## **Butt Contact Pushbutton Switches**



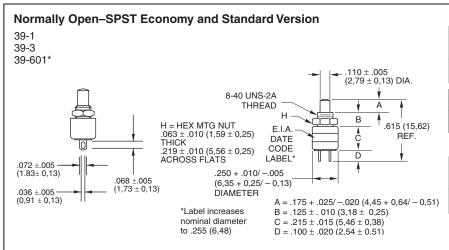
## SERIES 39 SPST, 150 mA to 1/2 Amp

#### **FEATURES**

- Requires an Absolute Minimum of Space
- Molded-In Terminals in SPST–N.O.
- Solder Lug Terminals



## **DIMENSIONS** in inches (and millimeters)



# Economy Version

Electrical Ratings		Operations at Rated Load	*Complete Part Number	Button Color
	At 20 Vdc 20 mA	1,000,000	39-601 RED 39-601 BLK	Red Black

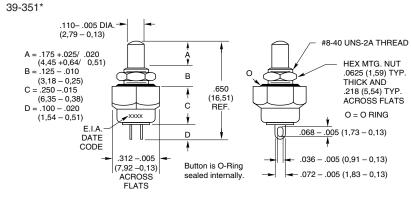
Action	Total Travel	Actuating Force (oz.)	Mtg. Hole
Momentary	.035 ± .015 (0,89 ± 0,38)	4 + 4 - 2	11/64" (4,37) DIA.

#### Standard

Electrical Ratings		Operations at Rated Load	Complete Part Number	Button Color
At 115 Vac 1/2 Amp Res.	At 220 Vac 1/4 Amp Res.		39-1 39-3	Red Black

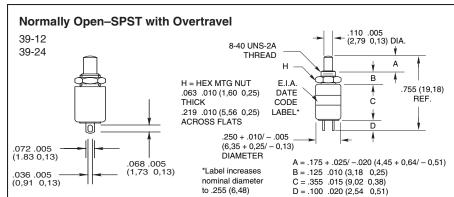
Action	Total Travel	Actuating Force (oz.)	Mtg. Hole
Momentary	$.035 \pm .015$ (0,89 ± 0,38)	4 + 4 - 2	11/64" (4,37) DIA.





Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button Color
1/2 Amp	¹/4 Amp	250,000	39-351 RED 39-351 BLK	Red Black

Action	Total Travel	Actuating Force (oz.)
Momentary	$.035 \pm .015$ (0,89 ± 0,38)	16 ± 8



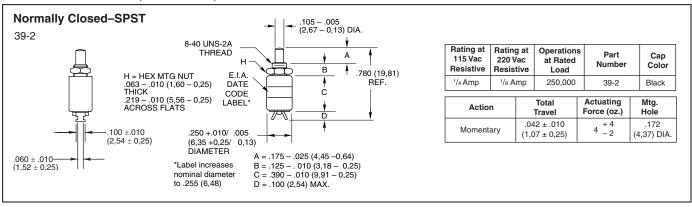
Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Complete Part Number	Button Color
1/2 Amp	¹/4 Amp	100,000	39-12 39-24	Red Black

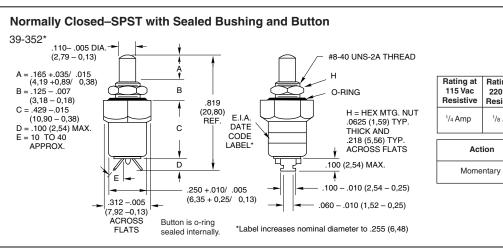
	Action	Total Travel	Over Travel	Actuating Force (oz.)	Mtg. Hole
ı	Momentary	.130 ± .025 (3,30 ± 0,64)	.015 (0,38) Min.	5 ± 3	11/64" (4,37) DIA.



## **Butt Contact Pushbutton Switches**

#### **DIMENSIONS** in inches (and millimeters)

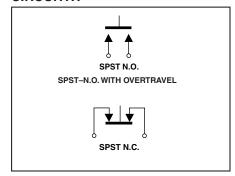




Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Comp Par Numb	t	Button Color
¹/4 Amp	¹/8 Amp	100,000	39-352 39-352	– –	Red Black
Action		Total			tuating

Action	Total Travel	Force (oz.)
Momentary	.042 ± .010 (0,17 ± 0,25)	8 ± 4

#### **CIRCUITRY**



## **SPECIFICATIONS**

## **Rating Criteria**

Contact Resistance: 25 milliohms maximum

on a new switch

Voltage Breakdown: 1,000 Vac between

mutually insulated parts

Insulation Resistance: 1,000 megohms

minimum

Operating Temperature: -40°C to +85°C Mounting Torque: 2 inch-pounds

#### Materials and Finishes

Mounting Nut: Brass, tin zinc

**Housing:** Aluminum, clear anodized for 39-351 and 39-352; Brass, zinc trivalent

chromate-plated for others **Button:** Thermoset plastic **Base:** Thermoset plastic

**Shorting Bar:** Fine silver for 39-2 and 39-352; brass, gold-plated over nickel plate for 39-601; fine silver, gold-plated for others

**Terminals:** Fine silver for 39-2 and 39-352; commercial bronze with gold-plated fine silver

contact surface for others **Spring:** Tinned music wire

O-Rings: (39-351 and 39-352) Internal ring is

silicone; external ring is buna 'N'

#### **ACCESSORY**



# **Button Cap**

Part No. 30B1012 For use with part numbers 39-351 and 39-352. (Fasten to button with Cyanoacrylate Adhesive)

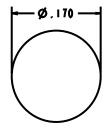
Accessory Part Number	Description
30B1012-5	Red Button Cap
30B1012-9	Black Button Cap
30B1012-8	White Button Cap

#### **ORDERING INFORMATION**

Part Number	Description
39-1	N.O., Red Button
39-2	N.C., Black Button
39-3	N.O., Black Button
39-12	N.O., Overtravel Red Button
39-24	N.O., Overtravel Black Button
39-351 RED	N.O., Sealed, Red Button
39-351 BLK	N.O., Sealed, Black Button
39-352 RED	N.C., Sealed, Red Button
39-352 BLK	N.C., Sealed, Black Button
39-601 RED	N.O., Economy, Red Button
39-601 BLK	N.O., Economy, Black Button

Accessory cap may be used with all switches shown except 39-2.

#### RECOMMENDED PANEL CUTOUT





# INTUITIVE HUMAN INTERFACE SOLUTIONS

## **Pushbutton Engineering Information**

Pushbutton switches are selected not only by their ratings, but also by their contact type. While nearly all rotary switches and DIP switches have wiping contacts, pushbutton switches may have either wiping or butt contacts (see internal views below).

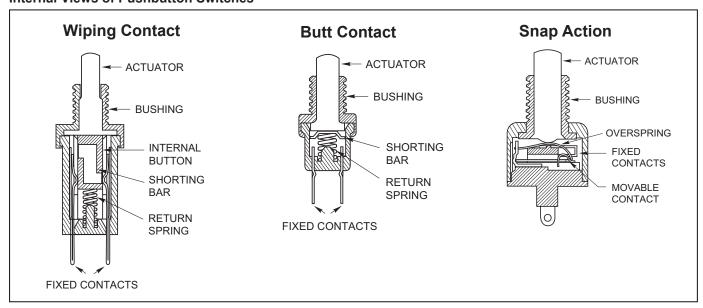
Wiping Contacts are self-cleaning and usually provide a low resistance in circuits where contact resistance is critical. However, the wiping action creates mechanical wear and conductive wear products.

Butt Contacts have less wear than wiping contacts and therefore, have a longer life. They are also smaller. Butt contacts are not self-cleaning, so their contact resistance can vary from operation to operation.

Snap Action switches are basically butt contact switches with a spring mechanism which provides the make and break. The mechanism controls both the operating point and the rate of operation, but adds to the wear of

the switch. The rapid rate of make and break means that these switches are appropriate for high current loads. They usually have a slight wiping action and contact surfaces made of precious metals to minimize their disadvantages.

#### **Internal Views of Pushbutton Switches**



#### **Switch Terminology**

**Actuator:** The part of the switch to which an external force is applied to operate the switch.

**Alternate Action (Push-Push) Switch:** A switch in which the operable position is maintained after the first actuation, and then disengaged with the second operation.

**Break-Before-Make Switch (BBM):** A double throw switch in which the moving contact breaks the connection with the first circuit before

making contact with the second; also called non-shorting switch.

**Double Throw Switch:** A switch which has a normally open as well as a normally closed circuit per pole.

Joystick Action Switch: (From Joystick, the control for an airplane). A lever switch which operates with momentary action in 4 directions, and is disengaged in the upright position.

Make-Before-Break Switch (MBB): A double throw switch in which the contacts makes connection with the second circuit before breaking contact with the first; also called shorting switch.

**Maintained Contact Switch:** A switch in which the actuator remains in a position until it is actuated to another position where it also remains until actuated. Example: Push-Pull Switch.

**Momentary Contact Switch:** A switch in which the shorting bar returns from its operated position to its normal or free position when the actuating force is removed.

**Operating Position or Point:** The position of the actuator when the desired electrical action (make or break of contact) occurs.

**N.C., Normally Closed:** Switch in which the circuit is closed without actuation (with actuator in the "normal" position).

**N.O., Normally Open:** Switch in which the circuit is open without actuation (with actuator in the "normal" position).

**Overtravel:** The distance or angle between the operating position and the extreme position to which the actuator may be moved.

**Pole:** An electrically isolated circuit within a switch; a common terminal and all the selected terminals to which it connects.

**Pretravel:** The distance or angle through which the actuator moves from its free position to its electrical operating position.

**Single Throw Switch:** A switch which has only one normally open or one normally closed circuit per pole.

**Throw:** See Single Throw and Double Throw.



# INTUITIVE HUMAN INTERFACE SOLUTIONS

	Circuitry*	Rating (Amps at 115 Vac Res.)	Operations At Rating	Maximum Width*** inch (mm)	Features	Series
Butt Co	ontact					
SPST	N.O. or N.C. N.O. or N.C. N.O. or N.C. N.O. On or Off N.O. or N.C. N.O. N.O. or N.C. N.O. N.O. N.O. N.O. N.O. N.O. N.O.	5 1 1 1 1 1 1 1 1 1 1 1 1 020** .020** .020** .020** .020* .250 .500 .500 .500 .500 .250 .250 .250	6,000 1,000,000 200,000 1,000,000 1,000,000 1,000,000 200,000 80,000 80,000 1,000,000 1,000,000 1,000,000 1,000,000	3/8 (9,53) 3/8 (9,53) 3/8 (9,53) 11/16 (17,46) 11/16 (17,46) 11/2 (12,7) 11/16 (17,46) 11/16 (17,46) 11/16 (17,46) 11/16 (17,46) 5/16+ (8,13) 5/16+ (8,13) 1/4 (6,35) 1/4 (6,35) 1/2 (12,7) 1/2 (12,7) 1/4 (6,35) 5/16 (7,94) 1/4 (6,35) 1/4 (6,35)	UL Listed Momentary, Terminal Seal, (Wire Leads Optnl.) Overtravel, Terminal Seal, (Wire Leads Optnl.) Positive Feel, Overtravel, Terminal Seal, (Wire Leads Optional) Push/Pull Action (Maintained) Watertight, Terminal Seal, (Wire Leads Optnl.) Square & Round Bezels Square Bezel Panel Mount Pos. Feel, Overtravel, Square & Round Bezels Pos. Feel, Overtravel, Formal PC Mount Miniature, Vertical to PC Mount Sealed Plunger, Stackable with LEDs Miniature Overtravel, Miniature Limit Switch, (Wire Leads Optional) Overtravel, Miniature, (Wire Leads Optional) Watertight Seal, Miniature, (Wire Leads Optional) Watertight Seal, Miniature, (Wire Leads Optional) Actuator Seal, Miniature, Sealed PC Mount, Miniature, Sealed PC Mount, Miniature, Right Angle, Cap Seal PC Mount, Miniature, Overtravel Economical Contact Plating Econ. Plating, Square Bezel Panel Mount Economical Contact Plating Actuator Seal, Overtravel, Miniature Limit Switch, (Wire Leads Optional)	30 30 30 30 30 30 30 30 30 30 30 38 38 38 38 39 39 39 39 39 39 39 39 39 39 39 39 39
SPDT	BBM BBM BBM	.250 .250 .020**	100,000 500,000 80,000	1/4 (6,35) 1/2 (12,7) 5/16 (8,13)	SPST AND SPDT, Stackable w/LEDs PC Mount, 2 Circuits, Right Angle, Total Seal Miniature, Surface Mount	32 39 38

## **Wiping Contact**

SPST	N.O. or N.C. N.O. or N.C. N.O. N.O.	3 1 .250 .4VA	6,000 100,000 100,000 40,000	13/16 (20,6) 13/16 (20,6) 1/2 (12,7) .177 (4,5)	Decorator Line Momentary Action & Positive Feel Types Momentary Action & Terminal Seal Types Process Sealed, Subminiture	4000/10 4000/10 23 49
SPDT	BBM or MBB BBM or MBB BBM or MBB BBM BBM BBM N.O.	.250 .250 .250 .250 .250 .250 .250 .4VA	250,000 250,000 100,000 250,000 250,000 250,000 40,000	7/16 (11,11) 1+ (25,4+) 1/2 (12,7) 11/16 (17,46) 11/16 (17,46) 1+ (25,4+) 177 (4,5)	Momentary Action Square Bezel Panel Mount Watertight Seal Square & Round Bezels Alternate Action, Square & Round Bezels Alternate Action, Square Bezel Panel Mount Process Sealed, Subminiature	46 46 46 46 46 46
DPDT	BBM or MBB BBM BBM or MBB BBM BBM BBM or MBB	.250 .250 .250 .250 .250 .250	100,000 250,000 100,000 250,000 250,000 250,000	5/8 (15,88) 13/16 (20,6) 11/16 (17,46) 11/16 (17,46) 11/16 (17,46) 1+ (25,4+)	Momentary Action Environmental Seal/Wire Leads Watertight Seal Square & Round Bezel & Positive Feel Types Alternate Action, Square & Round Bezels Alternate Action, Square Bezel Panel Mount	46 46 46 46 46 46

## **Snap Action Contact**

SPST	N.O. or N.C.	1, 3	25,000	7/8 (22,23)	SPST, 1 and 3 Amp	4000/10
SPDT	BBM	5, 10	25,000	7/8 (22,23)	Audible Click	2000/7

BBM is Break-Before-Make (Non-Shorting). MBB is Make-Before-Break (Shorting).

Rated for 28 Vdc and/or 5 Vdc (.150 A) and 20 Vdc (.020 A).

<sup>\*\*\*</sup> Maximum width behind panel or above PC board rounded to next highest 1/16" (1,59 mm).



## Pushbutton Options and Accessories

## **SEALED TERMINAL AND** WIRE LEAD OPTIONS **OPTION -E AND -EW**

#### **FEATURES**

- 1/4, 1/2, and 1 Amp
- · Limit, Overtravel, or Panel Seal
- Butt or Wiping Contact
- Normally Open or Normally Closed
- Momentary or Push/Pull
- Series 23, 30, 39 and 46



Option -E Epoxy-Sealed **Terminals** 



#### **SPECIFICATIONS**

#### Rating Criteria

Make and Break Current Rating: See page

for standard part number

Contact Resistance: 25 milliohms maximum on a new switch. Less than 4 milliohms per inch of wire for wire lead option styles.

Insulation Resistance: 1,000 megohms minimum between mutually insulated parts Voltage Breakdown: 1,000 Vac minimum between mutually insulated parts

#### **Materials and Finishes**

Potting Sleeve (Series 39): Thermoset Plastic Wire Leads: #26AWG, (.99mm diameter) insulated Teflon, Copper stranded wire, per MIL-W-16878, Type E. Ends are stripped 0.250" (6.35) and solder dipped. For other specifications, see Page References.

			Length Behind Panel	
Standard	Standard	Choices	In inches (and	millimeters)
Part Number	Part Number	of	Standard Switch	-EW Style
Red Button	Black Button	Suffix	& Terminals	Body
23-1	23-4	-E	0.665 (16,89)	
30-1	30-3	-E, -EW	0.592 (15,04)	0.645 (16,38)
30-15	30-37	-E, -EW	0.679 (17,25)	0.728 (18,49)
30-17 RED	30-17 BLK	-E, -EW	0.958 (24,33)	1.007 (25,58)
30-16 RED	30-16 BLK	-E, -EW	0.958 (24,33)	1.007 (25,58)
30-251 RED	30-251 BLK	-E, -EW	0.632 (16,05)	0.685 (17,40)
30-252 RED	30-252 BLK	-E, -EW	0.645 (16,38)	0.700 (17,78)
30-32 RED	30-32 BLK	-E, -EW	0.867 (22,02)	0.896 (22,76)
30-6	30-2	-E, -EW	0.605 (15,37)	0.640 (16,26)
30-601 RED	30-601 BLK	-E, -EW	0.592 (15,04)	0.645 (16,38)
39-1*	39-3*	-EW**	0.315 (8,00)	0.440 (11,18)
	39-2	-E,- EW	0.490 (12,45)	0.575 (14,61)
39-12*	39-24*	-EW**	0.455 (11,56)	0.575 (14,61)
39-101		-EW**	0.650 (16,51)	0.775 (19,69)
39-351 RED	39-351 BLK	-EW**	0.350 (8,89)	0.450 (11,43)
39-352 RED*	39-352 BLK*	-E, -EW	0.529 (13,44)	0.630 (16,00)
39-601 RED	39-601 BLK	-EW*	0.315 (8,00)	0.440 (11,18)
39-701***		-EW**	0.800 (20,32)	0.925 (23,50)
39-702***		-E, -EW	0.510 (12,95)	0.750 (19,05)
46-101 RED	46-101 BLK	-E, -EW	0.890 (22,61)	0.957 (24,31)
46-102 RED	46-102 BLK	-E, -EW	0.890 (22,61)	0.957 (24,31)
46-110 RED	46-110 BLK	-E, -EW	0.890 (22,61)	0.957 (24,31)
46-111 RED	46-111 BLK	-E, -EW	0.890 (22,61)	0.957 (24,31)
46-150 RED	46-150 BLK	-E, -EW	0.957 (24,31)	1.024 (26,01)
46-151 RED	46-151 BLK	-E, -EW	0.957 (24,31)	1.024 (26,01)
46-200 RED	46-200 BLK	-E	0.921 (23,39)	
46-201 RED	46-201 BLK	-E	0.921 (23,39)	
46-270 RED	46-270 BLK	-E	0.957 (24,31)	
46-271 RED	46-271 BLK	-E	0.957 (24,31)	

<sup>\*</sup>Epoxy potting sleeve enlarges the diameter of the -EW style to 0.300 (7,62).

<sup>\*\*</sup>Sealed terminal (-E) option is not necessary; terminals have sealed construction.

<sup>\*\*\*</sup>Natural Color Button

<sup>†</sup>Adjustable from 1.214 (30,84) to 1.334 (33,88) dependent on button height, see switch pages.

## Pushbutton Options and Accessories



#### **ORDERING INFORMATION**

Use the Selector Charts at the beginning of the section to select a series. Use the pages listed there or referenced here to select a switch.

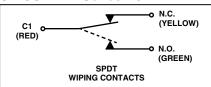
To order epoxy sealed terminals, add the suffix-E to the selected part number as allowed in the chart. *Example: 30-1-E*.

To order the epoxy-potted version with 6-inch wire leads, use the suffix -EW as allowed in the chart. *Example:* 39-1-EW

Available From Your Local Grayhill Distributors. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

Standard Part Number Without Options Choice of Button	Standard Part Number Choice of	Choices of	Length Behind Panel In inches (and millimeters)	
Color (see switch pages)	Color Button Color		Standard Switch & Terminals	-EW Style Body
30-01-01-500-XX 30-01-04-500-XX 30-05-01-502-XX 30-05-04-502-XX 46-01-07-500-XX 46-01-09-500-XX 46-01-09-500-XX 46-05-05-502-XX 46-05-08-502-XX 46-05-09-502-XX	30-001-A-XX 30-002-A-XX 30-015-A-XX 30-017-A-XX 30-1-1-50-XX 30-1-4-50-XX 30-5-1-52-XX 30-5-4-52-XX 30-601-A-XX 46-1-7-50-XX 46-1-8-50-XX 46-1-8-50-XX 46-5-5-52-XX 46-5-8-52-XX 46-5-9-52-XX 46-5-9-52-XX 46-102-A-XX 46-111-A-XX 46-200-A-XX	-E, -EW	1.119 (28,42) 1.132 (28,75) 1.204 (30,58) Adjustable† 1.100 (27,94) 1.257 (31,93) 0.930 (23,62) 1.130 (28,70) 1.119 (28,42) 1.451 (36,86) 1.381 (35,08) 1.381 (35,08) 1.179 (29,95) 1.465 (37,21) 1.188 (30,18) 1.317 (33,45) 1.417 (35,99) 1.417 (35,99) 1.448 (36,78) 1.448 (36,78)	1.172 (29,77) 1.167 (29,64) 1.253 (31,83) Adjustable† 1.153 (29,29) 1.310 (33,27) 0.983 (24,97) 1.183 (30,05) 1.172 (29,77) 1.518 (38,56) 1.246 (31,65) 1.532 (38,91) 1.484 (37,69) 1.484 (37,69)

**CIRCUITRY: Series 46** 



<sup>\*</sup>Epoxy potting sleeve enlarges the diameter of the -EW style to 0.300 (7,62).

<sup>\*\*</sup>Sealed terminal (-E) option is not necessary; terminals have sealed construction.

<sup>\*\*\*</sup>Natural Color Button

<sup>†</sup>Adjustable from 1.214 (30,84) to 1.334 (33,88) dependent on button height, see switch pages.



## Pushbutton Options and Accessories

## **ACCESSORIES**

## For Pushbutton Switches

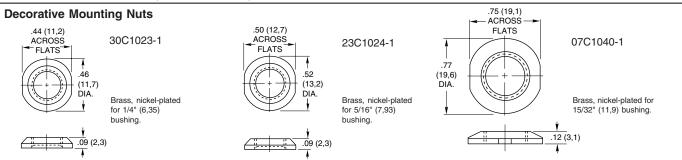


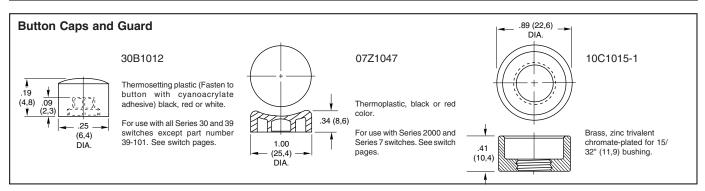


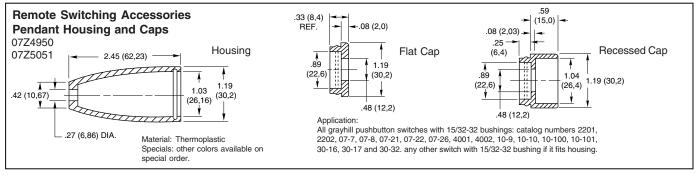


Pendant Housing

## **DIMENSIONS** In Inches (and millimeters)







## **ORDERING INFORMATION:**

## Mounting Nuts, Button Caps, and Guards

Mounting Nuts, Button Caps, and Guards			
Part Number	Color		
07C1040-1	Decorative Nut		
23C1024	Decorative Nut		
30C1023-1	Decorative Nut		
07Z1047-1 BLK	Black Button Cap		
07Z1047-2 RED	Red Button Cap		
10C1015-1	Button Guard		
30B1012-5	Red Cap		
30B1012-8	White Cap		
30B1012-9	Black Can		

#### **Pendant Housing and Caps**

Part Number	Description		
07Z4950 BLK 07Z5051 RED	Red Flat Cap & Housing Black Flat Cap & Housing Red Rcssd Cap & Housing Black Rcssd Cap & Housing		

Sold only as sets of one housing and one cap.

## Available from your local Grayhill Distributor.

For prices and discounts, contact a local Sales Office, an authorized local Distributor, or Grayhill.

# **X-ON Electronics**

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Pushbutton Switches category:

Click to view products by Grayhill manufacturer:

Other Similar products are found below:

8940K2012 LW1L-M1C10V-A LW1L-M1C70-A LW2L-A1C20M-GD LW2L-M1C20M-A 60324L M22-D-R-GB0/K11 M7E-HRN2 67021K512 67081K512X 701PB580 7199K101 810K12910 810KSV30B MML21EA2ADK MML21KA3ABK MML23KA3AC05K-001 MML23KW3AA01W 8418K2 8442K3 8450K1 860K11911T01A 861901 861K11911T01A07 861K13810T00A14 861K13911 8646AB6X718UL 8646ABUL 9001KXRK 907AYY100 PMHD155A1 9533CD4+U574+U4922 95-414.000 99-450.837 99-453.837 PV3H2B0NN-341 1203MRA A22NZBGANGA A22NZBNANGA A22NZMPATRA A2PMA1X03EC56 A3A-5123-02 A3A-7140 A3A-7340 A3U-TMW-A2C-5M A595 12037A2ULCSA ABD122N-B 1211390004