## Knob-type Selector Switch A165S/W

## Mounting Aperture of 16 mm

- Modular construction
- Oil-resistant IP65 models
- UL and cUL approved.
- Conforms to EN60947-5-1, IEC947-5-1
- Short mounting depth, less than 28.5 mm below panel
- Wide range of switching capacity from standard to microload
- Lighted and non-lighted models
- 2 and 3 -notch models
- Manual and automatic reset models




## Model Number Structure

## Model Number Legend

## Completely Assembled

The model numbers used to order sets of Units are illustrated below. One set comprises the Selector, Lamp (lighted models only), and Switch.


## Subassembled

## 1. Selector

A165


1. Lighted/Non-lighted

S: Non-lighted
W: Lighted
2. Flange Shape
$\mathrm{J}: \quad$ Rectangular
A: Square
T: Round
BA: Square ( $24-\mathrm{mm}$ square)
3. Number of Notches/Reset Method

2M: 2 notches/Manual
2A: 2 notches/Automatic
3M: 3 notches/Manual
3A: 3 notches/Mixed-operation
3MA: 3 notches
3AM: 3 notches
4. Illumination Color

None: Black (Non-lighted models only)
R: Red
G: Green
Y: Yellow

## 2. Switch (Same as for Key-type Selector Switches)

## A16S <br> 

1. Number of Notches

2 N : 2 notches
3 N : 3 notches
2. Contacts

1: SPDT
2: DPDT


## 3. Lamp

## A16- $\square \square$ <br> 12



1. Operating Voltage (Rated Voltage)

LED
5DS: 5 VDC (5 VDC)
12DS: 12 VDC (12 VDC)
24DS:24 VDC (24 VDC)
3. Lighted/Non-lighted

None: Non-lighted
L: Lighted
4. Terminals

None: Solder terminals (tab terminals \#110)

## Ordering Information

## List of Models

## Ordering as a Set

The model numbers used to order sets of Units are given in the following tables. One set comprises the Selector, Lamp (lighted models only), and Switch.

## Solder Terminals

## A165 $\square$-J (Rectangular) Models



IP65 Oil-resistant

| No. of notches | Output | Reset method |  | Lighting method | Operating voltage | Model |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2 notches | SPDT | Manual | V | LED | 24 VDC | A165W-J2M $\square$-24D-1 |
|  |  |  |  | Non-lighted | --- | A165S-J2M-1 |
|  |  | Automatic | $\nabla$ | LED | 24 VDC | A165W-J2A $\square$-24D-1 |
|  |  |  |  | Non-lighted | --- | A165S-J2A-1 |
|  | DPDT | Manual | $\checkmark$ | LED | 24 VDC | A165W-J2M $\square$-24D-2 |
|  |  |  |  | Non-lighted | --- | A165S-J2M-2 |
|  |  | Automatic | $\nabla$ | LED | 24 VDC | A165W-J2A $\square$-24D-2 |
|  |  |  |  | Non-lighted | --- | A165S-J2A-2 |
| 3 notches | DPDT | Manual | $\downarrow$ | LED | 24 VDC | A165W-J3M $\square$-24D-2 |
|  |  |  |  | Non-lighted | --- | A165S-J3M-2 |

Note: Enter the desired color symbol for the Selector in $\square: R$ (red); $Y$ (yellow); $G$ (green). The Selector for non-lighted models is black.
A165 $\square$-A (Square) Models


IP65 Oil-resistant

| No. of notches | Output | Reset method |  | Lighting method | Operating voltage | Model |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2 notches | SPDT | Manual | V | LED | 24 VDC | A165W-A2M $\square$-24D-1 |
|  |  |  |  | Non-lighted | --- | A165S-A2M-1 |
|  |  | Automatic | $\nabla$ | LED | 24 VDC | A165W-A2A $\square$-24D-1 |
|  |  |  |  | Non-lighted | --- | A165S-A2A-1 |
|  | DPDT | Manual | V | LED | 24 VDC | A165W-A2M $\square$-24D-2 |
|  |  |  |  | Non-lighted | --- | A165S-A2M-2 |
|  |  | Automatic | $\wp$ | LED | 24 VDC | A165W-A2A $\square$-24D-2 |
|  |  |  |  | Non-lighted | --- | A165S-A2A-2 |
| 3 notches | DPDT | Manual | $\downarrow$ | LED | 24 VDC | A165W-A3M $\square$-24D-2 |
|  |  |  |  | Non-lighted | --- | A165S-A3M-2 |



## A165 $\square$-T (Round) Models



## IP65 Oil-resistant

| No. of notches | Output | Reset method |  | Lighting method | Operating voltage | Model |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2 notches | SPDT | Manual | V | LED | 24 VDC | A165W-T2M $\square$-24D-1 |
|  |  |  |  | Non-lighted | --- | A165S-T2M-1 |
|  |  | Automatic | $\nabla$ | LED | 24 VDC | A165W-T2A $\square$-24D-1 |
|  |  |  |  | Non-lighted | --- | A165S-T2A-1 |
|  | DPDT | Manual | V | LED | 24 VDC | A165W-T2M $\square$-24D-2 |
|  |  |  |  | Non-lighted | --- | A165S-T2M-2 |
|  |  | Automatic | $\nabla$ | LED | 24 VDC | A165W-T2A $\square$-24D-2 |
|  |  |  |  | Non-lighted | --- | A165S-T2A-2 |
| 3 notches | DPDT | Manual | $\vee$ | LED | 24 VDC | A165W-T3M $\square$-24D-2 |
|  |  |  |  | Non-lighted | --- | A165S-T3M-2 |

Note: Enter the desired color symbol for the Selector in $\square: R(r e d) ; ~ Y ~(y e l l o w) ; ~ G ~(g r e e n) . ~ T h e ~ S e l e c t o r ~ f o r ~ n o n-l i g h t e d ~ m o d e l s ~ i s ~ b l a c k . ~$

## Ordering Individually

Selectors, Lamps, and Switches (Sockets) can be ordered separately. Combinations that are not available as sets can be created using individual Units. Also, store the parts as spares for maintenance and repairs.


Selectors (Oil-resistant IP65 Models Only)

| Appearance | Number of notches | Reset method | Lighting method | Operating voltage | Model | Selector color symbol |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Rectangular(A165-J) | 2 notches | Manual | LED | 24 VDC | A165W-J2M $\square$ | R (red), Y (yellow), G (green) |
|  |  |  | Non-lighted | --- | A165S-J2M |  |
|  |  | Automatic | LED | 24 VDC | A165W-J2A $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-J2A |  |
|  | 3 notches | Manual | LED | 24 VDC | A165W-J3M $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-J3M |  |
|  |  | Fully automatic | LED | 24 VDC | A165W-J3A $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-J3A |  |
|  | 3 notches | Mixedoperation | LED | 24 VDC | A165W-J3MA $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-J3MA |  |
|  |  | Mixedoperation | LED | 24 VDC | A165W-J3AM $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-J3AM |  |
| Square (A165 $\square$-A) | 2 notches | Manual | LED | 24 VDC | A165W-A2M $\square$ | R (red), Y (yellow), G (green) |
|  |  |  | Non-lighted | --- | A165S-A2M |  |
|  |  | Automatic | LED | 24 VDC | A165W-A2A $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-A2A |  |
|  | 3 notches | Manual | LED | 24 VDC | A165W-A3M $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-A3M |  |
|  |  | Fully automatic | LED | 24 VDC | A165W-A3A $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-A3A |  |
|  | 3 notches | Mixedoperation | LED | 24 VDC | A165W-A3MA $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-A3MA |  |
|  |  | Mixedoperation | LED | 24 VDC | A165W-A3AM $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-A3AM |  |
| Round (A165 $\square$-T) | 2 notches | Manual | LED | 24 VDC | A165W-T2M $\square$ | R (red), Y (yellow), G (green) |
|  |  |  | Non-lighted | --- | A165S-T2M |  |
|  |  | Automatic | LED | 24 VDC | A165W-T2A $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-T2A |  |
|  | 3 notches | Manual | LED | 24 VDC | A165W-T3M $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-T3M |  |
|  |  | Fully automatic | LED | 24 VDC | A165W-T3A $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-T3A |  |
|  | 3 notches | Mixedoperation | LED | 24 VDC | A165W-T3MA $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-T3MA |  |
|  |  | Mixedoperation | LED | 24 VDC | A165W-T3AM $\square$ |  |
|  |  |  | Non-lighted | --- | A165S-T3AM |  |

Note: 1. Enter the desired color symbol for the Selector in the $\square$.
2. The selector for non-lighted models is black.

## Switches



## Lamps

LED

| Light color | Operating voltage | 5 VDC | 12 VDC | 24 VDC |
| :---: | :---: | :---: | :---: | :---: |
| Red |  | A16-5DSR | A16-12DSR | A16-24DSR |
| Yellow |  | A16-5DSY | A16-12DSY | A16-24DSY |
| Green |  | A16-5DSG | A16-12DSG | A16-24DSG |

## Accessories (Order Separately)

## Accessories

| Name | Appearance | Classification | Model | Remarks |
| :---: | :---: | :---: | :---: | :---: |
| Panel Plugs |  | Rectangular | A16ZJ-3003 | Used for covering the panel cutouts for future panel expansion. <br> Degree of protection: IP40 |
|  |  | Square | A16ZA-3003 |  |
|  |  | Round | A16ZT-3003 |  |

Tools

| Name | Appearance | Model | Applicable types |  |  |  |  | Remarks |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Pushbutton Switch | Knob-type Selector Switch | Key-type Selector Switch | $\begin{aligned} & \text { Emergency } \\ & \text { Stop } \\ & \text { Switch } \end{aligned}$ | Indicator |  |
| Screw Fitting |  | A16Z-3004 | Yes | Yes | Yes | Yes | Yes | Convenient for ganged installation. <br> Tighten to a torque of 0.39 N•m min. |
| Extractor |  | A16Z-5080 | Yes | Yes | Yes | Yes | Yes | Convenient for extracting the Switches and Lamps. |

## Specifications

## Approved Standards

| Agency | Standards | File No. |
| :--- | :--- | :--- |
| UL, cUL (See note.) | UL508 | E41515 |
| -- | EN60947-5-1 | --- |

Note: cUL: CSA, C22.2 No. 14

## Approved Standard Ratings

## UL, cUL (File No. E41515)

5 A at 125 VAC, 3 A at 250 VAC (general use)
3 A at 30 VDC (resistive)

## EN60947-5-1 (Low Voltage Directive)

3 A at 250 VAC (AC12), 3 A at 30 VDC (DC12)
Ratings

## Contacts

| AC resistive load | DC resistive load |
| :--- | :--- |
| 3 A at 250 VAC | 3 A at 30 VDC |
| 5 A at 125 VAC |  |

Minimum applicable load: 1 mA at 5 VDC
Rated values are obtained from tests conducted under the following conditions.

1. Load: Resistive load
2. Mounting conditions: No vibration and no shock
3. Temperature: $20 \pm 2^{\circ} \mathrm{C}$
4. Operating frequency: 20 times $/ \mathrm{min}$

## Super-bright LED

| Rated <br> voltage | Rated current | Operating <br> voltage | Internal limiting <br> resistor |
| :--- | :--- | :--- | :--- |
| 5 VDC | $30 \mathrm{~mA}(15 \mathrm{~mA})$ | $5 \mathrm{VDC} \pm 5 \%$ | $33 \Omega(68 \Omega)$ |
| 12 VDC | 15 mA | $12 \mathrm{VDC} \pm 5 \%$ | $270 \Omega(560 \Omega)$ |
| 24 VDC | 10 mA | $24 \mathrm{VDC} \pm 5 \%$ | $1600 \Omega(2,000 \Omega)$ |

Note: The values in parentheses are for blue Selectors.

## - Characteristics

| Item |  | Knob-type Selector Switch |
| :---: | :---: | :---: |
| Allowable operating frequency | Mechanical | 20 operations/minute max. |
|  | Electrical | 10 operations/minute max. |
| Insulation resistance |  | $100 \mathrm{M} \Omega \mathrm{min}$. (at 500 VDC ) |
| Dielectric strength |  | 1,000 VAC, $50 / 60 \mathrm{~Hz}$ for 1 min between terminals of same polarity 2,000 VAC, $50 / 60 \mathrm{~Hz}$ for 1 min between terminals of different polarity and also between each terminal and ground $1,000 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$ for 1 min between lamp terminals (see note 2) |
| Vibration resistance | Malfunction | 10 to 55 Hz , 1.5-mm double amplitude (malfunction within 1 ms ) |
| Shock resistance | Mechanical | $500 \mathrm{~m} / \mathrm{s}^{2}$ |
|  | Malfunction | $150 \mathrm{~m} / \mathrm{s}^{2} \mathrm{max}$. (malfunction within 1 ms ) |
| Durability | Mechanical | 250,000 operations min. |
|  | Electrical | 100,000 operations min. |
| Ambient temperature |  | Operating: $-10^{\circ} \mathrm{C}$ to $55^{\circ} \mathrm{C}$ (with no icing or condensation) Storage: $\quad-25^{\circ} \mathrm{C}$ to $65^{\circ} \mathrm{C}$ (with no icing or condensation) |
| Ambient humidity |  | Operating: 35\% to 85\% |
| Electric shock protection class |  | Class II |
| PTI (tracking characteristic) |  | 175 |
| Degree of contamination |  | 3 (IEC947-5-1) |
| Weight |  | Approx. 13 g (in the case of a lighted DPDT switch) |

Note: 1. Set and reset constitute one operation.
2. With LED and incandescent lamp not mounted.

## Screw-less Clamp

| Item |  | Screw-less Clamp |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Recommended wire size |  | $0.5 \mathrm{~mm}^{2}$ twisted wire or 0.8 mm -dia. solid wire |  |  |  |
| Usable wires and tensile strength | Twisted wire | $0.3 \mathrm{~mm}^{2}$ | $0.5 \mathrm{~mm}^{2}$ | $0.75 \mathrm{~mm}^{2}$ | $1.25 \mathrm{~mm}^{2}$ |
|  | Solid wire | 0.5 mm dia. | 0.8 mm dia. | 1.0 mm dia. | --- |
|  | Tensile strength | 10 N | 20 N | 30 N | 40 N |
| Length of exposed wire |  | $10 \pm 1 \mathrm{~mm}$ |  |  |  |

Operating Characteristics

| Features | Type | Knob-type Selector Switch |  |
| :--- | :--- | :--- | :--- |
|  | 2 notches |  | 3 notches |
| Operating force (OF) max. | $9.8 \mathrm{~N} \cdot \mathrm{~m}$ | $45^{+10^{\circ}}$ |  |
| Set position (SP) | $90 \pm 5^{\circ}$ |  |  |

## - Operation Angle

## Two notches <br> Three notches



Note: 1. The angle used for automatic reset is shown in parentheses.
2. FP: Free Position

## Contact Form

| Name | Contact |
| :---: | :---: |
| SPDT | COM |
|  |  |



Selector
Flange Shape
Rectangular (A165 $\square$-J)


Square (A165 $\square$-A)


Round (A165 $\square$-T)


Protective Structure

- Oil-resistant IP65

Color of Selector

- LED models

Red, green, yellow

- Non-lighted models

Black

Lighting Method

- Lighted (LED) models
(The upper face of the knob is illuminated.)
- Non-lighted models

Number of Notches and Reset Method

- 2 Notches

Manual reset
Automatic reset

- 3 Notches

Manual reset
Automatic reset


- PCB terminals


## Switch

Switch Specifications

- Standard Loads

5 A at 125 VAC
5 A at 250 VAC
3 A at 30 VDC
Minimum applicable load: 1 mA at 5 VDC

## Dimensions

Note: All units are in millimeters unless otherwise indicated.
Knob-type Selector Switches without Voltage Reduction Unit

Rectangular
A165 $\square$-J
Solder terminals (tab terminals \#110)



Note: See page 14 for panel cutouts.

## Square

A165 $\square$-A
Solder terminals (tab terminals \#110)


## Round

A165 $\square$-T
Solder terminals (tab terminals \#110)



Note: See page 14 for panel cutouts.


Note: See page 14 for panel cutouts.

The following diagrams show the rectangular model as a representative example. The lamp terminal is also provided with non-lighted models.

## Rectangular A165 $\square$-J

PCB terminals


Note: See page 14 for panel cutouts.


## Rectangular

A165W $\square$-T
Reduced-voltage light-
ing, solder terminals
(tab terminals \#110)


## Rectangular

A165 $\square$-2S
Screw-Less Clamp


## Terminal Arrangement

## Models with Solder Terminals without Reduced-voltage Lighting

Lamp terminals are not provided with the Non-lighted Knob-type Selector Switches and Key-type Selector Switches.

## Lighted SPDT Switches



Terminal Arrangement (Bottom View)


Note: The L+ is not shown on the Switch.

Lighted DPDT Switches


Terminal Arrangement (Bottom View)


Note: The L+ is not shown on the Switch.

## Non-lighted DPDT Switches



## Lighted DPDT Switches



[^0]
## Non-lighted Models with PCB Terminals

Lamp terminals are not provided with the Non-lighted Knob-type Selector Switches and Key-type Selector Switches.

## Non-lighted SPDT Switches



## Non-lighted DPDT Switches



PCB Cutouts (Bottom View)


PCB Cutouts (Bottom View)


## Panel Cutouts

## Models with Solder Terminals

Rectangular
A165 $\square$-J
(Top View)


Square A165 $\square$-A
Round A165 $\square$-T
(Top View)


Note: 1. Make sure the thickness of the mounting panel is 0.5 to 3.2 mm .
2. If the panel is to be finished with coating, etc., make sure that the panel meets the specified dimensions after coating.

## Models with PCB Terminals



Note: 1. Ensure that the variation in the distance between the centers of neighboring mounting holes is less than $\pm 0.1 \mathrm{~mm}$.
2. Make sure the thickness of the mounting panel is 0.5 to 3.2 mm . If, however, a Switch Guard or Dust Cover is used, the thickness of the mounting panel must be 0.5 to 2 mm .
3. If the panel is to be finished with coating, etc., make sure that the panel meets the specified dimensions after coating.

## Installation

For details on mounting the Switch to a panel, and mounting and dismounting the Switch, refer to installation details for the A16 Pushbutton Switch.

## Panel Mounting

Refer to the Installation section for the A16.

## Mounting and Replacing the Pushbutton

Refer to the Installation section for the A16.

## Flange Rotation

## A165 Knob-type Selector Switch

Fix the Switch screw and rotate the flange in $45^{\circ}$ turns.


## Precautions

Refer to the Technical Information for Pushbutton Switches (Cat. No. A143) and the Precautions section for the A16.

[^1]To convert millimeters into inches, multiply by 0.03937 . To convert grams into ounces, multiply by 0.03527 .

## X-ON Electronics

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[^0]:    Note: For details of the terminal arrangement for Screw-Less Clamps, refer to the corresponding section for the A16.

[^1]:    ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

