

Pilot and Signaling Devices

Heavy-Duty 22.5 mm Watertight/Oiltight Pilot Devices

C-2000

Nomenclature

600 VAC Max., 300 VDC Max.

10 Amps Continuous AC, 2.5 Amps Continuous DC

For use in interpreting product numbers only. Do not use for developing product numbers.

Standard & Illuminated Push Buttons

| | | Style | | Illumination | | Cap Color | | Push Button Type | | Lens Type | |
|---|---|--|---|---|--|---|--|--|--|---|--|
| P | 9 | | P | | | | | | | | |
| | | C = Polished chrome M = Satin chrome X = Round plastic S = Square plastic | | N = Nonilluminated L = Illuminated | | 0 = No Cap N = Black R = Red V = Green G = Yellow L = Blue B = White M = Brown H = Gray A = Orange I = Clear | | G = Flush S = Extended E = Recessed | | D = Diffused R = Refracted 0 = No lens | |

Pilot Lights

| | | Style | | Cap Color | | Lens Type | |
|---|---|--|---|--|--|---|--|
| P | 9 | | L | | | | |
| | | C = Polished chrome M = Satin chrome X = Round plastic S = Square plastic | | R = Red V = Green G = Yellow L = Blue B = White I = Clear A = Orange 0 = No cap | | D = Diffused R = Refracted V = Glass 0 = No lens | |

Mushroom-Head Push Buttons

| | | Style | | Type | | Mushroom-Head Diameter | | Cap Color | | Illumination | | Position Type (1 Digit) or Key Selection (2 Digits) | |
|---|---|--|---|---|--|---|--|---|--|---|--|---|--|
| P | 9 | | E | | | | | | | | | | |
| | | C = Polished chrome M = Satin chrome X = Round plastic S = Square plastic | | M = Momentary T = Push/Pull R = Turn-to-reset C = Key-to-reset | | 3 = 28mm 4 = 40mm 6 = 60mm | | N = Black R = Red V = Green G = Yellow L = Blue B = White I = Clear A = Orange | | N = Nonilluminated A = Positive-action, nonilluminated L = Illuminated | | Position type 1 = 2-position push/pull 2 = 3-position, maintained push/momentary pull 3 = 3-position, push/pull, spring return to center Keys See keys selection table on page 9-64 | |

Knob- & Lever-Operated Selector Switches

| | | Style | | Operator Type | | Cam | | Spring Return | | Cap Color | |
|---|---|--|---|--|--|---|--|---|--|--|--|
| P | 9 | | S | | | | | | | | |
| | | C = Polished chrome M = Satin chrome X = Round plastic S = Square plastic | | M = Knob V = Lever L = Illuminated knob | | D, I, or H = 2-position E, L, U, or Z = 3-position X = 4-position Y or W = 5-position | | 0 = Fixed 1 = From left 3 = From left & right 5 = From right | | 0 = No knob or lever N = Black R = Red V = Green G = Yellow L = Blue B = White I = Clear A = Orange | |



Pilot and Signaling Devices

Heavy-Duty 22.5 mm Watertight/Oiltight Selector Switches

C-2000

Section 9

3-Position Lever Operated Selector Switches

Non-Illuminated

600 VAC Max., 300 VDC Max.

10 Amps Continuous AC, 2.5 Amps Continuous DC

Black Lever 3-Position

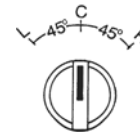
| Position Type | Operator Style | Release Type | Cam Codes | Product Number | List Price GO-10GC |
|---------------|--------------------------|-------------------------|------------|----------------|-----------------------|
| 3-Position | Round Polished Chrome | Maintained | Z, E, L, U | P9CSV#0N | \$14.50 |
| 3-Position | Round Satin Chrome | Maintained | Z, E, L, U | P9MSV#0N | \$14.50 |
| 3-Position | Round Engineered Plastic | Maintained | Z, E, L, U | P9XSV#0N | \$14.50 |
| 3-Position | Round Polished Chrome | Spring Return L → C | Z, E, L, U | P9CSV#1N | \$16.50 |
| 3-Position | Round Satin Chrome | Spring Return L → C | Z, E, L, U | P9MSV#1N | \$16.50 |
| 3-Position | Round Engineered Plastic | Spring Return L → C | Z, E, L, U | P9XSV#1N | \$16.50 |
| 3-Position | Round Polished Chrome | Spring Return C ← R | Z, E, L, U | P9CSV#5N | \$16.50 |
| 3-Position | Round Satin Chrome | Spring Return C ← R | Z, E, L, U | P9MSV#5N | \$16.50 |
| 3-Position | Round Engineered Plastic | Spring Return C ← R | Z, E, L, U | P9XSV#5N | \$16.50 |
| 3-Position | Round Polished Chrome | Spring Return L → C ← R | Z, E, L, U | P9CSV#3N | \$16.50 |
| 3-Position | Round Satin Chrome | Spring Return L → C ← R | Z, E, L, U | P9MSV#3N | \$16.50 |
| 3-Position | Round Engineered Plastic | Spring Return L → C ← R | Z, E, L, U | P9XSV#3N | \$16.50 |

Replace double dagger (§) in product number with cam code from cams table below.

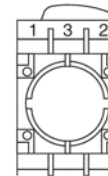
Cams

Choose desired cam. Note selection and position of contact block(s).

| §Cam Code | | | | Quick-Connect | | | |
|-----------|---|---|---|------------------------------|------------|------------------------|------------|
| | | | | Screw Terminal Contact Block | | Terminal Contact Block | |
| | | | | Position 1 | Position 2 | Position 1 | Position 2 |
| Z | 0 | 0 | X | P9B10VN | — | P9B10FN | — |
| | X | 0 | 0 | — | P9B10VN | — | P9B10FN |
| | X | X | 0 | P9B01VN | — | P9B01FN | — |
| | 0 | X | X | — | P9B01VN | — | P9B01FN |
| | 0 | 0 | X | P9B11VN | — | — | — |
| | X | X | 0 | — | — | — | — |
| | X | 0 | 0 | — | P9B11VN | — | — |
| | 0 | X | X | — | — | — | — |
| E | 0 | 0 | X | — | P9B01VN | — | P9B01FN |
| | 0 | X | 0 | P9B10VN | — | P9B10FN | — |
| | 0 | 0 | X | P9B11VN | — | — | — |
| | 0 | 0 | X | P9B11VN | — | — | — |
| L | X | 0 | 0 | — | P9B10VN | — | P9B10FN |
| | 0 | X | 0 | P9B01VN | — | P9B01FN | — |
| | X | 0 | 0 | — | — | — | — |
| | 0 | X | 0 | P9B11VN | — | — | — |
| U | 0 | 0 | X | P9B11VN | — | — | — |
| | 0 | X | 0 | — | — | — | — |
| | 0 | 0 | X | — | P9B11VN | — | — |
| | X | 0 | 0 | — | — | — | — |



Operator Positions



Contact Block Positions
(viewed from rear)



Outlines and Dimensions: See page 9-85

Accessories: See page 9-110 to 9-119

Technical Data: See page 9-127 to 9-133

Pilot and Signaling Devices

Heavy-Duty 22.5 mm Watertight/Oiltight Push Buttons

C-2000

Technical Data

600 VAC Max., 300 VDC Max.

10 Amps Continuous AC, 2.5 Amps Continuous DC

General Specifications

| | | | |
|--------------------------------|---|---|---|
| Conformity to standards | UL508 (USA) NEMA ICS-2 (USA) VDE 0660 (Germany) BSI (Great Britain) CEI EN60947.5. 1 (Italy) CENELEC EN 5000 7 (Europe) | CSA C22.2 No. 14-M91 (Canada) IEC 947.5. 1 (International) UTE (France) NFC 63140 (France) JIS (Japan) | |
| Approvals | UL listed —File Number E66677 CSA Certified —File Number 16661-63 Manufacturing facility is registered to ISO 9000 | CE | |
| Finger protection at terminals | IP2X according to IEC 529 Terminal identification per CENELEC EN 50013 | | |
| Enclosure ratings | Suitable for use in NEMA Types 1, 3, 3R, 3S, 4, 4X, 12, and 13 enclosures. (Multi-function push buttons are suitable for NEMA Type 1 enclosures only unless used with protective rubber cap accessory.) IP66 per IEC 529, when mounted in enclosures with equal or superior seal. | | |
| Ambient temperature | <u>Operating</u> -13° to + 158°F -25° to + 70°C | <u>Storage</u> -40° to + 158°F -40° to + 70°C | |
| Climate suitability/humidity | <u>Climate Type</u> Temperature Wet Hot Wet Variable Wet | <u>Temperature</u> 74°F (23°C) 74°F (23°C) 104°F (40°C) 74° to 104°F (23° to 40°C) | <u>Relative Humidity</u> 50% 83% 92% 83% to 92% |
| Resistance to vibration | Per IEC 68-2-6 . 16g with a frequency from 40-500 Hz and maximum peak-to-peak amplitude of 0.75mm. | | |
| Resistance to shock | According to MIL 202B, method 202A . Test was performed for 1/2 sinusoid for 11ms, 38g max for all operators with transformers and 100g for all other operators. | | |
| Operating force | Standard push button operator: 2.5 lbs. (11N) Each contact block: 1.3 lbs. (6N) Selector switch operator: 2.4 in.-lb. (0.27 N-m) | | |

Wire Terminals

| | | | |
|--|---|------------------------|--|
| | Suitable for #22-#12 AWG stranded or solid copper wires, single or parallel conductors of same size. Terminal torque: 7-12 in./lb. Parallel conductor size combinations (stranded or solid wire): | | |
| Wire capacity and terminal torque requirements (for all power supplies and contact blocks) | <u>Parallel Conductor Size Combinations (Stranded or Solid Wire)</u> | <u>Terminal Torque</u> | |
| | #12 with #14 | 12 in.-lb. | |
| | #14 with #16 | 12 in.-lb. | |
| | #16 with #18 | 12 in.-lb. | |
| | #16 with #20 | 12 in.-lb. | |
| | #16 with #22 | 12 in.-lb. | |
| | #18 with #22 | 10-12 in.-lb. | |
| | #18 with #20 | 10-12 in.-lb. | |
| | #20 with #22 | 7-12 in.-lb. | |
| Quick connect terminals | Suitable for one female tab connector measuring 0.25 x 0.03 inches (6.35 x 0.8 mm) or two female tab connectors measuring 0.11 x 0.03 inches (2.8 x 0.8 mm). | | |

Contact Data

| | | | | | | | | | |
|----------------------------------|---|-----|-----|-----|-----|------|------|------|-----|
| Electrical reliability data | Electrical life and reliability in low level current: 80 million operations at 12V, 5mA, resistive load. (32 contacts tested successfully for 2.5 million operations.) | | | | | | | | |
| Dust resistance | In extremely dusty environments, electrical life at low level current is 250,000 operations at 12 V, 5mA, resistive load. In a clean environment, electrical life at low level current is 10 million operations at 12 V, 5mA, resistive load. | | | | | | | | |
| Thermal current | I _{th} = 10A per IEC 947-5-1 | | | | | | | | |
| Insulation voltage | U _i = 660 Volts ac/dc (opposite polarity) except 2NO and 2NC blocks 300 Vac/dc | | | | | | | | |
| Protection from electrical shock | Class I per IEC 536 for metal operators Class II (double insulation) per IEC 536 for plastic operators | | | | | | | | |
| Insulation category | Group "C" per VDE 0110 | | | | | | | | |
| Dielectric strength | 2500 Volts | | | | | | | | |
| Short circuit protection | 10A type gG fuse, per IEC 269.1 & 269.3 | | | | | | | | |
| Pilot duty ratings | A600 (maximum make volt-amperes = 7200; maximum break volt-amperes = 720; PF = .25) | | | | | | | | |
| | Volts (V) | 12 | 24 | 48 | 60 | 120 | 240 | 480 | 600 |
| | Continuous (A) | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Making (A) | 60 | 60 | 60 | 60 | 60 | 30 | 15 | 12 |
| | Breaking (A) | 10 | 10 | 10 | 10 | 6 | 3 | 1.5 | 1.2 |
| | Q300 (maximum make or break volt-amperes = 69) | | | | | | | | |
| | Volts (V) | 12 | 24 | 48 | 60 | 125 | 250 | 300 | |
| | Continuous (A) | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | |
| | Making (A) | 2.5 | 2.5 | 1.4 | 1.1 | 0.55 | 0.27 | 0.23 | |
| | Breaking (A) | 2.5 | 2.5 | 1.4 | 1.1 | 0.55 | 0.27 | 0.23 | |



Publications and Reference: See Section 17 for a complete list of additional product-related publications

Pilot and Signaling Devices

Heavy-Duty 22.5 mm Watertight/Oiltight Push Buttons

C-2000

Section 9

Technical Data

600 VAC Max., 300 VDC Max.

10 Amps Continuous AC, 2.5 Amps Continuous DC

Materials

| Component | Material |
|---|---|
| Cap/levers/knobs (nonilluminated) | Polyamide/acetal |
| Cap/levers/knobs (illuminated) | Polycarbonate |
| Metal housing | Copper-nickel-chrome plated zinc/aluminum alloy |
| Plastic housing | Polyamide/acetal |
| Plunger | Polyester |
| Springs | Stainless steel |
| Body-to-panel gasket | Polyester elastomer |
| Cap-to-body gasket | Vinyl nitrile rubber |
| Lubricant | Lithium grease |
| Cams for nonilluminated selector switches | Polyamide/acetal |
| Cams for illuminated selector switches | Polyester |
| Cam followers | Polyamide/acetal |
| Contact block and power supply housings | Polyamide/acetal |
| Contacts | Pure silver |
| Conductors | Brass alloy |
| Flanges | Polyamide/acetal |
| Flange latches | Polyamide/acetal |
| Printed circuit board adapter | Polyamide/acetal |
| Joystick protective housing | Vinyl nitrile rubber |
| Joystick plunger, lever & cam | Acetal resin |
| Joystick actuator | Polyamide/acetal |
| Push-to-latch, turn-to-release actuator & plunger | Polyamide/acetal |
| Wobble stick | Polycarbonate |
| Toggle switch lever | Polyamide/acetal |
| Protective caps (clear) | Silicon rubber |
| Protective caps (colored) | Vinyl nitrile rubber |
| Push button protective guards | Polycarbonate |
| Mushroom-head guards | Polyamide/acetal |
| Padlockable cover | Polycarbonate and zinc-plated zinc/aluminum alloy |
| Metal locking rings | Zinc-plated zinc/aluminum alloy |
| Keys | Plated brass |
| Nameplate holders | Polyamide/acetal |
| Nameplate inserts | Laminated polyester |
| Hole plug | Polyamide/acetal |

Power Supply Selection

| Type | Principle of Operation | Benefit |
|---|---|--|
| Full voltage | Supplies input voltage directly to bulb. | Smallest and least expensive. Can be used with LEDs. |
| Transformer | Utilizes a transformer to step the input voltage down to 6 volts. | Transformer has the effect of damping the inrush current and voltage spikes from the switching device seen when the light is turned on, actually protecting the bulb from these factors that shorten life. Generates less heat than the resistor power supplies. Reduces unsafe supply voltages (up to 600 V) down to a safe level for lamp servicing. Can be used with LEDs. Able to withstand a short circuit of the lamp or lamp socket without damage. |
| Normal resistor | Utilizes a resistor in series with the incandescent lamp to drop the lamp voltage to 50% of the input voltage. | Least expensive way to reduce unsafe supply voltages (up to 240 V) down to a safe level for lamp servicing. |
| Diode resistor | Utilizes a resistor and a diode in series with the lamp to rectify and drop a 240 Vac input voltage to operate a 130 V incandescent lamp. | Provides the same function as the normal resistor, but takes up only one position in the flange rather than two. Generates less heat than the normal resistor power supplies. |
| Long-life resistor | Utilizes a resistor in series with the 130 V incandescent lamp to provide a lamp voltage 80% that of the input voltage. | Extends life of a 130 V incandescent bulb by 1300% (from 2000 to 28,000 hours). |
| Flashing (full-voltage or transformer) | Utilizes a flashing circuit which can be enabled or disabled by externally switching (shorting) two connections. | Allows the lamp to be switched between OFF, ON, and FLASHING modes. |
| Panel test (full-voltage or standard resistor) | Utilizes a diode to isolate the lamp test circuit from the supply circuit. | Allows use of indicating lights and "panel test" feature rather than individual push-to-test illuminated push buttons. Eliminates the need for the NO/NC contacts used on conventional push-to-test pilot lights. |

