

#### E47 Precision Switches

2



### E47 Precision Switches

#### Product Description

E47 Precision Switches from Eaton's electrical sector provide high accuracy switching at an affordable price. A variety of standard features, such as current capacity, operating force, travel characteristics and actuators, lets you custom fit the switch to your application.

The switches are available in their compact basic form, or enclosed in a rugged, metal housing.

#### Features

- Compact housings are ideal for use where space is restricted
- Precision, snap-action operators provide accurate repeatability of electrical and mechanical operating characteristics
- High current capacity (up to 20A) allows power load switching and motor handling capability
- Enclosed booted versions shield actuators from debris

### Contents

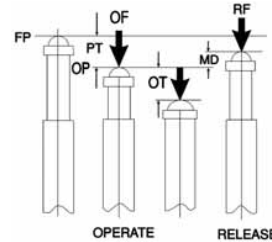
#### Description

	<i>Page</i>
E47 Precision Switches	
Product Selection	
Basic Switches . . . . .	<b>V8-T2-7</b>
Enclosed Switches . . . . .	<b>V8-T2-9</b>
Accessories . . . . .	<b>V8-T2-10</b>
Technical Data and Specifications . . . . .	<b>V8-T2-10</b>
Dimensions . . . . .	<b>V8-T2-12</b>



### Operating Characteristics

#### Definitions



- OF—Operating Force
- RF—Return Force
- PT—Pre-Travel
- OT—Over-Travel
- MD—Movement Differential
- FP—Free Position
- OP—Operating Position

### Standards and Certifications

- UL Recognized
- CSA Certified
- CE
- RoHS



#### **⚠ DANGER**

**THIS SENSOR IS NOT A SAFETY DEVICE AND IS NOT INTENDED TO BE USED AS A SAFETY DEVICE. This sensor is designed only to detect and read certain data in an electronic manner and perform no use apart from that, specifically no safety-related use. This sensor product does not include self-checking redundant circuitry, and the failure of this sensor product could cause either an energized or de-energized output condition, which could result in death, serious bodily injury, or property damage.**

For the most current information on this product, visit our Web site: [www.eaton.com](http://www.eaton.com)

For Customer Service in the U.S. call 1-877-ETN CARE (386-2273), in Canada call 1-800-268-3578. For Application Assistance in the U.S. and Canada call 1-800-426-9184.

## Product Selection

## Basic Switches

## E47 Precision Switches—Basic

	Type	Specifications <sup>①</sup>	15A Catalog Number	20A Catalog Number
	<b>Pin Plunger</b>			
	Screw terminal	OF max.—12.3 oz (350g) RF max.—4.02 oz (114g) PT max.—0.016 in (0.4 mm)	<b>E47BMS01</b>	<b>E47CMS01</b>
	Solder terminal	OT max.—0.005 in (0.13 mm) MD max.—0.002 in (0.05 mm) OP—0.626 in (15.9 mm)	<b>E47BML01</b>	<b>E47CML01</b> <sup>②</sup>
	<b>Extended Plunger</b>			
	Screw terminal	OF max.—12.3 oz (350g) RF max.—4.02 oz (114g) PT max.—0.016 in (0.4 mm)	<b>E47BMS03</b>	—
	Solder terminal	OT max.—0.063 in (1.6 mm) MD max.—0.002 in (0.05 mm) OP—1.11 in (28.2 mm)	<b>E47BML03</b>	—
	<b>Straight Plunger</b>			
	Screw terminal	OF max.—12.3 oz (350g) RF max.—4.02 oz (114g) PT max.—0.016 in (0.4 mm)	<b>E47BMS02</b>	<b>E47CMS02</b>
	Solder terminal	OT max.—0.063 in (1.6 mm) MD max.—0.002 in (0.05 mm) OP—0.846 in (21.5 mm)	<b>E47BML02</b>	<b>E47CML02</b>
	<b>Reversed Lever</b>			
	Screw terminal	OF max.—5.29 oz (150g) RF max.—0.49 oz (14g) PT max.—0.16 in (4 mm)	<b>E47BMS21</b>	—
	Solder terminal	OT max.—0.063 in (1.6 mm) MD max.—0.051 in (1.3 mm) FP max.—0.81 in (20.6 mm)	<b>E47BML21</b>	—
	Spade terminal	OP—0.685 in (17.4 mm)	<b>E47BMT21</b>	—
	<b>Straight Lever</b>			
	Screw terminal	OF max.—2.47 oz (70g) RF min.—0.49 oz (14g) PT max.—0.394 in (10 mm) OT max.—0.220 in (5.6 mm)	<b>E47BMS22</b>	<b>E47CMS22</b>
	Solder terminal	MD max.—0.051 in (1.3 mm) FP max.—1.11 in (28.2 mm) OP—0.748 in (19 mm)	<b>E47BML22</b>	—
	<b>Standard Lever</b>			
	Screw terminal	OF max.—3.53 oz (100g) RF min.—0.99 oz (28g) PT max.—0.197 in (5.0 mm) OT max.—0.079 in (2.0 mm)	<b>E47BMS20</b>	—
	Solder terminal	MD max.—0.039 in (1.0 mm) FP max.—0.976 in (24.8 mm) OP—0.748 in (19 mm)	<b>E47BML20</b>	—
	<b>Extended Straight Plunger</b>			
	Screw terminal	OF max.—12.3 oz (350g) RF max.—4.02 oz (114g) PT max.—0.016 in (0.4 mm)	<b>E47BMS04</b>	<b>E47CMS04</b>
	Screw terminal (with space lugs)	OT max.—0.217 in (5.5 mm) MD max.—0.002 in (0.05 mm) OP—0.858 in (21.8 mm)	<b>E47BMT04</b>	—
	Solder terminal		<b>E47BML04</b>	<b>E47CML04</b>

**Notes**

<sup>①</sup> OF = Operating Force; RF = Return Force; PT = Pre-Travel; OT = Over-Travel; MD = Movement Differential; FP = Free Position; OP = Operating Position.

<sup>②</sup> Contact Eaton's Sensor Applications Department at 1-800-426-9184 for approval status.





## E47 Precision Switches—Basic, continued

Type	Specifications <sup>①</sup>	15A Catalog Number	20A Catalog Number
<b>Roller Plunger</b>			
	<b>Roller Plunger</b>		
Screw terminal	OF max.—12.3 oz (350g) RF max.—4.02 oz (114g) PT max.—0.016 in (0.4 mm) OT max.—0.14 in (3.6 mm) MD max.—0.002 in (0.05 mm) OP—1.315 in (33.4 mm)	<b>E47BMS10</b>	<b>E47CMS10</b>
Solder terminal		<b>E47BML10</b>	—
<b>Cross Roller Plunger</b>			
	<b>Cross Roller Plunger</b>		
Screw terminal	OF max.—12.3 oz (350g) RF max.—4.02 oz (114g) PT max.—0.016 in (0.4 mm) OT max.—0.14 in (3.6 mm) MD max.—0.002 in (0.05 mm) OP—1.315 in (33.4 mm)	<b>E47BMS11</b>	<b>E47CMS11</b>
Solder terminal		<b>E47BML11</b>	—
<b>Reversed Roller Lever</b>			
	<b>Reversed Roller Lever</b>		
Screw terminal	OF max.—5.29 oz (150g) RF max.—0.49 oz (14g) PT max.—0.16 in (4 mm) OT max.—0.063 in (1.6 mm) MD max.—0.051 in (1.3 mm) FP max.—1.252 in (31.8 mm) OP—1.126 in (28.6 mm)	<b>E47BMS41</b>	—
Solder terminal		<b>E47BML41</b>	—
<b>Extended Roller Lever</b>			
	<b>Extended Roller Lever</b>		
Screw terminal	OF max.—5.64 oz (160g) RF min.—0.78 oz (22g) PT max.—0.28 in (7.1 mm) OT max.—0.16 in (4 mm)	<b>E47BMS42</b>	<b>E47CMS42</b>
Solder terminal	MD max.—0.04 in (1.02 mm) FP max.—1.437 in (36.5 mm) OP—1.189 in (30.2 mm)	<b>E47BML42</b>	—
<b>Roller Lever</b>			
	<b>Roller Lever</b>		
Screw terminal	OF max.—5.64 oz (160g) RF min.—1.48 oz (42g) PT max.—0.106 in (2.7 mm) OT max.—0.094 in (2.4 mm) MD max.—0.02 in (0.5 mm) FP max.—1.28 in (32.5 mm) OP—1.189 in (30.2 mm)	<b>E47BMS30</b>	<b>E47CMS30</b>
Solder terminal		<b>E47BML30</b>	—
Spade terminal		<b>E47BMT30</b>	<b>E47CMT30</b>
<b>One-Way Roller</b>			
	<b>One-Way Roller</b>		
Screw terminal	OF max.—5.64 oz (160g) RF min.—1.48 oz (42g) PT max.—0.106 in (2.7 mm) OT max.—0.094 in (2.4 mm) MD max.—0.02 in (0.5 mm)	<b>E47BMS31</b>	—
Solder terminal	FP—1.717 in (43.6 mm) OP—1.697 in (43.1 mm)	<b>E47BML31</b>	—
<b>Integral Leaf</b>			
	<b>Integral Leaf</b>		
Screw terminal	OF max.—0.35 oz (10g) RF min.—0.106 oz (3.0g) PT max.—0.787 in (20.0 mm) OT max.—0.22 in (5.6 mm) MD max.—0.118 in (3.0 mm) OP—0.748 in (19.0 mm)	<b>E47BMS23</b>	<b>E47CMS23</b>
Solder terminal		<b>E47BML23</b>	—

**Note**







<sup>①</sup> OF = Operating Force; RF = Return Force; PT = Pre-Travel; OT = Over-Travel; MD = Movement Differential; FP = Free Position; OP = Operating Position.

**E47 Precision Switches—Basic, continued**

Type	Specifications <sup>①</sup>	15A Catalog Number	20A Catalog Number
<b>Adjustable Roller</b>	<b>Adjustable Roller</b>		
 Screw terminal	OF max.—17.64 oz (500g) RF min.—6.0 oz (170g) PT max.—0.197 in (5.0 mm) OT max.—0.5 in (12.7 mm)	<b>E47BMS40</b>	—
 Solder terminal	MD max.—0.087 in (2.2 mm) FP max.—1.752 in (44.5 mm) OP—1.591 in (40.4 mm)	<b>E47BML40</b>	—
<b>Extended Adjustable Roller</b>	<b>Extended Adjustable Roller</b>		
 Screw terminal	OF max.—21.16 oz (600g) RF min.—10.58 oz (300g) PT max.—0.118 in (3.0 mm) OT max.—0.236 in (6.0 mm)	<b>E47BMS43</b>	—
 Solder terminal	MD max.—0.079 in (2.0 mm) FP max.—1.614 in (41 mm) OP—1.591 in (40.4 mm)	<b>E47BML43</b>	—

**Enclosed Switches**

**E47 Precision Switches—Enclosed**

Specifications <sup>①</sup>	Catalog Number	Specifications <sup>①</sup>	Catalog Number
<b>Plunger Actuator</b>	<b>Plunger Actuator</b>	<b>Booted Roller Lever</b>	<b>Booted Roller Lever</b>
 OF max.—8.82–12.3 oz (250–350g) RF min.—4.02 oz (114g) PT max.—0.016 in (0.4 mm) OT max.—0.217 in (5.5 mm) MD max.—0.002 in (0.05 mm) OP—1.504 in (38.2 mm)	<b>E47BLS05</b>	 OF max.—22.57 oz (640g) RF min.—8.11 oz (230g) PT max.—0.197 in (5.0 mm) OT max.—0.236 in (6.0 mm) MD max.—0.016 in (0.4 mm)	<b>E47BLS33</b>
	<b>E47CLS05</b> <sup>②③</sup>		
<b>Booted Plunger</b>	<b>Booted Plunger</b>	<b>Roller Plunger</b>	<b>Roller Plunger</b>
 OF max.—28.22 oz (800g) RF min.—8.46 oz (240g) PT max.—0.079 in (2.0 mm) OT max.—0.197 in (5.0 mm) MD max.—0.004 in (0.1 mm) OP—1.803 in (45.8 mm)	<b>E47BLS06</b>	 OF max.—8.82–12.3 oz (250–350g) RF min.—4.02 oz (114g) PT max.—0.02 in (0.5 mm) OT max.—0.142 in (3.6 mm) MD max.—0.002 in (0.05 mm) OP—1.957 in (49.7 mm)	<b>E47BLS07</b>
	<b>E47CLS06</b> <sup>②③</sup>		<b>E47BLS11</b> <sup>④</sup>
<b>Roller Lever</b>	<b>Roller Lever</b>	<b>Booted Roller Plunger</b>	<b>Booted Roller Plunger</b>
 OF max.—20.1 oz (570g) RF min.—6.0 oz (170g) PT max.—0.157 in (4.0 mm) OT max.—0.236 in (6.0 mm) MD max.—0.016 in (0.4 mm)	<b>E47BLS32</b>	 OF max.—17.64 oz (500g) RF min.—3.53 oz (100g) PT max.—0.039 in (1.0 mm) OT max.—0.138 in (3.5 mm) MD max.—0.005 in (0.12 mm) OP—1.957 in (49.7 mm)	<b>E47BLS08</b>
	<b>E47CLS32</b> <sup>②③</sup>		<b>E47BLS12</b> <sup>④</sup>

**Notes**

- ① OF = Operating Force; RF = Return Force; PT = Pre-Travel; OT = Over-Travel; MD = Movement Differential; FP = Free Position; OP = Operating Position.
- ② Contact Eaton's Sensor Applications Department at 1-800-426-9184 for approval status.
- ③ 20 ampere version.
- ④ Cross roller unit.

#### E47 Precision Switches— Enclosed, continued

Specifications ①	Catalog Number
<b>One-Way Roller</b>	
<b>One-Way Roller</b>	
OF max.—20.1 oz (570g)	<b>E47BLS34</b>
RF min.—6.0 oz (170g)	
PT max.—0.157 in (4.0 mm)	
OT max.—0.236 in (6.0 mm)	
MD max.—0.016 in (0.4 mm)	



<b>Booted One-Way Roller</b>	
<b>Booted One-Way Roller</b>	
OF max.—22.57 oz (640g)	<b>E47BLS35</b>
RF min.—8.11 oz (230g)	
PT max.—0.197 in (5.0 mm)	
OT max.—0.236 in (6.0 mm)	
MD max.—0.016 in (0.4 mm)	



#### E47 Precision Switches— Enclosed, continued

Specifications ①	Catalog Number
<b>Booted Wobble</b>	
<b>Booted Wobble</b>	
OF max.—2.11 oz (60g)	<b>E47BLS14</b>
RF min.—0.88 oz (25g)	
PT max.—0.520 in (13.2 mm)	
OT max.—0.315 in (8.0 mm)	
MD max.—0.039 in (1.0 mm)	



### Accessories

#### Terminal Wire Covers for Basic Switches

Description	Catalog Number
<b>45°</b>	
Terminal wire cover with 45° conduit interface	<b>E47PA1</b>



Description	Catalog Number
<b>90°</b>	
Terminal wire cover with 90° conduit interface	<b>E47PA2</b>



### Technical Data and Specifications

#### E47 Precision Switches

Description	Specification
Operating speed	0.01m/second to 1m/second
<b>Operating Frequency</b>	
Mechanical	120 operations/minute
Electrical	20 operations/minute
Mechanical life	3,000,000 operations minimum
Electrical life	500,000 operations minimum
Contact resistance	15M ohms maximum, initial
Insulation resistance	100M ohms minimum at 500 Vdc
<b>Dielectric Strength</b>	
Between non-current carrying parts	1000 Vac, 50/60 Hz for 1 minute
Between current carrying parts and ground	2000 Vac, 50/60 Hz for 1 minute

#### Notes

- ① OF = Operating Force; RF = Return Force; PT = Pre-Travel; OT = Over-Travel; MD = Movement Differential; FP = Free Position; OP = Operating Position.
- ② Cross roller unit.

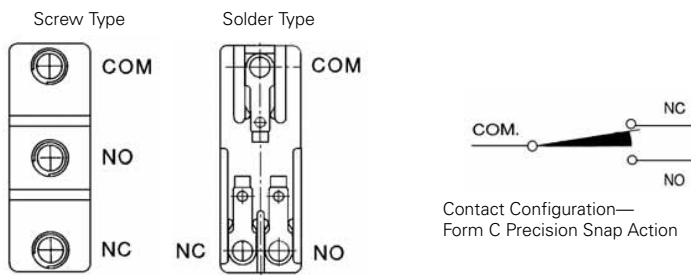
**E47 Precision Switches, continued**

Description	Specification
<b>Ambient Operating Temperature</b>	
Basic	-13° to 176°F (-25° to 80°C)
Enclosed	5° to 176°F (-15° to 80°C)
Environmental rating enclosed, booted	NEMA 1
Mounting centers	1.0 in (25.4 mm), #8 screw size
Terminal screws	Bottom facing M4 x 0.7 (8-32) Screws with cup washers will accept 22-12 AWG (2.5 sq. mm maximum) Maximum torque: 10 in-lbs.
Threaded bushing	15/32 in
Material of construction	Mineral filled phenolic
Enclosure rating	Aluminum die casting (ADC-3/A380); Seal boot: nitrile, butyl rubber (NBR)
Conduit fitting on enclosed type	1/2 in NPT

**Maximum Ampere Ratings <sup>①②</sup>**

Model	Rated Voltage	Non-Inductive Load (A)			Inductive Load (A)			Inrush Current (A)	
		Resistive Load NC and NO	Lamp Load NC	NO	Inductive Load NC and NO	Motor Load NC	NO	NC	NO
15A	125 Vac	15	3	1.5	15	5	2.5	30 max.	15 max.
	250 Vac	15	2.5	1.25	15	3	1.5		
	500 Vac	3	1.5	0.75	2.5	1.5	0.75		
	8 Vdc	15	3	1.5	15	5	2.5		
	14 Vdc	15	3	1.5	10	5	2.5		
	30 Vdc	6 (2)	3	1.5	5	5	2.5		
	125 Vdc	0.4	0.4	0.4	0.05	0.05	0.05		
	250 Vdc	0.2	0.2	0.2	0.03	0.03	0.03		
20A	125 Vac	20	7.5	7.5	20	12.5	12.5	60 max.	30 max.
	250 Vac	20	7.5	7.5	20	8.3	8.3		
	500 Vac	6	4	4	5	2	2		
	8 Vdc	20	3	1.5	20	12.5	12.5		
	14 Vdc	20	3	1.5	15	12.5	12.5		
	30 Vdc	6	3	1.5	5	5	5		
	125 Vdc	0.5	0.5	0.5	0.05	0.05	0.05		
	250 Vdc	0.25	0.25	0.25	0.03	0.03	0.03		

**Terminal Configurations**



(Spade type not shown, available on some models)

**Notes**

- ① Inductive load has a power factor of 0.04 minimum (AC) and a time constant of 7 m/second (DC).
- ② Lamp load has an inrush current of six times steady-state current.

# 2.1

## Limit Switches

### E47 Precision Switches

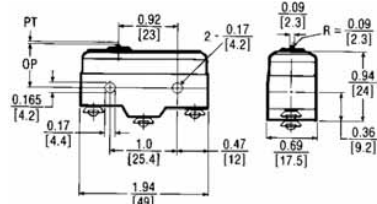
#### Dimensions

Approximate Dimensions in Inches [mm]

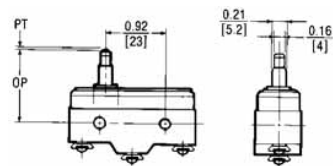
2

#### Basic Switches

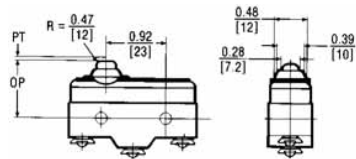
##### Pin Plunger



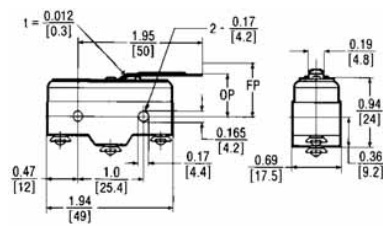
##### Extended Plunger



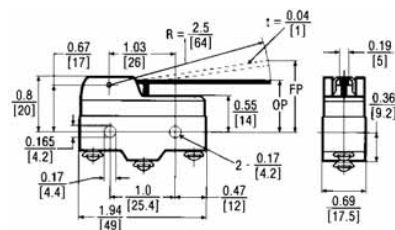
##### Straight Plunger



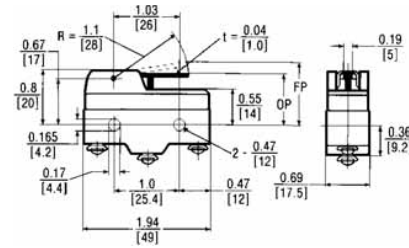
##### Reversed Lever



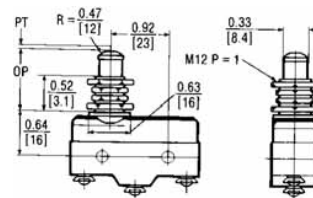
##### Straight Lever



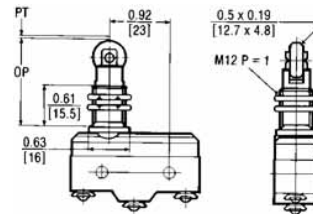
##### Standard Lever



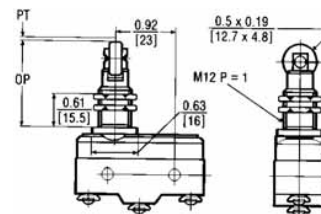
##### Extended Straight Plunger



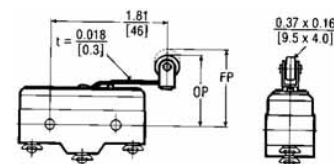
##### Roller Plunger



##### Cross Roller Plunger

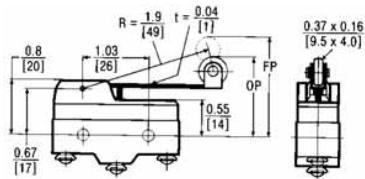


##### Reversed Roller Lever

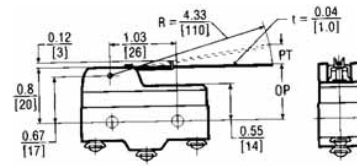


Approximate Dimensions in Inches [mm]

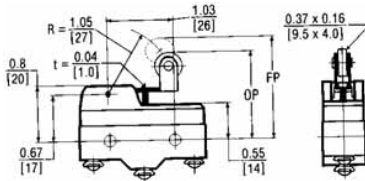
**Extended Roller Lever**



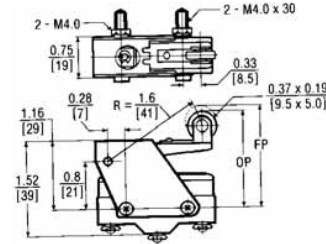
**Integral Leaf**



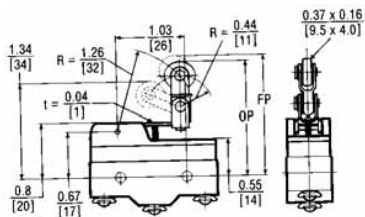
**Roller Lever**



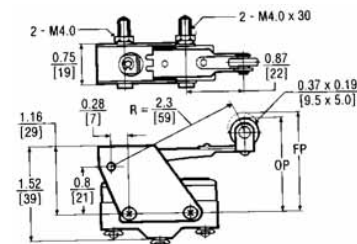
**Adjustable Roller**



**One-Way Roller**

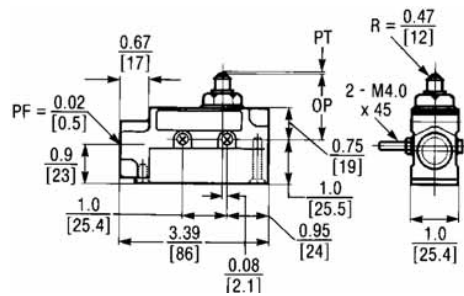


**Extended Adjustable Roller**

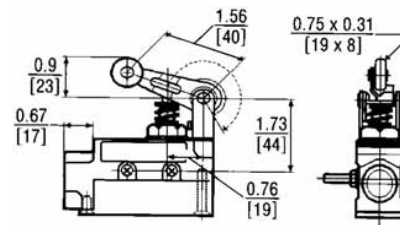


**Enclosed Switches**

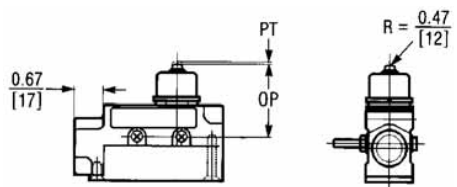
**Plunger Actuator**



**Roller Lever**



**Booted Plunger**



**Booted Roller Lever**

