## Panasonic ideas for life



## Limit Switches

General Catalogue 2005
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# Our ideas on compact Limit Switches. <br> Easy to use and highly functional, proven by our long years of market results. 

"Actuators that can be used for detection," "Iong life and high reliability," "highly accurate detection," "able to bear heavy loads," "easy installation and maintenance....."

## The essence of Limit Switches.

Matsushita Electric Works, Ltd. values this essence. Unique contact switching functions. A body that makes wiring easy. Able to handle low-level loads linked to PCs, the core of the FA era. Also, switching capacity with room to control heavy loads directly. These Limit Switches are not only compact and lightweight, but also they possess electronic responsiveness, contact reliability, long life, maintainability, economic value, and sensitivity, based on market needs. Compact Limit Switches. Ideas for easy control of the FA era.

- Wiring made simpler and faster
- Installation work standardized
- Operating checks easy

- Stout
(prevents external damage)
- Environment-resistant (dust-proof, drip-proof, oil-proof) - Longevity (need for maintenance and parts replacement reduced)
- Compact
(reduced attachment space)
- Contact reliability
(DC, low-level loads)
- Maintenance and safety guaranteed (with lamps and contact functions)
- Expanded detection functions (different kinds of actuators)
- Improved construction easy wiring and mounting (wiring and attachments)


## Compact horizontal type Limit Switches

## HL Limit Switches

High-capacity Limit Switches with excellent envi-ronment-proofing with a plentiful array of types, including connector type, low-level load model, and economic thermoplastic enclosure. The lowlevel load model has a highly reliable twin crossbar contact. Awarded the 1994 <if> prize.

## IP64



ML mini Limit Switches
Compact and lightweight, but mechanically highly sturdy. Also comes as a series with lamps and as a terminal mold model type.

## Door switches



Magnelimit
Secured by magnet Built-in switch detection
New dual-role switch in each unit.
Recommended for the following applications:


Suited to a wide variety of applications due to a broad array of actuators


## High contact reliability

With the use of our unique contacts and mechanism, we achieved a superior contact reliability and weld resistance, as well as a longer usable life.

Operation can be checked at a glance with the attached lamp


The load operation status can be checked easily at a glance. With both LED lamp type and neon lamp type, which can be connected directly to the load.

A high-level seal that satisfies IEC IP67


HL Limit Switches are compact and highly reliable with excellent environment-proof capabilities.

Improved reliability with the forced contact opening mechanism


DL limit switch area contacts can be forced open, even if the contact is welded.

## Easy wiring and installation



The terminal area of VL Limit Switches are fully open, making wiring easy.

Compact vertical type Limit Switches


VL mini Limit Switches
Uses Au-clad contact that can handle low-level loads with little chattering and bouncing. The series includes with LED lamp, with neon lamp, and touch switch.


## DL mini Limit Switches

The contact can be forced open due to the forced contact opening mechanism, even in the unlikely event of a welded contact. Awarded the 1989 <it> prize. Conforms to DIN standards.


Vertical type Limit Switches
A standards approved limit switch (standard model.) The type with lamp comes as both AC type (neon lamp) and DC type (LED lamp.)

## Limit Switches Selector Chart

| Classification |  |  |  | Compact size |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Product name |  |  |  | Limit Switche | (AZH) <br> (die cast case) | Limit Switch | (AZH) <br> (die cast case) | Limit Switc | (AZH) <br> (plastic case) | ML Mini <br> Limit Switches (standard) |
| AppearanceHead code |  |  |  |  | AZH2O 22 |  | AZH23 |  | AZH10 12 | AZ7 |
| Feature |  |  |  | - High sealability IEC IP67. <br> - Wiring is screw <br> - Low-level load available. | ity that satisfies -terminal type. type also | - High sealability IEC IP67. <br> - Less wiring, connector type <br> - LED lamp type | that satisfies ess installation also available. | - Low-level load <br> - Perfect for prioritize econ | ype available. plications that y. | - Switches installed with both eco nomical and compact Z-basic microswitches and limit switch protective construction. <br> - Coil spring system provides long life. |
| - |  |  |  |  | $\bigcirc$ |  |  |  |  | $\bigcirc$ |
| Abraion-proot type |  |  | IP64 |  | $\bigcirc$ |  |  |  |  | - |
| Surge-proot type |  |  | IP65 |  | $\bigcirc$ |  |  |  |  | - |
| Corrosion-proot type |  |  | IP67 |  | $\bigcirc$ |  |  |  |  | - |
| Oi-resistant type |  |  | - |  | $\bigcirc$ |  |  |  | ) | - |
| Neon |  |  |  | - |  | - |  | - |  | - |
|  | LED |  |  | - |  | $\bigcirc$ (with LED lamps) |  | - |  | - |
| Ratings (load resistance) |  |  |  | $\begin{gathered} \text { [Standard type] } \\ 5 A 125 \mathrm{~V} C \\ 5 \mathrm{~A} 250 \mathrm{~V} \text { AC } \\ 5 \mathrm{ABV} \mathrm{VC} \\ 5 \mathrm{~A} 4 \mathrm{~V} \text { DC } \\ 5 \mathrm{~A} 30 \mathrm{~V} \text { DC } \\ 0.5125 \mathrm{~V} \text { DC } \\ 0.25 \mathrm{~A} 250 \mathrm{VDC} \end{gathered}$ |  | [Bifurcated type] |  |  | $\begin{gathered} \text { [Bifurcated type] } \\ 0.1 \mathrm{Al25V} \mathrm{~V} \mathrm{AC} \\ 0.1 A 8 V \\ 0.1 \mathrm{~A} 14 \mathrm{VDC} \\ 0.1 \mathrm{~A} 30 \mathrm{~V} D C \end{gathered}$ | $\begin{aligned} & \text { 10A250V AC } \\ & 10 \mathrm{~A} 125 \mathrm{~V} \text { AC } \\ & 0.4 \mathrm{~A} 115 \mathrm{~V} \mathrm{DC} \end{aligned}$ |
|  |  |  |  | [Bifurcated type] 0.1 A 125 V AC $0.1 A 8 V D C$ 0.1 A30V DC | $\begin{gathered} \text { LEDlamps } \\ 0.11125 \mathrm{VAC} \\ 0.1 \mathrm{ABVDC} \\ 0.1 \mathrm{~A} 14 \mathrm{~V} D \mathrm{DC} \\ 0.1 \mathrm{~A} 30 \mathrm{~V} D \mathrm{C} \end{gathered}$ | with LEDlamps 0.1 A 24 V AC |  |  |  |
| Life (Min. ope.) |  | Mechanical |  |  | $10^{7}$ |  | $10^{7}$ |  | $10^{7}$ |  | $10^{7}$ |
|  |  | Electri |  | $5 \times 10^{5}$ |  | $5 \times 10^{5}$ |  | $5 \times 10^{5}$ |  | $2 \times 10^{5}$ |
| Operating force (max.) (hinge lever type) |  |  |  | $\begin{aligned} & 2.45 \mathrm{~N}\{2 \\ & 3.92 \mathrm{~N}\{ \\ & 11.8 \mathrm{~N}\{1, \\ & \text { (Plunger } \end{aligned}$ | 250gf\} 400gf\} 1,200gf\} r type) | $\begin{gathered} 2.45 \mathrm{~N}\{250 \mathrm{gf}\} \\ 3.92 \mathrm{~N}\{400 \mathrm{gf}\} \\ 11.8 \mathrm{~N}\{1,200 \mathrm{gf}\} \\ \text { (Plunger type) } \end{gathered}$ |  | $\begin{aligned} & 2.45 \mathrm{~N}\{250 \mathrm{gf}\} \\ & 3.92 \mathrm{~N}\{400 \mathrm{gf}\} \end{aligned}$ |  | $1.47 \mathrm{~N}\{150 \mathrm{gf}\}, 1.77 \mathrm{~N}\{180 \mathrm{gf}\}$, <br> $1.96 \mathrm{~N}\{200 \mathrm{gf}\}, 2.16 \mathrm{~N}\{220 \mathrm{gf}\}$, <br> $2.35 \mathrm{~N}\{240 \mathrm{gf}\}, 2.75 \mathrm{~N}\{280 \mathrm{gf}\}$, <br> 5.88 N \{600gf\} max. |
| Available actuators |  |  |  |  |  |  |  |  |  |  |
| Terminals |  |  |  | Screw terminal |  | Connector terminal |  | Screw terminal |  | Screw terminal |
| Wiring |  |  |  | Cabtire | code | Cabti | code | Cabti | code | Cabtire cable |
| Mounting pitch (Applicable screw) |  |  |  | 33mm 1.299inch (M4 screw) |  | 33mm 1.299inch (M4 screw) |  | 33 mm 1.299 inch (M4 screw) |  | 25.4 mm 1.000 inch (M4 screw) |
| Available standards |  |  |  | UL, CSA, | TÜV, CE | UL, CSA | TÜV, CE | UL, CSA | TÜV, CE | UL, CSA, TÜV, CE |
| Page |  |  |  | 14 |  | 14 |  | 14 |  | 29 |

Note: Excludes Limit Switch replacement parts
Actuators

| Push plunger | Roller plunger | Cross-roller plunger | Roller arm | Adjustable roller arm | Adjustable rod |  | Fork |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\text { ค } 月 \text { 色 }$ |  |  |  <br> 4 | 5 | 6 | 7 |  |


| Spring wire | Flexible rod | Hinge lever | Roller lever | One-way roller lever | Roller lever | Remote wire control plunger |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |

4

| Classification |  |  |  | Compact size vertical type |  |  |  | Vertic |  | Door switch |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Product name |  |  |  | DL mini Limit Switches | VL mini | Limit Switches |  | hly Reliab Limit S |  | Magnelimit |
| Appearance <br> Head code |  |  |  | AZD1 |  | AZ8 |  |  | AZ55 | AZC1 |
| Feature |  |  |  | －Excellent safety even if the contact point is welded，due to the forced contact opening mechanism． <br> －Block mount system makes parts replacement easy． <br> －Conforms to DIN standards． | －In addition to the characteris tics of stand mounted Limit Switches，is compact，easily installable，highly reliable，light weight，and economical． |  | － 6 available actuator types； Flexible design allows rotary type to be locked in any posi－ tion through 360deg．，actuator head to be moved to any of four directions，and roller lever to be faced in or out． <br> －Rugged aluminium die cast housing rated IP65；Conforms to DIN size standards 43694 \＆ 40430 for mounting distance and dimensions． <br> －Output contact（1 Form Z）rating 10 amps resistive． <br> －Screw connect terminals． |  |  | －Secured by magnet <br> －Built－in switch detection Dual－role switch in one unit． <br> －Construction possible with 100 V AC power． |
|  | Dust－proof type |  |  | $\bigcirc$ | $\bigcirc$ |  | － |  |  | － |
|  | Abrasion－proof type |  | IP64 | $\bigcirc$ | $\bigcirc$ |  | － |  |  | － |
|  | Surge－proof type |  | IP65 | $\bigcirc$ | － |  | $\bigcirc$ |  |  | － |
|  | Corrosion－proot type |  | IP67 | $\bigcirc$ | － |  | － |  |  | － |
|  | Oil－resistant type |  | － | － | $\bigcirc$ |  | － |  |  | － |
| $\begin{aligned} & \text { 亮 } \\ & \frac{\text { EN }}{\text { 空 }} \end{aligned}$ | Neon |  |  | － | － | $\bigcirc$ | － |  |  | － |
|  | LED |  |  | － | － | $\bigcirc$ | － |  |  | － |
| Ratings （load resistance） |  |  |  | $\begin{aligned} & \text { 6A250V AC } \\ & 6 A 380 V \text { AC } \\ & 5 A 24 V \text { DC } \end{aligned}$ | ［Standard type］ <br> 5A250V AC 5A125V AC 0．4A125V DC | ［With lamp type］ ［Neon lamp type］ <br> 5A 240V AC <br> 5A 125V AC <br> ［LED lamp type］ <br> 3A 24V DC |  | 10A125 6A250 0，8A11 |  | 5A 125V AC 5A 250 V AC 5A 30V DC |
| Life （Min．ope．） |  | Mechan | nical | $10^{7}$ |  | $0^{7}$ |  | 10 |  | $10^{5}$ |
|  |  | Electr | rical | $1.5 \times 10^{5}$ |  | $10^{5}$ |  | $5 \times 10$ |  | $3 \times 10^{4}$ |
| Operating force （max．） <br> （hinge lever type） |  |  |  | $\begin{aligned} & 6.37 \mathrm{~N}\{650 \mathrm{gf}\} \\ & 4.90 \mathrm{~N}\{500 \mathrm{gf}\} \\ & 3.29 \mathrm{~N}\{400 \mathrm{gf}\} \end{aligned}$ | $\begin{array}{r} 0.88 \mathrm{~N}\{90 \mathrm{gf}\}, \\ 8.83 \mathrm{~N} \\ 9.16 \mathrm{~N} \end{array}$ | $\begin{aligned} & 5.88 \mathrm{~N}\{600 \mathrm{gf}\}, \\ & \{900 \mathrm{gf}\}, \\ & \{200 \mathrm{gf}\} \end{aligned}$ | $26.67 \mathrm{~N}$ | $\begin{array}{r} \{2.720 \mathrm{gf}\}, \\ 1.39 \mathrm{~N}\{1 \\ 2.39 \mathrm{~N}\{2 \end{array}$ | $00 \mathrm{gf}\},$ | 3.43 N \｛350gf \} |
| Available actuators |  |  |  | $\frac{Q}{\infty} \frac{Q}{\infty}$ |  |  | $\begin{aligned} & R Q \text { 直 } \\ & \text { Mor } \end{aligned}$ |  |  | $\Omega$ |
| Terminals |  |  |  | Screw terminal（Conduit connectors：PF：1／2， PG： 13.5 types） | Screw terminal |  | Screw terminal |  |  | Screw terminal |
| Wiring |  |  |  | Cabtire code | Cabt Cap ti | re cord re cable | Cabti | re cable |  | Cabtire cord |
| Mounting pitch （Applicable screw） |  |  |  | $\begin{gathered} 22 \times(47 \mathrm{~mm}) \\ .866 \times 1.850 \text { inch } \end{gathered}$ | $\begin{array}{r} 21 \times \\ .827 \times \\ \text { (M4 } \end{array}$ | 56 mm 2．205inch crews） |  | $\begin{gathered} 60 \times 30 . \\ .189 \times 2 . \\ (\mathrm{M} 5 \mathrm{scr} \end{gathered}$ |  | 52mm 2．047inch （M4） |
| Available standards |  |  |  | UL，CSA，TÜV，CE | UL，CSA | ，TÜV，CE |  | CE |  | UL，CSA，CE |
| Page |  |  |  | 42 |  | 34 |  | 50 |  | 54 |

Notes：
1）Excludes exposed part of terminals，externally mounted components，and magnet catches．
2）Figures in parentheses（）indicate rated current of water－resistant type．

## Actuator selection

| Type | Classification | Pretravel (P.T.) | Overtravel (O.T.) | Operating force (O.F.) | Accuracy | Vibration shock | Characteristics |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\Omega$ | Push plunger type | Small | Medium | Large | Excellent | Excellent | High-level accuracy gives firm detection for position fixing, etc., by using perpendicular movement. |
|  | Roller plunger type (includes cross roller plunger) | Small | Medium | Large | Excellent | Excellent | Operating range can be widened by mounting accessory actuators like cams, dogs, cylinders, etc. High-level detection for position fixing. |
|  | Roller arm type | Small to large | Large | Medium | Good to excellent | Excellent | The stroke in the direction of revolution is large at between $45^{\circ}$ and $90^{\circ}$ and the lever angle can be set at will to within $360^{\circ}$ for easy use. Wide angle type (large O.T.) available. Can be used for wide-range position fixing. |
|  | Adjustable roller arm type | Small to large | Large | Medium | Good to excellent | Good | Lever length can be altered to allow rough operation detection using the roller lever characteristics. |
|  | Adjustable rod type | Large | Large | Medium | Good | Good | Wide range of operations, and convenient for uneven mountings. Lightest operation among the revolving operation type of limit switches. Rod length is adjustable, and bending is also easy. |
|  | Fork | Large | Medium | Medium | Good | Excellent | If operated up to $55^{\circ}$ position, revolves automatically to retain $90^{\circ}$ position. Two dog operation enables recovery operation through single dog, or for anything that has caused the roller position to slip. |
|  | Spring wire and flexible rod | Medium | Large | Small | Possible | Possible | Excluding the thread direction, direction can be adjusted up to $360^{\circ}$. Operating power is the lowest of the limit switches, and is effective in detecting when direction and conditions are uneven. In order to absorb the movements after operation in the actuator part, work slippage tolerances are also large. |
|  | Hinge lever type | Large | Medium | Small | Possible | Possible | Using a low speed, low torque cam, the lever can assume various shapes suited to the operation. The lever is very sturdy. |
|  | Roller lever type | Large | Medium | Small | Possible | Possible | Suited to high speed cams through the attachment of a hinge roller lever. |
| $\text { - } q$ | One way roller lever type | Medium | Medium | Medium | Possible | Possible | Operation is possible with both hinge lever type and one way operation, but the roller will break if operated in the opposite direction, rendering the unit inoperable. Can be used to prevent opposite direction movement. |
|  | Roller lever type | Medium | Medium | Medium | Possible | Possible | The roller position can be changed. |
|  | Remote wire control plunger | Small | Medium | Large | Good | Excellent | Flexible actuator attachment. |

## Standard glossary

- Fixed rating values

The values that guarantee the standards for the limit switch characteristics and functions. For example, the rated current and rated voltage, which are preset conditions (load type, current, voltage, frequency, etc.)

## - Operating object

The mechanism and mountings that operate the limit switch actuator.
Used for mechanical operators such as cams and dogs.

## - Detective object

The unit other than mechanical mountings that operate the limit switch. Products, parts, jigs, etc.

- Reaction spring (movable spring) The mechanical part that switches the limit switch contact is called either the reaction spring or the moveable spring.


## - Contact

When the counter-spring revolves, power is switched on and off through the contact between metal parts

## - Contact gap

The effective clearance between the fixed contact and the moveable contact. Also called breaking distance.

## - Contact arrangement

The construction of the electrical input/output circuit depending on use. For example, the following two applications:


## - Contact type

Used in opposition to a semiconductor switch that has switching characteristics. Fulfills switch functions through a mechanical ON/OFF contact.

## - Terminal mold

After wiring, the connecting part is molding by epoxy resin for waterproof, oil-resistant and dust-proof capabilities.

## - Construction

- Actuator

This part directly detects movement of the dog, cam, and so forth in the operating unit, and transmits external force to the changeover mechanism, thereby engaging the moveable contact and operating the switch.

## - Headblock

An independent part of the actuator mechanism of the Limit Switch.

- Wiring vent (cord vent)

The seal on the wiring at the mouth of the wiring vent. Also called the conduit vent for the screw hole used in the wiring.

## - Terminals

The part of the wiring work in the wiring that forms the circuit for electrical input and output.


## $\square$ Operating characteristics

- Operating Force (O.F.)

The force required to cause contact snap-action. It is expressed in terms of force applied to the actuator.

- Release Force (R.F.)

The force to be applied to the actuator, at the moment contact snaps back from the operated position to unoperated position.

- Total Force (T.F.)

The force required to make the actuator travel to overtravel position.

- Pretravel (P.T.)

Distance of the actuator movement from free position to operating position.

- Overtravel (O.T.)

The distance which the actuator is permitted to travel after actuation without any damage to the switching mechanism.

- Total Travel (T.T.)

The distance which the actuator is permitted to travel from free position without any damage to the switching mechanism.

- Movement Differential (M.D.)

The distance from operating to release position of the actuator.

- Operating Position (O.P.)

The position of the actuator when the traveling contact snaps to the fixed contact.

- Release Position (R.P.)

The position of the actuator when the traveling contact snaps back from the operating position to its original position.

- Free Position (F.P.)

Position of the actuator when no force is applied to it.


## TECHNICAL INFORMATION

## Glossary relating to the EN60947-5-1

- EN60947-5-1

EN standard same as IEC947-5-1

- Utilization categories

The following examples express the classification of switches by category of use.

| Current <br> type | Category | Contents |
| :---: | :---: | :--- |
| AC | AC-15 | Controls electromagnetic <br> loads in excess of 72VA <br> (Volt Amperes.) |
| DC | DC-12 | Controls resistance <br> loads and semiconductor <br> loads. |

- Rated operational voltage (Ue) The maximum rated voltage for switch operation. This must never exceed the maximum ratings insulation voltage (Ui).
- Rated operational current (le) The maximum rated current for switch operation.
- Rated insulation voltage (Ui) The maximum rated current value which guards the switch's insulation functions, forming the parameters for the resistance values and the mounting distance.
- Rated impulse withstand voltage (Uimp)
The peak impulse current value which enables the switch to resist without insulation breakdown.
- Rated enclosed thermal current (Ithe)
The current value that enables current to flow without exceeding the specified maximum temperature in the recharging contact switch. If the pins are made of brass, the maximum temperature limit is $65^{\circ} \mathrm{C} 149^{\circ} \mathrm{F}$.
- Conditional short circuit current The current the switch can resist until the short circuit protection device is activated.
- Short circuit protection device A device that protects the switch from short circuits through a circuit break (breakers, fuses, etc.)
- Switching overvoltage

The surge momentarily generated when a circuit is closed. Must be lower than the Uimp value.

- Pollution degree

Expresses in levels the environment in which the switch is used. The four levels are shown below.
Limit switches come under contamination level 3.

| Pollution <br> degree | Contents |
| :---: | :--- |
| 1 | No contamination or, even if conta- <br> mination is present, only non-con- <br> ducting contamination is generated. |
| 2 | Normally, only non-conducting cont- <br> amination is generated, but there <br> remains the possibility of temporary <br> conducting contamination when the <br> circuit is formed. |
| 3 | Conducting contamination is gener- <br> ated, or else dry non-conducting <br> contamination is generated by cir- <br> cuits which can be anticipated. |
| 4 | Permanent conducting contamina- <br> tion is generated by dust, rain, <br> snow, and other conductors. |

## PROTECTIVE CONSTRUCTION

## Protective construction

Expresses the degree of protective construction that guards the level of functionability of the switch against ingress of solid objects, water, and oil. The standards are IEC529 (IEC: International Electrotechnical Commission) standards. IEC standards determine the level of protection against both water and solid objects, but not against oil.

## Protection against both water and solid objects



Notes: 1. All of the tests cited above were conducted with the cord vent (conduit vent) tightly shut.
2. The above protective constructions are based on IEC standard but major differences may arise due to length of use and operating environment. This should be thoroughly discussed and verified.
3. When the corrosion-proof model is immersed in water for 30 minutes or more, verify that no water has penetrated the inside before use.

# CAUTIONS FOR USE 

## Design of operating dog and operating speed

Pay attention to the following points when designing the dog for limit switch operation.

1) Make the dog faceplate as smooth as possible.
2) Adjust both the dog angle and the set arm angle as below, depending on the operating speed.
3) The depth (h) of the dog effects the lifespan of the limit switch. Therefore, set the depth to a maximum of $80 \%$ of the Total Travel (T.T.)
4) The relationship between the speed of the $\operatorname{dog}(\mathrm{V}=\mathrm{m} / \mathrm{s})$ and the tip angle ( $\alpha$ ) is as follows:
1. $\mathrm{V} \leqq 0.2 \mathrm{~m} / \mathrm{s}$


| $\alpha$ | $\operatorname{Vmax}(\mathrm{m} / \mathrm{s})$ |
| :---: | :---: |
| $45^{\circ}$ | 0.2 |
| $65^{\circ}$ | 0.1 |
| 60 to $90^{\circ}$ | 0.05 |

When $\mathrm{V} \leqq 0.2 \mathrm{~m} / \mathrm{s}$, set the arm to perpendicular and set the arm rise angle to between $45^{\circ}$ and $90^{\circ}$. If the dog rise angle is reduced, the maximum tolerable speed is increased.
As a rule, $\alpha=45^{\circ}$ is optimum.

## 2. $\mathrm{V} \leqq 0.5 \mathrm{~m} / \mathrm{s}$



Because the arm jiggle is as a minimum at a comparative speed such as $\mathrm{V} \leqq 0.5 \mathrm{~m} / \mathrm{s}$, setting both the dog angle so that it travels perpendicularly and the arm angle to $45^{\circ}$ is optimum.

$$
\text { 3. } 0.5 \mathrm{~m} / \mathrm{s}<\mathrm{V} \leqq 2 \mathrm{~m} / \mathrm{s}
$$



| $\alpha$ | $\operatorname{Vmax}(\mathrm{m} / \mathrm{s})$ |
| :---: | :---: |
| $40^{\circ}$ | 0.7 |
| $35^{\circ}$ | 0.9 |
| $30^{\circ}$ | 1.3 |
| $25^{\circ}$ | 2.0 |

The maximum tolerable speed can be extended by further reducing the dog rise angle from $45^{\circ}$ when $0.5 \mathrm{~m} / \mathrm{s}<$ $\mathrm{V} \leqq 2 \mathrm{~m} / \mathrm{s}$. It is necessary to set the arm so that the dog's cutting surfaces are always parallel $\left(\theta \circ=90^{\circ}-\alpha\right)$
4. Overriding the $\operatorname{dog}(\mathrm{V} \leqq 0.2 \mathrm{~m} / \mathrm{s})$

| $\alpha \alpha$ | $\operatorname{Vmax}(\mathrm{m} / \mathrm{s})$ |
| :---: | :---: |
| $\alpha$ | 0.2 |
| $45^{\circ}$ | 0.1 |
| $65^{\circ}$ | 0.05 |
| 60 to $90^{\circ}$ |  |

If overriding the dog, set the arm perpendicularly, so that $\alpha=45^{\circ}$. If the dog angle is reduced, the tolerable speed is increased.

## 5. Roller plunger type

|  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\alpha$ | $\operatorname{Vmax}(\mathrm{m} / \mathrm{s})$ | $\mathrm{Vmax}(\mathrm{m} / \mathrm{s})$ |  |  |  |
| $20^{\circ}$ | 0.5 | $(0.5$ to 0.7$) \mathrm{T} . \mathrm{T}$. |  |  |  |
| $30^{\circ}$ | 0.25 | $(0.6$ to 0.8$) \mathrm{T} . \mathrm{T}$. |  |  |  |

Even if overriding the dog, set the forwards and rearwards motion exactly the same, and avoid any settings that make the actuator accelerate rapidly from the dog.

## Protection circuit

1) The ON/OFF circuit for the guidance load may suffer contact damage due to surges or inrushes when the power is turned either ON or OFF.
Consequently, insertion of a protective circuit as per the following diagram is recommended, in order to protect the contacts.

2) Do not connect either irregular poles or power sources to a switch contact. Power connection examples (irregular pole connection)


Example of unsuitable power connection (abnormal power connection)

3) Avoid circuits where power may find a way between the contact points (as this may cause welding.)

NO GOOD

4) Using electronic switch circuits (low power, low current)
Bouncing and chattering are generated due to collision between the contacts when the limit switch is switching between them, and this sometimes causes such problems as white noises and error pulses in both the electronic circuit and the reverberation equipment.
If the generation of bouncing and chattering becomes a problem, it is necessary to consider installing a CR circuit or other absorption circuit given the circuit design.
This is particularly necessary when high contact reliability is needed, and is unsuitable for silver contact switches. Switches with silver contacts possess excellent performance.

## Cautions for use

1) Do not attempt to physically alter any part of the switch itself, such as the actuator, or switch attachment vent, as this may cause alterations to both characteristics and performance, and damage the insulation.
2) Do not pour any lubricants such as oil or grease onto the moving parts of the actuator, as there is a possibility that this will cause a malfunction due to seepage into the inside, and impair the motion. Silicon-based grease in particular affects the contact points badly.
3) If the switches are not to be used for an extended period of time, their contact reliability may be reduced due to oxidation of the contact points. Because accidents may result from the impaired conductivity, always implement a check beforehand.
4) Prolonged continuous use of the switch hastens deterioration of the parts (especially the seal rubber) and may cause a malfunction in the release. For this reason, always implement a check beforehand.
5) Usage in the vicinity of either the switch operating position (O.P.) or the release position (R.P.) results in unstable contacts. If using the NC contact point, set the actuator to return to the free position (F.P.) Also, is using the NO contact point, hold the ratings values down to 70 to $100 \%$ for the overtravel (O.T.)
6) If the actuator is forced beyond its total travel (T.T.), the internal mechanism may be damaged. Always use within the T.T.
7) Do not apply unreasonable force to the actuator, as this may result in damage and impaired movement.
8) The switch, if dropped, may break due to excessive vibration and impact. Therefore, please use extra caution when transporting and installing. 9) Condensation inside the switch may occur if there are rapid ambient temperature changes when the switch is in a high temperature and humidity. Since this occurs easily during marine transport, be extra cautious of what the environment will be when shipping. Condensation is the phenomenon in which water vapor condenses into switch-adhering water droplets when the temperature rapidly drops in a high-temperature, high-humidity atmosphere or when the switch is quickly moved from a low temperature location to a place of high temperature and high humidity. It is the cause of insulation deterioration and of rust. 10) Be careful of freezing in temperatures below $0^{\circ} \mathrm{C}$. Freezing is the phenomenon in which moisture adhering to the switch from condensation or when in unusually high-humidity environments freezes onto the switch when the temperature drops below the freezing point. Please extra caution because freezing can lock moving parts, cause operational delays, or interfere with conductivity when there is ice between the contacts.
9) In low-temperature, low-humidity conditions, plastic becomes brittle and the rubber and grease harden, which may lead to malfunction.
10) Long term storage (including during transport) in high temperature or high humidity environments or where the atmosphere contains organic or sulfide gas, will cause sulfide or oxide membrane to form on the contact surfaces. This in turn will cause unstable or failed contacting that may lead to functional malfunction. Please verify the atmosphere when storing and transporting.
11) Packaging should be designed to reduce as much as possible the potential influence of humidity, organic gas, and sulfide gas, etc.
12) Please avoid sudden changes in temperature. This is a cause of switch deformation and encourages the seal structure to breathe, which may lead to seal failure and operational malfunction.
13) If installing a thermoplastic resin case, the use of a spring washer tightened directly against the case will cause the case to collapse and become damaged. Therefore, please add a flat washer before tightening. Also, be careful not to install if the case is being twisted.
14) When used outdoors (in places where there is exposure to direct sunlight or rain such as in multistory car parks) or in ambient temperature environments where ozone is generated, the influence of these environments may cause deterioration of the rubber material. Please consult us if you intend to use a switch in such environments.
15) For the purpose of improving quality, materials and internal structure may be changed without notice.

## Precautions relating to the installation environment

Avoid using in silicon environments such as organic silicon-based rubber, solvents, sealants, oil, grease, or wiring.

## IMPROVEMENT EXAMPLES


Explanation


- Wide selections of actuators, terminals and bodies to meet any application
- Excellent environmental resistance

Die casting case-IEC IP67
Plastic case-IEC IP64

- Highly reliable operation

Bifurcated contact (Au clad) suitable for low-level circuit control

- Connector type for easy installation
- Cost-effective plastic case also available
- Compact design good for small mounting space
$17 \%$ less mounting space compared with ML (AZ7) Limit switch
- Conforms to UL/CSA TÜV standards


## PRODUCT TYPE

1. Limit Switches

| Actuator | Die casting case |  |  |  | Plastic case |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Screw terminal |  | Connector type |  | Screw terminal |  |
|  | Standard | Bifurcated | Bifucated contact |  | Standard | Bifurcated |
|  |  |  | Without LED | With LED |  |  |
| Push plunger | Common to panel mount push plunger |  |  |  | AZH1001 | AZH1201 |
| Roller plunger | Common to panel mount roller plunger |  |  |  | AZH1002 | AZH1202 |
| Cross roller plunger | Common to panel mount cross roller plunger |  |  |  | AZH1003 | AZH1203 |
| Panel mount push plunger | AZH2031 | AZH2231 | AZH2331 | AZH233116 | AZH1031 | AZH1231 |
| Panel mount roller plunger | AZH2032 | AZH2232 | AZH2332 | AZH233216 | AZH1032 | AZH1232 |
| Panel mount cross roller plunger | AZH2033 | AZH2233 | AZH2333 | AZH233316 | AZH1033 | AZH1233 |
| Sealed push plunger | AZH2011 | AZH2211 | AZH2311 | AZH231116 | AZH1011 | AZH1211 |
| Sealed roller plunger | AZH2012 | AZH2212 | AZH2312 | AZH231216 | AZH1012 | AZH1212 |
| Sealed cross roller plunger | AZH2013 | AZH2213 | AZH2313 | AZH231316 | AZH1013 | AZH1213 |
| Short roller lever | AZH2041 | AZH2241 | AZH2341 | AZH234116 | AZH1041 | AZH1241 |
| Roller lever | AZH2021 | AZH2221 | AZH2321 | AZH232116 | AZH1021 | AZH1221 |
| One-way short roller lever | AZH2044 | AZH2244 | AZH2344 | AZH234416 | AZH1044 | AZH1244 |
| One-way short lever | AZH2024 | AZH2224 | AZH2324 | AZH232416 | AZH1024 | AZH1224 |
| Flexible | - | - | - | - | AZH1066 | AZH1266 |

2. Accessories

| Product | Specifications |  |  |  |  |  | Application | Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Pin arrangement | Type | Core No. | Color of wire | Conductor | Length of cable |  |  |
| Cable connector cord | AC | Straight | 4 | Brown White | $\begin{aligned} & 0.5 \mathrm{~mm}^{2} \\ & \text { (Circum- } \\ & \text { ference: } 6.5 \text { dia.) } \end{aligned}$ | $\begin{gathered} 3 \mathrm{~m} \\ 9.843 \mathrm{ft} \end{gathered}$ | All connector type | AZH28113 |
|  |  | Angle |  | Blue Black |  |  |  | AZH28133 |

## FOREIGN STANDARDS

| Standard | Applicable product | Part No. |
| :---: | :---: | :---: |
| UL | File no.: E122222 <br> Ratings: Normal load: $5 \mathrm{~A}, 250$ VAC ( $10^{5}$ cycles $)$, Pilot Duty B300 <br> Minute load: 0.1 A, 30 VDC <br> Certified products: All models | Order using the standard part number. |
| CSA | File no.: LR55880 <br> Ratings: Normal load: 5 A, 250 VAC, Pilot Duty B300 <br> Minute load: 0.1 A, 30 VDC <br> Certified products: All models |  |
| TÜV | File no.: Resin case typer J9650515  <br>  Die-cast case type J9650514 | Place a CE at the end of the part number when ordering. |

SPECIFICATIONS

## 1. Ratings

|  | Standard type |  |  |  |  | Bifurcated type |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Resistive | Lamp | Inductive | Motor |  | Without LED | With LED |
|  |  |  |  | N.C. | N.O. | Resistive |  |
| 125 V AC | 5 A | 1.5 A | 3 A | 2 A | 1 A | 0.1 A | - |
| 250 V AC | 5 A | 1.5 A | 3 A | 1 A | 0.5 A | - | - |
| 8 V DC | 5 A | - | 1.5 A | - | - | 0.1 A | - |
| 14 V DC | 5 A | - | 1.5 A | - | - | 0.1 A | - |
| 24 V DC | - | - | - | - | - | - | 0.1 A |
| 30 V DC | 5 A | - | 1.5 A | - | - | 0.1 A | - |
| 125 V DC | 0.5 A | - | 0.05 A | - | - | - | - |
| 250 V DC | 0.25 A | - | 0.03 A | - | - | - | - |

Notes: 1) Parameter of inductive load: AC power factor: Min. 0.4; DC time constant: Max. 7 ms .
2) Lamp load generates 10 times of inrush current. 3) Motor load generates 6 times of inrush current.

## 2. Characteristics

|  |  | Standard type | Bifurcated type |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | Screw terminal | Screw terminal | Connector type |
| Contact arrangement |  | 1 Form C | 1 Form C (Bifurcated contact) |  |
| Contact resistance |  | Initial: Max. $15 \mathrm{~m} \Omega$ | Initial: Max. $100 \mathrm{~m} \Omega$ | Initial: Max. $150 \mathrm{~m} \Omega$ |
| Contact material |  | Silver alloy | Gold clad |  |
| Insulation resistance |  | Initial: Min. $100 \mathrm{M} \Omega$ (at 500 V DC) |  |  |
| Initial breakdown voltage |  | $1,000 \mathrm{Vrms}$ for 1 min . between non-consecutive terminals <br> $1,500 \mathrm{Vrms}$ for 1 min . between dead metal parts and terminals <br> $1,500 \mathrm{Vrms}$ for 1 min . between ground and terminals |  |  |
| Shock resistance | Free position | Max. $98 \mathrm{~m} / \mathrm{s}^{2}\{10 \mathrm{G}\}$ |  |  |
|  | Full operating position | Max. $294 \mathrm{~m} / \mathrm{s}^{2}\{30 \mathrm{G}\}$ |  |  |
| Vibration resistance |  | 10 to 55 Hz (Double amplitude for max. 1.5 mm ) |  |  |
| Mechanical life |  | $10^{7}$ (at 120 cpm ) |  |  |
| Electrical life |  | $5 \times 10^{5}$ (at $20 \mathrm{cpm}, 5 \mathrm{~A} 250 \mathrm{~V} \mathrm{AC} \mathrm{resistive} \mathrm{load)}$ | $5 \times 10^{5}$ (at $20 \mathrm{cpm}, 0.1$ A 125 V AC resistive load) |  |
| Ambient temperature |  | -10 to $+80^{\circ} \mathrm{C}+14$ to $+176^{\circ} \mathrm{F}$ |  |  |
| Ambient humidity |  | Max. 95\% R.H. |  |  |
| Max. switching frequency |  | Max. 120 cpm |  |  |

## 3. Operating characteristics

- Die cast case

| Characteristics | Operating <br> force, max. <br> $\mathrm{N}(\mathrm{gf})$ | Release force, <br> $\mathrm{min} . \mathrm{N}(\mathrm{gf})$ | Pretravel, max. <br> $\mathrm{mm}(\mathrm{inch})$ | Movement dif- <br> ferential, max. <br> $\mathrm{mm}(\mathrm{inch})$ | Overtravel, min. <br> $\mathrm{mm}(\mathrm{inch})$ | Operating position, <br> $\mathrm{max} . \mathrm{mm}(\mathrm{inch})$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Actuator | $11.8(1200)$ | $4.90(500)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $17.4 \pm 0.8(.685 \pm .031)$ |
| Panel mount push plunger | $11.8(1200)$ | $4.90(500)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $23.4 \pm 0.8(.921 \pm .031)$ |
| Panel mount roller plunger | $11.8(1200)$ | $4.90(500)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $23.4 \pm 0.8(.921 \pm .031)$ |
| Panel mount cross roller plunger | $11.8(1200)$ | $4.90(500)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $30.0 \pm 0.8(1.181 \pm .031)$ |
| Sealed push plunger | $11.8(1200)$ | $4.90(500)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $41.3 \pm 0.8(1.626 \pm .031)$ |
| Sealed roller plunger | $11.8(1200)$ | $4.90(500)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $41.3 \pm 0.8(1.626 \pm .031)$ |
| Sealed cross roller plunger | $3.92(400)$ | $0.78(80)$ | $2.0(.079)$ | $0.3(.012)$ | $4.0(.157)$ | $23.1 \pm 0.8(.909 \pm .031)$ |
| Short roller lever | $2.45(250)$ | $0.39(40)$ | $4.0(.157)$ | $0.6(.024)$ | $7.0(.276)$ | $23.1 \pm 0.8(.909 \pm .031)$ |
| Roller lever | $3.92(400)$ | $0.78(80)$ | $2.0(.079)$ | $0.3(.012)$ | $4.0(.157)$ | $34.3 \pm 0.8(1.350 \pm .031)$ |
| One-way short roller lever | $2.45(250)$ | $0.39(40)$ | $4.0(.157)$ | $0.6(.024)$ | $7.0(.276)$ | $34.3 \pm 0.8(1.350 \pm .031)$ |
| One-way short lever |  |  |  |  |  |  |

- Plastic case

| Characteristics | Operating <br> force, max. <br> $\mathrm{N}(\mathrm{gf})$ | Release force, <br> $\mathrm{min} . \mathrm{N}(\mathrm{gf})$ | Pretravel, max. <br> $\mathrm{mm}(\mathrm{inch})$ | Movement dif- <br> ferential, max. <br> $\mathrm{mm}(\mathrm{inch})$ | Overtravel, min. <br> $\mathrm{mm}(\mathrm{inch})$ | Operating position, <br> $\mathrm{max} . \mathrm{mm}(\mathrm{inch})$ |
| :--- | ---: | :---: | :---: | :---: | :---: | :---: |
| Actuator | $5.88(600)$ | $0.98(100)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $25.4 \pm 0.8(1.000 \pm .031)$ |
| Push plunger | $5.88(600)$ | $0.98(100)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $31.4 \pm 0.8(1.236 \pm .031)$ |
| Roller plunger | $5.88(600)$ | $0.98(100)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $31.4 \pm 0.8(1.236 \pm .031)$ |
| Cross roller plunger | $5.88(600)$ | $0.98(100)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $17.4 \pm 0.8(.685 \pm .031)$ |
| Panel mount push plunger | $5.88(600)$ | $0.98(100)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $23.4 \pm 0.8(.921 \pm .031)$ |
| Panel mount roller plunger | $5.88(600)$ | $0.98(100)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $23.4 \pm 0.8(.921 \pm .031)$ |
| Panel mount cross roller plunger | $5.88(600)$ | $0.98(100)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $30.0 \pm 0.8(1.181 \pm .031)$ |
| Sealed push plunger | $5.88(600)$ | $0.98(100)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $41.3 \pm 0.8(1.626 \pm .031)$ |
| Sealed roller plunger | $5.88(600)$ | $0.98(100)$ | $1.5(.059)$ | $0.1(.004)$ | $3.0(.118)$ | $41.3 \pm 0.8(1.626 \pm .031)$ |
| Sealed cross roller plunger | $3.92(400)$ | $0.78(80)$ | $2.0(.079)$ | $0.3(.012)$ | $4.0(.157)$ | $23.1 \pm 0.8(.909 \pm .031)$ |
| Short roller lever | $2.45(250)$ | $0.39(40)$ | $4.0(.157)$ | $0.6(.024)$ | $7.0(.276)$ | $23.1 \pm 0.8(.909 \pm .031)$ |
| Roller lever | $3.92(400)$ | $0.78(80)$ | $2.0(.079)$ | $0.3(.012)$ | $4.0(.157)$ | $34.3 \pm 0.8(1.350 \pm .031)$ |
| One-way short roller lever | $2.45(250)$ | $0.39(40)$ | $4.0(.157)$ | $0.6(.024)$ | $7.0(.276)$ | $34.3 \pm 0.8(1.350 \pm .031)$ |
| One-way short lever | $0.88(90)$ | - | $30.0(1.181)$ | - | $20.0(.787)$ |  |
| Flexible |  |  |  |  |  |  |

HL (AZH)
4. Performance data for EN60947-5-1

| Item | Plastic case <br> Standard | Plastic case <br> Bifurcated | Die casting case <br> Standard | Die casting case <br> Bifurcated |
| :--- | :---: | :---: | :---: | :---: |
| Rated insulated voltage | 250 V AC | 250 V AC | 30 V DC |  |
| Impulse withstand voltage | 2.5 kV | 2.5 kV | 1.5 kV |  |
| Switching excess voltage | 2.5 kV | 0.8 kV | 0.8 kV | 1.5 kV |
| Rated closed thermocurrent | 5 A | 1 A | 5 A |  |
| Conditional short-circuit current | 100 A | 100 A | 100 kV |  |
| Short-circuit protection | 10 A Fuse | 10 A Fuse | 10 Fuse |  |
| Protective construction | IP64 (switch) | IP64 (switch) | 100 A |  |
| Degree of contamination | IP54 (terminal) | IP54 (terminal) | 10 Fuse |  |

## OUTPUT CIRCUIT

Wiring diagram

1) Screw terminal type Internal circuit

2) LED wired type

Lamp lighting circuit


Note: Since LED is connected to N.O. side, the polarity of the load shall be + for N.O.

## CONTACTS

Screw terminal type
Plunger type


Lever type


## Connector type



| Contact No. | Terminals | Color of lead- <br> wire |
| :---: | :---: | :---: |
| 1 | - | Brown |
| 2 | N.C. | White |
| 3 | COM | Blue |
| 4 | N.O. | Black |



The leakage current changes depends on the resistance of load connected in parallel.

Protective construction

| IEC standard | Die cast <br> case | Plastic case |
| :---: | :---: | :---: |
| IP64 | $\bigcirc$ | $\bigcirc$ |
| IP67 | $\bigcirc$ | $\times$ |

## DIMENSIONS


-

## Sealed push plunger




## Short roller lever



## Roller lever



AZH2021
AZH2221
 Comer
10.5 .413 dia. $\times$ width $4.157 \square$
$\square$ Oneaina fron

| Operating force, max. <br> $\mathrm{N}(\mathrm{gf})$ | $2.45(250)$ |
| :--- | :---: |
| Release force, min. <br> $\mathrm{N}(\mathrm{gf})$ | $0.39(40)$ |
| Pretravel, max. <br> mm (inch) | $4.0(.157)$ |
| Movement differential, <br> max. mm (inch) | $0.6(.024)$ |
| Overtravel, min. <br> mm (inch) | $7.0(.276)$ |
| Operating position, <br> mm (inch) | $23.1 \pm 0.8$ <br> $(.909 \pm .031)$ |

One-way short roller lever


AZH2O44
AZH2244

mm inch General tolerance: $\pm 0.4 \pm .016$
10.5 .413 dia. $\times$ width $4.157 \square$


| Operating force, max. <br> $\mathrm{N}(\mathrm{gf})$ | $3.92(400)$ |
| :--- | :---: |
| Release force, min. <br> $\mathrm{N}(\mathrm{gf})$ | $0.78(80)$ |
| Pretravel, max. <br> mm (inch) | $2.0(.079)$ |
| Movement differential, <br> max. mm (inch) | $0.3(.012)$ |
| Overtravel, min. <br> mm (inch) | $4.0(.157)$ |
| Operating position, <br> mm (inch) | $34.3 \pm 0.8$ <br> $(1.350 \pm .031)$ |

## 2. Connector type




## HL (AZH)

Panel mount cross roller plunger
mm inch General tolerance: $\pm 0.4 \pm .016$


## Sealed push plunger



## Sealed roller plunger



AZH2312
AZH231216 LED type on the photo
10.5 .413 dia. $\times$ width $4.157 \square$ Stainless steel roller


Sealed rubber口 (Oil-tight synthetic rubber)

| Operating force, max. <br> $\mathrm{N}(\mathrm{gf})$ | $11.8(1200)$ |
| :--- | :---: |
| Release force, min. <br> $\mathrm{N}(\mathrm{gf})$ | $4.90(500)$ |
| Pretravel, max. <br> mm (inch) | $1.5(.059)$ |
| Movement differential, <br> max. mm (inch) | $0.1(.004)$ |
| Overtravel, min. <br> mm (inch) | $3.0(.118)$ |
| Operating position, <br> mm (inch) | $41.3 \pm 0.8$ <br> $(1.626 \pm .031)$ |

Sealed cross roller plunger


AZH2313
AZH231316
AZH231316 LED type on the photo
10.5 .413 dia. $\times$ width $4.157 \square$ Stainless steel roller


Sealed rubber (Oil-tight synthetic rubber)

| Operating force, max. <br> $\mathrm{N}(\mathrm{gf})$ | $11.8(1200)$ |
| :--- | :---: |
| Release force, min. <br> $\mathrm{N}(\mathrm{gf})$ | $4.90(500)$ |
| Pretravel, max. <br> mm (inch) | $1.5(.059)$ |
| Movement differential, <br> max. mm (inch) | $0.1(.004)$ |
| Overtravel, min. <br> mm (inch) | $3.0(.118)$ |
| Operating position, <br> mm (inch) | $41.3 \pm 0.8$ <br> $(1.626 \pm .031)$ |



AZH2341
AZH234116 LED type on the photo
10.5 .413 dia. $\times$ width $4.157 \square$

Stainless steel roller 4


| Operating force, max. <br> $\mathrm{N}(\mathrm{gf})$ | $3.92(400)$ |
| :--- | :---: |
| Release force, min. <br> $\mathrm{N}(\mathrm{gf})$ | $0.78(80)$ |
| Pretravel, max. <br> mm (inch) | $2.0(.079)$ |
| Movement differential, <br> max. mm (inch) | $0.3(.012)$ |
| Overtravel, min. <br> mm (inch) | $4.0(.157)$ |
| Operating position, <br> mm (inch) | $23.1 \pm 0.8$ <br> $(.909 \pm .031)$ |

## Roller lever

10.5 .413 dia. $\times$ width $4.157 \square$


| Operating force, max. <br> $\mathrm{N}(\mathrm{gf})$ | $2.45(250)$ |
| :--- | :---: |
| Release force, min. <br> $\mathrm{N}(\mathrm{gf})$ | $0.39(40)$ |
| Pretravel, max. <br> mm (inch) | $4.0(.157)$ |
| Movement differential, <br> max. mm (inch) | $0.6(.024)$ |
| Overtravel, min. <br> mm (inch) | $7.0(.276)$ |
| Operating position, <br> mm (inch) | $23.1 \pm 0.8$ <br> $(.909 \pm .031)$ |

AZH2321
AZH232116 LED type on the photo

## One-way short roller lever



AZH2344
AZH234416 LED type on the photo
10.5 .413 dia. $\times$ width $4.157 \square$
17.4 Stainless steel roller


| Operating force, max. <br> $\mathrm{N}(\mathrm{gf})$ | $3.92(400)$ |
| :--- | :---: |
| Release force, min. <br> $\mathrm{N}(\mathrm{gf})$ | $0.78(80)$ |
| Pretravel, max. <br> mm (inch) | $2.0(.079)$ |
| Movement differential, <br> max. mm (inch) | $0.3(.012)$ |
| Overtravel, min. <br> mm (inch) | $4.0(.157)$ |
| Operating position, <br> mm (inch) | $34.3 \pm 0.8$ <br> $(1.350 \pm .031)$ |

## Plastic case

## Push plunger



AZH1001 AZH1201
mm inch General tolerance: $\pm 0.4 \pm .016$


Roller plunger


Cross roller plunger


Panel mount push plunger


## Panel mount roller plunger

mm inch General tolerance: $\pm 0.4 \pm .016$


Panel mount cross roller plunger


## Sealed push plunger




## Short roller lever



## Roller lever



## One-way short roller lever



AZH1044
AZH1244
10.5 .413 dia. $\times$ width $4.157 \square$

Nylon roller


## Cable connected cord

## Straight type



AZH28113


AC type

## Angle type

AZH28133


## MOUNTING METHOD

Die cast case

1. Side mounting (all types)

M4 screw is used for mounting on side. Mount it firmly with washer. Mounting torque is 1.37 to $1.57 \mathrm{~N} . \mathrm{m}$.
Remove the hexagonal nut when plunger type is used in side mounting.
Side mounting hole dimensions


## APPLICABLE WIRE

(For screw terminal)
Sealed rubber of the lead wire is applicable for 6 dia. to 8 dia.

| Electric wire name | Applicable wire |  |  |
| :---: | :---: | :---: | :---: |
|  | Wire strand | Conductor | Finished outside diameter |
| Vinyl cabtyre cord (VCTF) | 2-wire | $\begin{gathered} 0.75 \mathrm{~mm}^{2} \\ 1.25 \mathrm{~mm}^{2} \\ 2.0 \mathrm{~mm}^{2} \end{gathered}$ | 6.6 mm dia. 7.4 mm dia. 8.0 mm dia. |
|  | 3-wire | $\begin{aligned} & 0.75 \mathrm{~mm}^{2} \\ & 1.25 \mathrm{~mm}^{2} \\ & \hline \end{aligned}$ | 7.0 mm dia. 7.8 mm dia. |

2. Panel mounting (Panel plunger type) When the panel mounting type is fixed on the panel, the torque of hexagonal nut is set under 7.84 N.m.


## WIRING (For screw terminal)

M3 small binding screw is used as a terminal screw. When wiring, don't connect the lead wire to the terminal directly. Fasten the crimped terminals securely applying a tightening torque of 0.20 to 0.29 N.m.


## Plastic case

Side mounting (all types)
M4 screw is used for mounting on side. Mount it firmly with washer. Mounting torque is 1.18 to $1.47 \mathrm{~N} . \mathrm{m}$.


Take note the terminal arrangement is different between plunger type and lever type. The arrangement of N.C. and N.O. is reversed.


## CONNECTOR TYPE

1) The cord outlet direction is interchangeable. Refer to "How to change the cord outlet direction".
2) Do not remove the connector over 50 times.
3) Wiring diagram as shown below.


Contact No. of connector


Note: Contact No. 1 is not in use.
4) When the angle type of connector cord is used, the cord outlet direction is as follows.


Cord outlet direction (Left side)


## HOW TO CHANGE THE

CORD OUTLET DIRECTION FOR CONNECTOR TYPE
The cord outlet direction is interchangeable both right and left sides. The direction of connector cord is set to the right when it is shipped. When it is used left side direction, follow the next procedure.

Cord outlet direction (Right side)


Push down the fitting metal while pulling it horizontal direction.


- Do not put the lead wire between terminal cover and body.
- Put the seal rubber at the right place.
- Press up the terminal cover.


Turn the terminal cover at an angle of 180 degree. Follow the procedure 3.

- Do not pull the terminal cover.
- Do not rotate the terminal cover many times.
- Do not loosen the terminal screw.

Cord outlet direction (Left side)


Confirm the fitting metal is on tightly. If it is loosen, it might be cause of the trouble.

## INDICATOR LIGHTING CIRCUIT (Connector type only)

1) See the circuit diagram.
2) Voltage across the terminal No. 3 and No. 4 shall not exceed 24 V DC, with the indicated polarity in the circuit diagram. 3) The LED is turned on when the switch is at a free position. The LED is turned off when the switch operates.
3) Applicable power source is $24 \mathrm{~V} D C$. Use it with care on leakage current. The leakage current is approx. 1.5 mA at 24 V DC.

Internal circuit


## CAUTIONS

Die cast case

1) Do not expose HL limit switch to hot water (over $60^{\circ} \mathrm{C} 140^{\circ} \mathrm{F}$ ) and in a water vapor environment.
2) Avoid the place where organic solvents, strong acid, strong alkali liquid and vapor may attach to the products directly. Prevent using the HL limit switch in place where inflammable or corrosive gas will be generated.
3) Do not change the operating position by bending the actuator.
4) If $O T$ is too big, the life of limit switch will be shortened by switching friction. Use it with enough margin of OT. $70 \%$ of OT standard value will be good.
5) Attach the terminal cover securely to the body with the metal stop latch to the projection of the body.
6) Confirmation test in the actual application is highly recommended.
7) Do not use the switch in a silicon atmosphere. Care should be taken where organic silicon rubber, adhesive, seling material, oil, grease or lead wire generates silicon.

## Plastic case

1) Do not use in water or oil. Do not place the switch where it is always exposed to water or dust splash. 2) Do not expose HL limit switch to hot water (over $60^{\circ} \mathrm{C} 140^{\circ} \mathrm{F}$ ) and in a water vapor environment.
2) Avoid the place where organic solvents, strong acid, strong alkali liquid and vapor may attach to the products directly. Prevent using the HL limit switch is place where inflammable or corrosive gas will be generated.
3) Do not change the operating position by bending the actuator.
4) If $O T$ is too big, the life of limit switch will be shortened switching friction. Use it with enough margin of OT. $70 \%$ of OT standard value will be good for use.
5) Attach the terminal cover securely to the body to the extent you can identify the clicking or locking sound.
6) A confirmation test in the actual application is highly recommended.
7) Do not use the switch in a silicon atmosphere. Case should be taken where organic silicon rubber, adhesive, sealing material, oil, grease or lead wire generates silicon.

## Lamp attached- and terminal mold models also available.



Short roller lever type

## FEATURES

1. Long life

High efficiency coil spring switching mechanism for long life: More than $10^{7}$ mechanical operations.
2. Great mechanical strength while being compact and lightweight The attachment pitch is 25.4 mm (1.000inch), same as for the $Z$ basic model microswitch. Also, the outer cover cap uses a strong plastic with excellent mechanical characteristics. An M4 bolt can be used for the attachment.
3. The overtravel (O.T.) is large with great shock absorption
4. The switch itself is constructed to be dust-proof and oil resistant
The switch itself is closed flush with the diaphragm and the compressed rubber ring, so that the terminal mold model is perfectly flush with the terminal parts.

TYPICAL APPLICATIONS
Used in sequence control of food processing machines, automatic packaging machines, conveyers, and processors. Ideal for light industry machinery when installation pace is limited and a protective construction is sought.

## PRODUCT TYPE

1. Standard type

| Actuator | Part No. |
| :--- | :---: |
| Short push plunger | AZ7100 |
| Push plunger | AZ7110 |
| Hinge lever | AZ7120 |
| Roller lever | AZ7121 |
| One-way roller lever | AZ7124 |
| Hinge short lever | AZ7140 |
| Short roller lever | AZ7141 |
| One-way short roller lever | AZ7144 |
| Panel mount push plunger | AZ7310 |
| Panel mount roller plunger | AZ7311 |
| Panel mount cross roller plunger | AZ7312 |
| Flexible rod | AZ7166 |

Note 1. When ordering an overseas-specified product, refer to the foreign standards overview.

FOREIGN STANDARDS

| Standards | Applicable product |  | Part No. |
| :---: | :---: | :---: | :---: |
| UL | File No. Ratings Product type | E-122222 <br> 10A 250 V AC <br> Standard type only | Order by standard part No. |
| CSA | File No. Ratings Product type | LR55880 <br> 10A 250V AC <br> Standard type only |  |
| TÜV | File No. Ratings Product type | J9551204 <br> AC-15 2A/250V <br> Standard type only |  |

## SPECIFICATIONS

## 1. Rating

| Load | Resistive load $(\cos \phi \doteqdot 1)$ | Inductive load $(\cos \phi \doteqdot 0.4)$ | Motor or lamp load |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | N.C. contact | N.O. contact |  |
| 125 V AC | 10 A | 6 A | 3 A | 1.5 A |
| 250 V AC | 10 A | 4 A | 1.5 A |  |
| 115 V DC | 0.4 A | 0.05 A | - | - |

## 2.Characteristics

| Contact arrangement |  | 1 Form C |
| :---: | :---: | :---: |
| Initial contact resistance, max. |  | $15 \mathrm{~m} \Omega^{*}$ (By voltage drop 6 to 8V DC at rated current) |
| Initial insulation resistance (At 500V DC) |  | Min. $100 \mathrm{M} \Omega$ |
| Initial breakdown voltage |  | 1,500 Vrms for 1 min Between non-consecutive terminals <br> 2,000 Vrms for 1 min Between dead metal parts and each terminal <br> 2,000 Vrms for 1 min Between ground and each terminal |
| Shock resistance | In the free position | Max. 98m/s ${ }^{2}\{10 \mathrm{G}\}$ |
|  | In the full operating position | Max. 294m/s ${ }^{2}\{30 \mathrm{G}\}$ |
| Vibration resistance |  | 55 Hz , double amplitude of 1.5 mm |
| Expected life (Min. operation) | Mechanical | $10^{7}$ (at 50 cpm ) |
|  | Electrical | $2 \times 10^{5}$ (at 20 cpm$)$ |
| Ambient temperature/Ambient humidity |  | -20 to $+60^{\circ} \mathrm{C}-4$ to $+140^{\circ} \mathrm{F} / \mathrm{Max} .95 \%$ R.H. (at $20^{\circ} \mathrm{C} 68^{\circ} \mathrm{F}$ ) |
| Max. operating speed |  | 120 cpm |

*The resistance of a copper wire is not included.

## 3.EN60947-5-1 performance

| Item | Rating |
| :--- | :---: |
| Rated insulation voltage (Ui) | 250 VAC |
| Rated impulse withstand voltage (Uimp) | 2.5 kV |
| Switching over voltage | 2.5 kV |
| Rated enclosed thermal current (Ithe) | 10 A |
| Conditional short-circuit current | 100 A |
| Short-circuit protection device | 10 A fuse |
| Protective construction | IP64 (switch) |
| Pollution degree | 3 |

## 4. Operating characteristics

| Actuator | Characteristics <br> O.F. (N\{gf $\}$ ) | R.F. (N\{gf $)$ <br> min. | Pretravel <br> (P.T.), max. <br> mm inch | Movement <br> Differential <br> (M.D.), max. <br> mm inch | Overtravel <br> (O.T.), min. <br> mm inch | Operating Position <br> (O.P.) mm inch |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Short push plunger | $5.88\{600\}$ | $0.98\{100\}$ | 2.0 .079 | 0.8 .031 | 0.8 .031 | $30 \pm 0.81 .181 \pm .031$ |
| Push plunger | $5.88\{600\}$ | $0.98\{100\}$ | 2.0 .079 | 0.8 .031 | 5.0 .197 | $44 \pm 1.21 .732 \pm .047$ |
| Hinge lever | $1.47\{150\}$ | $0.39\{40\}$ | 13.5 .531 | 3.2 .126 | 4.0 .157 | $25 \pm 2.0 .984 \pm .079$ |
| Roller lever | $1.77\{180\}$ | $0.49\{50\}$ | 11.0 .433 | 2.4 .094 | 3.0 .118 | $40 \pm 1.91 .575 \pm .75$ |
| One-way roller lever | $1.96\{200\}$ | $0.59\{60\}$ | 11.0 .433 | 2.4 .094 | 3.0 .118 | $50 \pm 2.01 .969 \pm .079$ |
| Hinge short lever | $2.16\{200\}$ | $0.59\{60\}$ | 8.5 .335 | 2.0 .079 | 2.5 .098 | $25 \pm 1.3 .984 \pm .051$ |
| Short roller lever | $2.35\{240\}$ | $0.78\{80\}$ | 6.5 .256 | 1.5 .059 | 2.0 .079 | $40 \pm 1.61 .575 \pm .063$ |
| One-way short roller lever | $2.75\{280\}$ | $0.98\{100\}$ | 6.5 .256 | 1.5 .059 | 2.0 .079 | $50 \pm 1.61 .969 \pm .063$ |
| Panel mount push plunger | $5.88\{600\}$ | $0.98\{100\}$ | 2.0 .079 | 0.8 .031 | 6.0 .236 | $21.8 \pm 0.8 .858 \pm .031$ |
| Panel mount roller plunger | $5.88\{600\}$ | $0.98\{100\}$ | 2.0 .079 | 0.8 .031 | 6.0 .236 | $33.3 \pm 1.21 .311 \pm .047$ |
| Panel mount cross roller plunger | $5.88\{600\}$ | $0.98\{100\}$ | 2.0 .079 | 0.8 .031 | 6.0 .236 | $33.3 \pm 1.21 .311 \pm .047$ |
| Flexible rod | $1.18\{120\}$ | - | 25.984 | - | 11.433 | 361.417 (T.T.) |

Note) For the operating characteristics, refer to the TECHNICAL INFORMATION

## 5. Protective characteristics

| Protective construction | Screw terminal type | Epoxy-sealed terminal type |
| :---: | :---: | :---: |
| IEC |  | 0 |
| IP60 | - | 0 |
| IP64 |  | 0 |

## DATA

## 1. Life curve



WIRING DIAGRAM


Terminal


## Short push plunger type



## Push plunger type



Hinge lever type


Roller lever type


General tolerance: $\pm 0.4 \pm .016$

## One-way roller lever type



Hinge short lever type


General tolerance: $\pm 0.4 \pm .016$


Panel mount push plunger type


Panel mount roller planger type


Panel mount cross roller planger type


Flexible rod type


## CAUTIONS

1. When the switch is to be used in places where oil or is abundant, bore a drain hole in the bottom of the terminal cover.
2. Avoid places where highly acid or alkaline fluids are used or high temperatures prevail.
3.Wiring
(1) Remove the terminal cover with a $\Theta$ driver.

(2) Insert the lead wire through the knock-out of the terminal cover.
(3) Connect the lead wire to the terminal. When connecting the terminals with the fasten lug, those with the insulation sleeve are recommended.
(4) The terminal cover can be mounted in both directions.
In this case, fasten the terminal cover in the opposite direction.


- For epoxy-sealed terminal types, there are two types by the cord outlet direction; N.C. side and COM side.

4. Flexible rod type
(1) Put the detective object to the tip of plastic part.
(2) Avoid pushing the tip of actuating spring in the direction of axis. In the places of oil or water splashes and much dust area, use the limit switch with keeping the actuating spring in the vertical direction.

A compact and accurate vertical limit switch. Type with a lamp which makes maintenance convenient; either a neon AC powered lamp or an LED DC powered lamp.


Standard type
(Roller arm)

## CHARACTERISTICS

1. Compact design approximately $1 / 3$ of the AZ5 limit switches


Approx. 1/3

2. Au-clad contacts that can even use low level circuit and little chattering and bouncing
The built-in switch has Au-clad contacts with excellent contact reliability and uses a crossbar contact method, and moreover, has a dual cutoff circuit (1a1b contact) with little chattering and bouncing due to computer-operated analysis. 3. Easy wiring with full-open terminals When the cover is removed, the terminals are open as far as the flank, so the necessity to insert your fingers into a case to complete the wiring has been removed. Moreover, the wiring space is large despite the compact size, and the terminals are spread in a tiered array, so that wiring work can be completed very easily.

The cable can either be screwed in directly, or can use U-shaped and circular pressure terminals.

4. Mounting are possible to both front and back

<Rear>

5. Type with a lamp that can be used with a wide range of voltages

- With neon lamp

Compatible with: AC100 and 200V; Even at AC 100V, sufficient luminosity is achieved through the diamond-cut lens. Also with a long lifespan of more than 20 thousand hours.

- With LED lamp

Covers 6 to 48V DC and comes in three types, 6V DC, 12 V DC, 24 to 48 V DC Uses two highly luminescent LEDs and in addition, sufficient luminosity is achieved through the diamond-cut lens.

## 6. Lamp connection can be either spring type or lead wire type

- Spring type (wiring unnecessary) (With neon or LED lamp type) Wiring is unnecessary because the lamp is directly connected to the terminals. By simply changing the direction of the lamp holder attachment, it is possible to display both lights during inoperability and during operation (however, if both NO and NC loads are connected, only the inoperability lamp can be displayed.)
Construction permits lamp attachment method to be changed.

Operating lamp


Inoperability lamp (with output)


- Lead wiring type < Current leakage 0> (LED lamp type only)
Because the wiring can be made parallel to the load, current leakage from the lamp can be reduced to 0 . Even with a slight leak, the electronic circuit incurring the leak can be used safely.

7. Dust-proof, waterproof, oil resistant construction
The main unit and the cover are sealed with rubber packing, and the cord runner is doubly sealed by the cord vent. The actuator is sealed by both a rubber cap and an O ring in all models. Also, the lens and cover are formed simultaneously with the lamp type, and moreover, a nameplate is affixed to the upper surface, thereby improving the already excellent waterproof capabilities. (Note: Applications directly involving the cord entrance and the locations which are always wet and oily, or submersion in water or oil, cannot be used.)

## TYPICAL APPLICATIONS

Ideal for general plant facilities such as engineering machinery, conveyer machinery, and assembly lines LED lamp type is also compatible with low-voltage DC control circuits such as in PCs and computers.

## PRODUCT TYPE

## 1. Standard type

| Actuator | Part No. |
| :--- | :--- |
| Push plunger | AZ8111 |
| Roller plunger | AZ8112 |
| Cross roller plunger | AZ8122 |
| Roller arm | AZ8104 |
| Adjustable roller arm | AZ8108 |
| Adjustable rod | AZ8107 |
| Flexible rod | AZ8166 |
| Spring wire | AZ8169 |
| Remote wire control plunger | AZ8181 |

Note) When ordering an overseas-specified product,refer to the Overseas Standards given below.

## 2. With Neon lamp

| Lamp connection | Actuator | Lamp rating | Part No. |
| :---: | :---: | :---: | :---: |
| Spring type | Push plunger | 100 to 200 V AC | AZ811106 |
|  | Roller plunger |  | AZ811206 |
|  | Cross roller plunger |  | AZ812206 |
|  | Roller arm |  | AZ810406 |
|  | Adjustable roller arm |  | AZ810806 |
|  | Adjustable rod |  | AZ810706 |
|  | Flexible rod |  | AZ816606 |
|  | Spring wire |  | AZ816906 |
|  | Remote wire control plunger |  | AZ818106 |

Note) When ordering an overseas-specified product,refer to the Overseas Standards given below.

## 3. With LED

| Lamp connection | Actuator | Lamp rating |  |
| :---: | :---: | :---: | :---: |
|  |  | 12V DC | 24 to 48V DC |
|  |  | Part No. |  |
| Spring type | Push plunger | AZ8111161 | AZ811116 |
|  | Roller plunger | AZ8112161 | AZ811216 |
|  | Cross roller plunger | AZ8122161 | AZ812216 |
|  | Roller arm | AZ8104161 | AZ810416 |
|  | Adjustable roller arm | AZ8108161 | AZ810816 |
|  | Adjustable rod | AZ8107161 | AZ810716 |
|  | Flexible rod | AZ8166161 | AZ816616 |
|  | Spring wire | AZ8169161 | AZ816916 |
|  | Remote wire control plunger | AZ8181161 | AZ818116 |
| Lead wire type | Push plunger | AZ8111661 | AZ811166 |
|  | Roller plunger | AZ81122661 | AZ811266 |
|  | Cross roller plunger | AZ8122661 | AZ812266 |
|  | Roller arm | AZ8104661 | AZ810466 |
|  | Adjustable roller arm | AZ8108661 | AZ810866 |
|  | Adjustable rod | AZ8107661 | AZ810766 |
|  | Flexible rod | AZ8166661 | AZ816666 |
|  | Spring wire | AZ8169661 | AZ816966 |
|  | Remote wire control plunger | AZ8181661 | AZ818166 |

Notes 1. LED rating 6V DC type is available. When ordering, add suffix 162(spring type) or 662(lead wire type) to the standard part No.
2. The DC24-48V rated lamp is recommended for PC input use.

## 4. Option

|  | Application | Part No. |
| :---: | :---: | :---: |
| VL limit conduit adapter | VL, VL with lamp, VL-T | AZ8801 |

FOREIGN STANDARDS

| Standard |  | Applicable product | Part No. |
| :---: | :---: | :---: | :---: |
| UL | File No. Ratings <br> Product type | : E122222 <br> : 5A 250V AC <br> Pilot duty B300 <br> : Standard model, with neon lamp | Order by standard part No. However, add " 9 " to the end of the part No. for the model with neon lamp. |
| CSA | File No. Ratings <br> Product type | $\begin{aligned} & \hline \text { : LR55880 } \\ & \text { : 5A 250V AC } \\ & \text { Pilot duty B300 } \\ & \text { : Standard model, with neon lamp } \\ & \hline \end{aligned}$ |  |
| TÜV | File No. Ratings Product type | : J9551203 <br> : AC-15 2A/250V~ <br> : Standard model only | Order by standard part No. |

VL (AZ8)

## SPECIFICATIONS

## 1. Rating

1) Standard type

| Rated control voltage | Load | Resistive load <br> $(\cos \phi \doteqdot 1)$ |
| :---: | :---: | :---: |
| 125 V AC | 5 A | Inductive load <br> $(\cos \phi \fallingdotseq 0.4)$ |
| 250 V AC | 5 A | 3 A |
| 125 V DC | 0.4 A | 2 A |

2) Type with indicator

| Types | Rated control <br> voltage | Resistive load <br> $(\cos \phi \fallingdotseq 1)$ | Inductive load <br> $(\cos \phi \fallingdotseq 0.4)$ |
| :---: | :---: | :---: | :---: |
| With Neon lamp | 125 V AC | 5 A | 3 A |
|  | 240 V AC | 5 A | 2 A |
| With LED | 24 V DC | 3 A | - |

## 2. Characteristics

| Contact arrangement |  | 1 Form Z |
| :---: | :---: | :---: |
| Initial contact resistance, max. |  | $15 \mathrm{~m} \Omega$ (By voltage drop 6 to 8V DC at rated current) |
| Contact material |  | Gold clad over silver |
| Initial insulation resistance (At 500V DC) |  | Min. 100M $\Omega$ |
| Initial breakdown voltage |  | $1,000 \mathrm{Vrms}$ for 1 min Between non-consecutive terminals $2,000 \mathrm{Vrms}$ for 1 min Between dead metal parts and each terminal $2,000 \mathrm{Vrms}$ for 1 min Between ground and each terminal |
| Shock resistance max. | In the free position | Max. 98m/s ${ }^{2}$ \{10G\} |
|  | In the full operating position | Max. 294m/s² 30 G$\}$ |
| Vibration resistance |  | Standard type: Max. 55 Hz Type with indicator: 10 to 50 Hz , double amplitude of 1.5 mm |
| Expected life (Min. operations) | Mechanical | $10^{7}$ (at 120 cpm ) |
|  | Electrical | $3 \times 10^{5}$ (at rated resistive load) $5 \times 10^{6}$ (Magnetic contactor FC-100 200V AC load) |
|  | Life of lamp | Min. $2 \times 10^{4}$ hours (Neon lamp type) |
| Ambient temperature/Ambient humidity |  | -20 to $+60^{\circ} \mathrm{C}-4$ to $+140^{\circ} \mathrm{F} / \mathrm{Max} .95 \%$ |
| Max. operating speed |  | 120 cpm |

## 3. EN60947-5-1 performance

| Item | Rating |
| :--- | :---: |
| Rated insulation voltage (Ui) | 250 VAC |
| Rated impulse withstand voltage (Uimp) | 2.5 kV |
| Switching overvoltage | 2.5 kV |
| Rated enclosed thermal current (Ithe) | 5 A |
| Conditional short-circuit current | 100 A |
| Short-circuit protection device | 10 A fuse |
| Protective construction | IP64 |
| Pollution degree | 3 |

## 4. Operating characteristics

| Characteristics | O.F. (N $\{g f\})$ max. | R.F. (N $\{g f\})$ min. | Pretravel (P.T.), max. <br> mm inch | Movement Differential <br> (M.D.), max. mm inch | Overtravel (O.T.), min. <br> mm inch | Totaltravel (T.T.), min. <br> mm inch |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Actuator |  |  |  |  |  |  |

*Characteristics measured at bent condition: min. radius 100 mm 3.937 inch.
Notes 1. Keep the total travel values in the specified range. Otherwise the actuator force may rise to several times the operating force, resulting in a mechanical failure or much shorter service life. 2. For the operating characteristics, refer to the TECHNICAL INFORMATION.

## 5. Protective construction

| Protective construction | VL mini limit SW | VL mini limit SW <br> (with indicator) |
| :---: | :---: | :---: |
| $y n y$ |  | $O$ |
| $O$ |  |
| IP60 | $O$ | $O$ |
| IP64 |  |  |

## 6.Lamp rating

| Types | Rated operating voltage | Operating voltage range | Internal resister |
| :---: | :---: | :---: | :---: |
| Neon lamp | 100 to 200 V AC | 80 to 240 V AC | $120 \mathrm{k} \Omega$ |
| LED | 6 V DC | 5 to 15 V DC | $2.4 \mathrm{k} \Omega$ |
|  | 12 V DC | 9 to 28 V DC | $4.7 \mathrm{k} \Omega$ |
|  | 24 to 48 V DC | 20 to 55 V DC | $15 \mathrm{k} \Omega$ |

## DATA

1. Life curve

2. Actual load life curve (relay coil load)


Note: The FC magnetic contactor series is 200 V AC. The K is 2 Form C 24 V DC type.

## WIRING DIAGRAM



Terminal


DIMENSIONS
Push plunger type

(Standard type)

(Standard type)


(Standard type)

(With Neon lamp) tolerance:
$\pm 0.4 \pm .016$
(With Neon lamp)

(With Neon lamp)


VL (AZ8)


Adjustable roller arm type
(Length of arm can be adjustable within 30 to 70 mm 1.181 to 2.756 inch by 1 mm .039 inch pitch)


Flexible rod type (Should be used with less than 50 mm 1.969 inch of T.T.)

Standard type


(Standard type)


Spring wire type (Should be used with less than 50 mm 1.969 inch of T.T.)

(Standard type)

(With Neon lamp)

Remote wire control type


(Standard type)

(With Neon lamp)

## 1. Mounting

1) Fasten a switch body
2) Fasten a wire tentatively
3) Fasten an actuator
4) Fasten the wire

Note) When setting the operating position, it is recommended to adjust operation adjustment nut to keep safety margin for releasing.

## 2. Actuator

1) Make the hole $(12.5 \pm 0.3 \mathrm{~mm}$ $.492 \pm .012$ inch dia.) on the panel.
2) Fasten the actuator by a panel mounting nut and washer.


Panel thickness max. 10 mm .394 inch

## 3. Remote wire

1) Use the wire in as rectilinear condition as possible.
2) When the wire is bent, the radius should be more than 100 mm 3.937 inch.
3) When fastening the wire, fasten the wire at the point more than 100 mm 3.937 inch as below;

4) Less fastening points are recommended.
5) When the wire is fasten, use the rubber bushing to avoid to reform the diameter.
6) When the wire is bent, P.T., M.D. and O.T. can be adjustable as below;
P.T. $=2.5 \mathrm{~mm} .098 \mathrm{inch}($ max. $)$
M.D. $=1.5 \mathrm{~mm}$.059inch (max.)
O.T. $=3.5 \mathrm{~mm} .138 \mathrm{inch}$ (min.)

## OPTION



AZ8801

Applicable wire

| Electric wire name | Finished outside diameter |
| :---: | :---: |
| Vinyl cabtire cord (VCTF) | 8.7 to 11 dia. |
| Vinyl cabtire cable (VCT) | .343 to .433 dia. |


(A set of mounting hex. socket screws is supplied.)


## INDICATOR LIGHTING CIRCUIT

1. Spring type
1) When connecting load to N.O. side: When the switch is at free position, the indicator is lit, and when the switch operates, the indicator turns off. (Use the indicator holder in the same condition as when it was at the time of shipment.)

2. Lead wire type (only for types with LED)
1) When giving indication on N.O. side and N.C. side, operation is same as that in the case of the spring type. However, when load is connected to both N.O. side and N.C. side, indication can be given on both N.C. side and N.O. side.
2) When connecting load to N.C. side: When connecting switch is at free position, the indicator turns off, and when the switch operates, the indicator is lit. (Use the lamp holder, changing it direction by $180^{\circ}$.)

3) When the indication circuit is connected with load in parallel:
Load performs the same operation as the indication circuit does.
(When load operates, the lamp is lit, and when load is turned off, the lamp goes out.)

- More loads than for one circuit cannot be controlled.
- There is no leakage current.

3) When connecting loads to both N.O. and N.C. sides:
Same as in 1).
(Use the lamp holder in the same condition as when it was at the time of shipment. In this case, it is impossible to use it, changing its direction by $180^{\circ}$.)

> (With Neon lamp) (With LED)


## MOUNTING DIMENSIONS

Surface mounting


Depth of screw holes $>15 \mathrm{~mm} .591$ inch

Through hole mounting


Thickness of panel $<5 \mathrm{~mm}$. 197inch Rear mounting


Length of bolt < panel thickness $\mathrm{t}+7 \mathrm{~mm}$.276inch

WIRING
mm inch
-Insulation distance more than 6.4 mm .252inch for wiring and live parts
-Special assembly screws
-Grounding is available


Applicable wire

| Wire name | Applicable wire |  |  |
| :---: | :---: | :---: | :---: |
|  | Wire-strand | Conductor | Finished outside diameter |
| Vinyl cabtire cord (VCTF) | 2-wire 3 -wire 4-wire | $\begin{aligned} & 0.75 \mathrm{~mm}^{2} \cdot 1.25 \mathrm{~mm}^{2} \\ & 2.0 \mathrm{~mm}^{2} \\ & 0.75 \mathrm{~mm}^{2} \cdot 1.25 \mathrm{~mm}^{2} \end{aligned}$ | Round shape 6 dia. to 9 dia. <br> Flat shape Max. 9.4 |
| Vinyl cabtire cable (VCT) | 2-wire | $0.75 \mathrm{~mm}^{2}$ |  |
| 600 V vinyl insulation sealed cable (VVF) | 2-wire | $\begin{gathered} \hline 1.0 \text { dia. to } 1.2 \text { dia. } \\ \hline 1.6 \text { dia. } \end{gathered}$ |  |

## Applicable fasten terminal



With insulated grip
Fasten terminal



## Head direction change <br> (Roller arm, adjustable roller arm, adjustable rod types)

Actuator heads may be moved in $90^{\circ}$ increments to any of four directions, by removing one screw.

3. The use of these switches under the following conditions should be avoided. If the following conditions should become necessary, we recommend consulting us first.
-Use where there will be direct contact with organic solvents, strong acids or alkalis, or direct exposure to their vapors.
-Use where inflammable or corrosive gases exist.

3) After changing the direction of the indicator holder, put the cover on it in such a way that the spring touches the top of the terminal screw.
(Unless the spring rests completely on the terminal screw, distortion of the spring, failure in lighting of the lamp or short circuit may result.)

4. In order to maintain the reliability at a high level under practical conditions of use, the actual operating conditions should be checked for the benefit of the quality of the product.

| Types | Overtravel |
| :---: | :---: |
| Plunger | 1.5 to 2.0 mm |
| (AZ8111, 8112, 8122) | .059 to .079 inch |
| Roller Arm | 20 to $30^{\circ}$ |
| (AZ8104, 8107, 8108) |  |
| Flexible Rod | 15 to 20 mm .591 to |
| (AZ8166, 8169) | .787 inch (at the top) |

2. Because these switches are not of immersion protected construction, their use in water or oil should be avoided. Also, locations where water or oil can normally impinge upon the switch or where there is an excessive accumulation of dust should be avoided.

## 5. Remote wire control types:

Because the main unit is not of water resistant or immersion-proof construction, their use in water or oil should be avoided. Also, locations where water or oil can normally impinge upon the switch or where there is an excessive accumulation of dust should be avoided. The main unit should be installed above the detection part in such case. (An actuator is immersion-protected construction.)

## 6. Mounting

Three cover screws should be fasten uniformly. The rubber for opening cord should be corrected as normal condition after connecting the wire.
7. How to change the indicator holder.

1) As shown in the photograph, wrench a minus-driver in the gap between the cover and the part of the indicator holder indicated by the arrow in the direction of insertion, and raise the lamp a little.
2) After removing the indicator holder, insert it in the reverse direction, and push it in until a snap is heard.
8. Matters to be attended to in using spring type VL Limit Switch with indicator.
1) When loads are connected to both N.O. and N.C. only the indicatin at non-operation time can be used.
2) Take special care not to damage or deform the contact spring during change of indicator holder direction or during connection work.
3) In the case of VL Limit Switch with Neon lamp, if the indicator is connected in series in a 100 V circuit, the indicator ceases to be lighted.
However, for a 200 V circuit, up to 2 lamps can be connected in series.
9. Matters to be attended to in using lead wire type VL with lamp.
1) When loads are connected to both N.O. and N.C. indication can be given on both N.O. and N.C. sides, but it is impossible to connect the indication circuit to the load in series.

## DL Mini Limit Switches

(with forced contact opening mechanism)

An economic compact limit switch equipped with a forced contact opening mechanism and excellent environment proofing (IP67).

(Roller arm) + (Conduit connector)

## CHARACTERISTICS

1. Forced contact opening mechanism When the limit switch is ON, the contact is forced open by the N.C. contact through the cam movement.

2. Conforms to EN standard (EN50047)
3. Uses a unit system

Any combination of actuator, head block, and unit block is possible. The units are also sold separately, making maintenance easy.
4. Hinged cover for easy wiring

5. Protective construction (IP67), and wide operating temperature range $\left(-30^{\circ} \mathrm{C}\right.$ to $+80^{\circ} \mathrm{C}-22^{\circ} \mathrm{F}$ to $+176^{\circ} \mathrm{F}$ )

## TYPICAL APPLICATIONS

General plant facilities such as food processing, light machinery such as packaging machines, and assembly lines.

## PRODUCT TYPE

1. Basic products

| Actuator |  | Part No. |  |
| :--- | :---: | :---: | :---: |
|  |  | PG type |  |
| Roller Lever | AZD1000 | AZD1050 |  |
| Push Plunger | AZD1001 | AZD1051 |  |
| Roller Plunger | AZD1002 | AZD1052 |  |
| Roller Arm | AZD1004 | AZD1054 |  |
| Adjustable Roller Arm | AZD1008 | AZD1058 |  |
| Adjustable roller arm (50 dia. rubber roller) | AZD1003 | AZD1053 |  |
| Adjustable rod (2.6 dia.) | AZD1007 | AZD1057 |  |
| Roller lever (vertical action) | AZD1009 | AZD1059 |  |

Notes: 1. Type of conduit size: PF type (G1/2), PG type (PG13.5)
2. PG is a size standard used in Europe.

## 2. Blocks

| Product name |  | Part No. |
| :--- | :--- | :---: |
| Type of actuators | Roller Lever | AZD1800 |
|  | Roller Arm | AZD1804 |
|  | Adjustable Roller Arm | AZD1808 |
| Head block |  |  |
|  | For plunger | PF type |
|  |  | PG type |
| AZD1820 |  |
|  | For arm type | PF type |
|  |  | PG type |

3. Conduit connector

| Product name | Part No. |
| :---: | :---: |
| PF type conduit connector | AZD1830 |

Note: The conduit connector is for cables.
Rubber seals with an inside diameter of 9 and 11 are
attached.

## FOREIGN STANDARDS

| Standards |  | Applicable product | Part No. |
| :---: | :---: | :---: | :---: |
| UL | File No. Ratings Product type | : E122222 <br> 6A 380V AC Pilot duty A300 <br> : All models | Order by standard part No. |
| CSA | File No. Ratings Product type | LR55880 <br> 6A 380V AC Pilot duty A300 <br> : All models |  |
| TÜV | File No. Ratings Product type | : J9551205 <br> : AC-15 2A/250V~ Pilot duty A300 <br> : All models |  |

PRODUCT COMBINATION
[Basic products] Roller lever


Acutuator block


Adjustable roller arm $\square$
(50 dia. rubber roller) $]$


## SPECIFICATIONS

## 1. Rating

| Voltage | Load | Resistive load <br> $(\cos \phi \fallingdotseq 1)$ | Inductive load <br> $(\cos \phi \doteqdot 0.4)$ |
| :---: | :---: | :---: | :---: |
|  | 125 V | 6 A | 6 A |
|  | 250 V | 6 A | 6 A |
|  | 380 V | 6 A | 3 A |
| DC | 24 V | 5 A | 2.5 A |
|  | 60 V | 1.5 A | 1.5 A |
|  | 220 V | 0.3 A | 0.3 A |

Note: When DC voltage is applied, the time constant is ( $\tau=$ ) Oms for resistive load, $(\tau=) 100 \mathrm{~ms}$ or less for inductive load.
3. EN60947-5-1 performance

| Item | Rating |
| :--- | :---: |
| Rated insulation voltage (Ui) | 250 VAC Note* |
| Rated impulse withstand voltage (Uimp) | $2.5 \mathrm{kV} \mathrm{Note*}$ |
| Switching overvoltage | 2.5 kV |
| Rated enclosed thermal current (Ithe) | 6 A |
| Conditional short-circuit current | 100 A |
| Short-circuit protection device | 10 A Fuse |
| Protective construction | IP67 (Note 1) |
| Pollution degree | 2 |

Note) * The ratings, performance and operating characteristics are based on the basic model.
Note 1: Adjustable roller arm ( 50 dia. rubber roller) type is IP65.

## 5. Protective characteristics

| Protective construction | DL mini limit switches |
| :---: | :---: |
| IEC |  |
| IP60 | $\bigcirc$ |
| IP64 | $\bigcirc$ (Note 1) |
| IP67 |  |

Note 1: The value for protective function characteristics is the initially set value. Also, adjustable roller arm (50 dia. rubber roller) type is IP65.

The switches are compatible with DIN EN50047.

## 2. Characteristics

| Contact arrangement |  | 1a1b |
| :---: | :---: | :---: |
| Initial contact resistance, max. |  | $25 \mathrm{~m} \Omega$ (By voltage drop of 5 to 6 V DC 1A) |
| Contact material |  | Silver alloy |
| Initial insulation resistance (At 500V DC) |  | Min. 100M $\Omega$ |
| Initial breakdown voltage |  | $1,000 \mathrm{Vrms}$ for 1 min Between non-consecutive terminals <br> $2,500 \mathrm{Vrms}$ for 1 min Between dead metal parts and each terminal <br> $2,500 \mathrm{Vrms}$ for 1 min Between ground and each terminal |
| Shock resistance | Functional | Max. $294 \mathrm{~m} / \mathrm{s}^{2}$ (equivalent 30G) (Noe 1) |
|  | Destructive | Max. $980 \mathrm{~m} / \mathrm{s}^{2}$ (equivalent 100G) |
| Vibration resistance |  | 10 to 55 Hz , double amplitude of 1.5 mm |
| Expected life (min. operations) | Mechanical | $10^{7}$ (at 120 cpm ) |
|  | Electrical | $1.5 \times 10^{5}$ (at $20 \mathrm{cpm}, 6 \mathrm{~A} 380 \mathrm{~V} \mathrm{AC} \mathrm{resistive} \mathrm{load)}$ |
| Ambient temperature |  | -30 to $+80^{\circ} \mathrm{C}-22^{\circ} \mathrm{F}$ to $+176^{\circ} \mathrm{F}$ (but not ina frozen environment) |
| Ambient himidity |  | Max. 95\%R.H. (without dew at $40^{\circ} \mathrm{C} 104^{\circ} \mathrm{F}$ ) |
| Max. operating speed |  | 120 cpm |

Note: The ratings, performance and operating characteristics are based on the basic model.
Note 1: This value applies when the arm length of the adjustable roller arm ( 50 dia. rubber roller) is 70 mm or less.

## 4. Operating characteristics

| Characteristics | O.F. (N $\{g f\})$ <br> max. | R.F. (N $\{g f\})$ <br> min. | Pretravel <br> (P.T.), max. <br> mm inch | Movement <br> Diferential <br> (M.D.), max. <br> mm inch | Overtravel <br> (O.T.), min. <br> mm inch | Operating <br> Position <br> (O.P.), <br> mm inch |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Push plunger | $6.37\{650\}$ | $1.47\{150\}$ | 2.079 | 1.2 .047 | 4.157 | $18 \pm 0.5$ <br> $.708 \pm .020$ |
| Roller plunger | $6.37\{650\}$ | $1.47\{150\}$ | 2.079 | 1.2 .047 | 4.157 | $28 \pm 1$ <br> $1.102 \pm .03$ |
| Roller arm | $4.90\{500\}$ | $0.49\{50\}$ | $20^{\circ}$ to $26^{\circ}$ | $14^{\circ}$ | $30^{\circ}$ | - |
| Roller lever | $3.92\{400\}$ | $0.78\{80\}$ | 4.157 | 1.6 .063 | 5.197 | - |
| Adjustable roller arm | $4.90\{500\}$ | $0.49\{50\}$ | $20^{\circ}$ to $26^{\circ}$ | $14^{\circ}$ | $30^{\circ}$ | - |
| Adjustable roller arm <br> (50 dia. rubber roller) | $4.17\{425\}$ | $0.42\{43\}$ | $20^{\circ}$ to $26^{\circ}$ | $14^{\circ}$ | $30^{\circ}$ | - |
| Adjustable rod (2.6 dia.) | $4.90\{500\}$ | $0.49\{50\}$ | $20^{\circ}$ to $26^{\circ}$ | $14^{\circ}$ | $30^{\circ}$ | - |
| Roller lever <br> (vertical action) | $4.41\{450\}$ | $0.88\{90\}$ | 4.157 | 1.7 .067 | 5.197 | $27 \pm 0.8$ |

Note: The above values of adjustable roller arm shows the values when roller length is set at 26 mm same as roller type.
The value of adjustable roller arm ( 50 dia. rubber roller) type shows the value when roller length is set at 32 mm .
The value of adjustable rod ( 2.6 dia.) type shows the value when length of rod is set at 26 mm same as the roller arm type.

## WIRING DIAGRAM

Terminals


## DIMENSIONS

Head block


AZD1820



General tolerance: $\pm 0.4 \pm .016$

Roller lever type


Push plunger type


General tolerance: $\pm 0.4 \pm .016$


Adjustable roller arm (50 dia. rubber roller)


AZD1003
AZD1053


DL (AZD1)

Adjustable rod (2.6 dia.)


AZD1007 AZD1057


Adjustable roller arm type


AZD1008 AZD1058


General tolerance: $\pm 0.4 \pm .016$

Roller lever (vertical action)


AZD1009 AZD1059


General tolerance: $\pm 0.4 \pm .016$


AZD1830


| Rubber seal | Adaptable cable outer diameter |  |
| :---: | :---: | :---: |
| inside diameter | Min. | Max. |
| 9 dia. (.354) | 7.5 dia. (.295) | 9.5 dia. (.374) |
| 11 dia. (.433) | 9 dia. (.354) | 11 dia. (.433) |

General tolerance: $\pm 0.5 \pm .020$

## Arm Setting Position

The roller arm of the arm types (AZD1003, AZD1004, AZD1008, AZD1053, AZD1054 and AZD1058) can be set in any position at $15^{\circ}$ intervals. Loosen the arm fastening hex. nut, reposition the arm, and retighten the hex. nut. When doing so tighten the hex. nut with the arm secured to the unit. Tightening without securing may cause damage.
Also, the same is true of the variable rod types (AZD1007 and AZD1057).


## Head Direction

The head of the arm types (AZD1003, AZD1004, AZD1008, AZD1053, AZD1054 and AZD1058) can be set in any of four directions at $90^{\circ}$ intervals, but not in any other intermediate directions. Loosen four screws on the upper side of the head, and set the head in a desired direction, and retighten them at a torque of 0.20 to $0.39 \mathrm{~N} \cdot \mathrm{~m}$. Be careful not to use too much strength when tightening as this will cause the threads to strip. Also, the same is true of the variable rod types (AZD1007 and AZD1057).


## Roller Direction

The roller of the arm types (AZD1004, AZD1008, AZD1054 and AZD1058) can be mounted on the front and rear (dotted line in the figure) sides of the switch, as shown below. (Positioned on the front side at delivery.)
To set the roller on the rear side, remove the arm fastening hex. nut, and reinsert the arm so as to face the roller in the rear direction. Then, retighten the hex. nut.


## Adjustable Arm Length

To adjust the length of the adjustable arm of AZD1008 and AZD1058, slightly loosen the arm fastening hex. nut, and adjust the length.
The adjustable arm is graduated in two kinds of length units. Use these indications as the reference during adjustment.


## Roller Lever Direction

AZD1000, AZD1009, AZD1050 and AZD1059 type is move a detection object in the D direction as shown below. Be sure not to move the object oppositely. If the opposite direction is required, change the direction of the lever.


The roller lever can be set in two directions at $180^{\circ}$ intervals. (Even though it can be also set in the $90^{\circ}$ direction, the mounting surface will project.) Remove the four lever base fastening screws, turn the lever together with the lever base in $180^{\circ}$, and retighten the four screws at a torque of 0.20 to $0.39 \mathrm{~N} \cdot \mathrm{~m}\{2$ to $4 \mathrm{~kg} \cdot \mathrm{~cm}$ \}.


## Open and close the cover

For the adjustable roller arm type, the cover will not open and close since it contacts the adjustable arm. Either extend the arm fully or remove the arm, then open or close the cover. Also, the same is true of the variable rod types (AZD1007 and AZD1057).

## Adjustable Rod Length

To adjust the length of the variable rod, slightly loosen the hex. nut that is securing the rod and then change the length. After making the change, tighten the hex. nut keeping within a tightening torque of 0.98 and $1.37 \mathrm{~N} \cdot \mathrm{~m}$. Over tightening might damage the rod presser plate.

## Mounting

1) When mounting, use washers (to prevent loosening) and tighten at a torque of 0.49 to $0.69 \mathrm{~N} \cdot \mathrm{~m}\{5$ to $7 \mathrm{~kg} \cdot \mathrm{~cm}\}$.
2) To securely mount the switch, not only fasten the main switch body only with two mounting holes, but also provide two $4_{-0.35}^{+0.2} \mathrm{~mm}$ dia. and max. 5 mm . 197inch high projections and insert them into the holes on the bottom of the main switch body.


- Mounting dimensions


|  | Actuator <br> mevement | Required <br> force (Min.) |
| :--- | :---: | :---: |
| Push plunger <br> Roller plunger | Approx. <br> 3.5 mm <br> .138 inch | Approx. <br> 29.4 N |
| Roller arm <br> Adjustable rod <br> Adjustable roller arm | Approx. $45^{\circ}$ | 9.8 N |
| (50 dia. rubber roller) | Approx. $45^{\circ}$ | 6.4 N |
| Roller lever type | Approx. <br> 7 mm <br> .276 inch | 19.6 N |

11) To protect against entry of foreign matter from the outside, we recommend sealing as much as possible using conduit connectors.
12) Avoid use in excessively dusty environments where actuator operation would be hindered.
13) When used outdoors (in places where there is exposure to direct sunlight or rain such as in multistory car parks) or in environments where ozone is generated, the influence of these environments may cause deterioration of the rubber material. Please consult us if you intend to use a switch in environments such as these.
14) Do not store in places where organic gas might be generated or in places of high dust content or high humidity.
15) Since the roller section of the roller arm ( 50 mm dia. rubber roller type)(AZD1003 and AZD1053) is heavy, the contacts may reverse due to inertia of the roller section which easily leads to erroneous operation.
If there is a possibility of exposure to shock, please make considerations for safety, for example, by providing a redundant circuit so that danger can be avoided in the event that the contacts reverse and cause erroneous operation.


\section*{| $\begin{array}{l}\text { Panasonic } \\ \text { ideas for life }\end{array}$ | $\begin{array}{l}\text { HIGHLY RELIABLE } \\ \text { DIN SIZE } \\ \text { LIMIT SWITCHEs }\end{array}$ | AZ55 |
| :--- | :--- | :--- |
| Limit Switches |  |  |}



## FEATURES

1. Six available actuator types; Flexible design allows rotary type to be locked in any postition through 360 deg., actuator head to be moved to any of four directions, and roller lever to be faced on or out.
2. Output contact ( 1 Form Z ) rating 10 amps resistive.
3. Screw connect terminals.
4. Rugged aluminium die cast housing rated IP65; Conforms to DIN size standards 43694 \& 40430 for mounting distance and dimensions.

## PRODUCT TYPE

| Actuator | Part No. |
| :--- | :---: |
| Push Plunger | AZ5501N |
| Roller plunger | AZ5502N |
| Flexible rod | AZ5506N |
| Roller arm | AZ5524N |
| Adjustable rod | AZ5527N |
| Adjustable roller arm | AZ5528N |

## SPECIFICATIONS

## Rating

| Rated control voltage |  | 125V AC | 250V AC | 115V DC |
| :---: | :---: | :---: | :---: | :---: |
| Resistive load ( $\cos \phi \doteqdot$ 1) |  | 10A | 6A | 0.8A |
| Inductive load ( $\cos \phi \fallingdotseq 0.4$ ) |  | 6A | 4A | 0.1 A |
| Motor or lamp load | N.C. contact | 4A | 2.5A | 0.1A |
|  | N.O. contact | 2A | 1.2A | 0.1 A |

Characteristics

| Contact arrangement |  |  | 1 Form Z |
| :---: | :---: | :---: | :---: |
| Initial contact resistance, max. |  |  | $25 \mathrm{~m} \Omega$ |
| Initial insulation resistance (At 500V DC) |  |  | Min. 100M $\Omega$ |
| Initial breakdown voltage |  | 1,000Vrms for 1 min 1,500Vrms for 1 min 1,500Vrms for 1 min | Between terminals <br> Between dead metal parts and each terminal <br> Between ground and each terminal |
| Shock resistance |  |  | Max. 294 m/s ${ }^{2}$ \{30G\} |
| Vibration resistance |  |  | 55 Hz , double amplitude of 1.5 mm |
| Expected life (Min. operations) | Mechanical |  | $10^{7}$ (at 50 cpm ) |
|  | Electrical |  | $5 \times 10^{5}$ (at 20 cpm , rated load) |
| Ambient temperature |  |  | +5 to $+80^{\circ} \mathrm{C}+41$ to $+176{ }^{\circ} \mathrm{F}$ |
| Ambient humidity |  |  | Max. 95\%R.H. |

OPERATING CHARACTERISTICS

| Actuator | Operating Force (O.F.), max. N \{gf | Release Force (R.F.), min. N \{gf $\}$ | Pretravel (P.F.), max. ( mm inch) | Movement Differential (M.D.), max. ( mm inch) | Overtravel (O.T.), min. ( mm inch) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Push plunger | 26.67 \{2,720\} | 8.92 \{910\} | 1.7 .067 | 1.0 .039 | 6.4 .252 |
| Roller plunger | 26.67 \{2,720\} | 8.92 \{910\} | 1.7 .067 | 1.0 .039 | 5.6 .220 |
| Flexible rod ${ }^{1)}$ | 1.39 \{142\} | - | 291.142 | - | - |
| Roller arm | 8.83 \{900\} | 0.49 \{50\} | $18^{\circ}$ to $25^{\circ}$ | $15^{\circ}$ | $60^{\circ}$ |
| Adjustable rod ${ }^{2}$ | 2.39 \{244\} | 0.14 \{14\} | $18^{\circ}$ to $25^{\circ}$ | $15^{\circ}$ | $60^{\circ}$ |
| Adjustable roller $\mathrm{arm}^{3}{ }^{\text {3 }}$ | 8.83 \{900\} | 0.49 \{50\} | $18^{\circ}$ to $25^{\circ}$ | $15^{\circ}$ | $60^{\circ}$ |

Notes: 1) Characteristics measured at the top of rod.
2) Characteristics measured at the center distance of 141 mm 5.551 inch.
3) Characteristics measured at the center distance of 38.1 mm 1.500 inch.

## DIMENSIONS

Push Plunger type


AZ5501N


Roller plunger type


Flexible rod type


AZ5506N



AZ5524N


Adjustable rod type


Adjustable roller arn type

mm inch

ADJUSTING METHOD
Adjustable roller

1) A rotary actuator can be set and locked in any
2) An actuator head may be moved in $90^{\circ}$ increments to any of four directions, by removing the four head screws.
3) A roller lever may be faced in or out.


## Adjustable head

An actuator may be moved in $90^{\circ}$ increments by removing the four actuator screws.


## DIN STANDARDS

1. Mounting distance and dimensions meet DIN43694.
2. Protective construction meets IEC IP65, but insulation distance and terminal construction do not meet VDE standards.
3. Operating position of AZ5501N and AZ5502N meet DIN43694.
4. There are no DIN standards specified for the operating position of AZ5506N and AZ5528N. Only mounting distance and dimensions meet DIN43694. BUILT-IN DETECTOR SWITCH

## Magnelimit



## FEATURES

1. A switch that makes electrical construction possible at 100 V power.
2. The built-in magnet safeguards checking of the facility cover and gate.
3. Built-in switch with accurate ON/OFF detection.
4. Combination of magnet (support) and limit switch (detection) saves on both construction and space.
5. Two types of contact: 1a (ON when gate is closed), and 16 (ON when gate is open.)
6. The unit case comes in three colors:

Yellow, brown, and gray.
7. The product comes with three different types of weight sustainability: $1 \mathrm{~kg}, 3 \mathrm{~kg}$, and 5 kg .

## PRODUCT TYPE

| Product name | Specifications |  |  |  | Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Contact construction | Case color | Sustainable weight sustainability | Packaging |  |
| Magnelimit 1 Form A | 1a <br> (ON when gate is closed) | Yellow | 3kg type (29.4N \{3kgf\}) <br> (Note: 1) | - | AZC11013Y |
|  |  |  |  | Blister pack | AZC11013YP |
|  |  | Brown |  | - | AZC11013A |
|  |  |  |  | Blister pack | AZC11013AP |
|  |  | Gray |  | - | AZC11013H |
|  |  |  |  | Blister pack | AZC11013HP |
| Magnelimit 1 Form B | 1b <br> (ON when gate is open) | Yellow |  | - | AZC11113Y |
|  |  |  |  | Blister pack | AZC11113YP |
|  |  | Brown |  | - | AZC11113A |
|  |  |  |  | Blister pack | AZC11113AP |
|  |  | Gray |  | - | AZC11113H |
|  |  |  |  | Blister pack | AZC11113HP |
| Options | Metal plate | Metal plate ( $13 \mathrm{~mm} \times 60 \mathrm{~mm} \times 1.6 \mathrm{~mm} .512 \mathrm{inch} \times 2.362$ inch $\times .063 \mathrm{inch}$ ) |  |  | AZC1801 |

Notes:1. The unit comes with an metal plate enclosed.
2. The blister pack type comes with 1 metal plate and 4 screws (2 long, 2 short) enclosed.
3. Weight sustainability also comes in 1 kg and 5 kg types. Specify when ordering by replacing " 3 " with " 1 " for the 1 kg type, and " 5 " for the 5 kg type at the end of the part No.

## SPECIFICATIONS

## 1. Ratings

| Rated voltage Load type | Resistance load | Lamp load | Guidance load |
| :---: | :---: | :---: | :---: |
| 125 V AC | 5 A | 1.5 A | 3 A |
| 250 V AC | 5 A | - | 3 A |
| 30 V DC | 5 A | - | 1.5 A |

Notes:1. Inductive load is a minimum 0.4 (AC) and time duration is maximum 7 ms (DC).
2. Lamp load has 10 times the inrush current.
3. Minute load ratings: 5 mA 6 V DC, 1 mA 24 V DC

## 2. Switch operating features

| Operating force (O.F.) ( $\mathrm{N}\{\mathrm{gf}$ ) |  |  | 3.43 \{350\} max. |
| :---: | :---: | :---: | :---: |
| Return force (R.F.) (N\{gf\}) |  |  | 0.49 \{50\} min. |
| Pretravel (P.T.) |  |  | 1.8 mm . 071 inch max. |
| Movement differential (M.D.) |  |  | 0.2 to 0.8 |
| Release position (R.P.) |  |  | 4.0 mm . 157 inch max. |
| 3. Capabilities overview |  |  |  |
| Electrical capabilities | Insulation resistance (initial) | Min. $100 \Omega$ (measured at 500 V DC insulation resistance) |  |
|  | Voltage resistance | Contact distance: AC $1000 \mathrm{~V} / 1 \mathrm{~min}$. (initial) <br> Distance between each pin and uncharged metal parts: AC 2100V/1 min. Distance between each pin and earth: AC 2100V/1 min. |  |
| Life | Mechanical life | Min. 100 thousand times (ON/OFF frequency 60 times/min.) |  |
|  | Electrical life | Min. 50 thousand times (resistance load AC 250V 5A) Min. 30 thousand times (lamp load AC 125V 1.5V) ON/OFF frequency 20 times/min. |  |
| Protective capabilities |  | IP40 |  |
| Usage conditions | Ambient temperature | -20 to $+80^{\circ} \mathrm{C}-4$ to $176^{\circ} \mathrm{F}$ (but not in a frozen environment.) |  |
|  | Ambient humidity | Max. 95\% RH |  |
|  | Tolerable operating frequency | Mechanical: 60 times/min. Electrical: 20 times/min. |  |
| Sustainability (when using the enclosed metal plate) |  | 1 kg ( 9.8 N \{1 kgf$\}$ ), 3 kg ( 29.4 N \{3kgf\}), 5 kg ( $49 \mathrm{~N}\{5 \mathrm{kgf}\}$ ) |  |

OUTPUT CIRCUIT DIAGRAM


DIMENSIONS


## METAL PLATE <br> ATTACHMENT

## - Attaching the main unit

1. Using an M4 screw, attach firmly remembering to employ a washer, etc. The appropriate torque is 1.18 to 1.47 N ( 12 to $15 \mathrm{~kg} / \mathrm{cm}$.)
2. 2. When moveable parts such as the gate are closed, ensure that the yoke and metal plate are flush with each other.


- Attaching the metal plate

1. Using an M3 dish screw, attach to the side opposite from the yoke. Pay particular attention that the head of the attached screw does not protrude further than the surface of the metal plate (if using wooden screws, a call of 2.7 is optimum.)
2. If the adhesive side is magnetic (metal plate), the adhesion may prove ineffective.

Further, since the sustainability varies depending on the board thickness and the surface processing (paint, etc.), it is best to check beforehand.


Unit attachment hole processing dimensions


Unless the metal plate and the yoke are flush with each other, adhesive power will be lost, and there is a risk that the switch will not operate.


Adhesion board hole processing dimensions

(Fit a C1 panel to the inlet vent)

## SUITABLE WIRING

## - Maximum external dimensions upon completion

Circular: 8 mm dia. . 315 inch dia. max. Flat: Lengthwise 9.4 mm . 370inch max. (VVF 2 cores, conductor radius 1.6 dia.)

- Wiring processing dimensions

Refer to the diagram below for the wiring processing dimensions


Circular


Flat (VVF 2 cores, conductor radius 1.6 . 063 dia)

## WIRING

- Terminal uses a M3.5 angle washer attachment.
- During wiring work, do not connect the lead wire directly to the terminal, but via a crimp contact. However, this excludes single wiring.
- Wiring by solder should be avoided.

1. Wiring method

Insert a flat screwdriver into the indentation of the product side, and remove the terminal cover.

2. Slide the rubber cap and the terminal cover over the wire, as shown in the illustration then attach a crimp contact to the terminal. The torque applied to the terminal screw should be within the range of $0.39-0.59 \mathrm{Nm}(4-6 \mathrm{~kg} / \mathrm{cm})$.

3. If using a VVF wire, bend the wire towards the unit, and once it has taken the proper shape, install the terminal cover. After installing the terminal cover, attach the rubber cap.


## CAUTIONS FOR USE

- Because the magnelimit is not waterproof, avoid using in areas where it may be splashed with either water or oil. Also, avoid using in locations where dust may accumulate.
- Do not use in atmospheres where the unit may directly come into contact with any kind of organic solvent, strong acid or alkaline liquids, or combustible or corrosive gasses.
- Avoid using in silicon environments such as organic silicon-based rubber, solvents, sealants, oil, grease, or wiring. - The moveable parts on the magnelimit such as the gates are equipped with a stopper, so avoid attachments that require them to bear the full load. - In order to improve reliability under actual working conditions, check the quality under as close to actual working conditions as possible.
- This magnelimit has a built-in electromagnet. For this reason, take care not to place floppy disks, magnetic cards, or other magnetic recording mediums near the unit, as the data may be corrupted or lost.


## SAFETY STANDARDS OVERVIEW

## 1. UL specifications



UL is an abbreviation of Underwriter's Laboratories Inc., a non-profit organization that was established by an

IIAmerican disaster insurance conference in 1894. At UL, products that meet the requirements of the manufacturers are inspected, and the announcing of specifications and safety standards for products across a wide range of fields such as crime prevention, radiation exposure prevention, automatic controls, scientific safety levels, safety of electrical equipment, fire prevention, and gas and oil are announced. UL publishes a list of those products which pass their specifications and work to facilitate ease of use on the part of the users. The safety standards set by UL cover all events that may occur during the use of a product, across a very wide range, thoroughly. The reliability of products bearing the UL mark is extremely high, and in many American states and cities, there are legal restrictions on the sale of products not bearing the mark, and even in unregulated states, such products are treated as inferior.

## 4. Pilot Duty

One of the specifications in the "UL508 Industrial Control Equipment" regulations at UL (Underwriters Laboratories Inc.), has to do with the grade of contact control capacity by NEMA (National Electrical Manufacturers Association) standards. By obtaining both UL and CSA approval for this grade, the product becomes authorized publicly.

## 2. CSA specifications



An abbreviation for the Canadian Standard Association, this body possesses the authority to determine whether or not electrical products conform to their standards and to set standards for manufacturing products that are used by the general public. The CSA has enormous public trust and authority, and nearly all of the Canadian provinces are required to receive CSA approval in order to sell electrical products within their province, which the CSA enforces. Consequently, electrical products exported from Japan to Canada must receive CSA approval and display the CSA mark; if not, the product in question will not be legally approved.
valid as VDE approval.

## 3. TÜV (Technischer UberwachungsVerein)

The "German Boiler Monitoring
Association" which was inaugurated in 1875 with the aim of preventing boiler accidents, is the parent body of this civil non-profit, independent organization.
The TÜV has the unique characteristic of existing as an independent body in each of Germany 14 states (TÜV Rheinland, TÜV Bayern's etc.)
The TÜV conducts wide-ranging inspections of factory plants, facilities, etc, and is entrusted by the government to conduct inspection and approval work on electrical products as well, mainly based upon EN specifications.
TÜV approval is valid in all of Germany's 14 states regardless of which TÜV body issued it, and this approval is as equally valid as VDE approval.


Pilot Duty A300

| AC applied voltage [V] | Electrifi-cationcurrent[A] | Input power [A] | Breaker power [A] | [VA] |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | During input | During breaker |
| 120 | 10 | 60 | 6 | 7,200 | 720 |
| 240 |  | 30 | 3 | 7,200 | 720 |

Pilot Duty B300

| AC applied voltage [V] | Electrification current [A] | Input power [A] | Breaker power [A] | [VA] |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | During input | During breaker |
| 120 |  | 30 | 3 | 3,600 | 360 |
| 240 |  | 15 | 1.5 | 3,600 | 360 |

Pilot Duty C300

| AC applied voltage [V] |  | Input power [A] | Breaker power [A] | [VA] |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | During input | During breaker |
| 120 | 2.5 | 1.5 | 1.5 | 1,800 | 180 |
| 240 |  | 7.5 | 0.7 | 1,800 | 180 |

## SUMMARY OF SAFETY STANDARDS RECOGNITION

## LIMIT SWITCHES

| Product name |  | UL recognized |  | CSA certified |  | TÜV approval |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | File No. | Approved ratings | File No. | Approved ratings | File No. | Approved ratings |
| SL Limit Switches |  | E122222 | 4A 250V AC | LR55880 | 4A 250V AC | - | - |
| HL Limit Switches | Dies-cast case standard load model | E122222 | 5 A 250 V AC Pilot duty B300 | LR55880 | 5A 250V <br> AC Pilot duty B300 | J9650514 | DC-12 1A 30V- |
|  | Die-cast case low level load model (includes connector type) |  | 0.1A 30V DC |  | 0.1 A 30 V DC |  | DC-12 0.1A 30V- |
|  | Plastic case standard load model |  | 5 A 250 V AC Pilot duty B300 |  | 5A 250VAC Pilot duty B300 | J9650515 | $\begin{gathered} \text { AC-15 2A 250V~ } \\ \text { DC-12 1A 30V- } \end{gathered}$ |
|  | Plastic case low level load model |  | 0.1A 30V DC |  | 0.1A 30V DC |  | DC-12 0.1A 30V- |
| ML Limit Switches | Standard model | E122222 | 10A 250V AC | LR55880 | 10A 250V AC | J9551204 | AC-15 2A 250V~ |
|  | Terminal mold model | - | - | - | - | - | - |
|  | With lamp | - | - | - | - | - | - |
| New slitted type limit switch |  | E99838 | $\begin{aligned} & \text { 15A 1/2HP } 125 \mathrm{~V} \text { AC } \\ & 10 \mathrm{~A} 1 / 2 \mathrm{HP} 250 \mathrm{~V} \text { AC } \\ & \hline \end{aligned}$ | LR55880 | $\begin{aligned} & \text { 15A 1/2HP } 125 \mathrm{~V} \text { AC } \\ & 10 \mathrm{~A} 1 / 2 \mathrm{HP} 250 \mathrm{~V} \text { AC } \end{aligned}$ | - | - |
| QL Limit Switches |  | E122222 | 5A 250V AC | LR55880 | 5A 250V AC | - | - |
| VL Limit | Standard model | E122222 | 5A 250V AC Pilot duty B300 | LR55880 | 5A 250V AC Pilot duty B300 | J9551203 | AC-15 2A 250V~ |
| Switches | With neon lamp |  |  |  |  | - | - |
| DL Limit Switches |  | E122222 | $\begin{gathered} \text { 6A 380V AC } \\ \text { Pilot duty A300 } \end{gathered}$ | LR55880 | 6A 380V AC Pilot duty A300 | J9551205 | AC-15 2A 250V~ |
| Vertical Limit Switches |  | E99838 | $\begin{aligned} & \text { 15A 1/2HP } 125 \mathrm{~V} \text { AC } \\ & 10 \mathrm{~A} 1 / 2 \mathrm{HP} 250 \mathrm{~V} \text { AC } \end{aligned}$ | - | - | - | - |
| Compact Magnelimit | General type | E43149 | 5A 250V AC | $\begin{gathered} \text { E43149 } \\ \text { (C-UL) } \\ \hline \end{gathered}$ | 5A 250V AC | - | - |
|  | Water-resistant type | E43149 | 2A 250V AC | $\begin{gathered} \text { E43149 } \\ \text { (C-UL) } \\ \hline \end{gathered}$ | 2A 250V AC | - | - |
| Magnelimit |  | E122222 | $\begin{gathered} 5 \mathrm{~A} 250 \mathrm{~V} \mathrm{AC} \\ \text { Pilot duty B300 } \\ \hline \end{gathered}$ | LR55880 | 5A 250V AC Pilot duty B300 | - | - |

## LIMIT SWITCHES CONFORMING TO IE/IEC STANDARDS

The limit switches shown below conform to both EN and IEC standards, and may display the CE markings.

| Product classification | Product name | Suitable standard | Approving body | File No. |
| :---: | :---: | :---: | :---: | :---: |
| Limit Switches | HL | EN60947-5-1 | TÜV | $\mathrm{J} 9650514 / \mathrm{J} 9650515$ |
|  | ML | EN60947-5-1 | TÜV | J 9551204 |
|  | VL | EN60947-5-1 | TÜV | J 9551203 |
|  | DL | EN60947-5-1 | TÜV | J 9551205 |
|  | Magnelimit | EN60947-5-1 | - | - |

Note: Refer to the page for each individual product for detailed approval conditions and approved types. Moreover, the HL limit switch alone does not display the CE mark as standard. If the CE mark is necessary, add (CE) to the end of the part No. when ordering.

## WHAT ARE EN STANDARD?

An abbreviation of Norme Europeenne (in French), and called European Standards in English. Approval is by vote among the CEN/CENELEC member countries, and is a unified standards limited to EU member countries, but the contents conform to the international ISO/IEC standards.

If the relevant EN standard does not exist, it is necessary to obtain approval based on the relevant IEC standard or, if the relevant IEC standard does not exist, the relevant standard from each country, such as VDE, BS, SEMKO, and so forth.

## CE MARKINGS AND EC DIRECTIVES

The world's largest single market, the European Community (EC) was born on 1 January 1993 (changing its name to EU in November 1993. It is now always expressed as EU, apart from EC directives.) EU member country products have always had their quality and safety guaranteed according to the individual standards of each member country. However, the standards of each country being different prevented the free flow of goods within the EU. For this reason, in order to eliminate non-tariff barriers due to these standards, and to maximize the merits of EU unification, the EC directives were issued concomitant to the birth of the EU.
The EN standards were established as universal EU standards in order to facilitate EU directives. These standards were merged with the international IEC standards and henceforth reflect the standards in all countries. Also, the CE markings show that products conform to EC directives, and guarantee the free flow of products within the EC.

## APPROPRIATE EC DIRECTIVES FOR CONTROL EQUIPMENT PRODUCTS

The main EC directives that are to do with machinery and electrical equipment are the machinery directive, the EMC directive, the low voltage directive, and the telecom directive. Although these directives have already been issued, the date of their enactment is different for each one. The machinery directive was 1 January 1995. The EMC directive was 1 January 1996, and the low voltage directive was enacted from 1 January 1997. The telecom directive was established by the separate CTR (Common Technology references.)

## Variety of products



## Timers and Counters

Panasonic's precision timers, counters, preset type counters and time switches are flexible, reliable and affordable. Moreover, you can be sure that the wide product range will always include the right device for your application.

## Temperature Controllers

Control any temperature simply, accurately and economically with our temperature controllers. Five different models, a universal input (for thermocouples, resistance temperature detectors, voltage, current), a variety of outputs (relays, solid-state relays, current, alarm) and ease of use mark the KT Series.

## Human Machine Interfaces

Our compact size, bright and easy-to-read Human Machine Interfaces can be used to visualise inspection results. Touch panels can even replace the standard keypad if you so desire.


## Compact Machine Vision Systems Imagechecker A100/200

For more sophisticated applications, the A-Series is the next step. With its dimensions of just $120 \times 40 \times$ 70 mm , the A-Series Imagechecker is one of the smallest of its kind. It allows high-speed, dual-camera processing (A200) with a robust and mature stand-alone hardware.


## Photoelectric sensors

SUNX is the brand name for our sensor products. Whatever type of sensor is required, our wide product range offers you the right solution.


## Relays

With a wide spectrum of advanced relays, photoMOS relays and switches, Panasonic can accommodate sophisticated applications from the automotive, process measuring and control technology, machine manufacturing and telecommunication branches.


## Lasermarker

With its wavelength in the lower infrared, our new $\mathrm{CO}_{2}$-laser marker LP-310-C is the optimal choice for non-abrasive and durable marking of plastics, glass, and organic materials like paper, wood, rubber, or leather.


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