

OTTO[®]

Expect Excellence.

SWITCHES
GRIPS
JOYSTICKS



HALL EFFECT TECHNOLOGY
OPERATOR CONTROL MODULES
VALUE ADDED PRODUCTS AND SOLUTIONS



iS Rayfast

SHORT FORM CATALOG

AEROSPACE AND MILITARY GRIPS

For over 50 years, OTTO has built a reputation for innovative engineering capabilities and adherence to the highest quality standards. Our switches and controls perform every day in some of the toughest applications in the world, from Military Ground Support Grips, Throttle Quadrant and Control Grips for fixed-wing aircraft, to Helicopter Cyclic and Collective Grips. OTTO houses a complete MIL-I-45208, as well as ISO 17025 (A2LA), onsite test lab facility with environmental, mechanical, electrical and audio test capabilities. Registration to ISO 9001:2008, AS9100C and FAA Part 145 Repair Station. Our experience in the design and manufacturing of precision switches and grips have made us a supplier to all flight control manufacturers. With an emphasis on sealed-switch technology and custom electromechanical switch design and development, OTTO has a solution to meet the most demanding applications.

Flight Control Grips

- **B8 & Cobra style grips are made in accordance with MIL-DTL-25561**
- **Most ergonomic version on the market**
- **Non-reflecting, non-hygroscopic, rugged injection molded grips**
- **Choice of termination styles—from integral connectors to wire harnesses**
- **Threaded disconnect or tube mounting**
- **Can be populated with MIL qualified switches, standard or custom configurations**



Cyclic Grip



Collective Grip



Military Ground Vehicle Grips

- **Custom machined heads available to fit standard handles**
- **Backlighting options**
- **Custom head can be outfitted with a variety of OTTO switches**



Cobra Style Grip



B8 Style Grip

Throttle Control Grips

- **Control for fixed-wing aircraft**
- **Custom toggle & rocker switches can be used to meet high cycle requirements**



Throttle Grips



Specifications Subject To Change Without Notice

AEROSPACE AND MILITARY GRIPS

Helicopter Cyclic & Collective Grips

- Grips have thin-wall, investment cast aluminum construction for high strength & low weight
- Modular construction
- Custom heads & switch mounting plates can be fabricated to fit standard handles
- Available with switch access panel for easy repair & maintenance
- A variety of button colors & style options available
- Transducer & electromechanical trim switch options



Systems Grip



Collective Grip with Thumbwheel Switch and NVG Backlighting



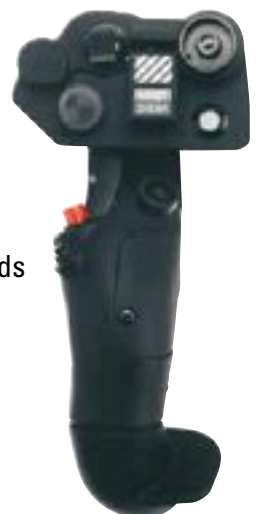
Modular Design



Cyclic Grip



Cyclic Grips with Custom Switch Guards



SMALL AND MEDIUM UNIVERSAL GRIPS

The G3 Universal Grips can be customized for top-of-the-line machines requiring high switch content, or to provide only basic control functions on lower tier units. The OTTO G3 Universal Grips have a modular design and were developed for use with OTTO's standard pushbuttons, rockers, toggles, Hall effect switches and the JH and JHM series Hall effect joystick. Both the Small Universal Grip and the Medium Universal Grip are easily customized with multiple switch configurations, quickly and without tooling charges. Soft touch versions available.

Universal Grips

- **Modular design eliminates the need for tooling charges**
- **Compatible with the OTTO JH and JHM series Hall effect Joysticks**
- **Standard and custom configurations**
- **Accommodates a full line of pushbutton, rocker, toggle, HP Hall effect & HPL proportional output series of switches**
- **Various mounting & termination options available**
- **Includes mounting adapter with boot ring**

Standard Configurations



Custom Configurations



Specifications Subject To Change Without Notice

HEAVY EQUIPMENT COMMERCIAL GRIPS

OTTO serves agriculture, off-highway, material handling and specialized industrial equipment markets. If your application cannot be met with one of our standard grips, OTTO can help design and build a truly custom made solution, utilizing state-of-the-art 3-D solid modeling work stations. Our grips can be manufactured with an almost unlimited variety of switches, custom termination and custom mounting options. OTTO is a vertically integrated facility offering in-house rapid prototyping using FDM (fused deposition model); in-house precision machining; progressive die stamping; injection, insert and compression molding; cable and over-molding assembly capabilities. All OTTO products are manufactured under an ISO 9001:2008 approved quality system, ensuring the greatest value and the highest performance for our customers. Soft touch versions available.

Heavy Equipment & Material Handling Grips

- Rugged injection molded grip can be outfitted with a variety of OTTO switches
- Ergonomic design for extended use
- Custom designs
- Left-handed, right-handed or universal orientation available
- Comfortable Soft Touch Grip available



Universal Orientation



Right-handed Orientation



Left-handed Orientation

Soft Touch Grips



Ergonomically Designed Contour Grips reduce muscle strain allowing for extended use with minimal fatigue.

Agricultural Grips

- Powder-coat, cast aluminum grip & steel mounting brackets available
- Can be outfitted with a variety of OTTO switches



Palm Grips



Tractor Grips

- Rugged thermoplastic
- Can be outfitted with a variety of OTTO switches

DUAL GRIPS

The G3-0360 is a durable, lightweight game style grip. Its ergonomic design allows for comfortable extended use and its molded body eliminates the need for tooling charges. The G3 dual grip remote accommodates OTTO's standard HTL and P7 series switches, with your choice of button styles and colors. Ideal for controlling unmanned vehicles, unattended ground sensors and other remote controlled applications.

Features:

- Standard USB or serial interface
- Readily available options include HTL series and P7/P9 switches
- Lightweight, ergonomic design for comfortable use
- Excellent proportional control
- Switches sealed to IP68S
- Switches provide excellent EMI/RFI shielding
- RoHS/WEEE/ Reach compliant
- Custom configurations available

Dual Grip Standard Configurations



Custom Configuration



Dual Grip 3D Printed Prototype - Saves time and money during the custom design creation process

Specifications Subject To Change Without Notice

HALL EFFECT PUSHBUTTON SWITCHES

Designated the HP7 series, these momentary pushbutton switches utilize Hall effect sensor technology for long life contactless switching. Available in dusttight and moistureproof sealed configurations, these switches can also be watertight sealed to IP68S.

This rugged switch is designed to withstand harsh environments while being subjected to high rates of actuation. Applications that require repeated "jogging" and other continuous operations are prime applications for the HP7 Hall Effect Switch. Examples of such can be found in material handling equipment such as loaders, lift trucks, bucket and shovel, and other applications where positioning of the load is critical.

HP7 Features:

- 10 million cycle life
- Hall effect sensor technology for long life
- Moistureproof & dusttight to IP64 or watertight to IP68S
- Stylish dome-shaped buttons in 9 colors
- Momentary action
- Choice of termination styles
- Mechanical detent available for tactile feedback
- RoHS/WEEE/Reach compliant



Raised dome HP7 with wire leads



Exposed dome HP7 with wire leads



Raised dome HP7 with 3-pin header

The HPL Hall Effect Linear Output Pushbutton Switch is a revolutionary switch utilizing Hall effect technology to provide the user an output proportional to the travel of the button. The HPL is offered as a stand-alone switch and in a dual HPL rocker assembly.

This rugged switch is ideal for applications where a simple on/off control is insufficient and a linear output is desired. Using the HPL, an operator can control the motion of a device as well as the speed of the movement. The HPL switch is an ideal control device for valves and variable speed drives, and can be used in industrial control, heavy equipment and material handling applications.



HPL-3

5/8" thread front mount with dome button and wire leads



HPL-4

15/32" thread rear mount with wire leads

HPL Features:

- Programmable outputs of 0.5 to 4.5 volts
- 10 million cycle life
- Hall effect for reliable contactless switching
- Watertight per IP68S available
- Front or behind panel mounting
- Choice of termination styles
- Rocker version available
- RoHS/WEEE/Reach compliant

HALL EFFECT THUMBWHEEL SWITCHES

The HTW Hall Effect Proportional Output Thumbwheel is a durable return-to-center, single axis thumbwheel with an actuator that provides linear change in voltage output in either direction from the center. Redundant option available.

HTW Features:

- Variety of button & bezel colors
- 8 output options
- Snaps into 1.47" x 0.71" panel opening
- Rocker switch style mounting
- 3 million cycle rotational life
- Electronics sealed to IP68S
- Excellent EMI/RFI immunity
- Detent options available
- RoHS/WEEE/Reach compliant



Knurled wheel
return-to-center
HTW with wires

Paddle wheel
style and pinned
termination also
available

OTTO's HTWE control is a return-to-end, single axis, proportional output thumbwheel. Redundant option available.

Paddle wheel
return-to-end
HTWE with wires

Knurled wheel
style and pinned
termination also
available



HTWE Features:

- Variety of button & bezel colors
- 6 output options
- Rocker switch style mounting
- Snaps into 1.47" x 0.71" panel opening
- 1 million cycle rotational life
- Electronics sealed to IP68S
- Excellent EMI/RFI immunity
- RoHS/WEEE/Reach compliant

The HTWF Friction Hold Thumbwheel offers a maintained position, single axis thumbwheel actuator that provides a linear change in voltage output in either direction from center. Redundant option available.

HTWF Features:

- Variety of bezel & button colors
- 8 output options
- 250,000 cycle life, full forward/full backward with center detent
- Maintained control positioning
- Snaps into 1.47" x 0.710" panel opening
- Electronics sealed to IP68S
- Excellent EMI/RFI immunity
- RoHS/WEEE/Reach compliant



Paddle wheel
friction hold
HTWF with pins

Knurled wheel
style and wire
termination also
available

Specifications Subject To Change Without Notice

HALL EFFECT THUMBWHEELS AND ROCKERS

The HTWM offers the same performance and features as the standard return-to-center HTW Proportional Thumbwheel but with a much shorter behind panel depth of 0.96" max., ideal for use in grip, armrest and panel applications. Redundant option available.

Knurled wheel
HTWM with pins



Wire termination
also available



Paddle wheel
HTWM with pins

The HTWME offers the same performance and features as the standard HTWE return-to-end, proportional output thumbwheel, but has a much shorter behind panel depth. With a panel depth of 0.96" max., the HTWME is ideal for panel or armrest mountings, or can be incorporated into one of OTTO's joysticks. Redundant option available.



Knurled wheel
HTWME with
wires

Paddle wheel
style and pinned
termination also
available

Tested to 10 million cycles, the HPL-R Hall Effect Rocker Switch uses two linear output Hall effect pushbutton switches for reliable contactless switching.

HPL-R Rocker
with wires

Pinned
termination
also available



The HFNR, Hall Effect Forward/Neutral/Reverse Rocker, is compact, robust and reliable, ideal for grip or panel mount applications. This 3-position switch provides operator comfort by reducing the movement required to change direction or switch gears.



HFNR Features:

- 3 million cycle life, full forward to full backward
- Choice of bezel and button colors
- 2V to 24V LED backlighting options
- Electronics sealed to IP68S
- Outstanding EMI/RFI immunity
- Snap-in panel mounting—accepts multiple panel thicknesses
- RoHS/WEEE/Reach compliant



HALL EFFECT FINGER JOYSTICKS & PADDLES

The HTL Linear Hall Effect Finger Joystick provides all of the performance of a full size, dual axis joystick in a miniature package that can be mounted in control handles, armrests and panels. Programmable sensors with built-in temperature compensation ensure consistent and repeatable operation. The HTL series has excellent tactile feel for improved operator control. A wide variety of output configurations are available to satisfy different applications.



HTL4 with Bat Handle Style Button

HTL Features:

- Designed for grip, armrest & panel mounting
- Available in 2-way linear and 4-way linear styles
- Wire or pinned terminations
- Redundant outputs available
- 1 million cycles
- Electronics watertight to IP68S
- Outstanding EMI/RFI immunity
- RoHS/WEEE/Reach compliant



HTL2 with Tall Concave Stadium Button Style



HTL4 with Castle Style Button

The HPW series is available with eight output options. The HPW series offers a self-centering single axis actuator that provides linear change in voltage output in either direction from center. Options include increasing or decreasing voltage output in either direction from center position to the full travel position in either direction, and single or dual outputs in either direction. The HPW series provides a one million cycle full forward to full back life and the electronics are sealed to IP68S, all the while offering outstanding EMI/RFI immunity.

HPW Lever Style



HPW Paddle Style

HPW Features:

- Designed for grip, armrest & panel mounting
- Proven contactless analog output Hall effect technology
- 8 output options available
- Self-centering, single axis actuator
- 1,000,000 mechanical life
- Electronics watertight to IP68S
- Outstanding EMI/RFI immunity
- RoHS/WEEE/Reach compliant

Specifications Subject To Change Without Notice

HALL EFFECT JOYSTICKS

The JH Series Joystick is designed around the rugged mechanism of a traditional 2-way and 4-way hydraulic joystick, but it utilizes contactless Hall effect technology for increased life and more dependable performance in the field. This combination provides performance and features never before available in an electronic joystick. The JH series uses OTTO's field-proven dual magnet configuration found in OTTO's HPL Linear Output Hall Effect Switches. The Hall effect sensors are fully protected against electromagnetic and radio frequency interference (EMI and RFI) up to 100V/M. Programmable sensors with built-in magnetic temperature compensation logic ensure consistent and repeatable operation. The JH series is designed for maximum flexibility in features and in tactile feel. A wide variety of input and output configurations are available to satisfy different applications. The modular electronic package can be configured for both standard and custom I/O requirements including CANbus and other output options available.

JHM Medium Joystick
with Hall Effect Rocker



JH Large Joystick
shown with Small
Universal Grip



JHS-F Single Axis
Friction Hold Joystick



JHT Miniature
Z-Axis Joystick
with Pushbuttons



JHS-RC Single Axis Spring-
Return-to-Center Joystick
Also Available

JHT Miniature
Joystick with a
Pushbutton



OTTO - CUSTOM AND VALUE ADDED

The new Operator Control Module from OTTO is a great example of a multi-use device with joystick and keypad functionality combined into one active assembly. While the technology drives the increased capabilities, the organization drives the project, and a structured value added infrastructure is now essential to succeed in this arena.

This begins with:

- A team of technical sales personnel who can translate the customer's needs into a robust and complete technical document
- An engineering team who is knowledgeable of the latest standards, protocols, software and interfaces
- A complete and capable manufacturing environment that includes rapid prototyping, machining, molding, tooling, stamping, assembly and quality testing



OTTO's Operator Control Module

OTTO engineers and designers utilized an optimized product development process to develop this CAN driven device for a forestry tractor application. This particular forest tractor cab is like a command center on tracks and is loaded with individual components that must be networked together. The plug and play CAN environment allows the component suppliers to provide a value added service when developing new interfaces. The OEM can easily provide an interface document indicating the protocol to be followed along with the functionality of the accessory or control device. The component supplier can then provide a component that will plug in at the node in the CAN system that the OEM requires. All messaging, error handling and prioritization hierarchy is specified, guaranteeing that the unit will work as soon as it is plugged into the network.



Operator Control Module CAD Design

As companies such as OTTO continue to show success in this arena, it only helps that the rapid product development infrastructure is clearly in place to create custom configurations and promote enduring success. While the engineers work on the components and interfaces, the machine shop can provide rapid prototypes of the conceptual product. This prototyping capability provides production-grade thermoplastic models from CAD designs that are accurate and repeatable. By creating these custom configurations, a customer is able to evaluate the overall look and feel of a product within days, rather than the weeks or months it could take if a standard tooled and molded prototype is used.

DED PRODUCTS AND SOLUTIONS

This gives the customer the opportunity to refine the ergonomics and design requirements and produce multiple prototypes prior to spending valuable dollars and time on standard tooling. Working these projects simultaneously completes the project in less time while assuring the quality and performance of the design.

Rapid prototype development provides numerous advantages:

- Shortened development cycle
- Quality improvements by testing on site at each step of the project
- Reduction in the overall development and manufacturing cost



3D Printed Left-Handed
Contour Grip
(Front and Back)

Reduce Suppliers

Save Time

Save Money

By leveraging a value added manufacturing program, one company can provide distinct, yet cohesive teams to design, manufacture and fully certify solutions that allow for one stop new product development.

Another way customers can save time is by downloading our Full Line Catalog App. It is available in three different formats:

- E-Catalog for the PC - Available at OTTO's website: www.ottoexcellence.com
- Apple Tablet App - Available at the Apple App Store by searching "OTTO Engineering"
- Android Tablet App - Available at the Google Play Store by searching "OTTO Engineering"

They have been carefully designed to provide easy access to the most current version of the OTTO Controls catalog and includes great, easy to use features such as search, favorite, e-mail, print and build a part. Product categories are broken down into four quadrants: Electromechanical, Grips, Hall Effect Controls and Joysticks.

The apps give you free easy access to:

- Features
- Descriptions
- Specifications
- Part Number Codes
- Drawings
- Schematics
- And More



Specifications Subject To Change Without Notice

BASIC SWITCHES

For use in spaces where cam or other limit actuators are used, miniature and subminiature basic switches are designed and qualified to meet military specifications. A variety of custom configured actuators for pushbutton, toggle and lever actuators are available.

B1-5 Ultra-Subminiature Basic Switches with Integral Actuating Levers



B1 Ultra-Subminiature Basic Switch

B2 Subminiature Basic Switch



B2-5 Subminiature Basic Switches with Integral Actuating Levers

B5 Miniature Basic Switch



B3 Subminiature Basic Switch with Auxiliary Lever Actuator

B3 Subminiature Basic Switch



End Terminal Style



Front Terminal Style

B5-7 Miniature Basic Switches

Basic Switch Features:

- Military per M8805 or commercial grades
- Miniature, subminiature and ultra-subminiature sizes available
- Low level to 10A loads
- Highly repeatable operation
- Long operating life
- UL recognized & CSA certified
- RoHS/WEEE/Reach compliant

Specifications Subject To Change Without Notice

LIMIT SWITCHES

P6 series switches are sealed against immersion and corrosive atmospheres. These switches are designed for rugged duty both mechanically and electrically. A one-piece stainless steel or nickel plated brass housing, sealed at the plunger with an O-ring seal and at the base with a glass-to-metal header option provides true environment-free sealing to comply with MIL-PRF-8805/39, MIL-PRF-8805/40, MIL-PRF-8805/43, MIL-PRF-8805/100 and MIL-PRF-8805/104. Most case parts are grounded for EMI reduction.

The P6 series is available with roller plunger styles for cam or slide actuation and pin plunger for in-line actuation. Contact factory for additional designs.

P6 series features the OTTO B2, B3 or B5 series snap-action basic switch. High contact pressure and unique contact design provides low contact resistance for low level switching as well as full rated service.



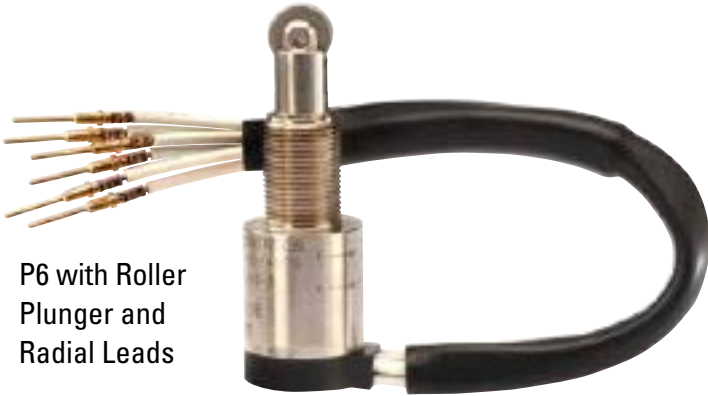
P6 with Pin Plunger and Radial Leads

- Limit Switch Features:**
- Complies with MIL-PRF-8805 sealing
 - One-piece housing
 - Sealed at plunger with O-rings
 - Sealed at base with a glass seal
 - EMI reduction construction
 - Choice of pin or roller plunger
 - Choice of axial or radial leads
 - Reach compliant

P6 with Roller Plunger and Axial Leads



P6 with Pin Plunger and Axial Leads



P6 with Roller Plunger and Radial Leads

P6 with Pin Plunger and Radial Leads



P6 with Roller Plunger and Radial Leads



P6-3 Subminiature Over-Travel Plunger Style with Solder Terminals



P6-3 Subminiature Lever Style with Solder Terminals

Specifications Subject To Change Without Notice

PUSHBUTTON SWITCHES

OTTO offers the most diverse line of military and commercial pushbutton switches - all sealed, rugged, and reliable. Choose from thousands of standard parts or create your own custom pushbutton.

The **P1** momentary action military series (MS25089, 1 through 5) operates on our patented "rolling sleeve" providing longer life and smoother operation over a wide temperature range. The **P3** series is the commercial version of the P1 and offers IP68S sealed options. The **P4's** are auxiliary actuators for OTTO's basic switches. The **P5** alternate action switches match the P1, P3 and P8 for mixed function with common panel appearance. Our **P7** series is a sealed subminiature snap action switch, commercial or military grade, with thousands of parts that are qualified to MIL-PRF-8805/110. The **P3-D**, **P5-D** and **P7-D** dome series offer all seal options and a variety of housing and mounting styles. The **P8** compact series features a shortened behind panel depth while offering all the regular features of the P1 and P3 series. The **P8-V** is the vandal resistant version of the P8. The **P9** is a sealed dome pushbutton that withstands extreme shock and vibration. The **PE** series is MIL-PRF-8805/96 approved, while the **PE2** series is MIL-PRF-8805/99 approved.

OTTO's line of illuminated pushbuttons switches includes the **LP3**, **LP5**, **LP7-D** and **LP9** series. The **LP3-V** and the **LP5-V** are vandal resistant versions.

Illuminated Pushbuttons -



LP3-3 Custom with Green LED



LP3-E Exposed Dome with Amber LED



LP3-F Flush Dome with Red LED



LP3-F with Amber LED and Legend



LP5-6 Rear Mount with Green LED



LP9 Flush Button Style with Green LED



LP7-D Raised Dome with Red LED and Matte Finish



LP7-D Flush Dome with Blue LED



LP9 Group with White LEDs

Vandal Resistant Illuminated Pushbuttons



LP5-A with Blue LED and Black Aluminum Case



LP5-V with Green LED and Stainless Steel Case



LP3-A with Red LED and Black Aluminum Case



LP5-A with New Deep Green LED and Black Aluminum Case

Specifications Subject To Change Without Notice

PUSHBUTTON SWITCHES

Pushbuttons -



PE Momentary
Action MIL-
PRF-8805/96



P1-8 Momentary
Action MIL-
PRF-8805/3



P3-6 Sealed
Momentary
Action



P3-3 Sealed
Momentary
Action



P4-3 Auxiliary
Actuator for Basic
Switches



P7 Subminiature Series
Momentary Action
MIL-PRF-8805/110



P3-D Sealed Flush
Dome Momentary
Action



Custom P3 with
Wire Leads



P5-1 Alternate
Action, Sealed
Options



P5-3 Alternate
Action, Sealed
Options

P5-D Alternate
Action Flush
Dome, Sealed
Options



P8-V Compact
Momentary Action
Vandal Resistant

P7-D with
Flush Dome,
Sealed Options



P8-8 Compact
Momentary Action
(Push Pull Option)



P9-2 with Raised
Dome and White
Case



P9 Series - Sealed Momentary Action
Also Available with Matte Finish

ROTARY, SLIDE & TRANSDUCER SWITCHES

OTTO's J2 transducers are strain gauge based, force transducer switches. They provide analog output proportional to the force applied to the button. Normally mounted in a grip and operated by a finger or thumb, common applications include flight control of aircraft, operating ground vehicles, target acquisition and air traffic management.

Transducer Switch Features:

- Enclosure dusttight to M8805 Design 2
- Null temp coefficient $\pm 0.4\%$ of full scale per degree C
- Hysteresis $\pm 0.5\%$ of full scale within one second after release
- Sensitivity temperature coefficient $\pm 2\%$ full scale per degree C
- Operating temperature range -40°C to $+71^{\circ}\text{C}$



The SL series slide switch is offered in both single and double pole, double throw configurations and low level ratings. Three-position center off with momentary or maintained switch action is available in any combination. The slide switch is supplied in both commercial and military grades. Button styles include raised or flush contours.

SL Slide Switch Features:

- Single and double pole, double throw switch configurations
- Low level up to 5A loads
- 100,000 cycle mechanical life
- Dusttight to MIL-PRF-8805 Design 2
- Choice of button color
- FAA/PMA available



J2-S2 with Flat Button Style



J2-S3 with Conical Hat Button Style



J2-S1 with Conical Hat Button Style

Used in the heavy equipment, marine, process control and instrumentation markets, OTTO's R2 series rotary switches are an excellent replacement for rocker switches, offering improved visual position indication, additional lighting options and different styling opportunities on front panels. The R2 snaps into a 1.475" x 0.875" industry standard rocker switch panel opening.

R2 Rotary Switch Features:

- Sealed watertight per IP68S
- Unique lighting options - up to 3 independent LED light positions
- Plastic or soft touch knob options
- 2 or 3 positions in all combinations of momentary & maintained action
- Reach compliant



R2 Rotary Switches

Specifications Subject To Change Without Notice

ROCKER SWITCHES

OTTO's rocker switches are precision designed to comply with standards established for appliance, marine (ignition protection), off-road vehicles and other demanding applications where rugged rocker switches are required. The snap-in rocker fits industry standard panel openings and snaps right into the panel from the front for simple mounting. The design supports a wide range of panel thicknesses. Existing applications can be easily upgraded to sealed functionality. Choose incandescent, neon, or LED illumination. Legends can be printed, lens etched or laser etched onto a button and backlit. Custom colors available.

Rocker Switch Features:

- Sealed up to IP68S
- Low level up to 20A
- Single and double pole circuits
- Mating connectors available on some styles
- UL recognized & CSA certified
- Incandescent, neon or LED illumination options
- Standard and custom legends available
- RoHS/WEEE/Reach compliant



K1 Single Pole Rockers



K2 Double Pole Rockers



K3 Rockers for Rugged Environments



K5 Rockers for Rugged Environments



U2-452 Hall Effect Rocker



U2 Custom Rocker



TOGGLE SWITCHES

OTTO's rugged, sealed and highly reliable toggle switches are available in a wide variety of toggle styles, bushing styles and terminal styles.

Toggle Switch Features:

- Sealed up to IP68S
- Military and commercial versions
- Single and double pole circuits
- Black matte finish available, contact factory
- Available in miniature and standard sizes
- RoHS/WEEE/Reach compliant



T7 - Double Pole with Bushing Seal



Custom T7 with Long Bat Handle

T7 series is a high performance switch that is submersible to IP68S and withstands direct water spray. A choice of models are offered to handle power levels to 16A, 0.5HP and low level electronic switching applications.

TE series is a MIL qualified, snap-action, non-teasible, positive make and break, panel mount miniature toggle switch. The TE is sealed per MIL-DTL-8834 and all metal components are corrosion resistant. Commercial version available.



Custom TE with Black Bat Handle

The K4 is a snap-in toggle switch that is a rugged, high performance, totally sealed switch designed for use under severe conditions. The K4 switch can handle low level switching up to 16A. Mounting is simple as it was designed to fit industry standard panel openings for a quick drop-in replacement. Illuminated designs available.



T1-0241



T1-0332

T1 toggles feature 2 or 3 positions, 1 to 8 poles and are available with a lever lock option. Many are panel sealed per MIL-PRF-83731. Available with a wide variety of bat handle styles, most T1's feature OTTO's B2 and B3 basic switches.



T3 with 15/32 Bushing and Lever Lockout in Center Position



T3 Double Pole with 1/4-40 Bushing

T3 series commercial and military miniature toggles are rugged, highly reliable switches with snap-action switch mechanism and toggle actuator design for non-teasible contact transfer.



Standard T9

Custom T9 with Lever Lock and Black Bat Handle



Commercial and military versions are available in the T9 series toggles. Environmentally sealed, the T9 is particularly suitable for applications in military, off-highway, aviation, commercial and industrial equipment.



K4 Snap-in Toggles



Specifications Subject To Change Without Notice

MINI AND LARGE TRIM SWITCHES

OTTO mini trims are toggle switches available in 2-way, 4-way, 4-way plus pushbutton, and 8-way versions. Numerous button styles are available on both the Commercial and Military grade switch versions. Mini trims are typically press fit into control grips or panel mounted using versions with an 11/16" threaded case. Mini trims are also available with multiple sealing levels to fit all applications.

The T1 Mini Trim is a single pole, double throw, center off, momentary contact (self return to center off) switch.



The T4 Mini Trim is a single pole, 4 throw, center off, momentary contact (self return to center off).



The T4-T toggle switch provides a 4-way momentary toggle action with detent providing a positive click action.

The T5 Mini Trim is a single pole, 4 throw plus center pushbutton, center off, momentary contact (self return to center off) switch.



The T8 Mini Trim is a single pole, 8 throw, center off momentary contact (self return to center off) switch.



OTTO's Split Trim switch uses 2 single-pole-single-throw momentary toggles with detent providing a positive click action. Each two-way switch can operate independently or simultaneously.

OTTO large trims are toggle switches that provide toggle and pushbutton action in one switch and are available in 2-way, 2-way plus pushbutton, 4-way, and 4-way plus pushbutton versions. Numerous button styles are available on both the Commercial and Military grade switch versions. Large trims are also available with multiple sealing levels to fit all applications. Low level options available.



T2-0015



T2-0004



T4-0111



T5-0026

SPECIAL DESIGNS

U2-351 Flight Grip Rocker Switch

Compact lightweight design for flight grips.



- **Shallow mounting depth**
- **ON-OFF-ON spring return to center**
- **2 circuit (N.O.–N.C.) switches**
- **Utilizes OTTO B3 Basic switches per MIL-PRF-8805/101**
- **Low level or standard rating**

U2-326 Park Brake

This heavy duty push-pull switch was designed specifically for off-road heavy duty equipment. With an electrical life of 200,000 cycles and watertight to IP68S, the U2-326 park brake switch can withstand the most demanding applications.



P1-90158 4-Pole Emergency Pushbutton

To prevent inadvertent actuation, the operator's finger must be directed into the protective cup before the OTTO high-force pushbutton switch can be energized. Designed as an aircraft jettison switch, this deep shrouded configuration can be adapted and applied wherever precise, no-error pushbutton switching is required. Edge backlit for night vision operation



U2-451 Trim Switch

This low level trim switch is a double pole, double throw, center-off, three-position momentary switch. The U2-451 is made with three B2 basic switches and is ideal for the aviation industry.



P8 Custom Call Button

This custom call button uses the P8 pushbutton switch style "G" case. This durable switch is sealed to IP64 and tested to 1 million mechanical cycles.



P1-30075 Large Diameter Pushbutton

Red anodized aluminum alloy mushroom style button that is free to rotate 360°. Button diameter is 1.187" and is mounted on a Type P1 style "C" body.



U2-053 Door Interlock Switch

Features a defeat function. Normal logic requires the assembly to be mounted so the switch button is engaged by the actuator when the door is closed. When the door is opened, the spring disengages the actuator to turn off the machine. The assembly features an OTTO B3 double break snap-action basic switch.



U2-016 Trigger Switch

This precision trigger switch has an actuating force of 2.25 lbs. to make the first pole; 6.5 lbs. passing through a detent to actuate the second pole. Rated 7 amps @ 28VDC. Qualified to M8805/111-01.



P3 Shrouded Pushbutton

This P3 pushbutton is designed to avoid accidental actuation of the switch because the actuation occurs below the height of the protective shroud. Enclosure design is dusttight per IP64 and the case is black anodized aluminum alloy.



Specifications Subject To Change Without Notice

ACCESSORIES AND HARDWARE

OTTO offers a vast array of standard accessories and hardware. We also design and fabricate shapes to meet your unique specifications and application needs.

Shrouds

Shrouds are added to pushbutton switches to guard against inadvertent actuation. The actuating device must be inserted into the shroud in order to actuate the switch.



Hexnuts and Washers

Mounting hardware such as keyway washers, internal tooth lockwashers, standard hexnuts and wire-locking hexnuts are available in a variety of bushing sizes.



Flip Guards

The flip guard assembly offers a maintained or momentary actuation for pushbutton switches with a 15/32 threaded bushing. The flip guard's main feature is a spring-loaded cover that locks in either an open or closed position. In the open position the switch operates freely; in the closed position the switch is protected from accidental operation. The momentary open position prevents the guard from remaining in an open position, reducing the chance of inadvertent actuation. The flip guard is easily installed from the front panel and offers an optional D-flat or mounting tabs to prevent any rotation during assembly.



Standard colors are red and black



Toggle Guards

OTTO's toggle guards are offered for 2 and 3 position switches with 15/32-32 threaded bushings and slotted or flat keyways. All models feature spring loaded covers that lock in either the open or closed positions. The toggle guard is easily installed on the switch from the front panel with two mounting hex nuts and may be used with an optional panel seal provided with each switch. Military qualified parts available.

Sealing Boots

While many of OTTO's switches are IP64 or IP68S, choose from dozens of sealing boots for pushbutton and toggle switches when additional protection is needed. OTTO's sealing boots come in a variety of sizes and colors. Military qualified boots available.



Panel Plugs and Gaskets

Place panel plugs in control panel spaces that do not currently require switches but may require switches in the future. OTTO's panel plugs are available for the K1, K2, K3, and K5 rocker switch series and the R2 rotary switch series. Panel gaskets for sealing are also available in two different thicknesses.



Anodizing

Anodizing provides a decorative, durable, corrosion-resistant finish to metal surfaces. Available in clear or a variety of colors.



OTTO[®]

Expect Excellence.

is Rayfast

2 Lydiard Fields, Swindon Wiltshire, SN5 8UB, United Kingdom
Tel: +44(0) 1793 616700 • Fax: +44(0)1793 644304
uksales@is-rayfast.com • www.is-rayfast.com

