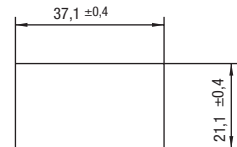
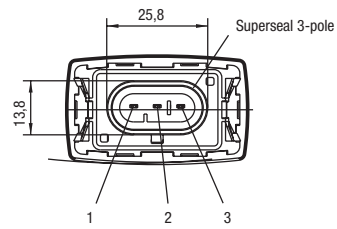
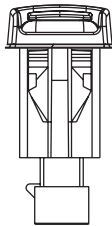
Suitable cable sets can be found on page 163.

PUSH BUTTON SWITCH

Double push button switch 145MD With Superseal connector, 3-pin

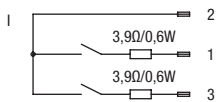
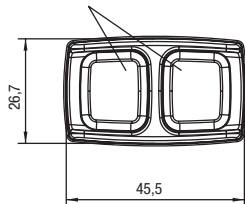


Material: PBT/NBR



sheet thickness 3-5 mm
mounting hole

Please specify symbol and colour, when ordering



Double push button switch 145MD

With Superseal connector, 3-pin

ELECTRICAL DATA

	145MD40A...
Max. switching voltage	48.00 V DC
Max. switching current	0.50 A
Switching power max.	10 W / 10 VA
Contact form	N.O.

ENVIRONMENTAL CONDITIONS

	145MD40A...
Protection class, electronic	IP67 EN 60529
Operating temperature min./max.	-35...70 °C
Storage temperature min./max.	-35...70 °C

INSTALLATION

	145MD40A...
Installation	From above
Mounting type	Inserted/latched

CONNECTION

	145MD40A...
Connector type	AMP Superseal 3-pin

PUSH BUTTON SWITCH

Double push button switch 145MD With Superseal connector, 3-pin

ORDERING KEY

145MD40A07

Micro double push button – black without symbol

Steering column switch 151LSS

With rotatable handle

PRODUCT CHARACTERISTICS

- Space-saving design
- Rotatable handle for wiper function
- Temperature range -30 °C to + 70 °C
- Short-circuit proof up to 28 V
- Mechanical blinker reset

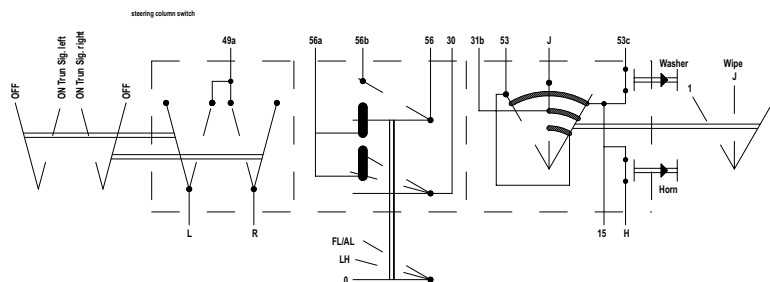
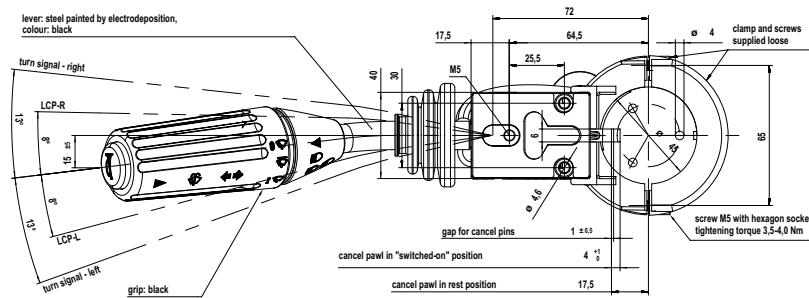
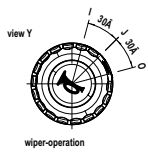
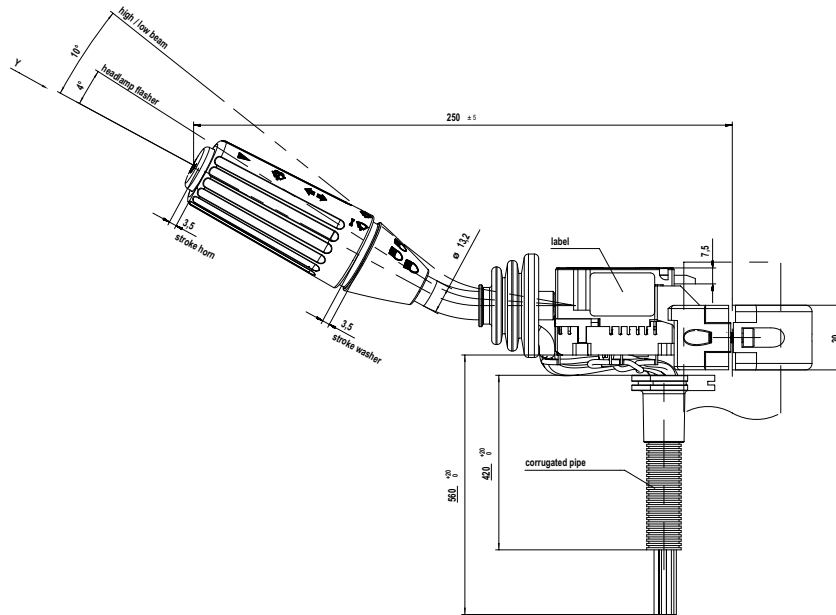


Thanks to the compact design and integrated mounting bracket, the Steering column switch 151LSS is ideal for direct installation on the steering column. The Steering column switch 151LSS can be used in agricultural vehicles, construction machinery and self-propelled machinery. Using proven technology, these steering column switches are robust and reliable even under tough working conditions.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

STEERING COLUMN SWITCHES

Steering column switch 151LSS With rotatable handle



Steering column switch 151LSS

With rotatable handle

ELECTRICAL DATA

	151LSS...
Max. switching voltage	12.00 V DC
Contact form	Mechanical
Turn signal - max. switching voltage	12.0 V DC
Turn signal - max. switching current	10.5 A
Turn signal - max. switching power	6x21 W
Horn - max. switching voltage	12.0 V DC
Horn - max. switching current	5.5 A
Horn - max. switching power	66 W
Headlamp flasher – max. switching voltage	12.0 V DC
Headlamp flasher – max. switching current	10.8 A
Headlamp flasher – max. switching power	2x65 W
Max. actuation torque	200.0 N-m
Deflection - turn signal	13 °
Deflection - headlamp flasher	4 °
Deflection - high beam	10 °
Deflection – LCP indicator	8 °
Contact form - turn signal	Mechanical
High beam – max. switching voltage	12.0 V DC
High beam – max. switching current	10.8 A
High beam – max. switching power	2x65 W
Low beam – max. switching voltage	12.0 V DC
Low beam – max. switching current	9.1 A
Low beam – max. switching power	2x55 W
Continuous wiper operation – max. switching voltage	12.0 V DC
Continuous wiper operation – max. switching current	8.0 A
Continuous wiper operation – max. switching power	Approx. 96 W
Interval wiper operation – max. switching voltage	12.0 V DC
Interval wiper operation – max. switching current	8.0 A
Interval wiper operation – max. switching power	approx. 96 W
Stroke washer – max. switching voltage	12.0 V DC
Stroke washer – max. switching current	5.0 A
Stroke washer – max. switching power	approx. 60 W

MECHANICAL DATA

	151LSS...
Steering column diameter	45 mm

MATERIAL INFORMATION

	151LSS...
Housing material	Die cast
Shaft material	Steel
Gaiter material	EPDM

ENVIRONMENTAL CONDITIONS

	151LSS...
Protection class, electronic	IP6K7 DIN40050 Part 9
Operating temperature min./max.	-30...70 °C
Storage temperature min./max.	-40...80 °C

CONNECTION

	151LSS...
Cable type	FLRY
Cable length	0.56 m

STEERING COLUMN SWITCHES

Steering column switch 151LSS With rotatable handle

ORDERING KEY

151 LSS 01

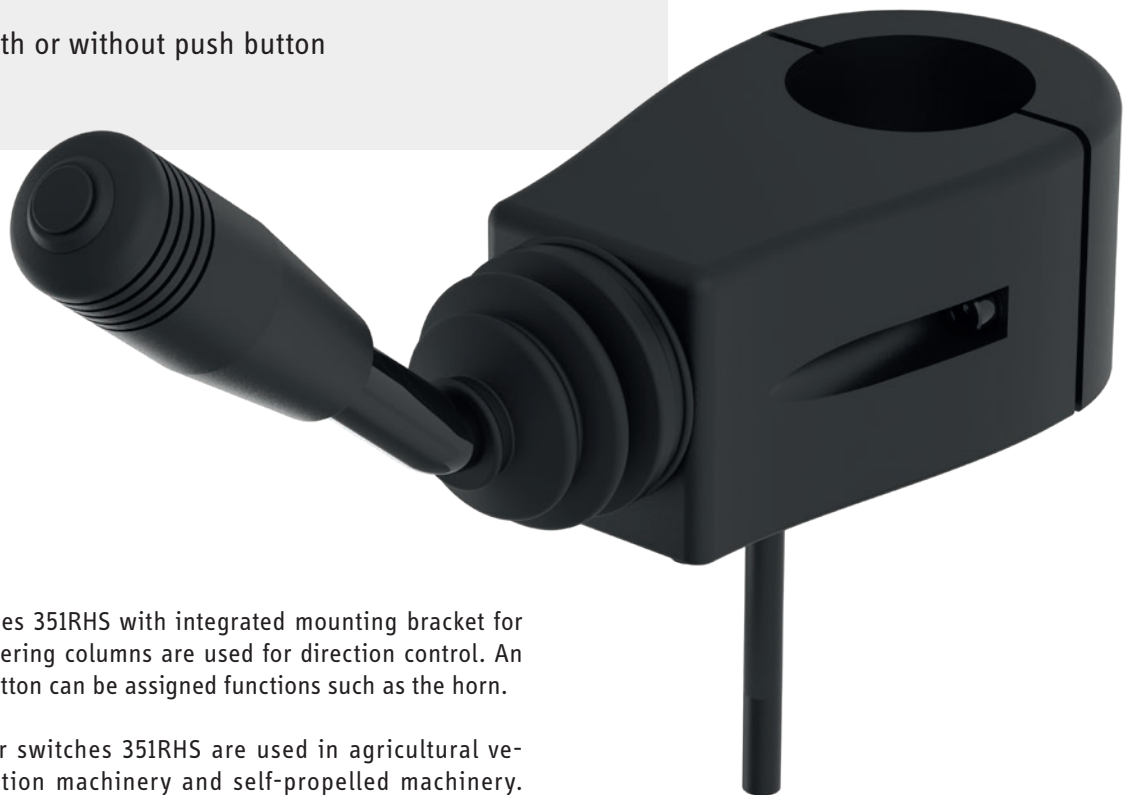
Steering column switches

Lever switch 351RHS

Detent or no detent

PRODUCT CHARACTERISTICS

- High reliability and long service life thanks to contactless reed technology
- Developed for harsh operating conditions, high protection class IP67 for electronics
- Robust and space-saving design
- 3 detent positions for direction control
- Switching signals optionally overlapping for the optional detection of line interruptions
- Integrated mounting bracket available for steering columns for diameters of 38 mm or 45mm
- Mechanical locking in centre position
- Available with or without push button



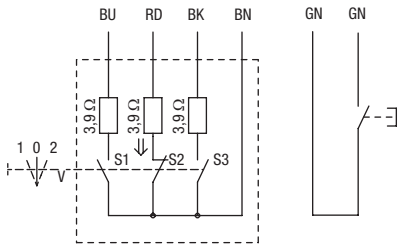
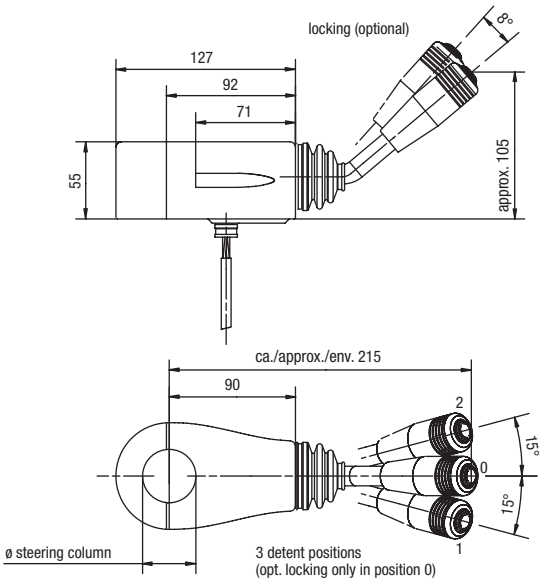
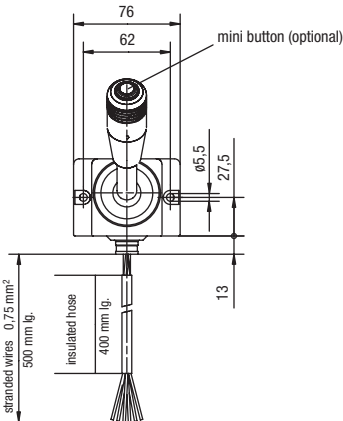
The lever switches 351RHS with integrated mounting bracket for standardised steering columns are used for direction control. An optional push button can be assigned functions such as the horn.

The robust lever switches 351RHS are used in agricultural vehicles, construction machinery and self-propelled machinery. Using proven technology, these steering column switches are robust and reliable even under tough working conditions.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

STEERING COLUMN SWITCHES

Lever switch 351RHS Detent or no detent



Switch in zero position drawn with S2 in actuated state (↓)
S3 is closed in position 1
S1 is closed in position 2

Lever switch 351RHS

Detent or no detent

ELECTRICAL DATA

	351RHS3...	351RHS3...T	351RHS4...	351RHS4...T
Max. switching voltage	48.00 V DC			
Max. switching current	0.50 A			
Switching power max.	10 W			
Switching power max.	10 VA			
Contact form	N.O.			
Maximum switching voltage mini push button switch	-	48.00 V DC	-	48.00 V DC
Maximum switching current mini push button switch	-	0.50 A	-	0.50 A
Maximum switching power mini push button switch	-	10 W	-	10 W
Maximum switching power mini push button switch	-	10 VA	-	10 VA
Contact form mini push button switch	-	N.O.	-	N.O.

MECHANICAL DATA

	351RHS3...	351RHS3...T	351RHS4...	351RHS4...T
Deflection	± 15 °			
Steering column diameter	38 mm	38 mm	45 mm	45 mm
Button stroke	-	2.0 mm	-	2.0 mm

MATERIAL INFORMATION

	351RHS3...	351RHS3...T	351RHS4...	351RHS4...T
Housing material	PA12 GF30			
Shaft material	Steel			
Gaiter material	NBR			

ENVIRONMENTAL CONDITIONS

	351RHS3...	351RHS3...T	351RHS4...	351RHS4...T
Protection class, electronic	IP67 EN 60529			
Operating temperature min./max.	-30...75 °C			
Storage temperature min./max.	-30...75 °C			

CONNECTION

	351RHS3...	351RHS3...T	351RHS4...	351RHS4...T
Cable type	FLRY			
Cable length	0.50 m			

STEERING COLUMN SWITCHES

Lever switch 351RHS Detent or no detent

ORDERING KEY

351RHS						Lever switch
						Diameter of steering column
	3					D 38
	4					D 45
						Function
		1	1			No detent, mechanically lockable (self-resetting to centre position)
		3	0			Detent, not mechanically lockable (3 detent positions)
		3	1			Detent, mechanically lockable
						Switching points
				0		Overlapping
				1		Not overlapping
						Handle version
					T	Push button (omitted if no push button selected)

Universal switch 151U

With two or three switching levels

PRODUCT CHARACTERISTICS

- Space-saving design
- Various actuation types: no-detent/detent actuation
- Temperature range -30 °C to +80 °C
- Optionally with large handle (Ø17 mm) or flat handle (24 x 38 mm)



Universal switch 151 U... ..A with two switching levels for operation of the turn signal, horn and headlamp-flash functions.

Universal switch 151 U... ..B has three switching levels to additionally operate high and low beam.

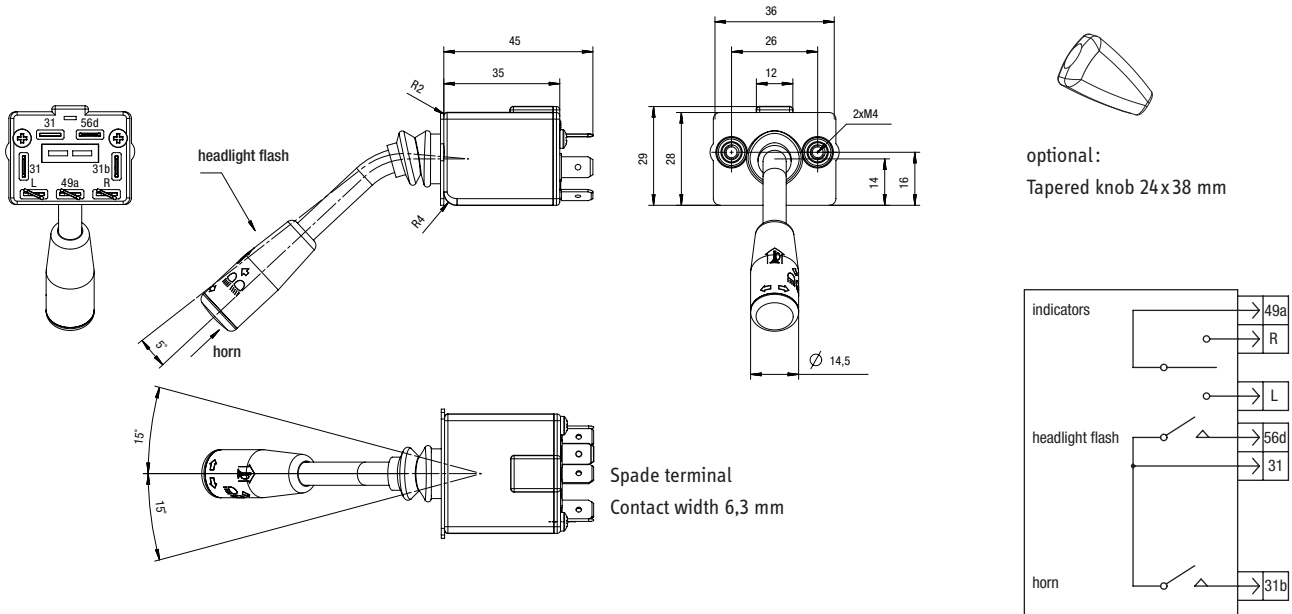
The Steering column switch 151 U can be used in agricultural vehicles, construction machinery and self-propelled machinery. Using proven technology, these steering column switches are robust and reliable even under tough working conditions.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

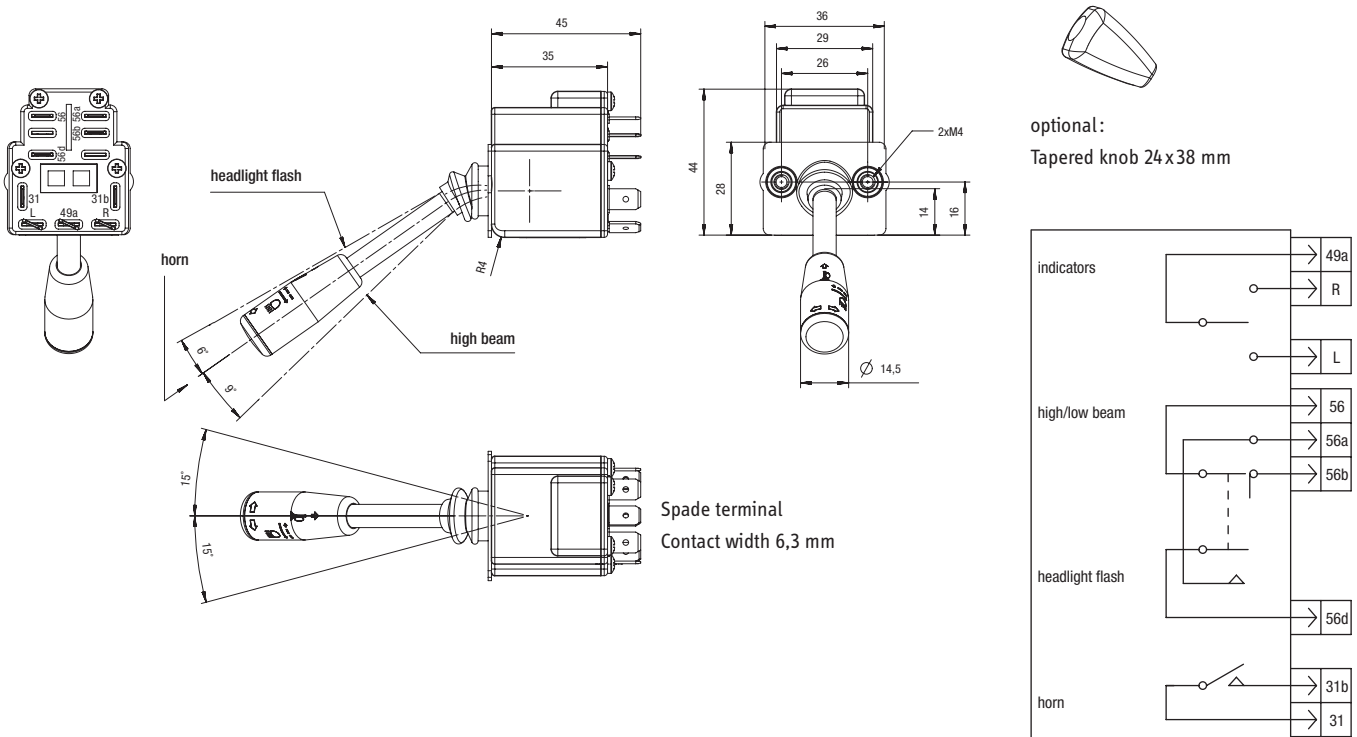
STEERING COLUMN SWITCHES

Universal switch 151U With two or three switching levels

151 U...A, two switching levels



151 U...B, three switching levels



Universal switch 151U

With two or three switching levels

ELECTRICAL DATA

	151UM.A..	151UN.A..	151UM.B..	151UN.B..
Contact form	Mechanical			
Turn signal - max. switching voltage	12.0 V DC	48.0 V DC	12.0 V DC	48.0 V DC
Turn signal - max. switching current	8.0 A	0.5 A	8.0 A	0.5 A
Turn signal - max. switching power	96 W	10 W	96 W	10 W
Horn - max. switching voltage	12.0 V DC			
Horn - max. switching current	4.16 A			
Headlamp flasher – max. switching voltage	12.0 V DC			
Headlamp flasher – max. switching current	0.256 A		10 A	
Headlamp flasher – max. switching power	3W inductive	3W inductive	120 W	120 W
Contact form - turn signal	Mechanical	Reed switches	Mechanical	Reed switches
High beam – max. switching voltage	-	-	12.0 V DC	12.0 V DC
High beam – max. switching current	-	-	10.0 A	10.0 A
High beam – max. switching power	-	-	120 W	120 W
Low beam – max. switching voltage	-	-	12.0 V DC	12.0 V DC
Low beam – max. switching current	-	-	10.0 A	10.0 A
Low beam – max. switching power	-	3W inductive	120 W	120 W

MECHANICAL DATA

	151UM.A..	151UN.A..	151UM.B..	151UN.B..
Deflection - turn signal	±15 °			
Deflection - headlamp flasher	5 °		6 °	
Deflection - high beam	-	-	9 °	9 °

MATERIAL INFORMATION

	151UM.A..	151UN.A..	151UM.B..	151UN.B..
Housing material	PBT			
Shaft material	Al			
Gaiter material	NBR			

ENVIRONMENTAL CONDITIONS

	151UM.A..	151UN.A..	151UM.B..	151UN.B..
Operating temperature min./max.	-30...80 °C			
Storage temperature min./max.	-40...80 °C			

STEERING COLUMN SWITCHES

Universal switch 151U With two or three switching levels

INSTALLATION

	151UM.A..	151UN.A..	151UM.B..	151UN.B..
Installation depth	45.00 mm			

ORDERING KEY

151 U						Universal switch
						Function
	N					No detent
	M					Detent
						Lever version
		S				Standard lever, diameter 7 mm
						Handle version
			1	0	B	Small handle, handle print for turn signal / horn / headlamp flasher (three switching levels)
			1	1	A	Small handle, handle print for turn signal / horn (two switching levels)
			1	2	A	Small handle, without handle print (two switching levels)
			1	2	B	Small handle, without handle print (three switching levels)

Universal switch shuttle Lever 151SL

Robust, detent and no detent

PRODUCT CHARACTERISTICS

- High reliability and long service life thanks to contactless reed technology
- Robust and space-saving design
- Symbols can be individually customised
- Also available with round handle and push button switches
- Temperature range from -40 °C to +85 °C
- Developed for harsh operating conditions, high protection class IP67 for electronics
- Long service life with 4 million operating cycles
- Up to 9 switching points



Universal switch shuttle lever 151SL with flat handle is designed for controlling the direction of travel in mobile machinery. The switch matrix can be individually adapted and configured for up to 9 functions. The switch knob can be individually adjusted in terms of handle and symbols. It can withstand high mechanical loads thanks to its robust design.

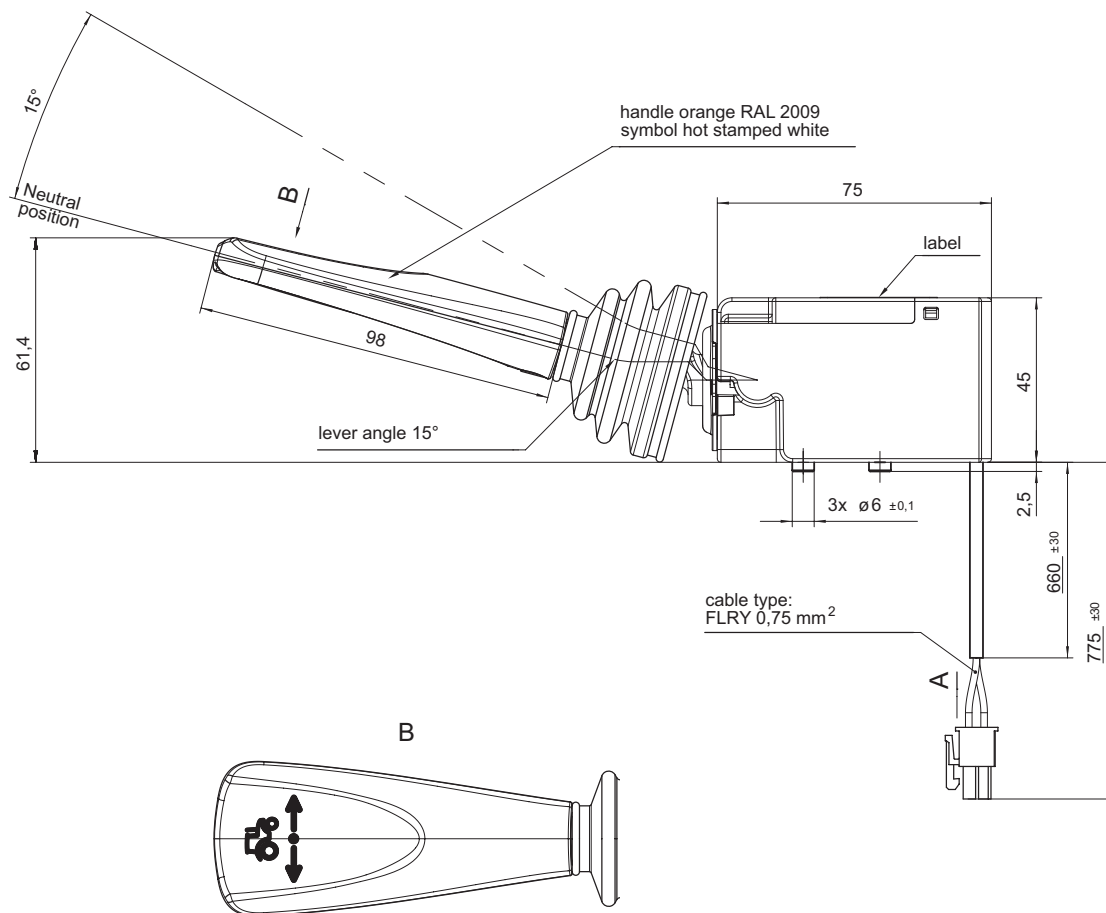
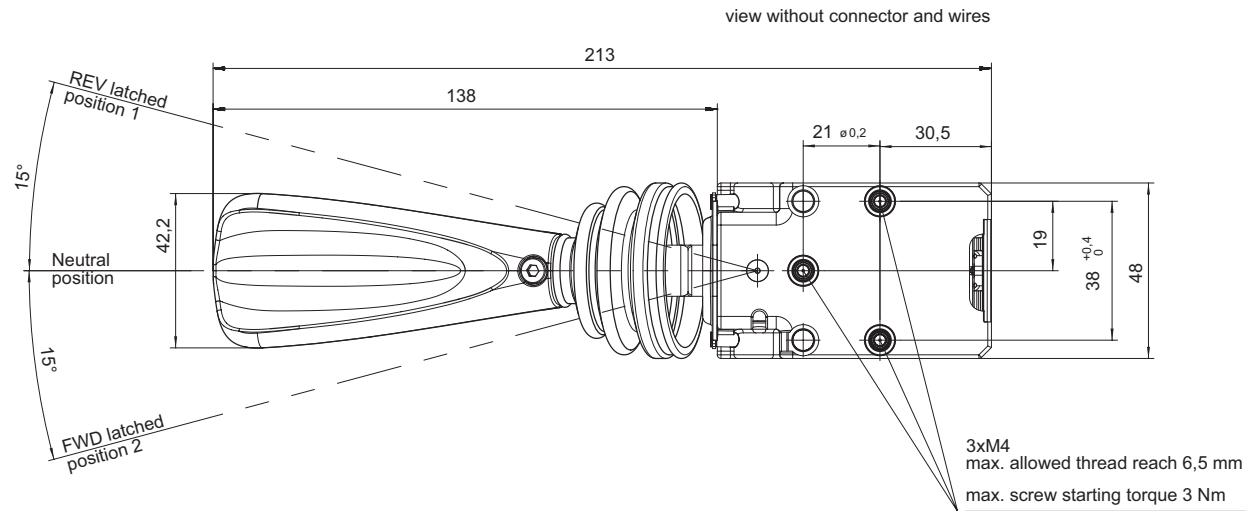
The universal switch shuttle lever 151SL is used in agricultural vehicles, construction machinery and self-propelled machinery. Using proven technology, these steering column switches are robust and reliable even under tough working conditions.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

STEERING COLUMN SWITCHES

Universal switch shuttle Lever 151SL Robust, detent and no detent

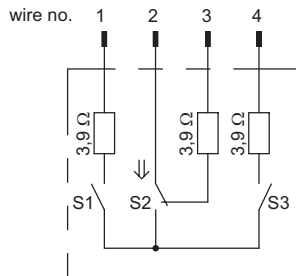
151SLX11S5A.. with flat handle and detent actuation



Universal switch shuttle Lever 151SL

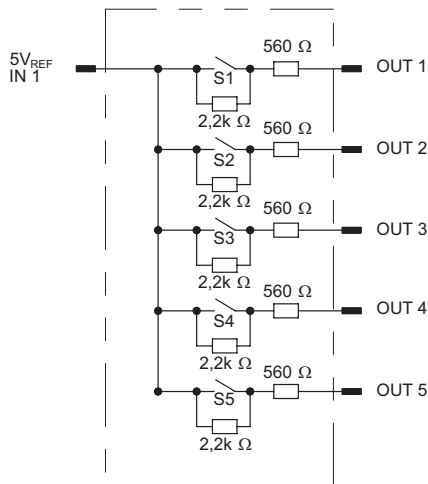
Robust, detent and no detent

151SLX11S5A01 with flat handle and detent actuation

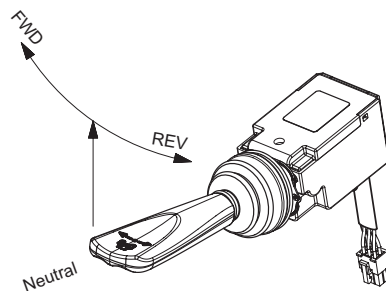


Wiring view in zero position with S2 in operated condition (⇕)
 in position 1: S3 is closed and S2 changes its switching condition
 in position 2: S1 is closed and S2 changes its switching condition

151SLX11S5A02 with flat handle and detent actuation



Lever position	Output configuration				
	OUT 1	OUT 2	OUT 3	OUT 4	OUT 5
FORWARD	1	0	0	1	0
FWD/REV	0	1	0	1	0
REVERSE	0	0	1	1	0
REST	0	1	0	0	1

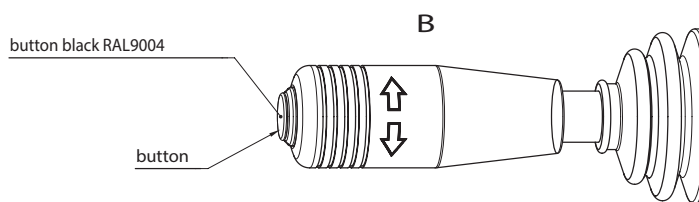
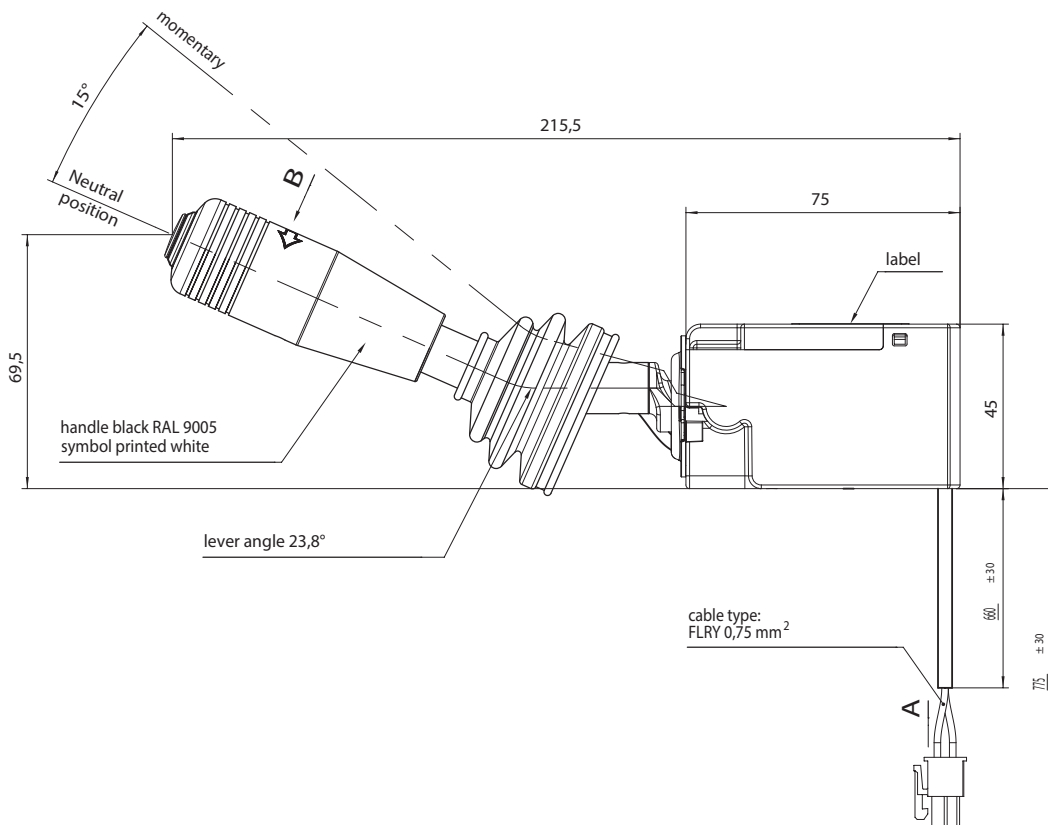
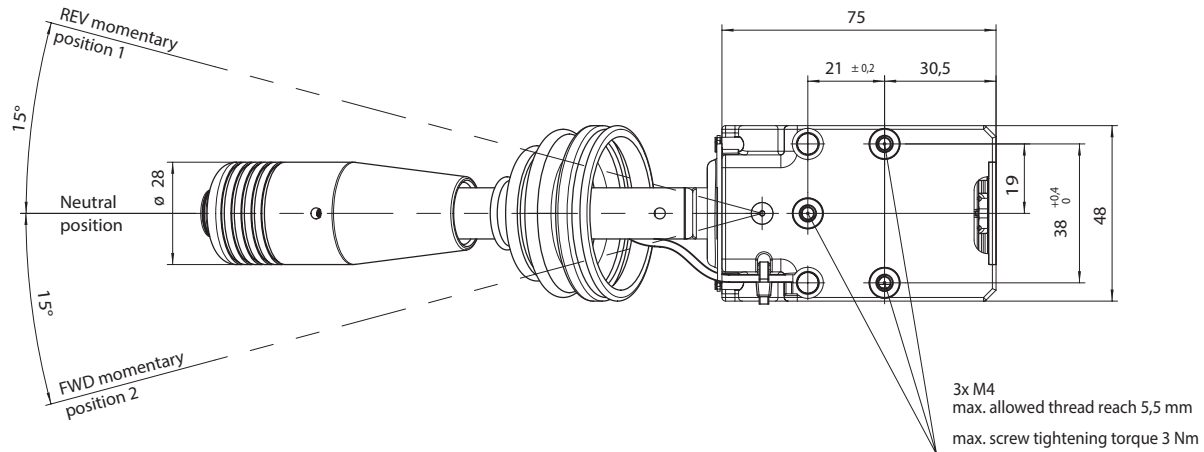


Meaning of every position		
Forward	fwd/rev	Reverse
	Rest	

Universal switch shuttle Lever 151SL Robust, detent and no detent

151SLY33S1A.. with round handle and no-detent actuation

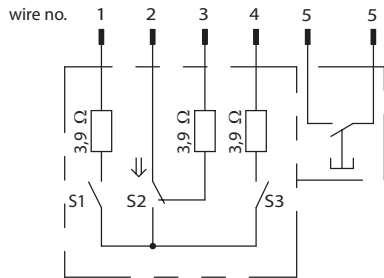
view without connector and wires



Universal switch shuttle Lever 151SL

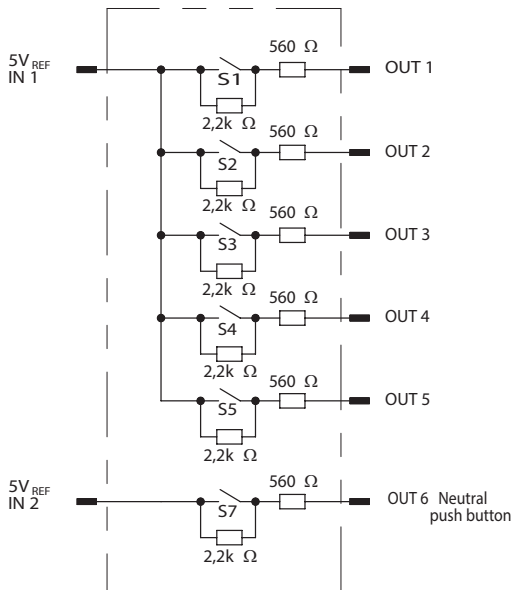
Robust, detent and no detent

151SLY33S1A03 with round handle and no-detent actuation

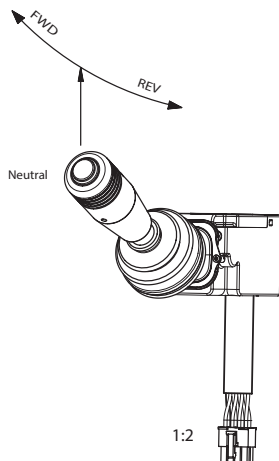


Wiring view in zero position with S2 in operated condition (⇄)
 in position 1: S3 is closed and S2 changes its switching condition
 in position 2: S1 is closed and S2 changes its switching condition

151SLY33S1A04 with round handle and no-detent actuation



Lever position	Output configuration				
	OUT 1	OUT 2	OUT 3	OUT 4	OUT 5
FORWARD	1	0	0	1	0
FWD/REV	0	1	0	1	0
REVERSE	0	0	1	1	0
REST	0	1	0	0	1
Neutral button	Push				1



Meaning of every position		
Forward	fwd/rev	Reverse
	Rest	

STEERING COLUMN SWITCHES

Universal switch shuttle Lever 151SL Robust, detent and no detent

ELECTRICAL DATA

	151SLX11S5A01	151SLX11S5A02	151SLY33S1A03	151SLY33S1A04
Max. switching voltage	48.00 V DC			
Max. switching current	0.50 A			
Switching power max.	10 W			
Contact form	N.O. (normally open) / changeover contact	N.O.	N.O. (normally open) / changeover contact	N.O.

MECHANICAL DATA

	151SLX11S5A01	151SLX11S5A02	151SLY33S1A03	151SLY33S1A04
Max. lever load with specified lever length	550N at 100mm (20° C)			
Deflection	± 15 °			

MATERIAL INFORMATION

	151SLX11S5A01	151SLX11S5A02	151SLY33S1A03	151SLY33S1A04
Housing material	PBT GF45			
Shaft material	Z430			
Gaiter material	NBR			

ENVIRONMENTAL CONDITIONS

	151SLX11S5A01	151SLX11S5A02	151SLY33S1A03	151SLY33S1A04
Protection class, electronic	IP67 EN 60529			
Operating temperature min./max.	-30...85 °C			
Storage temperature min./max.	-40...85 °C			

CONNECTION

	151SLX11S5A01	151SLX11S5A02	151SLY33S1A03	151SLY33S1A04
Connector type	Molex Mini-Fit			
Cable type	FLRY			
Cable length	0.78 m			

Universal switch shuttle Lever 151SL

Robust, detent and no detent

ORDERING KEY

151 SL									Shuttle lever
									Function and handle version
	X	1	1	S	5	A	0	1	Flat handle with detent actuation and 3 switch positions
	X	1	1	S	5	A	0	2	Flat handle with detent actuation and matrix circuit (3 switch positions)
	Y	3	3	S	1	A	0	3	Round handle with push button, no detent actuation and 3 switch positions
	Y	3	3	S	1	A	0	4	Round handle with push button, no detent actuation and matrix switching (3 switch positions)

Hand throttle 351H008

With Deutsch connector

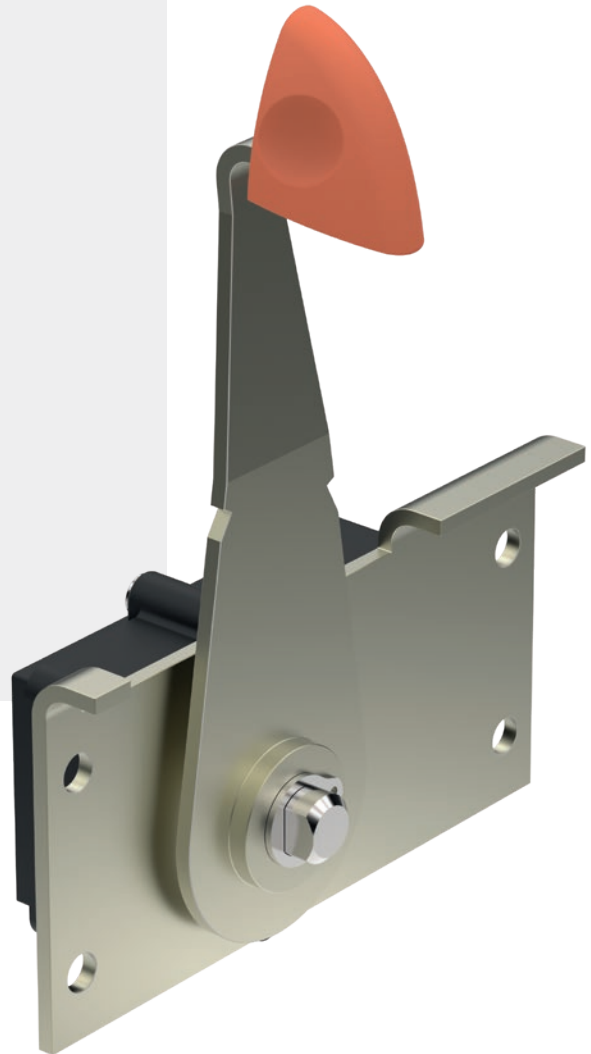
PRODUCT CHARACTERISTICS

- Long service life due to contactless Hall-effect technology
- Developed for harsh operating conditions, high protection class IP67 for electronics
- Specific lever versions and mounting plates are available
- Available with different output signals: analogue, redundant as well as with current and voltage output available
- Fast and simple installation
- Connection with Deutsch connector, robust and sealed

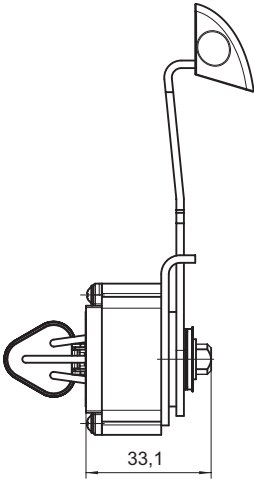
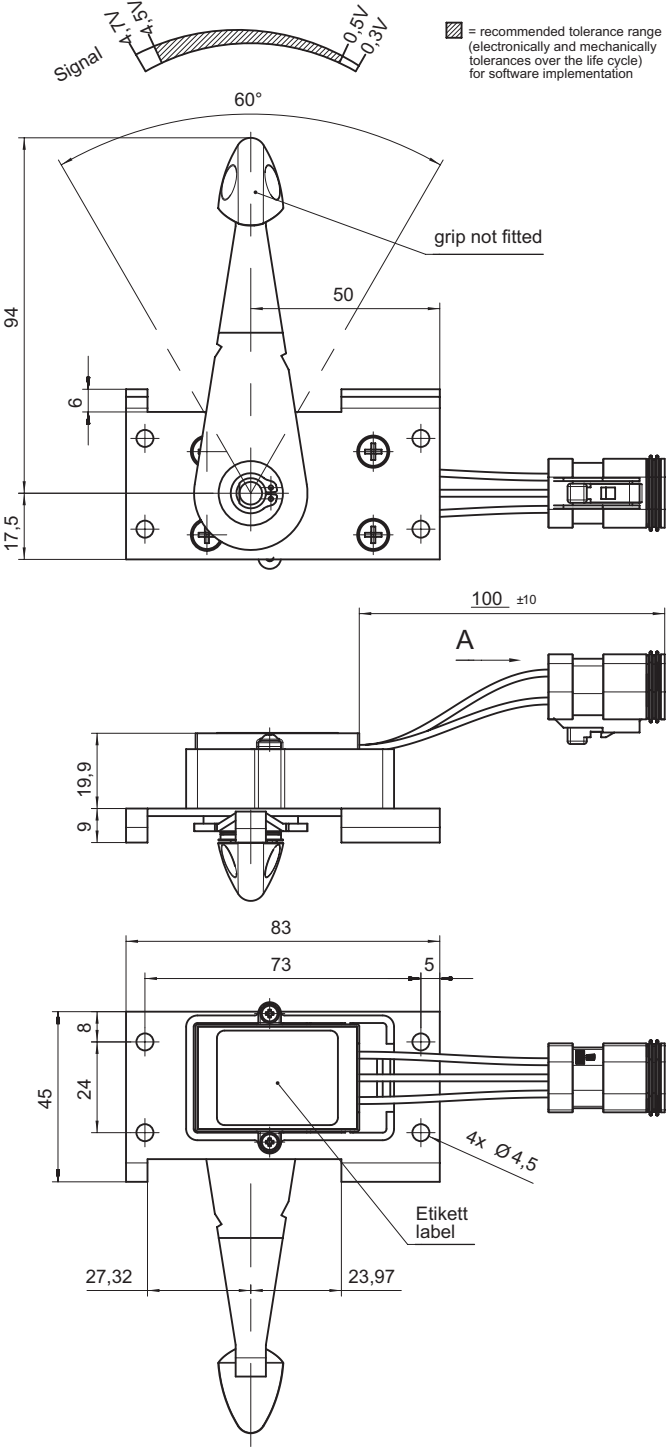
The hand throttle is used in control panels and armrests for engine speed regulation. The hand throttle is used primarily in tractors and agricultural machinery.

With the friction brake, the hand throttle lever can be fixed in a certain position in order to maintain a constant engine speed. This simplifies uniform work in the field.

Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

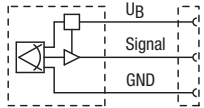


Hand throttle 351H008
With Deutsch connector

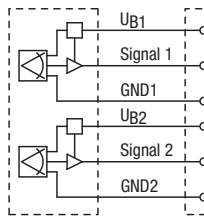


Standard

Analogue

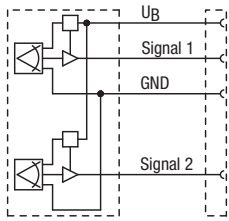


Redundant



Optional

Semi-redundant



Hand throttle 351H008

With Deutsch connector

ELECTRICAL DATA

	351H008A1	351H008A6	351H008A7
Polarity reversal protection	Yes		
Output signal min./max.	-	0.50...4.50 V DC	0.50...4.50 V DC
Output signal min./max.	4.00...20.00 mA	-	-
Output signal	Analogue		
Operating voltage min./max.	10.00...30.00 V DC	4.50...5.50 V DC	10.00...30.00 V DC
Current consumption	at 12 V max. 18 mA	Max. 15 mA	at 12 V max. 18 mA
Technology	Hall		

MECHANICAL DATA

	351H008A1	351H008A6	351H008A7
Lever length	94.0 mm		
Deflection	60 °		

MATERIAL INFORMATION

	351H008A1	351H008A6	351H008A7
Housing material	PBT		

ENVIRONMENTAL CONDITIONS

	351H008A1	351H008A6	351H008A7
Protection class, electronic	IP67 EN 60529		
Operating temperature min./max.	-25...85 °C		
Storage temperature min./max.	-40...85 °C		

INSTALLATION

	351H008A1	351H008A6	351H008A7
Mounting type	Screwed		

Hand throttle 351H008 With Deutsch connector

CONNECTION

	351H008A1	351H008A6	351H008A7
Connector type		English	
Cable type		FLRY	
Cable length		0.10 m	

ORDERING KEY

351H008			Hand throttle
			Electronics
	A	1	Analogue 4-20 mA
	A	6	Analogue 0.5-4.5 V DC, ratiometric
	A	7	Analogue 0.5-4.5 V DC
	R	1	Redundant 4-20 mA
	R	6	Redundant 0.5-4.5 V DC, ratiometric
	R	7	Redundant 0.5-4.5 V DC

351CM007 CAN MODULE

Housing made of fibre-glass reinforced plastic

PRODUCT CHARACTERISTICS

- Openings for cable attachment for effective strain relief on the cable harness
- Simple and accurate installation due to compact design and molded-in mounting sleeves
- 3 LED outputs
- 16 inputs for analogue and digital signals
- Supports CANopen or SAE J1939 CAN protocols
- Additional 5 V supply voltage for external components
- Variant with safety-certified electronics SIL 2 and PL d available
- Sealed electronics in accordance with protection class IP67

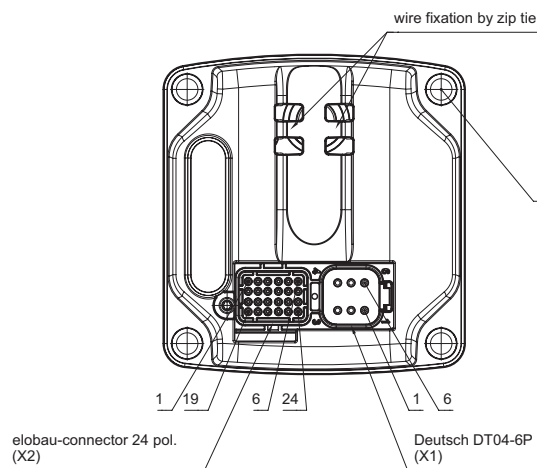
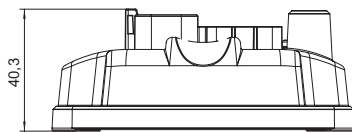
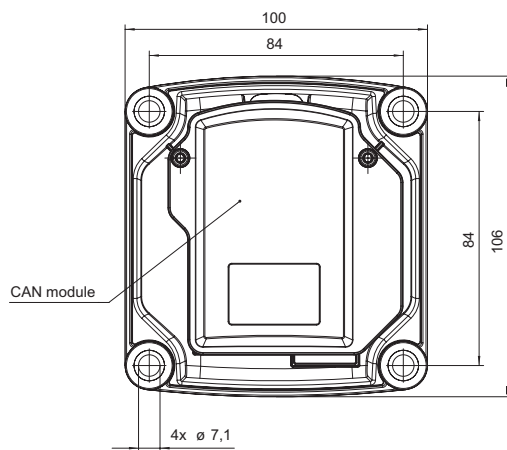


The 351CM007 CAN module enables analogue or digital signals from our standard products to be flexibly connected to your CAN bus system. The CAN module operates on CAN open or SAE J1939 protocols. Simply specify the required elobau operator controls and cable set to connect to the CAN module. Safety critical functions can also be controlled.

The compact design ensures effortless integration of the CAN module and simplifies installation in confined spaces. The robust design guarantees safe and reliable use even under the most extreme environmental conditions.

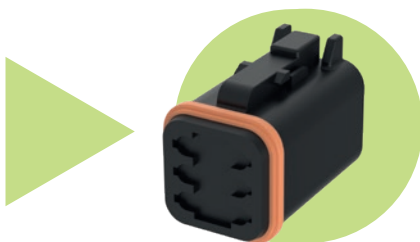
Do you need anything else? If you have any questions we will be happy to assist. You can find our contact details on page 2.

351CM007 CAN module Housing made of fibre-glass reinforced plastic



elobau-connector 24 pol.
(X2)

Deutsch DT04-6P
(X1)



Suitable cable sets can be found on page 159.

351CM007 CAN MODULE

Housing made of fibre-glass reinforced plastic

ELECTRICAL DATA

	351CM007C...	351CM007J...
Operating voltage min./max.	7.00...36.00 V DC	
Current consumption	400 mA	
Protocol	CANopen	J1939
Node ID Source Address	0x11	0x70
Transmitting cycle	100 ms	
Baud rate	250 kbit/s	

ENVIRONMENTAL CONDITIONS

	351CM007C...	351CM007J...
Protection class, electronic	IP67 EN 60529	
Operating temperature min./max.	-25...85 °C	
Storage temperature min./max.	-40...85 °C	

ORDERING KEY

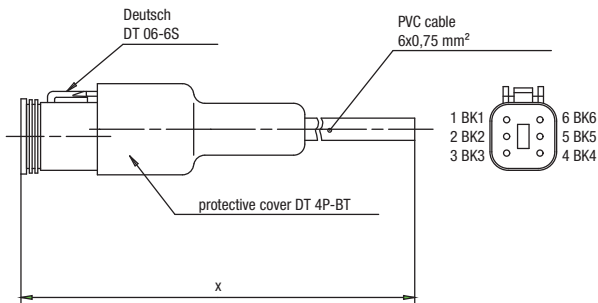
351CM007...	CAN module
	Input configuration is always customer specific – please contact us!

Optional	
	CAN protocol
351CM007CN...	CANopen
351CM007JN...	SAE J1939
351CM007JF...	SAE J1939 with safety-certified electronics in accordance with DIN ISO 13849-1:2008 up to PL d, DIN EN IEC 61508:2010 up to SIL 2

Deutsch DT 06-6S L1FD00.B 6-pin

PRODUCT CHARACTERISTICS

- Suitable for J4 CAN joysticks and CAN module 351CM007
- Suitable for outdoor use, IP67



ENVIRONMENTAL CONDITIONS

	L1FD.0.B01_D_1
Operating temperature range Min./max.	-40...85 °C
Storage temperature Min./max.	-40...85 °C
Cable temperature range, moving, min./max.	-25...80 °C

ORDERING KEY

L1FD	0	0		B	Deutsch DT 06-6S
					Cable length
			1		1 m ± 30 mm
			3		3 m ± 40 mm
			5		5 m ± 60 mm
			0		10 m ± 80 mm

CONNECTION

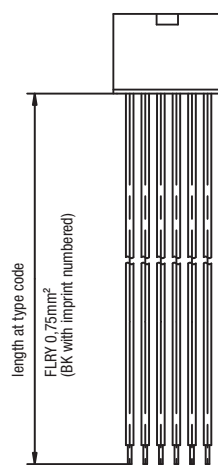
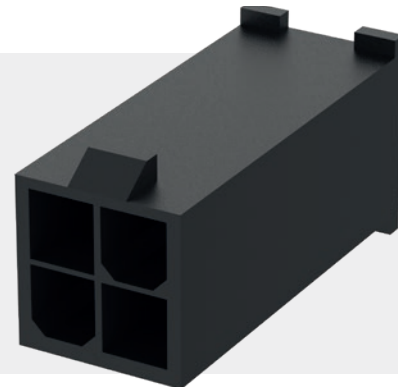
	L1FD00.B
Cable type	PVC 6 x 0.75 mm ²

CABLE SETS

Molex Mini-Fit L2.D00.A

PRODUCT CHARACTERISTICS

- Suitable for elobau standard joysticks
- Number of connection pins selectable



view entry side



L2DD00.A
Molex 39-01-3043



L2FD00.A
Molex 39-01-3063



L2HD00.A
Molex 39-01-3083



L2JD00.A
Molex 39-01-3103



L2LD00.A
Molex 39-01-3123



L2ND00.A
Molex 39-01-3143



L2PD00.A
Molex 39-01-3163

MATERIAL INFORMATION

	L2.D00.A
Cable material	PVC

ENVIRONMENTAL CONDITIONS

	L2.D00.A
Operating temperature min./max.	-40...85 °C
Storage temperature min./max.	-40...85 °C
Cable temperature range, moving, min./max.	-5...85 °C

CONNECTION

	L2.D00.A
Connector type	Molex Mini-Fit
Cable type	FLRY

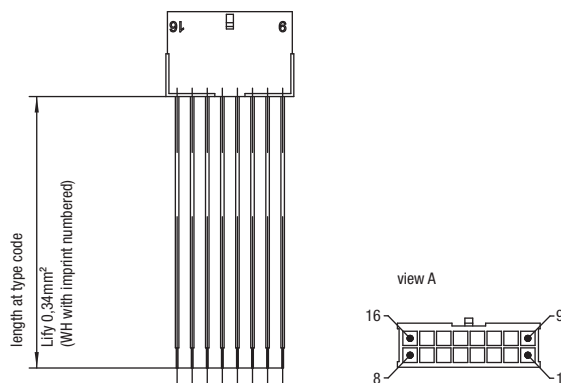
ORDERING KEY

L2		D00		A	Molex Mini-Fit
					Connection pins
	D				4-pin
	F				6-pin
	H				8-pin
	J				10-pin
	L				12-pin
	N				14-pin
	P				16-pin
					Cable length
			1		1 m ± 30 mm
			3		3 m ± 40 mm
			5		5 m ± 60 mm
			0		10 m ± 80 mm

Molex Micro-Fit L2PK00.A

PRODUCT CHARACTERISTICS

- Suitable for J1 Joystick
- Available in different lengths



MATERIAL INFORMATION

	L2PK00.A
Cable material	Soft PVC

ENVIRONMENTAL CONDITIONS

	L2PK00.A
Operating temperature min./max.	-40...85 °C
Storage temperature min./max.	-40...85 °C
Cable temperature range, moving, min./max.	-20...85 °C

CONNECTION

	L2PK00.A
Connector type	Molex Micro-Fit
Cable type	Lify-t

ORDERING KEY

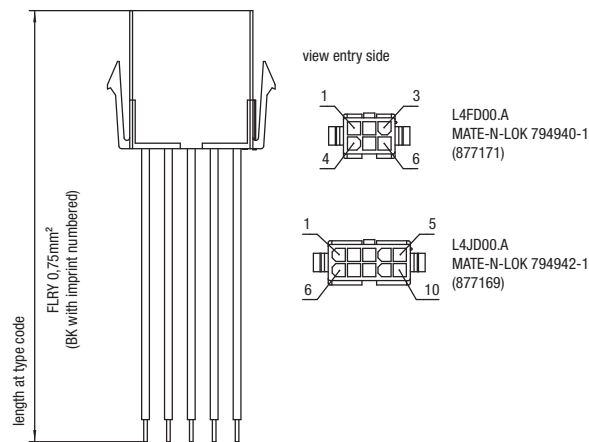
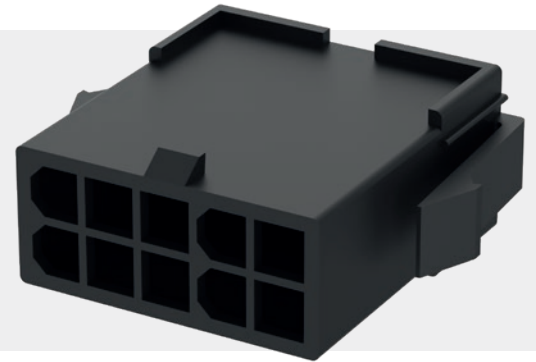
L2P K00	A	Molex Micro-Fit
		Cable length
	1	1 m ± 30 mm
	3	3 m ± 40 mm
	5	5 m ± 60 mm
	0	10 m ± 80 mm

CABLE SETS

MATE-N-LOK L4.D00.A

PRODUCT CHARACTERISTICS

- Suitable for elobau joystick grips
- Suitable for outdoor use, IP54



MATERIAL INFORMATION

	L4.D00.A
Cable material	PVC

ENVIRONMENTAL CONDITIONS

	L4.D00.A
Operating temperature min./max.	-40...85 °C
Storage temperature min./max.	-40...85 °C
Cable temperature range, moving, min./max.	-25...85 °C

CONNECTION

	L4.D00.A
Connector type	Mate-N-Lock
Cable type	FLRY

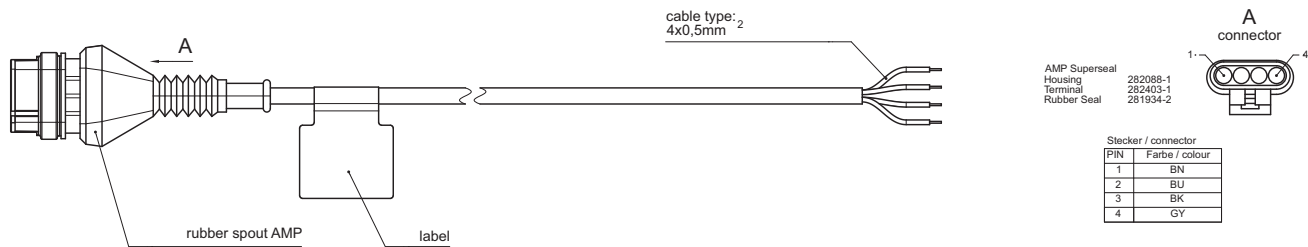
ORDERING KEY

L4		D00	A	MATE-N-LOCK
				Connection pins
	F			6-pin
	J			10-pin
				Cable length
		1		1 m ± 30 mm
		3		3 m ± 40 mm
		5		5 m ± 60 mm
		0		10 m ± 80 mm

AMP Superseal 1.5 LODC00.B

PRODUCT CHARACTERISTICS

- Suitable for elobau standard joysticks with CAN output
- Suitable for outdoor use, IP67



MATERIAL INFORMATION

	LODC00.B
Cable material	PVC

ENVIRONMENTAL CONDITIONS

	LODC00.B
Operating temperature min./max.	-40...85 °C
Storage temperature min./max.	-40...85 °C
Cable temperature range, moving, min./max.	-25...80 °C

CONNECTION

	LODC00.B
Connector type	AMP Superseal 4-pin

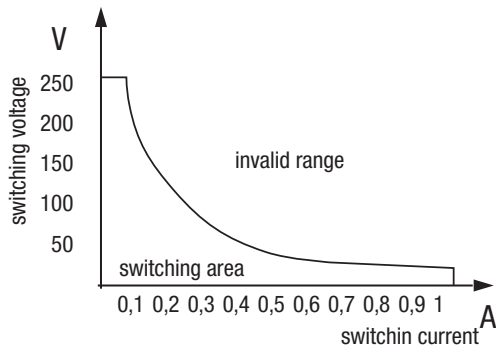
ORDERING KEY

LO	D	C00	B	AMP Superseal 1.5
				Cable length
		1		1 m ± 30 mm
		3		3 m ± 40 mm
		5		5 m ± 60 mm
		0		10 m ± 80 mm

Switching power limits

The displayed current-voltage curve primarily applies to magnetic proximity switches with integrated reed contacts.

Please note: Neither the switching current (A) nor the switching power (VA/W) may be exceeded under any circumstances.



Electrical overload causes

Incandescent lamps draw up to 20 times as much current when switched on as their nominal value (the switch-on current of a 5 W bulb at 24 V switching voltage can, for example, be up to 2.5 A). Capacitors (capacitive loads) essentially constitute a short-circuit during the switching-on. This also includes lengthier control cables, because wires that lie parallel to one another function like a capacitor. With cable lengths of 20 m or more, the capacitive loads that occur as a result of this can become critical. Electromagnetic coils (contactors, relays, solenoid valves) induce very high voltages when switched off. In practice, values of far more than 1000 V can be attained.

If there is doubt as to the type of load, we recommend that you refer to the "Contact protection measures" section or ask for our advice.

Mechanical overload causes

Reed contacts are reliably insensitive to impact. Over 100 g of force is required to cause misalignment. This amount of force rarely occurs in normal operation but could take place if the device fell from height onto a workbench, or if handled incorrectly with force.

Under normal conditions the reed contacts are reliably protected by the housing. Care must be taken to avoid causing damage to the housing by such means as impact by hitting it or by over tightening mounting screws.

Please also refer to our range of switches with an integrated relay output. In addition to the types listed, other versions are available on request.

Service life of a reed contact

Reed switch: Depending on the load conditions, the service life of reed contacts is between 10^6 - 10^9 operating cycles. Because the contact material used remains fracture free even after 3×10^9 operating cycles, a minimum of 3×10^9 operating cycles can be expected.

Connection cable

The standard version has a 1m long PVC cable which has a cross section of $0.5 - 0.75 \text{ mm}^2$. For smaller devices or lower power, the wire cross-section is $0.14 - 0.5 \text{ mm}^2$.

Temperature resistant switches are equipped with silicone tubing cable. Other versions, e.g. Teflon, shielded cable, heat resistant PVC cable, are available on request.

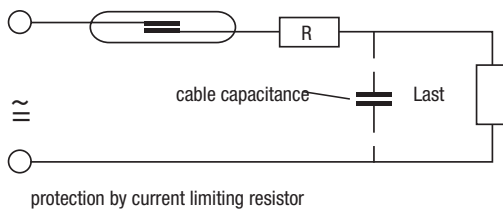
Please note: PVC cable must be firmly fixed at temperatures below $-5 \text{ }^\circ\text{C}$.

Contact protection measures

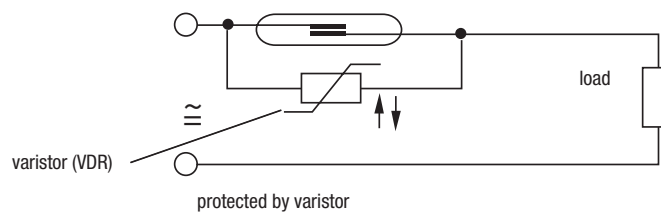
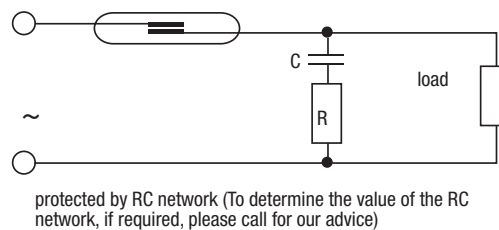
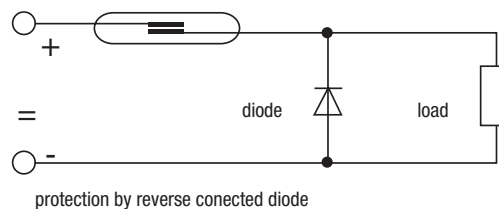
With reed switches, the specified values for switching current and voltage must not be exceeded, not even briefly. For capacitive and inductive loads (long cables and relays/contactors), we recommend a protective circuit.

High starting current loads, such as those that occur with capacitors or incandescent lamps, can be compensated to a certain extent by series resistors. These series resistors then limit the maximum value for the reed contact.

Capacitive load



Inductive load



MATERIAL SPECIFICATIONS

PLASTICS

	Systematic name	Properties	Possible applications	Temperature range
ASA	Acrylonitrile-styrene acrylate copolymers	Very good chemical resistance, very good resistance to aqueous media, scratch-resistant surfaces, weather-resistant	Electrical devices subjected to high temperatures, exterior vehicles	-20°C...100°C
CR	Chloroprene rubber	Good resistance to ozone, weathering, ageing and salt water	Hoses, cable sheaths, seals	-40°C...100°C
EPDM	Ethylene propylene diene monomer rubber	High thermal resistance, high elasticity, good chemical resistance	Seals, bellows	-50°C...150°C
GF	Fibreglass	Good mechanical strength, temperature resistant	Additive in plastics for improvement of characteristics (GFRP)	-278°C...1000°C
NBR	Acrylonitrile-butadiene rubber	Resistant to swelling, low-temperature flexibility, high resistance to fats and oils	Seals, bellows	-30°...100°C
PA	Polyamide	Good mechanical strength, temperature resistant	Carrier parts, plastic cover parts, machined parts	-40...100°C
PBT	Polybutylenterephthalate	High mechanical strength, temperature-resistant, chemical-resistant, flame-retardant version possible	Oils, greases, solvents, machined parts	-50°C...150°C
PEEK	Polyetheretherketone	Good sliding and friction characteristics, excellent wear resistance, highest heat resistance	Bearings, sockets	-40°C...260°C
PVC	Polyvinylchloride	Good mechanical strength, good chemical resistance, weather-resistant, paintable and printable	Pipes, cables, flanges	-30°C...65°C

METALS

	Material	Properties	Possible applications	Temperature range
Al	Aluminium (refined)	High mechanical strength, lightweight	Machine and tool manufacturing	-40...100°C
GD-Zn	Zinc die-cast	Good strength, good resistance		-60...220°C

CONVERSION TABLE LENGTH

cm	→	inches	× 0.3937
mm	→	inches	× 0.03937
cm	→	feet	× 0.03281
m	→	feet	× 3,281
m	→	inches	× 39.37
inches	→	mm	× 25.4
feet	→	cm	× 30.48

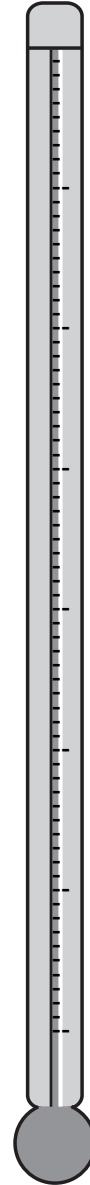
CONVERSION TABLE TEMPERATURE

°C	→	°F	$\times (\text{°C} \times 9/5) + 32$
°F	→	°C	$\times (\text{°F} - 32) \times 5/9$
°C	→	°K	$\text{°C} + 273.18$

THREAD

Thread	External diameter (mm)	Internal diameter (mm)
PG7	12.50	11.30
G 1/8"	9.73	8.57
G 3/8"	16.66	14,95
G 3/4"	26.44	24.12
G 1"	33.25	30.29
G 1 1/2"	47.80	44.85
G 2"	59.61	56.66
1/8" NPT	10.24	8.25
1/4" NPT	13,62	10.70
1/2" NPT	21.22	17.40
3/4" NPT	26.57	22.60
1" NPT	33.23	28.50
1 1/2" NPT	48.05	43.50
2" NPT	60.09	55.00




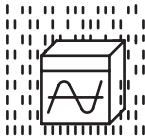








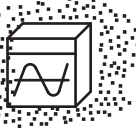
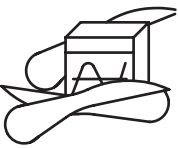


°C	°F
550	1022
260	500
250	482
220	428
200	392
180	356
160	320
150	302
140	284
135	275
130	266
125	257
120	248
110	230
105	221
100	212
85	185
80	176
75	167
65	149
55	131
50	122
40	104
20	68
0	32
-10	14
-15	5
-20	-4
-25	-13
-40	-40
-55	-67
-60	-76
-200	-328



IP PROTECTION CLASS IN ACCORDANCE WITH DIN EN 60529

The test and marking procedure for housing protection classes of electrical devices, particularly the procedure against water, is described in detail in standard DIN EN 60529.

Up to class 6 it is determined that the specifications of the lower classes are automatically met. In higher protection classes, each class must be tested separately and marked accordingly (e.g. IP67/IP66).

First digit	Protection class for protection against contact and foreign objects	Second digit	Protection class for water protection
0	 No protection	0	 No protection
1	 Protected against penetration of solid foreign objects ≥ 50 mm diameter (e.g. back of hand)	1	 Protected against dripping water
2	 Protected against penetration of solid foreign objects ≥ 12.5 mm diameter (e.g. finger)	2	 Protected against dripping water when the housing is tilted up to 15°
3	 Protected against penetration of solid foreign objects ≥ 2.5 mm diameter (e.g. tool)	3	 Protected against water spray
4	 Protected against penetration of solid foreign objects ≥ 1.0 mm diameter (e.g. wire)	4	 Protected against splashed water
5	 Dust protection	5	 Protected against water jet
6	 Dustproof	6	 Protected against heavy water jet
		7	 Protected against the effects of temporary submersion in water
		8	 Protected against the effects of continuous submersion in water
		9K	Water which is directed at the housing from any direction under high pressure must not have any harmful effect.

Type	Designation	Chapter	Page
225MA midi	Modular armrest	3	16-23
361G / 362G	Joystick grip	4	26-29
351G	Joystick grip	4	30-33
341G / 342G	Joystick grip	4	34-37
J4 / J5	Robust joystick base	4	38-43
J4F	Robust joystick	4	44-47
J6	Robust joystick base	4	48-53
J2	Compact joystick	4	54-59
J1	Mini joystick	4	60-65
JFT	Fingertip joystick	4	66-69
J3	Fingertip joystick	4	70-74
J7	Robust joystick	4	76-81
175D	Thumbwheel switch	4	82-86
151DT01	Thumbwheel switch	4	88-90
145	Push button switch	4	92-96
145NT	Nano push button switch	4	98-102
145MR / MG	Micro push button switch	4	104-107
145MT..A / ..D	Micro push button switch	4	108-111
145MA	Micro push button switch	4	112-115
151PT0	Power take-off switch	4	116-119
145PT0	Power take-off switch	4	120-123
145DW40A	Rocker switch	4	124-127
145MD	Double push button switch	4	128-131
151LSS	Steering column switches	4	132-135
351RHS	Lever switch	4	136-139
151U	Universal switch	4	140-143
151SL	Universal switch shuttle lever	4	144-150
351H008	Hand throttle	4	152-155
351CM007	CAN module	4	156-158
L1FD00.B	Cable set Deutsch DT 06-6S	4	159
L2.D00.A	Cable set Molex Mini-Fit	4	160
L2PK00.A	Cable set Molex Micro-Fit	4	161
L4.D00.A	Cable set MATE-N-LOK	4	162
LODC00.B	Cable set AMP Superseal 1.5	4	163



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