

## MICRO SWITCH Subminiature Basic Switches

ZM/ZM1 Series

004991

Issue 3

Datasheet



### DESCRIPTION

MICRO SWITCH ZM and ZM1 Series are subminiature snap action switches from the Honeywell MICRO SWITCH family of Z Series subminiature basic switches. Although small in size, the ZM and ZM1 Series are rated for controlling electrical loads ranging from logic level (computer based circuits) to power duty switching (up to 16.1 A and 250 Vac).

The package size of the subminiature switch is ideal for applications where space on the equipment is at a premium. The overall length of the ZM and ZM1 Series are less than 20 mm [0.78 in]. As with all snap-action switches, the audible click when actuated promotes ease of installation and set-up of the switches. A wide variety of integral stainless steel levers are available and when combined with the subminiature package size, may adapt the switch to a wide variety of applications. The ZM Series is agency certified to UL, cUL, CE, and CQC for worldwide use, while the ZM1 Series is agency certified to UL, cUL, ENEC, and CQC for worldwide use.

### VALUE TO CUSTOMERS

- Subminiature size is a solution for applications where space is a premium
- Internal permanent levers and external levers for field configurability

### FEATURES

- Subminiature package size (19,80 mm x 10,60 mm x 6,40 mm [0.78 in x 0.42 in x 0.25 in])
- Well suited for power-duty and logic-level loads
- SPDT, SPNC, or SPNO switch options
- Power duty switching with silver alloy contacts
- Gold-plated, silver alloy contacts for logic-level control
- Pin plunger and various stainless steel lever options, including internal and external mount levers
- Variety of electrical terminations
- Certified per UL, cUL to UL 61058-1, ENEC to IEC 61058-1, and CQC to GB 15092.1

### DIFFERENTIATION

- Temperature ranges from -40 °C to 125 °C [-40 °F to 257 °F] typically allows for years of reliable performance in harsh conditions
- Choice of internal switch mechanism: ZM Series with coil spring design for increased mechanical life or ZM1 Series with flat spring design for increased electrical rating
- Current carrying capacity, up to 16.1 A (ZM1 Series), typically allows for a solution in many applications where space is a premium
- Wide variety of electrical ratings, integral actuators, and electrical terminations to facilitate integration into control and/or monitoring circuits

### POTENTIAL APPLICATIONS

- Copy machines
- Cash registers: Senses drawer open or closed
- Refrigerators
- HVAC
- Hospital beds

### PORTFOLIO

The ZM/ZM1 Series of subminiature basic switches are a part of a strong offering of submins including ZD, ZX, and ZW Series switches.

# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

**Table 1. MICRO SWITCH ZM Series Specifications**

Characteristic	ZM10 Series (Logic Level)	ZM50 Series (Standard Duty)	ZM90 Series (Power Duty)
Circuitry	SPDT, SPNC, SPNO		
Operating force (at pin plunger)	60 g, 104 g, 146 g, 249 g	104 g, 146 g, 249 g	249 g
Termination	Solder (standard and extended), PCB (standard, left, or right)		
Sealing	IP40		
Actuators, pin plunger standard Levers (300 series stainless steel)	pin plunger, straight lever (5 lengths), simulated roller lever (3 styles), roller lever, L-shaped lever, special levers		
Agency certification	UL, cUL, CE, CQC, RoHS, and Reach compliant		
Operating temperature (manufacturer rated)	-40 °C to 125 °C [-40 °F to 257 °F]		
Mechanical endurance (cycles)	5,000,000 min. @ 400 cycles/minute max.		
Switch resistance (initial)	100 mΩ max.	100 mΩ max.	300 mΩ max.
Insulation resistance (initial)	100 MΩ min. (500 Vdc for 1 minute)		
Dielectric strength (initial) <i>(between live parts and ground)</i>	1500 V RMS for one minute (≤0.5 ma leakage current)		
Plunger material	PA (nylon)		
Case/cover material	PA (nylon)		
Contact material	gold-plated silver alloy	silver alloy	silver alloy

Note: Refer to engineering drawing for additional information.

**Table 2. MICRO SWITCH ZM Series Electrical Ratings**

Switch option	UL/cUL per UL 61058-1 File E12252, Temp 120 °C [248 °F]	CQC per GB15092.1 0 °C to 125 °C [32 °F to 257 °F] μ (micro-disconnection)
ZM10 Series (Gold-plated silver alloy contacts)	0.1 RA 30 Vdc, 10,000 cycles min. 0.1 RA 125/250 Vac, 10,000 cycles min.	0.1 A 30 Vdc 0.1 A 125/250 Vac 10,000 cycles
ZM50 Series (Silver alloy contacts)	5 RA 30 Vdc, 10,000 cycles min. 5 RA 125/250 Vac, 10,000 cycles min.	5 A 125/250 Vac 10,000 cycles
ZM90 Series (Silver alloy contacts)	10.1 GPA 125/250 Vac, 10,000 cycles min.	10.1 A 125/250 Vac 10,000 cycles

# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

**Table 3. MICRO SWITCH ZM1 Series Specifications**

Characteristic	ZM110 Series, ZM115 Series (Logic Level)	ZM150 Series, ZM155 Series, ZM160 Series (Standard Duty)	ZM190 Series, ZM195 Series (Power Duty)
Circuitry	SPDT, SPNC, SPNO		
Operating force (at pin plunger)	70 g, 95 g, 150 g	70 g, 95 g, 150 g	ZM190: 150 g, 355 g ZM195: 355 g
Termination	solder (standard and extended); PCB (standard, left, or right), special termination		
Sealing	IP40		
Actuators, pin plunger standard levers (300 series stainless steel)	pin plunger, straight lever (5 lengths), simulated roller lever (3 styles), roller lever, L-shaped lever, special levers		
Agency certification	UL, cUL, CQC, ENEC, RoHS, and Reach compliant		
Operating temperature (manufacturer rated)	ZM110: -40 °C to 125 °C [-40 °C to 257 °F] ZM115: 0 °C to 85 °C [32 °F to 185 °F]	ZM150, ZM160: -40 °C to 125 °C [-40 °C to 257 °F] ZM155: 0 °C to 85 °C [32 °F to 185 °F]	-40 °C to 125 °C [-40 °C to 257 °F]
Mechanical endurance (cycles)* 120 cycles/minute max.	1,000,000 min.	1,000,000 min.	ZM190 (150 G OF): 1,000,000 min. ZM190 (355 g OF): 50,000 min. ZM195: 50,000 min.
Switch resistance (initial)	300 mΩ max.		
Insulation resistance (initial)	100 MΩ min. (500 Vdc for 1 minute)		
Dielectric strength (initial) (between live parts and ground)	1500 V RMS for one minute (≤0.5 ma leakage current)		
Plunger material	PA (nylon)		
Case/cover material	PBT (polyester)	PBT (polyester)	PA (nylon)
Contact material	silver alloy	silver alloy	silver alloy
Contact material (optional)	gold-plated silver alloy (ZM115 only)	gold-plated silver alloy (ZM115 only)	-

Note: Refer to engineering drawing for additional information

\*Refer to engineering drawing for additional detail of mechanical endurance

**Table 4. MICRO SWITCH ZM Series Electrical Ratings**

Switch option	UL/cUL per 61058-1 File E12252	ENEC per IEC 61058-1 μ (Micro-disconnection)	CQC per GB 15092.1 μ (Micro-disconnection)
ZM110 Series	0.1 RA 125/250 Vac, 10,000 cycles min. 125 °C [257 °F]	0.1 A 125/250 Vac, 10,000 cycles -40 °C to 125 °C [-40 °F to 257 °F]	
ZM115 Series	0.1 RA 125/250 Vac, 10,000 cycles min. 85 °C [185 °F]	0.1 A 125/250 Vac, 10,000 cycles 0 °C to 85 °C [32 °F to 185 °F]	
ZM150 Series	3 RA 125/250 Vac, 10,000 cycles min. 125 °C [257 °F]	3 A 125/250 Vac, 10,000 cycles -40 °C to 125 °C [-40 °F to 257 °F]	
ZM155 Series	3 RA 125/250 Vac, 10,000 cycles min. 85 °C [185 °F]	3 A 125/250 Vac, 10,000 cycles 0 °C to 85 °C [32 °F to 185 °F]	
ZM160 Series	6 RA 125/250 Vac, 10,000 cycles min. 125 °C [257 °F]	6 A 125/250 Vac, 6 (2) A 125/250 Vac, 10,000 cycles -40 °C to 125 °C [-40 °F to 257 °F]	
ZM190 Series	10.1 GPA 125/250 Vac, 10,000 cycles min. 125 °C [257 °F]	10.1 A 125/250 Vac, 6 (2) A 125/250 Vac, 10,000 cycles -40 °C to 125 °C [-40 °F to 257 °F]	
ZM195 Series	16.1 GPA 125/250 Vac 10,000 cycles min. 55 °C [131 °F]	16.1 (4) A 125/250 Vac 10,000 cycles -40 °C to 85 °C [-40 °F to 185 °F] 16.1 A 125/250 Vac 6 (3) A 125/250 Vac 10,000 cycles -40 °C to 125 °C [-40 °F to 257 °F]	16.1 A 125/250 Vac 6 (3) A 125/250 Vac 10,000 cycles -40 °C to 125 °C [-40 °F to 257 °F]

RA – Resistive Amps (Resistive Load), GPA – General Purpose Amps (Inductive Load), X(Y) – X is max. resistive amps., and (Y) is max. inductive amps.

# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

Figure 1. MICRO SWITCH ZM Series Product Nomenclature

ZM	50	E	10	E	01	-
Switch Type	Current Rating	Operating Force (at pin plunger)	Terminal Type	Actuator Type (Integral Levers)	Circuitry	Special Designator <sup>2</sup>
<b>ZM Series Subminiature Basic Switch</b>	<b>10</b> 0.1 A 125 Vac (Gold-plated contacts)	<b>B</b> 60 g max. <b>D</b> 104 g max. <b>E</b> 146 g max. <b>G</b> 249 g max.	<b>10</b> Solder, straight	<b>A</b> Pin plunger	<b>01</b> SPDT	A special designator character(s) is used when there is a special modification to the switch. A special designator is required when Terminal Type is "99" or Actuator Type is "S".
	<b>50</b> 5 A; 125 Vac/250 Vac	<b>D</b> 104 g max. <b>E</b> 146 g max. <b>G</b> 249 g max.	<b>20</b> PCB, straight	<b>B</b> Short straight lever, 16,7 mm [0.66 in] length	<b>03</b> SPNO	
	<b>90</b> 10.1 A; 125 Vac/250 Vac <sup>1</sup>	<b>G</b> 249 g max.	<b>50</b> PCB, right angle	<b>C</b> Standard straight lever, 18,7 mm [0.74 in] length	<b>04</b> SPNC	
		<b>60</b> PCB, left angle	<b>D</b> Long straight lever, 24,8 mm [0.98 in] length			
		<b>70</b> Quick connect 0.110 in	<b>E</b> Std sim. roller lever, 18,0 mm [0.71 in] length R 2,75 mm			
		<b>99</b> SPECIAL <sup>2</sup>	<b>F</b> Roller lever, 16,6 mm [0.65 in] length Ø4,8 mm roller			
			<b>H</b> Small sim. roller lever, 17,9 mm [0.70 in] length R 1,3 mm			
			<b>J</b> Extended straight lever, 55,2 mm [2.17 in] length			
			<b>K</b> Straight lever, 35,2 mm [1.39 in] length			
			<b>L</b> L-shaped lever, 31,5 mm [1.24 in] length			
			<b>M</b> Large sim. roller lever, 21,1 mm [0.83 in] length R 2,45 mm			
			<b>S</b> SPECIAL lever <sup>2</sup>			

Not all combinations of model code are available. Please contact your Honeywell representative or distributor for assistance.

NOTES:

<sup>1</sup> Switches with 10.1 A rating are only available with "G" operating force.

<sup>2</sup> Terminal Type "99" or Actuator Type "S" designates a special and therefore requires a special designator character(s) at the end of the listing.

# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

Figure 2. MICRO SWITCH ZM1 Series Product Nomenclature

ZM1	50	C	10	A		01	-
Switch Type	Current Rating	Operating Force (at pin plunger)	Terminal Type	Actuator Type	Lever Assembly Type	Circuitry	Special Designator <sup>2</sup>
ZM1 Series Subminiature Basic Switch				Internal mount	External mount		
<b>10</b>	0.1 A 125 Vac/ 250 Vac <sup>3</sup>	<b>B</b> 70 g max. <b>D</b> 95 g max. <b>C</b> 150 g max.	<b>10</b> Solder, straight	Pin plunger	<b>A</b> n/a (Plungers utilize internal lever type housing)	Internal mount (None)	<b>01</b> SPDT
<b>15<sup>5</sup></b>						External mount	<b>03</b> SPST-NO <b>04</b> SPST-NC
<b>50</b>	3 A; 125 Vac/ 250 Vac <sup>3</sup>	<b>B</b> 70 g max. <b>D</b> 95 g max. <b>C</b> 150 g max.	<b>20</b> PCB, straight	Short straight lever, 16.7 mm [0.66 in] length	<b>B</b> Short straight lever, 17.4 mm [0.69 in] length		
<b>55<sup>5</sup></b>							
<b>60</b>	6 A; 125 Vac/ 250 Vac <sup>3</sup>	<b>B</b> 70 g max. <b>D</b> 95 g max. <b>C</b> 150 g max.	<b>50</b> PCB, right angle	Standard straight lever, 18.7 mm [0.74 in] length	<b>C</b> Standard straight lever, 19.4 mm [0.76 in] length		
<b>90</b>	10.1 A; 125 Vac/ 250 Vac <sup>4</sup>	<b>C</b> 150 g max. <b>G</b> 355 g max.	<b>60</b> PCB, left angle	Long straight lever, 24.8 mm [0.98 in] length	<b>D</b> Long straight lever, 25.5 mm [1.00 in] length		
<b>95</b>	16.1 A; 125 Vac/ 250 Vac <sup>5</sup>	<b>G</b> 355 g max.	<b>70</b> Quick connect 0.110 in	Std sim. roller lever, 18.0 mm [0.71 in] length R 2.75 mm	<b>E</b> Std sim. roller lever, 18.65 mm [0.73 in] length R 2.75 mm		
			<b>99</b> SPECIAL <sup>2</sup>	Roller lever, 16.6 mm [0.65 in] length Ø4.8 mm roller	<b>F</b> Roller lever, 17.2 mm [0.68 in] length Ø4.8 mm roller		
				Small sim. roller lever, 17.9 mm [0.70 in] length R 1.3 mm	<b>H</b> Small sim. roller lever, 18.65 mm [0.73 in] length R 1.3 mm		
				Extended straight lever, 55.2 mm [2.17 in] length	<b>J</b> Extended straight lever, 55.9 mm [2.20 in] length		
				Straight lever, 35.2 mm [1.39 in] length	<b>K</b> Straight lever, 40.7 mm [1.60 in] length		
				L-shaped lever, 31.5 mm [1.24 in] length	<b>L</b> Unavailable		
				Large sim. roller lever, 21.1 mm [0.83 in] length R 2.45 mm	<b>M</b> Unavailable		
				SPECIAL lever <sup>2</sup>	<b>S</b> SPECIAL lever <sup>2</sup>		

NOTES:

<sup>1</sup> Nomenclature is for identification purposes only; not all combinations of model code are available. Please contact your Honeywell representative or distributor for assistance.

<sup>2</sup> Terminal Type "99" or Actuator Type "S" designates a special and therefore requires a special designator character(s) at the end of the listing.

<sup>3</sup> Switches with a 0.1 A, 3 A, or 6 A current rating may have an operating force choice of B (70 g max.), C (150 g max.), or D (95 g max.).

<sup>4</sup> Switches with a 10.1 A current rating may only have an operating force of either "C" (150 g max.) or "G" (355 g max.).

<sup>5</sup> Switches with a 16.1 A current rating may only have an operating force of "G" (355 g max.).

<sup>6</sup> Gold-plated contacts only available with "15" and "55" current rating options.




A special designator character(s) is used when there is a special modification to the switch. A special designator is required when Terminal Type is "99" or Actuator Type is "S".  
**G - Gold plated contacts<sup>6</sup>**

# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

- O.F. • Operating force
- R.F. • Release force
- P.T. • Pretravel
- O.T. • Overtravel
- D.T. • Differential travel
- O.P. • Operating position

**Table 5. MICRO SWITCH ZM Series Product Specifications and Listings**

Contact your Honeywell rep or distributor for additional listings

	Catalog Listing	Circuitry/ Contact Material	Elect. Rating (page 6)	Termination	Operate Force max. g [oz]	Release Force min. g [oz]	Free Position from mounting hole mm [in] max.
 <p><b>Pin Plunger</b></p>	<b>ZM10B10A01</b>	SPDT Gold Plated	0.1 A	Solder	60 [2.17]	8 [0.28]	9,3 [0.37]
	<b>ZM10B70A01</b>	SPDT Gold Plated	0.1 A	Long Solder	60 [2.17]	8 [0.28]	9,3 [0.37]
	<b>ZM10D70A01</b>	SPDT Gold Plated	0.1 A	Long Solder	104 [3.67]	20 [0.70]	9,3 [0.37]
	<b>ZM10E10A01</b>	SPDT Gold Plated	0.1 A	Solder	146 [5.15]	35 [1.23]	9,3 [0.37]
	<b>ZM10E20A01</b>	SPDT Gold Plated	0.1 A	PCB (Straight)	146 [5.15]	35 [1.23]	-
	<b>ZM10E50A01</b>	SPDT Gold Plated	0.1 A	PCB (90° Right )	146 [5.15]	35 [1.23]	-
	<b>ZM10E70A01</b>	SPDT Gold Plated	0.1 A	Long Solder	146 [5.15]	35 [1.23]	9,3 [0.37]
	<b>ZM10E70A03</b>	SPNO Gold Plated	0.1 A	Long Solder	146 [5.15]	35 [1.23]	9,3 [0.37]
	<b>ZM50E10A01</b>	SPDT Silver Alloy	5 A	Solder	146 [5.15]	35 [1.23]	9,3 [0.37]
	<b>ZM50E10A03</b>	SPNO Silver Alloy	5 A	Solder	146 [5.15]	35 [1.23]	9,3 [0.37]
	<b>ZM50E20A01</b>	SPDT Silver Alloy	5 A	PCB (Straight)	146 [5.15]	35 [1.23]	-
	<b>ZM50E20A03</b>	SPNO Silver Alloy	5 A	PCB (Straight)	146 [5.15]	35 [1.23]	-
	<b>ZM50E50A01</b>	SPDT Silver Alloy	5 A	PCB (90° Right )	146 [5.15]	35 [1.23]	-
	<b>ZM50E70A01</b>	SPDT Silver Alloy	5 A	Long Solder	146 [5.15]	35 [1.23]	9,3 [0.37]
	<b>ZM50G20A01</b>	SPDT Silver Alloy	5 A	PCB (Straight)	249 [8.78]	50 [1.76]	-
	<b>ZM90G10A01</b>	SPDT Silver Alloy	10.1 A	Solder	249 [8.78]	50 [1.76]	9,3 [0.37]
	<b>ZM90G20A01</b>	SPDT Silver Alloy	10.1 A	PCB (Straight)	249 [8.78]	50 [1.76]	-
<b>ZM90G70A01</b>	SPDT Silver Alloy	10.1 A	Long Solder	249 [8.78]	50 [1.76]	9,3 [0.37]	
 <p><b>Short Straight Lever (16,7 mm [0.66 in])</b></p>	<b>ZM10E10B01</b>	SPDT Gold Plated	0.1 A	Solder	40 [1.41]	6 [0.21]	11,7 [0.46]
	<b>ZM10E50B01</b>	SPDT Gold Plated	0.1 A	PCB (90° Right )	40 [1.41]	6 [0.21]	-
	<b>ZM10G10B01</b>	SPDT Gold Plated	0.1 A	Solder	66 [2.33]	9 [0.32]	11,7 [0.46]
	<b>ZM50D10B01</b>	SPDT Silver Alloy	5 A	Solder	30 [1.06]	3 [0.10]	11,7 [0.46]
	<b>ZM50E10B01</b>	SPDT Silver Alloy	5 A	Solder	40 [1.41]	6 [0.21]	11,7 [0.46]
	<b>ZM50E20B01</b>	SPDT Silver Alloy	5 A	PCB (Straight)	40 [1.41]	6 [0.21]	-
	<b>ZM50E50B01</b>	SPDT Silver Alloy	5 A	PCB (90° Right )	40 [1.41]	6 [0.21]	-
	<b>ZM50E60B01</b>	SPDT Silver Alloy	5 A	PCB (90° Left)	40 [1.41]	6 [0.21]	-
	<b>ZM50E70B01</b>	SPDT Silver Alloy	5 A	Long Solder	40 [1.41]	6 [0.21]	11,7 [0.46]
 <p><b>Standard Straight Lever (18,7 mm [0.74 in])</b></p>	<b>ZM10B70C01</b>	SPDT Gold Plated	0.1 A	Long Solder	14 [0.49]	2 [0.07]	12,0 [0.47]
	<b>ZM10E10C01</b>	SPDT Gold Plated	0.1 A	Solder	36 [1.27]	6 [0.21]	12,0 [0.47]
	<b>ZM10E20C01</b>	SPDT Gold Plated	0.1 A	PCB (Straight)	36 [1.27]	6 [0.21]	-
	<b>ZM50E10C01</b>	SPDT Silver Alloy	5 A	Solder	36 [1.27]	6 [0.21]	12,0 [0.47]
	<b>ZM50E70C01</b>	SPDT Silver Alloy	5 A	Long Solder	36 [1.27]	6 [0.21]	12,0 [0.47]

# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

O.F. • Operating force  
 R.F. • Release force  
 P.T. • Pretravel  
 O.T. • Overtravel  
 D.T. • Differential travel  
 O.P. • Operating position

Free Position max. mm [in] from base of straight PCB terminal*	Free Position from formed PCB terminal center line mm [in] max. *	Operate point from mounting hole mm [in]	Operate point from base of straight PCB terminal mm [in]*	Operate point from formed PCB terminal center line mm [in]*	P.T. max. mm [in]	O.T. min. mm [in]	D.T. max. mm [in]
-	-	8,5 ±0,3 [0.33 ±0.01]	-	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	-	8,5 ±0,3 [0.33 ±0.01]	-	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	-	8,5 ±0,3 [0.33 ±0.01]	-	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	-	8,5 ±0,3 [0.33 ±0.01]	-	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
12,7 [0.50]	-	-	11,9 ±0,3 [0.47 ±0.01]	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	14,0 [0.55]	-	-	13,2 ±0,3 [0.52 ±0.01]	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	-	8,5 ±0,3 [0.33 ±0.01]	-	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	-	8,5 ±0,3 [0.33 ±0.01]	-	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	-	8,5 ±0,3 [0.33 ±0.01]	-	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	-	8,5 ±0,3 [0.33 ±0.01]	-	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
12,7 [0.50]	-	-	11,9 ±0,3 [0.47 ±0.01]	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
12,7 [0.50]	-	-	11,9 ±0,3 [0.47 ±0.01]	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	14,0 [0.55]	-	-	13,2 ±0,3 [0.52 ±0.01]	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	-	8,5 ±0,3 [0.33 ±0.01]	-	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
12,7 [0.50]	-	-	11,9 ±0,3 [0.47 ±0.01]	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	-	8,5 ±0,3 [0.33 ±0.01]	-	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
12,7 [0.50]	-	-	11,9 ±0,3 [0.47 ±0.01]	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	-	8,5 ±0,3 [0.33 ±0.01]	-	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	-	8,9 ±0,8 [0.35 ±0.03]	-	-	3,6 [0.14]	0,6 [0.02]	0,8 [0.03]
-	16,4 [0.65]	-	-	13,6 ±0,8 [0.54 ±0.03]	3,6 [0.14]	0,6 [0.02]	0,8 [0.03]
-	-	8,9 ±0,8 [0.35 ±0.03]	-	-	3,6 [0.14]	0,6 [0.02]	0,8 [0.03]
-	-	8,9 ±0,8 [0.35 ±0.03]	-	-	3,6 [0.14]	0,6 [0.02]	0,8 [0.03]
-	-	8,9 ±0,8 [0.35 ±0.03]	-	-	3,6 [0.14]	0,6 [0.02]	0,8 [0.03]
15,1 [0.59]	-	-	12,3 ±0,8 [0.48 ±0.03]	-	3,6 [0.14]	0,6 [0.02]	0,8 [0.03]
-	16,4 [0.65]	-	-	13,6 ±0,8 [0.54 ±0.03]	3,6 [0.14]	0,6 [0.02]	0,8 [0.03]
-	16,4 [0.65]	-	-	13,6 ±0,8 [0.54 ±0.03]	3,6 [0.14]	0,6 [0.02]	0,8 [0.03]
-	-	8,9 ±0,8 [0.35 ±0.03]	-	-	3,6 [0.14]	0,6 [0.02]	0,8 [0.03]
-	-	8,9 ±0,9 [0.35 ±0.04]	-	-	4,0 [0.16]	0,6 [0.02]	0,8 [0.03]
-	-	8,9 ±0,9 [0.35 ±0.04]	-	-	4,0 [0.16]	0,6 [0.02]	0,8 [0.03]
15,4 [0.61]	-	-	12,3 ±0,9 [0.48 ±0.04]	-	4,0 [0.16]	0,6 [0.02]	0,8 [0.03]
-	-	8,9 ±0,9 [0.35 ±0.04]	-	-	4,0 [0.16]	0,6 [0.02]	0,8 [0.03]
-	-	8,9 ±0,9 [0.35 ±0.04]	-	-	4,0 [0.16]	0,6 [0.02]	0,8 [0.03]





\* See asterisk on page 16 for dimension locations.

# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

- O.F. • Operating force
- R.F. • Release force
- P.T. • Pretravel
- O.T. • Overtravel
- D.T. • Differential travel
- O.P. • Operating position

**Table 5. MICRO SWITCH ZM Series Product Specifications and Listings, continued**

Contact your Honeywell rep or distributor for additional listings

	Catalog Listing	Circuitry/ Contact Material	Elect. Rating (page 6)	Termination	Operate Force max. g [oz]	Release Force min. g [oz]	Free Position from mounting hole mm [in] max.
 <p><b>Long Straight Lever (24,8 mm [0.98 in])</b></p>	<b>ZM10B10D01</b>	SPDT Gold Plated	0.1 A	Solder	13 [0.46]	2 [0.07]	13,5 [0.53]
	<b>ZM10B70D01</b>	SPDT Gold Plated	0.1 A	Long Solder	13 [0.46]	2 [0.07]	13,5 [0.53]
	<b>ZM10D10D01</b>	SPDT Gold Plated	0.1 A	Solder	20 [0.70]	5 [0.18]	13,5 [0.53]
	<b>ZM10D20D01</b>	SPDT Gold Plated	0.1 A	PCB (Straight)	20 [0.70]	5 [0.18]	-
	<b>ZM10E70D01</b>	SPDT Gold Plated	0.1 A	Long Solder	28 [0.99]	4 [0.14]	13,5 [0.53]
	<b>ZM50E10D01</b>	SPDT Silver Alloy	5 A	Solder	28 [0.99]	4 [0.14]	13,5 [0.53]
	<b>ZM50E50D01</b>	SPDT Silver Alloy	5 A	PCB (90° Right)	28 [0.99]	4 [0.14]	-
	<b>ZM50E70D01</b>	SPDT Silver Alloy	5 A	Long Solder	28 [0.99]	4 [0.14]	13,5 [0.53]
 <p><b>Extended Straight Lever (55,2 mm [2.17 in])</b></p>	<b>ZM50E70J01</b>	SPDT Silver Alloy	5 A	Long Solder	12 [0.42]	2,5 [0.09]	19,2 [0.76]
 <p><b>Small Simu- lated Roller Lever (17,9 mm [0.70 in])</b></p>	<b>ZM10E20H01</b>	SPDT Gold Plated	0.1 A	PCB (Straight)	34 [1.20]	8 [0.28]	-
	<b>ZM50G10H01</b>	SPDT Silver Alloy	5 A	Solder	56 [1.98]	13 [0.46]	14,4 [0.57]
 <p><b>Standard Simulated Roller Lever (18 mm [0.71 in])</b></p>	<b>ZM10B70E01</b>	SPDT Gold Plated	0.1 A	Long Solder	14 [0.49]	2 [0.07]	18,9 [0.74]
	<b>ZM10D10E01</b>	SPDT Gold Plated	0.1 A	Solder	26 [0.92]	5 [0.18]	18,9 [0.74]
	<b>ZM10D70E01</b>	SPDT Gold Plated	0.1 A	Long Solder	26 [0.92]	5 [0.18]	18,9 [0.74]
	<b>ZM10E10E01</b>	SPDT Gold Plated	0.1 A	Solder	35 [1.23]	8 [0.28]	18,9 [0.74]
	<b>ZM10E50E01</b>	SPDT Gold Plated	0.1 A	PCB (90° Right)	35 [1.23]	8 [0.28]	-
	<b>ZM50E10E01</b>	SPDT Silver Alloy	5 A	Solder	35 [1.23]	8 [0.28]	18,9 [0.74]
	<b>ZM50E20E01</b>	SPDT Silver Alloy	5 A	PCB (Straight)	35 [1.23]	8 [0.28]	-
	<b>ZM50E70E01</b>	SPDT Silver Alloy	5 A	Long Solder	35 [1.23]	8 [0.28]	18,9 [0.74]



# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

O.F. • Operating force  
 R.F. • Release force  
 P.T. • Pretravel  
 O.T. • Overtravel  
 D.T. • Differential travel  
 O.P. • Operating position

Free Position max. mm [in] from base of straight PCB terminal*	Free Position from formed PCB terminal center line mm [in] max. *	Operate point from mounting hole mm [in]	Operate point from base of straight PCB terminal mm [in]*	Operate point from formed PCB terminal center line mm [in]*	P.T. max. mm [in]	O.T. min. mm [in]	D.T. max. mm [in]
-	-	8,9 ±1,5 [0.35 ±0.06]	-	-	6,1 [0.24]	0,8 [0.03]	1,5 [0.06]
-	-	8,9 ±1,5 [0.35 ±0.06]	-	-	6,1 [0.24]	0,8 [0.03]	1,5 [0.06]
-	-	8,9 ±1,5 [0.35 ±0.06]	-	-	6,1 [0.24]	0,8 [0.03]	1,5 [0.06]
16,9 [0.67]	-	-	12,3 ±1,5 [0.48 ±0.06]	-	6,1 [0.24]	0,8 [0.03]	1,5 [0.06]
-	-	8,9 ±1,5 [0.35 ±0.06]	-	-	6,1 [0.24]	0,8 [0.03]	1,5 [0.06]
-	-	8,9 ±1,5 [0.35 ±0.06]	-	-	6,1 [0.24]	0,8 [0.03]	1,5 [0.06]
-	18,2 [0.72]	-	-	13,6 ±1,5 [0.54 ±0.06]	6,1 [0.24]	0,8 [0.03]	1,5 [0.06]
-	-	8,9 ±1,5 [0.35 ±0.06]	-	-	6,1 [0.24]	0,8 [0.03]	1,5 [0.06]
-	-	8,9 ±3,0 [0.35 ±0.12]	-	-	13,3 [0.52]	1,0 [0.04]	2,9 [0.11]
17,8 [0.70]	-	-	14,2 ±1,0 [0.56 ±0.04]	-	4,6 [0.18]	0,8 [0.03]	0,8 [0.03]
-	-	10,8 ±1,0 [0.43±0.04]	-	-	4,6 [0.18]	0,8 [0.03]	0,8 [0.03]
-	-	12,2 ±1,5 [0.48 ±0.06]	-	-	5,2 [0.20]	0,6 [0.02]	0,9 [0.04]
-	-	12,2 ±1,5 [0.48 ±0.06]	-	-	5,2 [0.20]	0,6 [0.02]	0,9 [0.04]
-	-	12,2 ±1,5 [0.48 ±0.06]	-	-	5,2 [0.20]	0,6 [0.02]	0,9 [0.04]
-	-	12,2 ±1,5 [0.48 ±0.06]	-	-	5,2 [0.20]	0,6 [0.02]	0,9 [0.04]
-	23,6 [0.93]	-	-	16,9 ±1,5 [0.66 ±0.06]	5,2 [0.20]	0,6 [0.02]	0,9 [0.04]
-	-	12,2 ±1,5 [0.48 ±0.06]	-	-	5,2 [0.20]	0,6 [0.02]	0,9 [0.04]
22,3 [0.88]	-	-	15,6 ±1,5 [0.61 ±0.06]	-	5,2 [0.20]	0,6 [0.02]	0,9 [0.04]
-	-	12,2 ±1,5 [0.48 ±0.06]	-	-	5,2 [0.20]	0,6 [0.02]	0,9 [0.04]



\* See asterisk on page 16 for dimension locations.

# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

- O.F. • Operating force
- R.F. • Release force
- P.T. • Pretravel
- O.T. • Overtravel
- D.T. • Differential travel
- O.P. • Operating position

**Table 5. MICRO SWITCH ZM Series Product Specifications and Listings, continued**

Contact your Honeywell rep or distributor for additional listings

	Catalog Listing	Circuitry/ Contact Material	Elect. Rating (page 6)	Termination	Operate Force max. g [oz]	Release Force min. g [oz]	Free Position from mounting hole mm [in] max.
 <p><b>Roller Lever (16,6 mm [0.65 in])</b></p>	<b>ZM10B70F01</b>	SPDT Gold Plated	0.1 A	Long Solder	19 [0.67]	2 [0.07]	17,6 [0.69]
	<b>ZM10E10F01</b>	SPDT Gold Plated	0.1 A	Solder	34 [1.23]	8 [0.28]	17,6 [0.69]
	<b>ZM10E50F01</b>	SPDT Gold Plated	0.1 A	PCB (90° Right)	34 [1.23]	8 [0.28]	-
	<b>ZM50D10F01</b>	SPDT Silver Alloy	5 A	Solder	25 [0.88]	6 [0.21]	17,6 [0.69]
	<b>ZM50E10F01</b>	SPDT Silver Alloy	5 A	Solder	34 [1.23]	8 [0.28]	17,6 [0.69]
	<b>ZM50E50F01</b>	SPDT Silver Alloy	5 A	PCB (90° Right)	34 [1.23]	8 [0.28]	-
	<b>ZM50E70F01</b>	SPDT Silver Alloy	5 A	Long Solder	34 [1.23]	8 [0.28]	17,6 [0.69]
	<b>ZM90G20F01</b>	SPDT Silver Alloy	10.1 A	PCB (Straight)	60 [2.17]	15 [0.53]	-
 <p><b>L-Shaped Lever (31,5 mm [1.24 in])</b></p>	<b>ZM50E10L01</b>	SPDT Silver Alloy	5 A	Solder	20 [0.71]	4 [0.14]	2,5 [0.10]

# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

O.F. • Operating force  
 R.F. • Release force  
 P.T. • Pretravel  
 O.T. • Overtravel  
 D.T. • Differential travel  
 O.P. • Operating position

	Free Position max. mm [in] from base of straight PCB terminal*	Free Position from formed PCB terminal center line mm [in] max. *	Operate point from mounting hole mm [in]	Operate point from base of straight PCB terminal mm [in]*	Operate point from formed PCB terminal center line mm [in]*	P.T. max. mm [in]	O.T. min. mm [in]	D.T. max. mm [in]
	-	-	14,6 ±0,8 [0.57 ±0.03]	-	-	3,8 [0.15]	0,8 [0.03]	0,8 [0.03]
	-	-	14,6 ±0,8 [0.57 ±0.03]	-	-	3,8 [0.15]	0,8 [0.03]	0,8 [0.03]
	-	22,3 [0.88]	-	-	19,3 ±0,8 [0.76 ±0.03]	3,8 [0.15]	0,8 [0.03]	0,8 [0.03]
	-	-	14,6 ±0,8 [0.57 ±0.03]	-	-	3,8 [0.15]	0,8 [0.03]	0,8 [0.03]
	-	-	14,6 ±0,8 [0.57 ±0.03]	-	-	3,8 [0.15]	0,8 [0.03]	0,8 [0.03]
	-	22,3 [0.88]	-	-	19,3 ±0,8 [0.76 ±0.03]	3,8 [0.15]	0,8 [0.03]	0,8 [0.03]
	-	-	14,6 ±0,8 [0.57 ±0.03]	-	-	3,8 [0.15]	0,8 [0.03]	0,8 [0.03]
	21,0 [0.83]	-	-	18,0 ±0,8 [0.71 ±0.03]	-	3,8 [0.15]	0,8 [0.03]	0,8 [0.03]
	-	-	-5,2 ± 3,0 [-0.20 ±0.12]	-	-	6,0 [0.24]	1,0 [0.04]	1,9 [0.07]

\* See asterisk on page 16 for dimension locations.

# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

- O.F. • Operating force
- R.F. • Release force
- P.T. • Pretravel
- O.T. • Overtravel
- D.T. • Differential travel
- O.P. • Operating position

**Table 6. MICRO SWITCH ZM1 Series Product Specifications and Listings (Internal Mount Lever)**

Contact your Honeywell rep or distributor for additional listings

	Catalog Listing	Circuitry/ Contact Material	Elect. Rating (page 7)	Termination	Operate Force max. g [oz]	Release Force min. g [oz]	
 <b>Pin Plunger</b>	<b>ZM110B70A01</b>	SPDT Silver Alloy	0.1 A	Long Solder	70 [2.47]	5 [0.18]	
	<b>ZM160B60A01</b>	SPDT Silver Alloy	6 A	PCB (left side)	70 [2.47]	5 [0.18]	
	<b>ZM160C10A01</b>	SPDT Silver Alloy	6 A	Solder	150 [5.29]	25 [0.88]	
	<b>ZM160C70A01</b>	SPDT Silver Alloy	6 A	Long Solder	150 [5.29]	25 [0.88]	
	<b>ZM190C60A01</b>	SPDT Silver Alloy	10.1 A	PCB (90° Left)	150 [5.29]	25 [0.88]	
	<b>ZM195G10A03</b>	SPNO Silver Alloy	16.1 A	Solder	355 [12.52]	100 [3.53]	
 <b>Short Straight Lever (16,7 mm [0.66 in])</b>	<b>ZM190C10B01</b>	SPDT Silver Alloy	10.1 A	Solder	50 [1.76]	6 [0.21]	
	<b>ZM195G10B04</b>	SPNC Silver Alloy	16.1 A	Solder	118 [4.16]	20 [0.71]	
 <b>Standard Straight Lever (18,7 mm [0.74 in])</b>	<b>ZM115C70C01-G</b>	SPDT Gold Plated	0.1 A	Long Solder	45 [1.59]	5 [0.18]	
	<b>ZM150C70C01</b>	SPDT Silver Alloy	3 A	Long Solder	45 [1.59]	5 [0.18]	
	<b>ZM190C10C01</b>	SPDT Silver Alloy	10.1 A	Solder	45 [1.59]	5 [0.18]	
 <b>Standard Simulated Roller Lever (18 mm [0.71 in])</b>	<b>ZM160C10E01</b>	SPDT Silver Alloy	6 A	Solder	42 [1.48]	6 [0.21]	

# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

- O.F. • Operating force
- R.F. • Release force
- P.T. • Pretravel
- O.T. • Overtravel
- D.T. • Differential travel
- O.P. • Operating position


Free Position from mounting hole mm [in] max.	Free Position from formed PCB terminal center line mm [in] max. *	Operate point from mounting hole mm [in]	Operate point from formed PCB terminal center line mm [in]*	P.T. max. mm [in]	O.T. min. mm [in]	D.T. max. mm [in]
9,4 [0.37]	-	8,6 ±0,3 [0.34 ± 0.01]	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	14,0 [0.55]	-	13,2 ±0,3 [0.52 ±0.01]	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
9,4 [0.37]	-	8,6 ±0,3 [0.34 ± 0.01]	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
9,4 [0.37]	-	8,6 ±0,3 [0.34 ± 0.01]	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
-	14,0 [0.55]	-	13,2 ±0,3 [0.52 ±0.01]	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
9,4 [0.37]	-	8,6 ±0,3 [0.34 ± 0.01]	-	1,1 [0.04]	0,4 [0.02]	0,2 [0.01]
11,8 [0.46]	-	9,0 ±0,8 [0.35 ±0.03]	-	3,6 [0.14]	0,6 [0.02]	0,8 [0.03]
11,8 [0.46]	-	8,6 ±1,3 [0.34 ±0.05]	-	4,6 [0.18]	0,5 [0.02]	1,5 [0.06]
12,1 [0.48]	-	9,0 ±0,9 [0.35 ±0.04]	-	4,0 [0.16]	0,7 [0.03]	0,9 [0.04]
12,1 [0.48]	-	9,0 ±0,9 [0.35 ±0.04]	-	4,0 [0.16]	0,7 [0.03]	0,9 [0.04]
12,1 [0.48]	-	9,0 ±0,9 [0.35 ±0.04]	-	4,0 [0.16]	0,7 [0.03]	0,9 [0.04]
16,0 [0.63]	-	12,3 ±1,5 [0.48 ±0.06]	-	5,2 [0.20]	0,6 [0.02]	0,9 [0.04]

\* See asterisk on page 17 for dimension locations.

## MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

**Table 7. MICRO SWITCH ZM1 Series Product Specifications and Listings (External Mount Lever)**

Contact your Honeywell rep or distributor for additional listings

	Catalog Listing	Circuitry/ Contact Material	Elect. Rating (page 6)	Termination	Operate Force max. g [oz]	Release Force min. g [oz]	Free Position from mounting hole mm [in] max.
 <b>Straight Lever</b>	<b>ZM160C20J501</b>	SPDT (Silver Alloy)	6 A	PCB (straight)	30 [1.06]	1 [0.04]	–
 <b>Roller Lever (17,2 mm [0.68in])</b>	<b>ZM160C10F501</b>	SPDT (Silver Alloy)	6 A	Solder	55 [1.94]	6 [0.21]	18,2 [0.72]
	<b>ZM115C70F501-G</b>	SPDT (Gold Plated)	0.1 A	Long Solder	55 [1.94]	6 [0.21]	18,2 [0.72]
 <b>Special Lever</b>	<b>ZM115D10S501-GA**</b>	SPDT (Gold Plated)	0.1 A	Solder	38 [1.34]	1 [0.04]	15,1 [0.59]
	<b>ZM160D20S501-A***</b>	SPDT (Silver Alloy)	6 A	PCB (straight)	45 [1.59]	1 [0.04]	–

\*\* 25,7 mm [1.01 in] external straight plastic lever

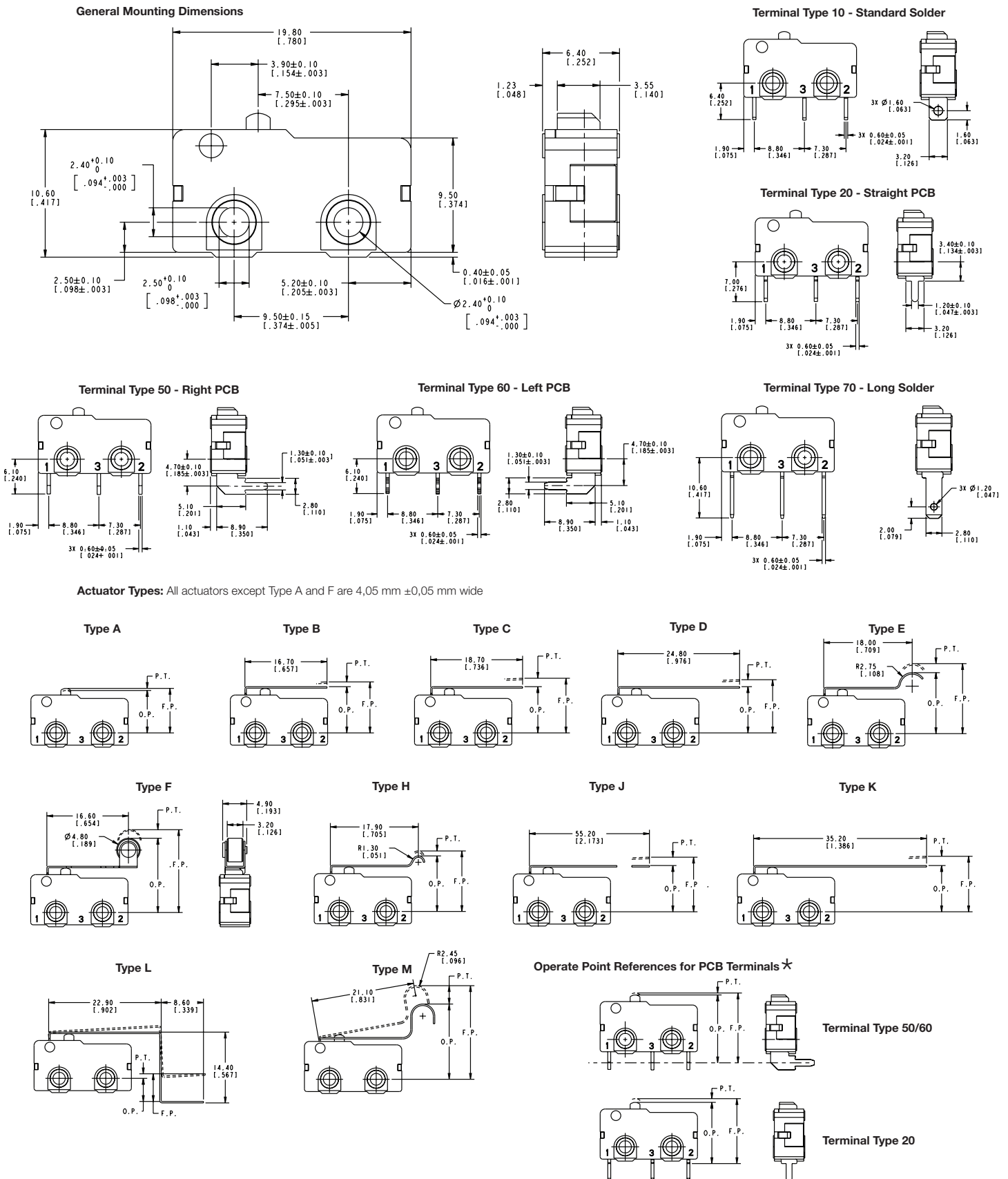
\*\*\* 17,2 mm [0.68 in] external roller lever with plastic roller

## MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

Free Position max. mm [in] from base of straight PCB terminal*	Free Position from formed PCB terminal center line mm [in] max. *	Operate point from mounting hole mm [in]	Operate point from base of straight PCB terminal mm [in]*	Operate point from formed PCB terminal center line mm [in]*	P.T. max. mm [in]	O.T. min. mm [in]	D.T. max. mm [in]
23,7 [0.93]	-	-	12,4 ±3,5 [0.49 ±0.14]	-	14,8 [0.58]	2,8 [0.11]	2,6 [0.10]
-	-	15,1 ±1 [0.59 ±0.04]	-	-	4,1 [0.16]	0,6 [0.02]	0,9 [0.04]
-	-	15,1 ±1 [0.59 ±0.04]	-	-	4,1 [0.16]	0,6 [0.02]	0,9 [0.04]
-	-	10,2 ±1,5 [0.40 ±0.06]	-	-	4,5 [0.18]	0,1 [0.004]	0,6 [0.02]
25,2 [0.99]	-	-	22,0 ±1,1 [0.87 ±0.04]	-	4,8 [0.19]	0,6 [0.02]	0,9 [0.04]

# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

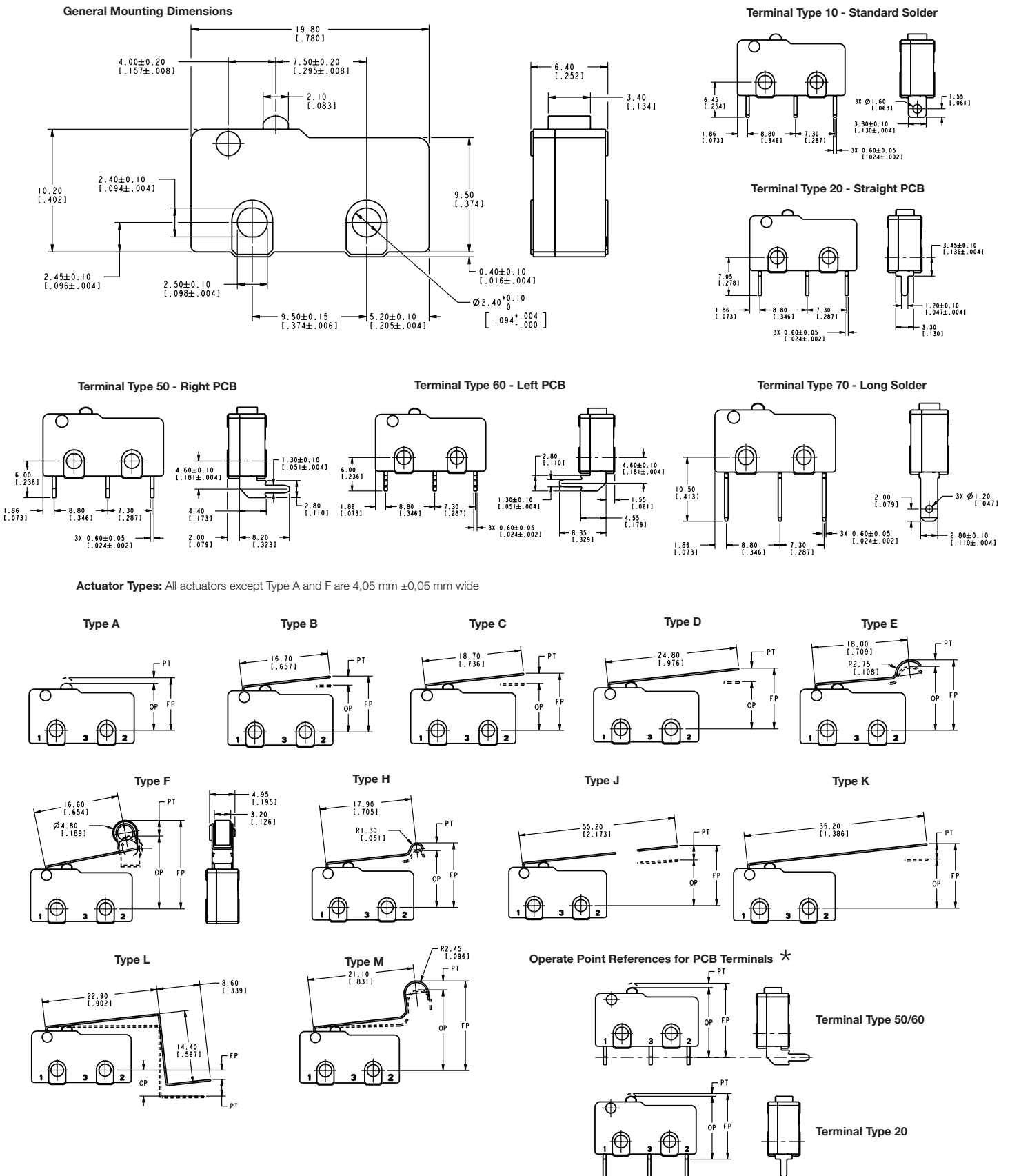
Figure 3. MICRO SWITCH ZM Series Mounting Dimensions





# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

Figure 4. MICRO SWITCH ZM1 Series Mounting Dimensions - Internal Mount Actuator

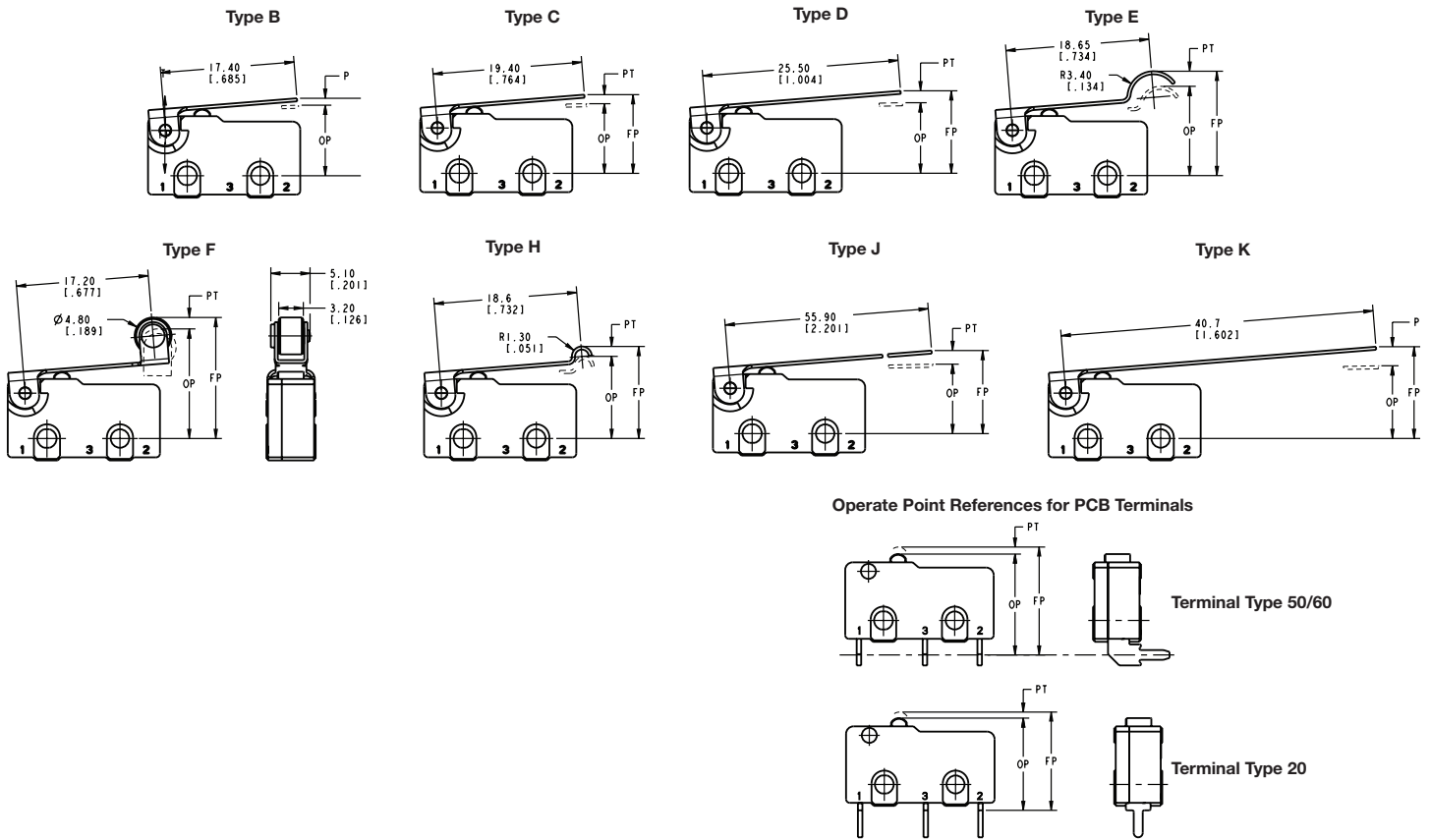


# MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

**Figure 5. MICRO SWITCH ZM1 Series Mounting Dimensions - External Mount Actuator**

For general ZM1 Series dimensions, please see Figure 4. Only external mount actuator dimensions given below.

**Actuator Types:** All actuators except Type F are 4,05 mm ±0,05 mm wide



## ADDITIONAL MATERIALS

The following associated literature is available on the Honeywell web site at [sensing.honeywell.com](http://sensing.honeywell.com):

- Product installation instructions
- Product range guide
- Product nomenclature tree
- Product application-specific information
  - Application note: Sensors and switches for potential HVAC/R applications
  - Application note: Sensors and switches for potential medical applications
  - Technical bulletin: Applying precision switches
  - Technical bulletin: Low energy switch guide

### Find out more

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office.

To learn more about Honeywell's sensing and switching products, call **+1-815-235-6847** or **1-800-537-6945**, visit [sensing.honeywell.com](http://sensing.honeywell.com), or e-mail inquiries to [info.sc@honeywell.com](mailto:info.sc@honeywell.com)

### Honeywell Safety and Productivity Solutions

9680 Old Bailes Road  
Fort Mill, SC 29707  
[honeywell.com](http://honeywell.com)

## **WARNING** **PERSONAL INJURY**

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

**Failure to comply with these instructions could result in death or serious injury.**

## **WARNING** **MISUSE OF DOCUMENTATION**

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

**Failure to comply with these instructions could result in death or serious injury.**

### Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective.

**The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

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