

LAMPIRAN

1. Kode Program ESP32

```
// TTGO T-Call pin definitions
#define MODEM_RST      5
#define MODEM_PWKEY    4
#define MODEM_POWER_ON 23
#define MODEM_TX       27
#define MODEM_RX       26
#define I2C_SDA        21
#define I2C_SCL        22

#define BLYNK_PRINT Serial
#define BLYNK_HEARTBEAT 30
#define TINY_GSM_MODEM_SIM800
#include <SPI.h>
#include <TinyGsmClient.h>
#include <BlynkSimpleSIM800.h>
#include <Wire.h>
// #include <TinyGsmClient.h>
#include "utilities.h"

// Set serial for debug console (to the Serial Monitor, default speed 115200)
#define SerialMon Serial

// Hardware Serial on Mega, Leonardo, Micro
#define SerialAT Serial1
const char apn[] = "indosatgprs";
const char user[] = "indosat";
const char pass[] = "indosat";
const char auth[] = "DhyYEOilGyK1r0SrVyqOJbTiGJZ_H9fn";
```

```

TinyGsm modem(SerialAT);
#define Pin1 18 //IN1 is connected to 10
#define Pin2 19 //IN2 is connected to 11
#define Pin3 32 //IN3 is connected to 12
#define Pin4 33 //IN4 is connected to 13

#define sensormagnet 15 //define input pin for CW push button
#define sensor 0 //define input pin for Stop push button
#define buzzer 2 //define input pin for CCW push button

int pole1[] = {0,0,0,0, 0,1,1,1, 0}; //pole1, 8 step values
int pole2[] = {0,0,0,1, 1,1,0,0, 0}; //pole2, 8 step values
int pole3[] = {0,1,1,1, 0,0,0,0, 0}; //pole3, 8 step values
int pole4[] = {1,1,0,0, 0,0,0,1, 0}; //pole4, 8 step values

int poleStep = 0;
int dirStatus = 3; // stores direction status 3= stop (do not change)

void setup()
{
  // Set console baud rate
  SerialMon.begin(115200);
  delay(10);

  // Keep power when running from battery
  Wire.begin(I2C_SDA, I2C_SCL);
  bool isOk = setPowerBoostKeepOn(1);
  SerialMon.println(String("IP5306 KeepOn ") + (isOk ? "OK" : "FAIL"));

  // Set-up modem reset, enable, power pins

```

```

pinMode(MODEM_PWKEY, OUTPUT);
pinMode(MODEM_RST, OUTPUT);
pinMode(MODEM_POWER_ON, OUTPUT);
pinMode(Pin1, OUTPUT);//define pin for ULN2003 in1
pinMode(Pin2, OUTPUT);//define pin for ULN2003 in2
pinMode(Pin3, OUTPUT);//define pin for ULN2003 in3
pinMode(Pin4, OUTPUT);//define pin for ULN2003 in4

pinMode(sensormagnet,INPUT_PULLUP);// CW push button pin as input
pinMode(sensor ,INPUT_PULLUP);//Stop push button pin as input
pinMode(buzzer,OUTPUT);//CCW push button pin as input
//digitalRead(buzzer, LOW);

digitalWrite(MODEM_PWKEY, LOW);
digitalWrite(MODEM_RST, HIGH);
digitalWrite(MODEM_POWER_ON, HIGH);

// Set GSM module baud rate and UART pins
SerialAT.begin(115200, SERIAL_8N1, MODEM_RX, MODEM_TX);
delay(3000);

// Restart takes quite some time
// To skip it, call init() instead of restart()
SerialMon.println("Initializing modem...");
modem.restart();

String modemInfo = modem.getModemInfo();
SerialMon.print("Modem: ");
SerialMon.println(modemInfo);

// Unlock your SIM card with a PIN

```

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//modem.simUnlock("1234");

SerialMon.print("Waiting for network...");
if (!modem.waitForNetwork(240000L)) {
  SerialMon.println(" fail");
  delay(10000);
  return;
}
SerialMon.println(" OK");

if (modem.isNetworkConnected()) {
  SerialMon.println("Network connected");
}

SerialMon.print(F("Connecting to APN: "));
SerialMon.print(apn);
if (!modem.gprsConnect(apn, user, pass)) {
  SerialMon.println(" fail");
  delay(10000);
  return;
}
SerialMon.println(" OK");

Blynk.begin(auth, modem, apn, user, pass);

}
BLYNK_WRITE(V1){
  int pinData = param.asInt();
  if (pinData==1){
    dirStatus = 1; // maju
  }
}

```

```

}

BLYNK_WRITE(V3){
  int pinData2 = param.asInt();
  if (pinData2==1){
    dirStatus = 3; // stop
  }
}

void loop()
{
  Blynk.run();
  sendData1();
}

void sendData1(){

if((digitalRead(sensor ) == HIGH) ||BLYNK_WRITE(V1))

  {Serial.println("TERBACA");
  dirStatus = 1;
}else if(digitalRead(sensor ) == LOW)
{Serial.println("TIDAKB TERBACA");
  dirStatus =2; //mundur
}

if(dirStatus ==1){
  poleStep++;
  driveStepper(poleStep);
}else if(dirStatus ==2){
  poleStep--;

```

```
    driveStepper(poleStep);
  }else{
    driveStepper(8);
  }
  if(poleStep>7){
    poleStep=0;
  }
  if(poleStep<0){
    poleStep=7;
  }
  delay(1);

}
void driveStepper(int c)
{
  digitalWrite(Pin1, pole1[c]);
  digitalWrite(Pin2, pole2[c]);
  digitalWrite(Pin3, pole3[c]);
  digitalWrite(Pin4, pole4[c]);
} //driveStepper end here
```

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 ²
ZM Series Subminiature Basic Switch	10 0.1 A 125 Vac (Gold-plated contacts)	B 60 g max. D 104 g max. E 146 g max. G 249 g max.	10 Solder, straight	A Pin plunger	01 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".
	50 5 A; 125 Vac/250 Vac	D 104 g max. E 146 g max. G 249 g max.	20 PCB, straight	B Short straight lever, 16,7 mm [0.66 in] length	03 SPNO	
	90 10.1 A; 125 Vac/250 Vac ¹	G 249 g max.	50 PCB, right angle	C Standard straight lever, 18,7 mm [0.74 in] length	04 SPNC	
		60 PCB, left angle	D Long straight lever, 24,8 mm [0.98 in] length			
		70 Quick connect 0.110 in	E Std sim. roller lever, 18,0 mm [0.71 in] length R 2,75 mm			
		99 SPECIAL ²	F Roller lever, 16,6 mm [0.65 in] length Ø4,8 mm roller			
			H Small sim. roller lever, 17,9 mm [0.70 in] length R 1,3 mm			
			J Extended straight lever, 55,2 mm [2.17 in] length			
			K Straight lever, 35,2 mm [1.39 in] length			
			L L-shaped lever, 31,5 mm [1.24 in] length			
			M Large sim. roller lever, 21,1 mm [0.83 in] length R 2,45 mm			
			S SPECIAL lever ²			

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

NOTES:

¹ Switches with 10.1 A rating are only available with "G" operating force.

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

NOTES:

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

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

³ 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.).

⁴ 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.).

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

⁶ 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 contacts⁶

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>Pin Plunger</p>	ZM10B10A01	SPDT Gold Plated	0.1 A	Solder	60 [2.17]	8 [0.28]	9,3 [0.37]
	ZM10B70A01	SPDT Gold Plated	0.1 A	Long Solder	60 [2.17]	8 [0.28]	9,3 [0.37]
	ZM10D70A01	SPDT Gold Plated	0.1 A	Long Solder	104 [3.67]	20 [0.70]	9,3 [0.37]
	ZM10E10A01	SPDT Gold Plated	0.1 A	Solder	146 [5.15]	35 [1.23]	9,3 [0.37]
	ZM10E20A01	SPDT Gold Plated	0.1 A	PCB (Straight)	146 [5.15]	35 [1.23]	-
	ZM10E50A01	SPDT Gold Plated	0.1 A	PCB (90° Right)	146 [5.15]	35 [1.23]	-
	ZM10E70A01	SPDT Gold Plated	0.1 A	Long Solder	146 [5.15]	35 [1.23]	9,3 [0.37]
	ZM10E70A03	SPNO Gold Plated	0.1 A	Long Solder	146 [5.15]	35 [1.23]	9,3 [0.37]
	ZM50E10A01	SPDT Silver Alloy	5 A	Solder	146 [5.15]	35 [1.23]	9,3 [0.37]
	ZM50E10A03	SPNO Silver Alloy	5 A	Solder	146 [5.15]	35 [1.23]	9,3 [0.37]
	ZM50E20A01	SPDT Silver Alloy	5 A	PCB (Straight)	146 [5.15]	35 [1.23]	-
	ZM50E20A03	SPNO Silver Alloy	5 A	PCB (Straight)	146 [5.15]	35 [1.23]	-
	ZM50E50A01	SPDT Silver Alloy	5 A	PCB (90° Right)	146 [5.15]	35 [1.23]	-
	ZM50E70A01	SPDT Silver Alloy	5 A	Long Solder	146 [5.15]	35 [1.23]	9,3 [0.37]
	ZM50G20A01	SPDT Silver Alloy	5 A	PCB (Straight)	249 [8.78]	50 [1.76]	-
	ZM90G10A01	SPDT Silver Alloy	10.1 A	Solder	249 [8.78]	50 [1.76]	9,3 [0.37]
	ZM90G20A01	SPDT Silver Alloy	10.1 A	PCB (Straight)	249 [8.78]	50 [1.76]	-
ZM90G70A01	SPDT Silver Alloy	10.1 A	Long Solder	249 [8.78]	50 [1.76]	9,3 [0.37]	
 <p>Short Straight Lever (16,7 mm [0.66 in])</p>	ZM10E10B01	SPDT Gold Plated	0.1 A	Solder	40 [1.41]	6 [0.21]	11,7 [0.46]
	ZM10E50B01	SPDT Gold Plated	0.1 A	PCB (90° Right)	40 [1.41]	6 [0.21]	-
	ZM10G10B01	SPDT Gold Plated	0.1 A	Solder	66 [2.33]	9 [0.32]	11,7 [0.46]
	ZM50D10B01	SPDT Silver Alloy	5 A	Solder	30 [1.06]	3 [0.10]	11,7 [0.46]
	ZM50E10B01	SPDT Silver Alloy	5 A	Solder	40 [1.41]	6 [0.21]	11,7 [0.46]
	ZM50E20B01	SPDT Silver Alloy	5 A	PCB (Straight)	40 [1.41]	6 [0.21]	-
	ZM50E50B01	SPDT Silver Alloy	5 A	PCB (90° Right)	40 [1.41]	6 [0.21]	-
	ZM50E60B01	SPDT Silver Alloy	5 A	PCB (90° Left)	40 [1.41]	6 [0.21]	-
	ZM50E70B01	SPDT Silver Alloy	5 A	Long Solder	40 [1.41]	6 [0.21]	11,7 [0.46]
 <p>Standard Straight Lever (18,7 mm [0.74 in])</p>	ZM10B70C01	SPDT Gold Plated	0.1 A	Long Solder	14 [0.49]	2 [0.07]	12,0 [0.47]
	ZM10E10C01	SPDT Gold Plated	0.1 A	Solder	36 [1.27]	6 [0.21]	12,0 [0.47]
	ZM10E20C01	SPDT Gold Plated	0.1 A	PCB (Straight)	36 [1.27]	6 [0.21]	-
	ZM50E10C01	SPDT Silver Alloy	5 A	Solder	36 [1.27]	6 [0.21]	12,0 [0.47]
	ZM50E70C01	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
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 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>Long Straight Lever (24,8 mm [0.98 in])</p>	ZM10B10D01	SPDT Gold Plated	0.1 A	Solder	13 [0.46]	2 [0.07]	13,5 [0.53]
	ZM10B70D01	SPDT Gold Plated	0.1 A	Long Solder	13 [0.46]	2 [0.07]	13,5 [0.53]
	ZM10D10D01	SPDT Gold Plated	0.1 A	Solder	20 [0.70]	5 [0.18]	13,5 [0.53]
	ZM10D20D01	SPDT Gold Plated	0.1 A	PCB (Straight)	20 [0.70]	5 [0.18]	-
	ZM10E70D01	SPDT Gold Plated	0.1 A	Long Solder	28 [0.99]	4 [0.14]	13,5 [0.53]
	ZM50E10D01	SPDT Silver Alloy	5 A	Solder	28 [0.99]	4 [0.14]	13,5 [0.53]
	ZM50E50D01	SPDT Silver Alloy	5 A	PCB (90° Right)	28 [0.99]	4 [0.14]	-
	ZM50E70D01	SPDT Silver Alloy	5 A	Long Solder	28 [0.99]	4 [0.14]	13,5 [0.53]
 <p>Extended Straight Lever (55,2 mm [2.17 in])</p>	ZM50E70J01	SPDT Silver Alloy	5 A	Long Solder	12 [0.42]	2,5 [0.09]	19,2 [0.76]
 <p>Small Simu- lated Roller Lever (17,9 mm [0.70 in])</p>	ZM10E20H01	SPDT Gold Plated	0.1 A	PCB (Straight)	34 [1.20]	8 [0.28]	-
	ZM50G10H01	SPDT Silver Alloy	5 A	Solder	56 [1.98]	13 [0.46]	14,4 [0.57]
 <p>Standard Simulated Roller Lever (18 mm [0.71 in])</p>	ZM10B70E01	SPDT Gold Plated	0.1 A	Long Solder	14 [0.49]	2 [0.07]	18,9 [0.74]
	ZM10D10E01	SPDT Gold Plated	0.1 A	Solder	26 [0.92]	5 [0.18]	18,9 [0.74]
	ZM10D70E01	SPDT Gold Plated	0.1 A	Long Solder	26 [0.92]	5 [0.18]	18,9 [0.74]
	ZM10E10E01	SPDT Gold Plated	0.1 A	Solder	35 [1.23]	8 [0.28]	18,9 [0.74]
	ZM10E50E01	SPDT Gold Plated	0.1 A	PCB (90° Right)	35 [1.23]	8 [0.28]	-
	ZM50E10E01	SPDT Silver Alloy	5 A	Solder	35 [1.23]	8 [0.28]	18,9 [0.74]
	ZM50E20E01	SPDT Silver Alloy	5 A	PCB (Straight)	35 [1.23]	8 [0.28]	-
	ZM50E70E01	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>Roller Lever (16,6 mm [0.65 in])</p>	ZM10B70F01	SPDT Gold Plated	0.1 A	Long Solder	19 [0.67]	2 [0.07]	17,6 [0.69]
	ZM10E10F01	SPDT Gold Plated	0.1 A	Solder	34 [1.23]	8 [0.28]	17,6 [0.69]
	ZM10E50F01	SPDT Gold Plated	0.1 A	PCB (90° Right)	34 [1.23]	8 [0.28]	-
	ZM50D10F01	SPDT Silver Alloy	5 A	Solder	25 [0.88]	6 [0.21]	17,6 [0.69]
	ZM50E10F01	SPDT Silver Alloy	5 A	Solder	34 [1.23]	8 [0.28]	17,6 [0.69]
	ZM50E50F01	SPDT Silver Alloy	5 A	PCB (90° Right)	34 [1.23]	8 [0.28]	-
	ZM50E70F01	SPDT Silver Alloy	5 A	Long Solder	34 [1.23]	8 [0.28]	17,6 [0.69]
	ZM90G20F01	SPDT Silver Alloy	10.1 A	PCB (Straight)	60 [2.17]	15 [0.53]	-
 <p>L-Shaped Lever (31,5 mm [1.24 in])</p>	ZM50E10L01	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]	
 <p>Pin Plunger</p>	ZM110B70A01	SPDT Silver Alloy	0.1 A	Long Solder	70 [2.47]	5 [0.18]	
	ZM160B60A01	SPDT Silver Alloy	6 A	PCB (left side)	70 [2.47]	5 [0.18]	
	ZM160C10A01	SPDT Silver Alloy	6 A	Solder	150 [5.29]	25 [0.88]	
	ZM160C70A01	SPDT Silver Alloy	6 A	Long Solder	150 [5.29]	25 [0.88]	
	ZM190C60A01	SPDT Silver Alloy	10.1 A	PCB (90° Left)	150 [5.29]	25 [0.88]	
	ZM195G10A03	SPNO Silver Alloy	16.1 A	Solder	355 [12.52]	100 [3.53]	
 <p>Short Straight Lever (16,7 mm [0.66 in])</p>	ZM190C10B01	SPDT Silver Alloy	10.1 A	Solder	50 [1.76]	6 [0.21]	
	ZM195G10B04	SPNC Silver Alloy	16.1 A	Solder	118 [4.16]	20 [0.71]	
 <p>Standard Straight Lever (18,7 mm [0.74 in])</p>	ZM115C70C01-G	SPDT Gold Plated	0.1 A	Long Solder	45 [1.59]	5 [0.18]	
	ZM150C70C01	SPDT Silver Alloy	3 A	Long Solder	45 [1.59]	5 [0.18]	
	ZM190C10C01	SPDT Silver Alloy	10.1 A	Solder	45 [1.59]	5 [0.18]	
 <p>Standard Simulated Roller Lever (18 mm [0.71 in])</p>	ZM160C10E01	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.
 Straight Lever	ZM160C20J501	SPDT (Silver Alloy)	6 A	PCB (straight)	30 [1.06]	1 [0.04]	–
 Roller Lever (17,2 mm [0.68in])	ZM160C10F501	SPDT (Silver Alloy)	6 A	Solder	55 [1.94]	6 [0.21]	18,2 [0.72]
	ZM115C70F501-G	SPDT (Gold Plated)	0.1 A	Long Solder	55 [1.94]	6 [0.21]	18,2 [0.72]
 Special Lever	ZM115D10S501-GA**	SPDT (Gold Plated)	0.1 A	Solder	38 [1.34]	1 [0.04]	15,1 [0.59]
	ZM160D20S501-A***	SPDT (Silver Alloy)	6 A	PCB (straight)	45 [1.59]	1 [0.04]	–

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

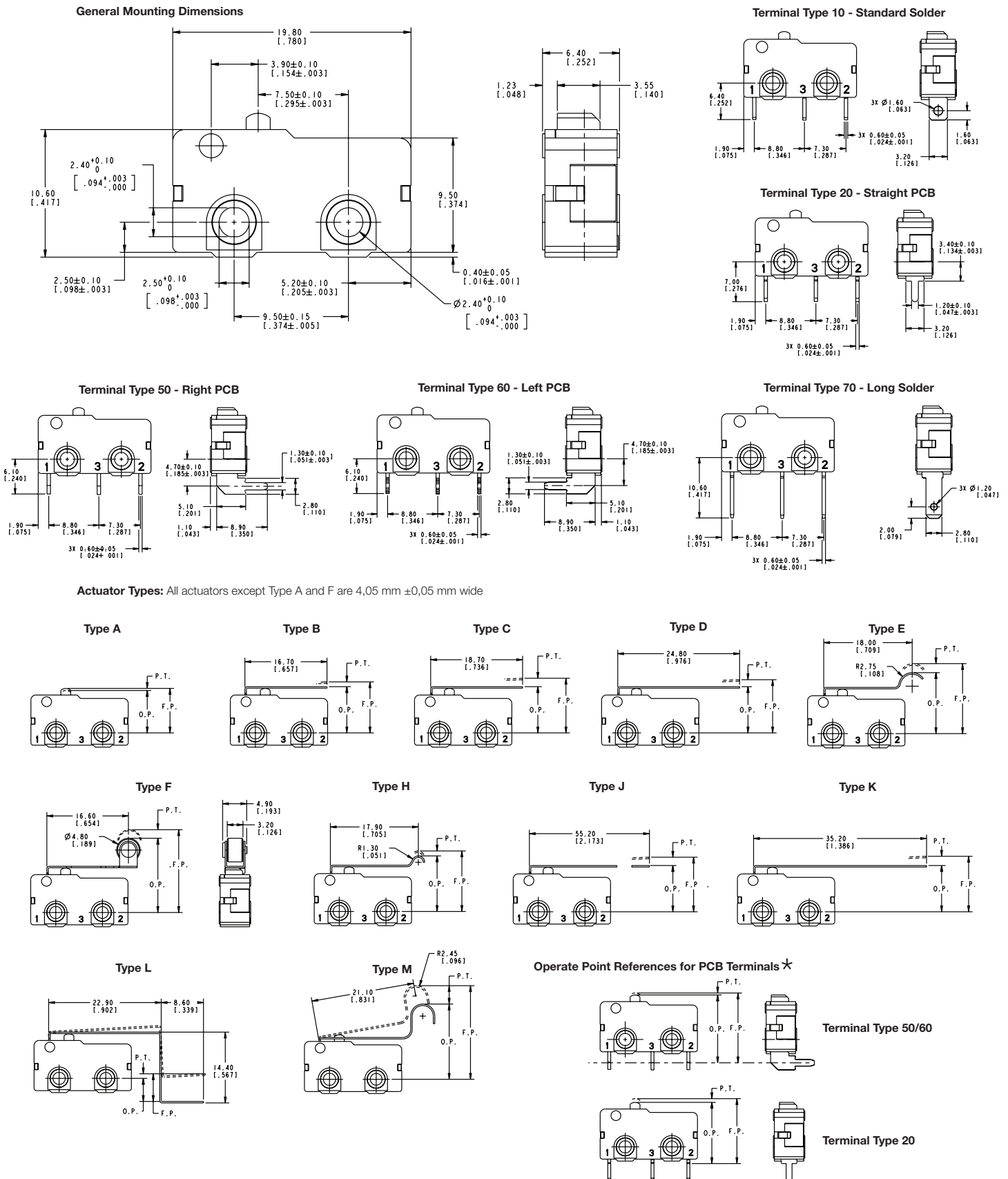
*** 17,2 mm [0.68 in] external roller lever with plastic roller

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]

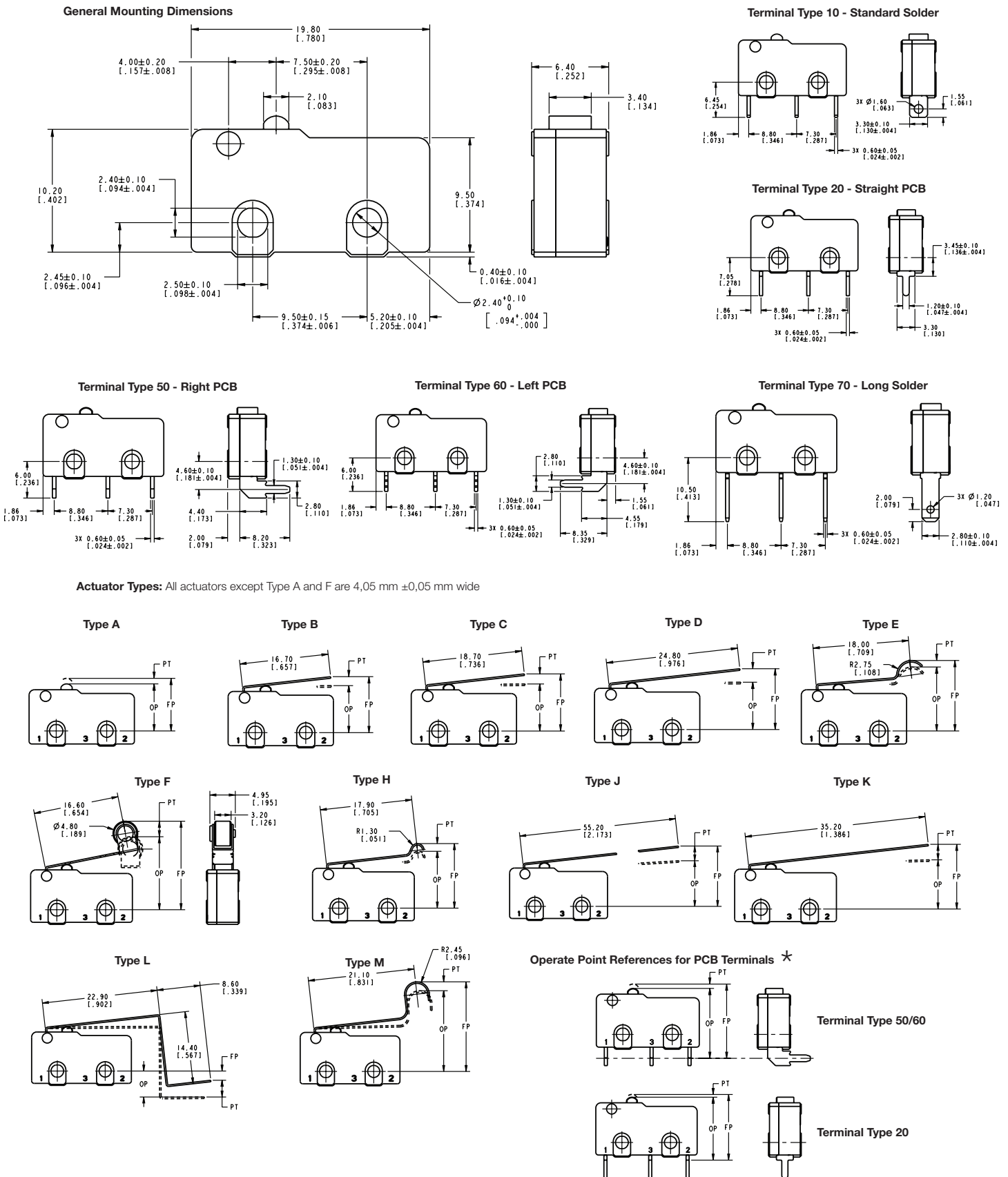
MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

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

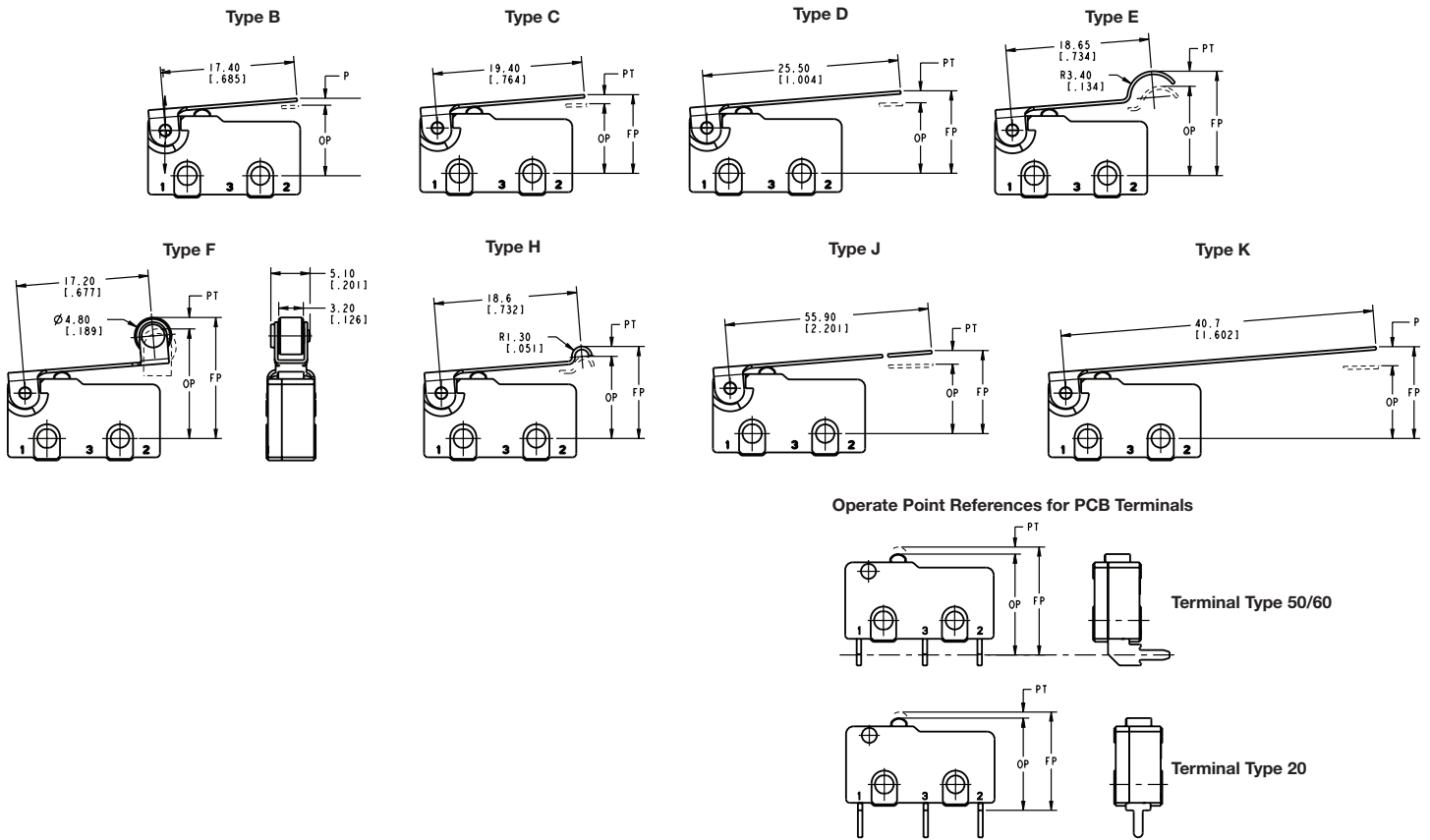


MICRO SWITCH Subminiature Basic Switches, ZM/ZM1 Series

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:

- 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, or e-mail inquiries to info.sc@honeywell.com

Honeywell Safety and Productivity Solutions

9680 Old Bailes Road
Fort Mill, SC 29707
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.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Honeywell

USERS GUIDE MATRIX DIGITAL INDUCTIVE LOOP SENSORS

APPLICATIONS

The MATRIX Digital Inductive Loop Detector is the ideal solution for parking barrier control, motorized gates and doors, vehicle access control and industrial control systems.

The MATRIX is a high performance single or dual-channel vehicle detector packaged in a compact housing. The connection is made with a standard industrial 11-pin round connector.

The six versions listed below include single or dual-channel, and 3 possible power supplies:

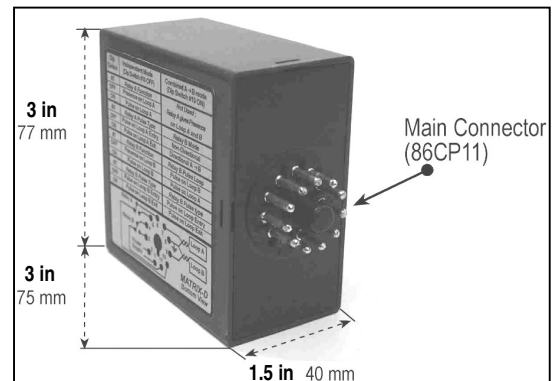
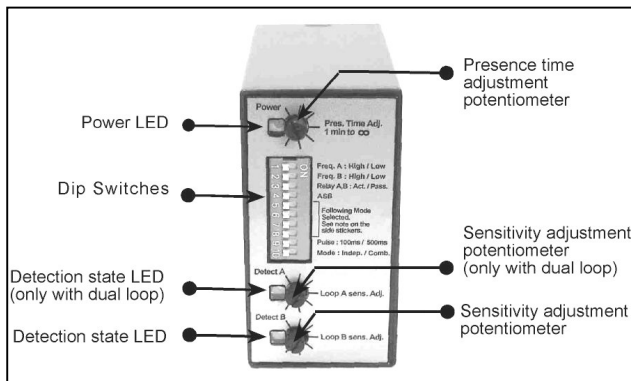
10MATRIXS110	:	Single loop detector with 110 to 120 V AC power supply.
10MATRIXS220	:	Single loop detector with 220 to 240 V AC power supply.
10MATRIXS1224	:	Single loop detector with 12 to 24 V AC/DC power supply.
10MATRIXD110	:	Dual loop detector with 110 to 120 V AC power supply.
10MATRIXD220	:	Dual loop detector with 220 to 240 V AC power supply.
10MATRIXD1224	:	Dual loop detector with 12 to 24 V AC/DC power supply.

TECHNICAL SPECIFICATIONS

Technology	:	Inductive loop
Tuning	:	automatic
Detection mode	:	presence
Presence time	:	1 min to infinity (permanent presence) with 250 steps.
Pulse time output	:	100 ms or 500 ms
Inductance range	:	20 μH to 1000 μH
Frequency range	:	20 kHz to 130 kHz
Frequency steps	:	4 for single loop 2 for dual loop (for each loop)
Sensitivity (ΔL/L)	:	0.005% to 0.5% with 250 steps
Reaction time	:	25ms for single loop 50ms for dual loop(each channel)
Setup time at power on	:	8 s max by channel
Setup time after configuration	:	2s max by channel
Power supply (depending on model)	:	<ul style="list-style-type: none"> • 12-24 AC/DC ± 10% • 230VAC ± 10 % • 115VAC ± 10 %
Power Frequency	:	48 to 62 Hz
Power Consumption	:	< 2.5 W
Temperature range	:	-22°F to 158°F [-30°C to +70 °C]

Degree of protection	:	IP40
2 Output relays (free potential change-over contact)	:	<ul style="list-style-type: none"> • Max contact voltage : 230 VAC ; • Max contact current : 5A (resistive).
LED indicators	:	<ul style="list-style-type: none"> • 1 green LED : power ; • 1 red LED : Loop status 1 ; • 1 red LED : Loop status 2.
Protections	:	<ul style="list-style-type: none"> • loop insulation transformer ; • Zener diodes ; • gas discharge clamping.
Connection	:	Standard 11-pin round connector 86CP11
Dimensions	:	3 in (H) x 1.5 in (W) x 3 in (D) [77mm (H) x 40mm(W) x 75mm(D)]
Weight	:	7 ounces [< 200g]
Product compliance	:	R&TTE 1999/5/EC EMC 89/336/EEC FCC 47CFR15 IC RSS-210 Issue 5

DESCRIPTION OF THE SENSOR



SAFETY PRECAUTIONS



- Shut off all power before attempting any wiring procedures.
- Maintain a clean & safe environment.
- Constantly be aware of traffic around the door or gate area.
- Always suspend traffic through the doorway or gate area when performing testing that may result in unexpected reactions by the door or gate.
- Always check placement of all wiring and components before powering up to insure that moving parts will not catch any wires and cause damage to equipment.

FCC COMPLIANCE

10MATRIXS110:	Matrix, Single Unit, 110 Volt AC supply	} (FCC ID: G9B-MATRIX) (IC: 4680A-MATRIX)
10MATRIXS220:	Matrix, Single Unit, 220 Volt AC supply	
10MATRIXS1224:	Matrix, Single Unit, 12-24 Volt AC/DC supply	
10MATRIXD110:	Matrix, Double Unit, 110 Volt AC supply	
10MATRIXD220:	Matrix, Double Unit, 220 Volt AC supply	
10MATRIXD1224:	Matrix, Double Unit, 12-24 Volt AC/DC supply	

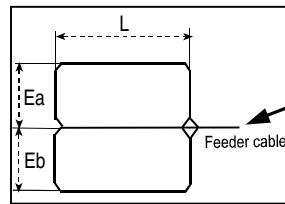
The Digital Transmitters and Receivers comply with Part 15 of the FCC rules. Operation is subject to the following two conditions:
 1) This device may not cause harmful interference and;
 2) This device must accept any interference received including interference that may cause undesired operations.
 Changes or modifications not expressly approved by B.E.A., Inc. for compliance could void the user's authority to operate the equipment.

LOOP INSTALLATION TIPS

A . CABLE SPECIFICATIONS FOR LOOP AND FEEDER

- 16 AWG (1.5mm²) cross section area ;
- Multi-strand cable ;
- Insulation material : PVC or Silicone ;
- For the feeder cable, the wire must be twisted at least 15 times per yard for each cable.
- Feeder for long runs used for foil screened cable is recommended (earth at equipment end only)
- The feeder cable must be firmly fixed to avoid any false detection (max length: 330 feet (100 m)).
- Waterproof cable junction box is required.

B. LOOP GEOMETRY



- When two adjacent loops are connected to a dual channel sensor, it is possible for these loops to share a common slot, if so required. As the channels are multiplexed, no interference will occur.
- Avoid large loops or long feeder [max 330 feet (100 m)], or else the sensitivity will be affected.

C. DETERMINATION OF THE NUMBER OF LOOP TURNS

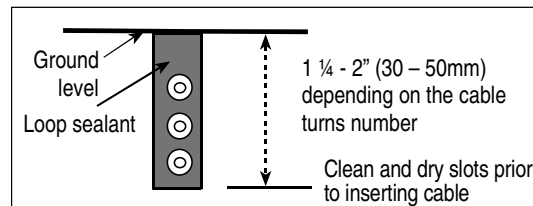
- Measure the length (L) and width (Ea) of one loop. Multiply these numbers together to determine the loop surface area. See above drawing.
- For example, if L=10 ft, Ea= 3 ft, then the area = 30 ft²; 4 loop turns are recommended.
 or if L=2m, Ea=1m, then the area = 2 m²; 4 loop turns are recommended.

Recommended values for the turns:

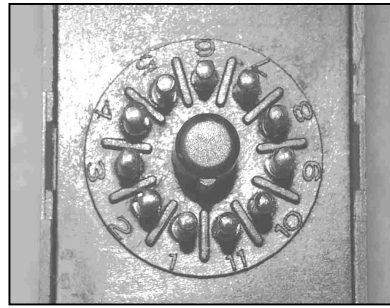
Area		Number of turns
<32 ft ²	<3 m ²	4
32 – 54 ft ²	3 – 5 m ²	3
65 – 108 ft ²	6 – 10 m ²	2

WARNING:
 For conformity reasons, in any installation, the loop surface multiplied by the number of turns should not exceed **215** (for square feet); **20** (for square meters)

D. SLOT DEPTH



WARNING : Do not remove the grease on the connector's pins.



- Pin 1** : Power Supply
- Pin 2** : Power Supply
- Pin 3** : Relay 2 (NO)
- Pin 4** : Relay 2 (COM)
- Pin 5** : Relay 1 (NO)
- Pin 6** : Relay 1 (COM)
- Pin 7** : Loop A
- Pin 8** : Loop common and **connect to ground** \perp
- Pin 9** : Loop B
- Pin 10** : Relay 1 (NC)
- Pin 11** : Relay 2 (NC)



WARNING:
Pin #8 must be connected to the loop and to ground

I. THE 3 CONFIGURATIONS

- Configuration A : single loop detector (MATRIX-S) ;
- Configuration B : dual loop detector in independent mode (MATRIX-D with dip switch #10 OFF) ;
- Configuration C : dual loop detector in combined mode (MATRIX-D with dip switch #10 ON).

Dip Switch	Configuration A Single loop		Configuration B Dual loop in independent mode		Configuration C Dual loop in combined mode	
	OFF	ON	OFF	ON	OFF	ON
DS#1	See next table		High (loop A)	Low (loop A) [High -30%]	High (loop A)	Low (loop A) [High -30%]
DS#2	See next table		High (loop B)	Low (loop B) [High -30%]	High (loop B)	Low (loop B) [High -30%]
DS#3	Active mode	Passive mode	Active mode	Passive mode	Active mode	Passive mode
DS#4	ASB OFF	ASB ON	ASB OFF	ASB ON	ASB OFF	ASB ON
DS#5	Relay A : Presence on loop A	Relay A : Pulse on loop	Relay A : Presence on loop A	Relay A : Pulse on loop A	Not used	Not used
DS#6	Relay A : Pulse on loop A entry	Relay A : Pulse on loop A exit	Relay A : Pulse on loop A entry	Relay A : Pulse on loop A Exit	Relay B : Non-Directional mode	Relay B : Directional A→B mode
DS#7	Relay B : Presence on loop A	Relay B : Pulse on loop A	Relay B : Presence on loop B	Relay B : Pulse on loop B	Relay B : Pulse on loop B	Relay B : Pulse on loop A
DS#8	Relay B : Pulse on loop A entry	Relay B : Pulse on loop A exit	Relay B : Pulse on loop B entry	Relay B : Pulse on loop B exit	Relay B : Pulse on loop entry	Relay B : Pulse on loop exit
DS#9	100 ms	500 ms	100 ms	500 ms	100 ms	500 ms
DS#10	Not used	Not used	Independent	Combined mode	Independent	Combined mode

II. POTENTIOMETERS

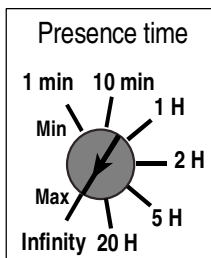


FIG. 1

- A potentiometer for adjustment of the maximum duration of a presence detection : from 1 min to infinity ; (see Fig. 1)
- A potentiometer for adjustment of the linear sensitivity (Δf) for the loop A : from 0.005% to 0.5 % ; (see Fig. 2)
- A potentiometer for adjustment of the linear sensitivity (Δf) for the loop B : from 0.005% to 0.5 %. (see Fig. 2)

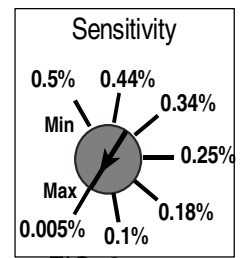


FIG. 2

DIPSWITCH SETTINGS

A 10 position dip switch is located on the front of the Matrix single detector. Dip switch 3, 5, 6, 7, and 8 configure the relay, while dip switch 9 controls the duration of the pulse when the Matrix is configured for pulse operation, (as opposed to presence). Configurations are as follows:

Dip Switch 3:

OFF= FAIL-SECURE MODE Relay is NOT energized when power is applied. Relay is energized upon detection only. In this mode, the N.O. circuit is open, and the N.C. circuit is closed. Thus, if a closed circuit is required upon detection, one must use the N.O. and COM terminals since they would close upon detection. When the Matrix is NOT powered, it is in the same state as it would be for non-detection.

ON = FAIL-SAFE MODE Relay is energized as soon as power is applied, and de-energizes upon detection or power loss. In this mode, upon powering the detector, the N.O. circuit becomes closed, and the N.C. circuit becomes open. Thus, if a closed circuit is required upon detection, one must use the N.C. and COM terminals, since they would now be OPEN during non-detection, and would close upon detection. When the Matrix is NOT powered, it is in the same state as it would be for detection.

Detection Status	Fail-Secure Mode (Active Mode) (Relay is not energized upon power-on) Dipswitch 3 OFF	Fail-Safe Mode (Passive Mode) (Relay becomes energized upon power-on) Dipswitch 3 ON
No Detection	The COM and N.O. terminals are OPEN. COM and N.C. terminals are CLOSED. The relay is de-energized.	The COM and N.O. terminals are CLOSED. COM and N.C. terminals are OPEN. The relay is energized.
Detection	The COM and N.O. terminals are CLOSED. COM and N.C. terminals are OPEN. The relay is energized.	The COM and N.O. terminals are OPEN. COM and N.C. terminals are CLOSED. The relay is de-energized.
Upon Power Loss	The COM and N.O. terminals are OPEN. COM and N.C. terminals are CLOSED The relay is de-energized.	The COM and N.O. terminals are OPEN. COM and N.C. terminals are CLOSED. The relay is de-energized.

DIPSWITCH SETTINGS

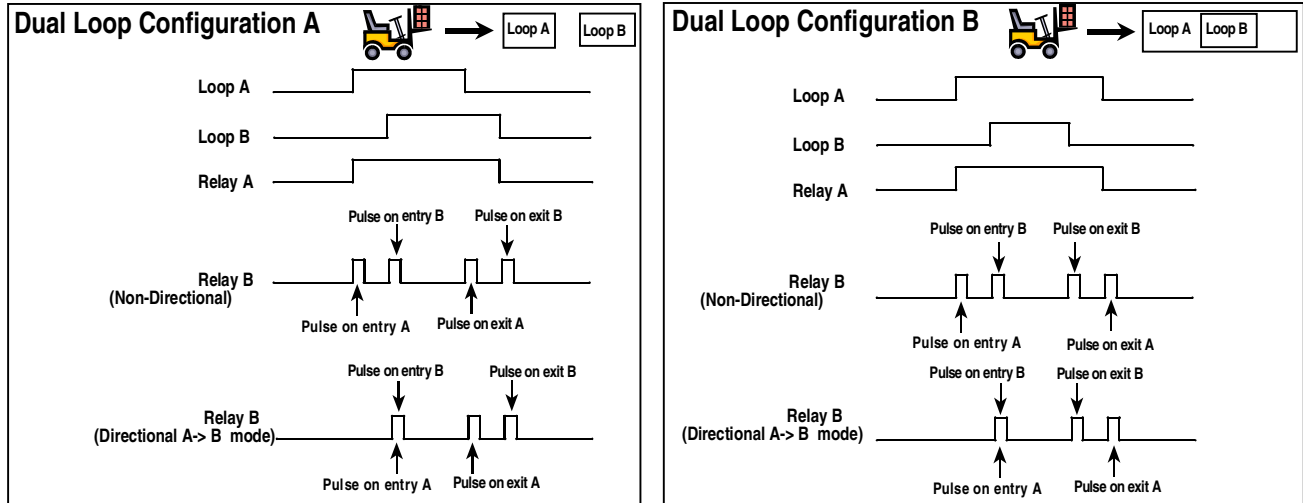
III. DIP SWITCHES

After each dip switch change the sensor launches a learning process.

Dip Switch #1	Frequency Adjustments of Loop A (see ADJUSTMENTS on the next page)
Dip Switch #2	Frequency Adjustments of Loop A (with single loop) or Loop B (with dual loops)
Dip Switch #3	Relay configuration : active (fail-secure) or passive (fail-safe_ (see above)
Dip Switch #4	Automatic Sensitivity Boost (ASB option) [recommended for improved truck detection] : During a detection, the sensitivity increases automatically to 8 times the preset sensitivity given by the sensitivity potentiometer adjustment. It is limited to the maximum sensitivity ($\Delta f = 0.005\%$). It goes back to the preset value after detection stops.
Dip Switch #5	Relay A function : presence or pulse (not used with dual loop in combined mode)
Dip Switch #6	Relay A Pulse type : entry or exit (used only at pulse function) or Relay B mode (with dual loop in combined mode) (see drawing on next page) <ul style="list-style-type: none"> • Non-Directional : Relay B provides a pulse according to the dip switches #7 and #8 setting. • Directional A→B : Relay B provides a pulse only if loop A is detecting before loop B. The logic detection takes place according to dip switches #7 and #8. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Warning : During the detection, the 2 loops have to detect simultaneously for a short period to be able to determine the movement direction. During loop installation make sure the 2 loops are close enough to each other to ensure a common detection (typical 3 feet).</p> </div>
Dip Switch #7	Relay B function : presence or pulse Or loop selection for relay B pulse : pulse on Loop B or pulse on Loop A (used with dual loop in combined mode)
Dip Switch #8	Relay B Pulse type : entry or exit (used only at pulse function)
Dip Switch #9	Pulse duration for both relays (used only at pulse function): 100 ms or 500 ms
Dip Switch #10	Dual loop mode : independent or combined A→B (not used with single loop)

ADJUSTMENTS

Frequency adjustment for loop A for single loop detector		
Dip Switch #1	Dip Switch #2	Loop frequency
OFF	OFF	High
ON	OFF	Mid High [High -20%]
OFF	ON	Mid Low [High - 25%]
ON	ON	Low [High - 30%]



LED SIGNAL

Green LED shows when the module is powered;
Red LED gives:

- the corresponding loop detection state in normal situation;
- the value of the oscillation frequency measurement or an error message on power ON.

Normally, the red LED stays ON as long as the loop is in a state of detection.

On **POWER ON**, the sensor measures the oscillation frequency of each loop. The result of this measurement is displayed using the corresponding red LED. The number of flashes indicates the tens value of the frequency. For example 4 short flashes correspond to a frequency between 40 kHz and 49 kHz. After this message the LED goes back to normal display.

If the loop oscillation frequency falls outside the limits (20 kHz to 130 kHz) the red LED displays an error message and the sensor activates the corresponding relay. The blinking frequency shows the type of error according to the next table. The sensor will stay in error mode until the error is cleared and the frequency goes to the right range.

Remark : The sensor launches automatically a learning process if the oscillation frequency varies more than 10% in comparison with the measurement value.

Loop frequency error	LED display
Oscillation frequency too LOW or loop opened	LED blinking at 1Hz
Oscillation frequency too HIGH	LED blinking faster at 2 Hz
Loop shorted or no oscillation	LED blinking slower at 0.5 Hz

**TROUBLE-
SHOOTING**

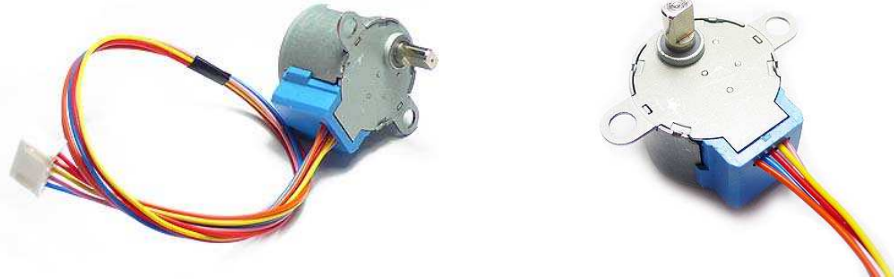
<i>SYMPTOM</i>	<i>PROBABLE CAUSE</i>	<i>CORRECTIVE ACTION</i>
The loop detector will not work. The green LED is off.	There is no power supply to the loop detector.	Check power supply.
The loop detector will not work. The red LED is flashing slowly (0.5 Hz).	The corresponding loop is shorted.	Check the loop cable.
The loop detector will not work. The red LED blinks at either 1Hz or 2Hz.	The frequency of oscillation falls outside the allowed range.	Adjust frequency with dip switches or change loop turns.
The loop LED is detecting properly but the contact is not made.	Bad connection of the relay contacts.	Check relay connections.
Dip switches 5 to 8 are not responding properly.	Their function varies according to dip switch #10 setting.	Check the appropriate loop mode required and adjust dip switch #10.

**COMPANY
CONTACT**

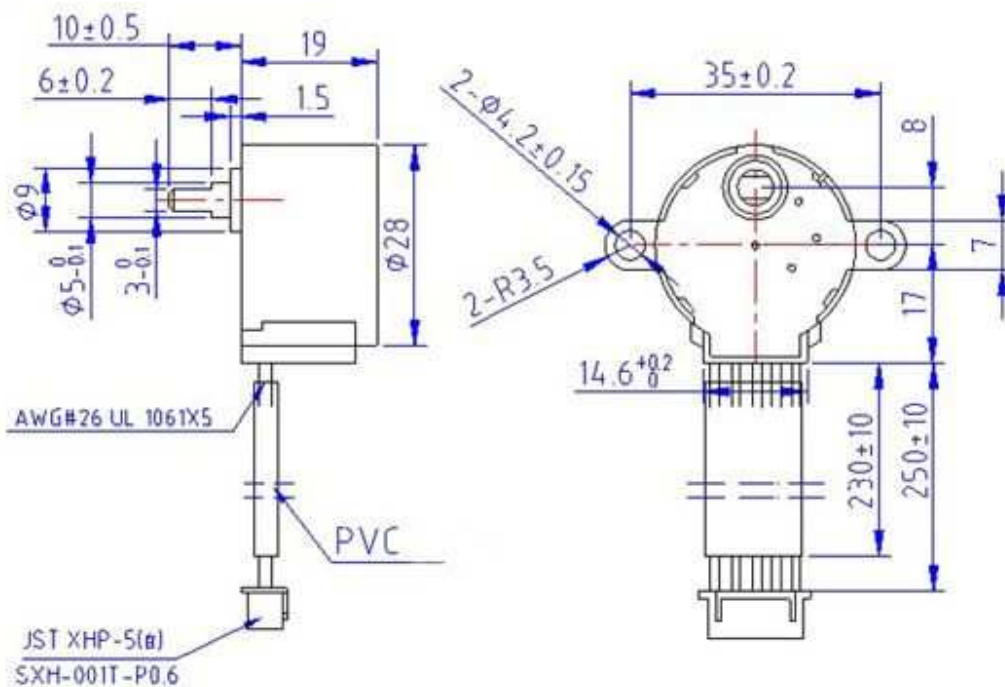
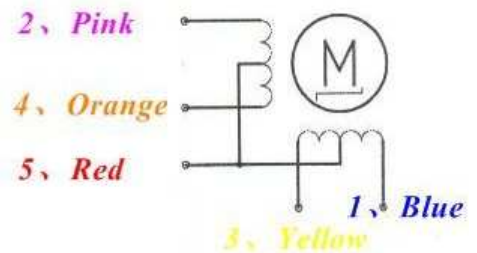
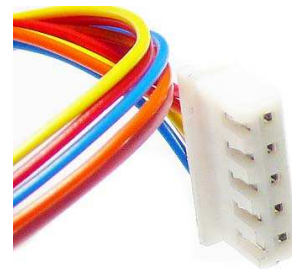
If after troubleshooting a problem, a satisfactory solution cannot be achieved, please call B.E.A., Inc. for further assistance during **Eastern Standard Time at 1-800-523-2462 from 8am - 5pm.**
 For after-hours, call East Coast: 1-866-836-1863 / Mid-West: 1-888-308-8843
 West Coast: 1-888-419-2564. **DO NOT leave any problem unresolved.** If you must wait for the following workday to call B.E.A., leave the door inoperable until satisfactory repairs can be made.
NEVER sacrifice the safe operation of the automatic door or gate for an incomplete solution.
Web: www.beasensors.com

28BYJ-48 – 5V Stepper Motor

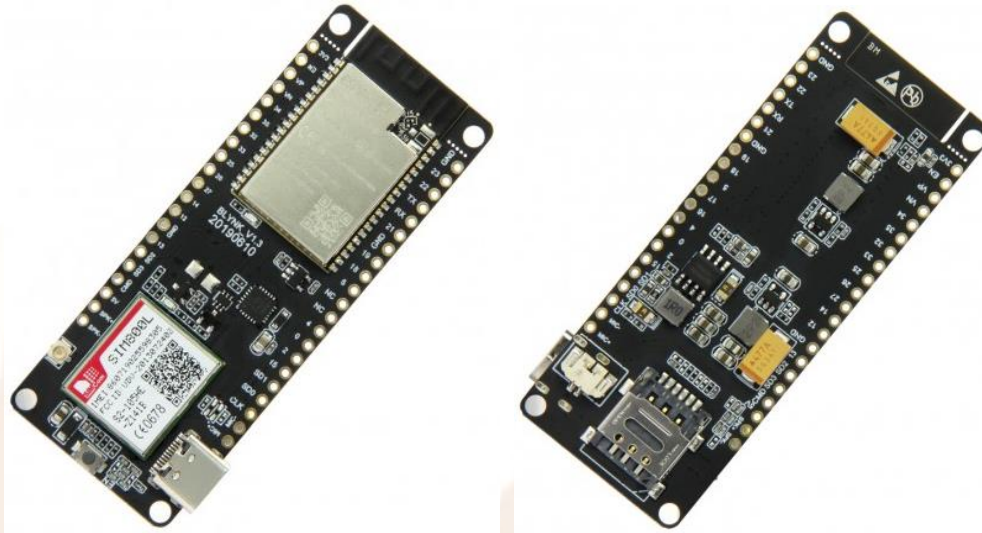
The 28BYJ-48 is a small stepper motor suitable for a large range of applications.



Rated voltage :	5VDC
Number of Phase	4
Speed Variation Ratio	1/64
Stride Angle	5.625°/64
Frequency	100Hz
DC resistance	50Ω±7%(25°C)
Idle In-traction Frequency	> 600Hz
Idle Out-traction Frequency	> 1000Hz
In-traction Torque	>34.3mN.m(120Hz)
Self-positioning Torque	>34.3mN.m
Friction torque	600-1200 gf.cm
Pull in torque	300 gf.cm
Insulated resistance	>10MΩ(500V)
Insulated electricity power	600VAC/1mA/1s
Insulation grade	A
Rise in Temperature	<40K(120Hz)
Noise	<35dB(120Hz, No load, 10cm)
Model	28BYJ-48 – 5V



SIM800L With ESP32 Wrover B



This is a custom ESP32 (ESP-WROVER-B 8MB PSRAM) based development board with an onboard 2G/GPRS Module SIM800L. The USB Type C pluggable board also has an onboard LiPo Battery Charging Circuit & Connector and use for building IoT applications.

SPECIFICATIONS:

Hardware Specifications:

- Chipset: ESPRESSIF-ESP32 240MHz Xtensa® dual-core 32-bit LX6 microprocessor
- FLASH: QSPI flash 4MB / PSRAM 8MB
- SRAM : 520 kB SRAM
- Button: Reset
- USB to TTL: CP2104
- Modular interface: UART, SPI, SDIO, I2C, LED PWM, TV PWM, I2S, IRGPIO, capacitor touch sensor, ADC, DAC/LNA pre-amplifier
- On-board clock: 40MHz crystal oscillator
- Working voltage: 2.7V-3.6V

- Working current: About 70Ma
- Sleep current: About 300uA
- SIM card: Only supports Nano SIM card
- Working temperature range: -40°C ~ +85°C
- Size: 78.83mm*28.92mm*8.06mm
- Weight: 11.77g

Power Supply Specifications:

- Power Supply: USB 5V/1A
- Charging current: 500mA
- Battery: 3.7V lithium battery
- JST Connector: 2Pin 1.25mm
- USB: Type-C

Wi-Fi:

- Standard: FCC/CE-RED/IC/TELEC/KCC/SRRC/NCC
- Protocol: 802.11 b/g/n(802.11n, speed up to150Mbps)A-MPDU and A-MSDU polymerization, support 0.4μS Protection interval
- Frequency range: 2.4GHz~2.5GHz(2400M~2483.5M)
- Transmit Power: 22dBm
- Communication distance: 300m

Bluetooth:

- Protocol: meet bluetooth v4.2BR/EDR and BLE standard
- Radio frequency: with -97dBm sensitivity NZIF receiver Class-1,Class-2&Class-3 emitter AFH
- Audio frequency: CVSD&SBC audio frequency

Software specification:

- Wi-Fi Mode: Station/SoftAP/SoftAP+Station/P2P
- Security mechanism: WPA/WPA2/WPA2-Enterprise/WPS

- Encryption Type : AES/RSA/ECC/SHA
- Firmware upgrade: UART download/OTA(Through network/host to download and write firmware)
- Software Development: Support cloud server development /SDK for user firmware development
- User Configuration: AT + Instruction set, cloud server, android/iOSapp
- OS: FreeRTOS

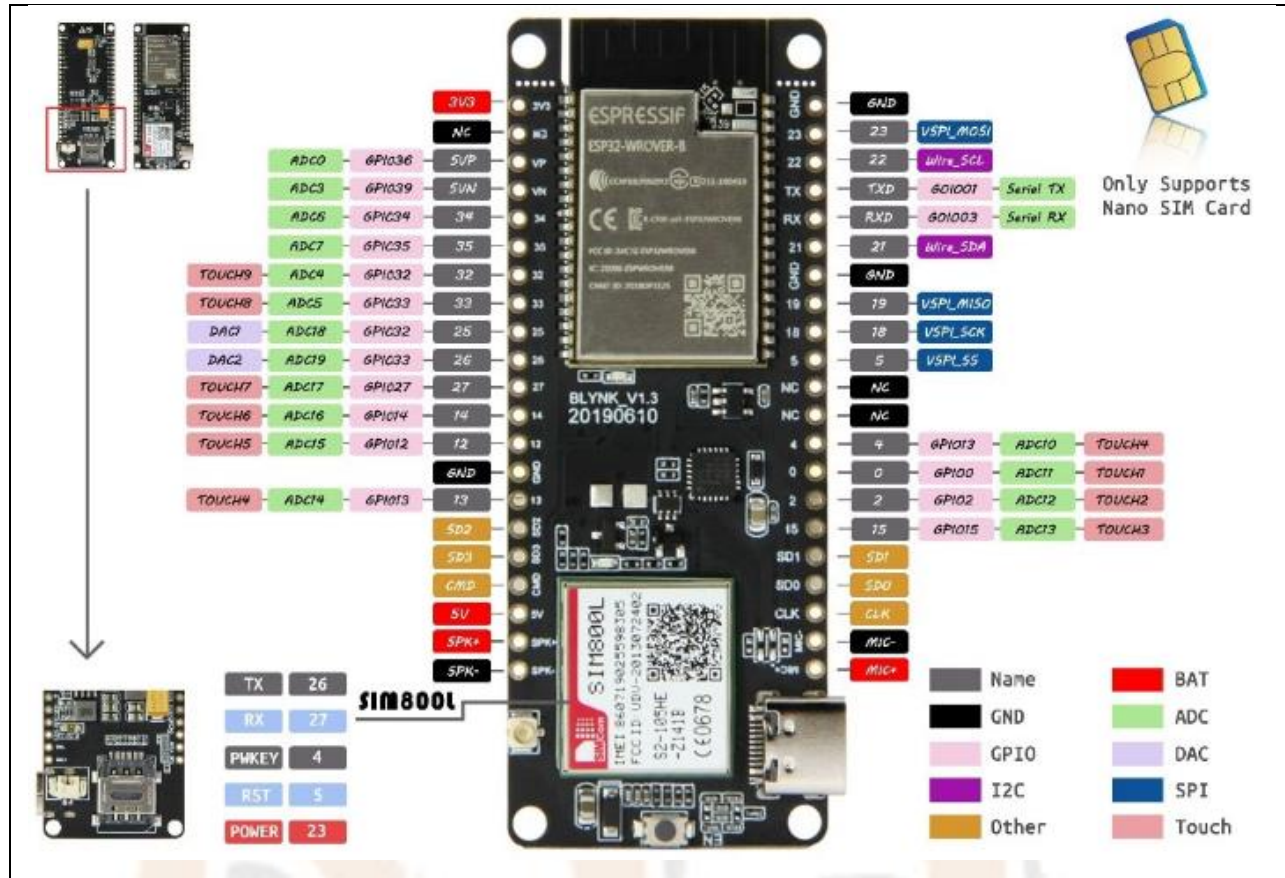
FUNCTIONAL DESCRIPTION:

- It is an ESP32 development board that combines a SIM800L GSM/GPRS module. This allows you to connect your ESP32 to the internet using your SIM card data plan, or communicate with the board via SMS or phone calls.
- It uses a USB-C slot for power and programming (via CP2104).



- The SIM800L With ESP32 Wrover B can be powered via USB-C cable or you can use the 2-pin JST header for the 3.7V lithium battery.

PIN FUNCTION:



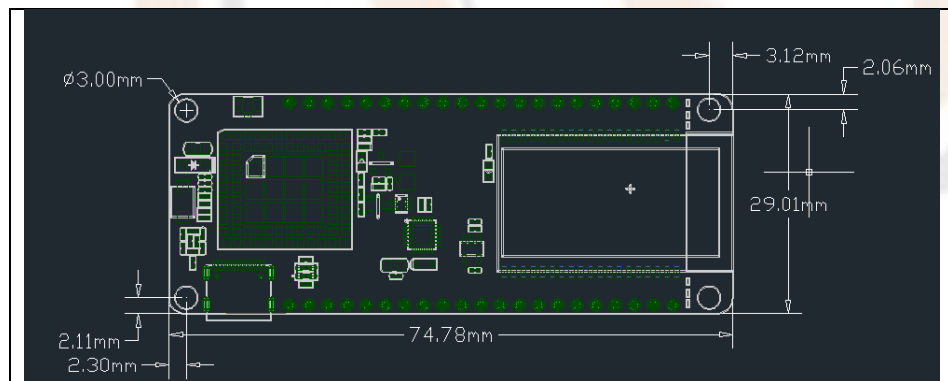
- It comes with header pins that you can solder to the board to access the ESP32 GPIOs to connect peripherals like sensors or outputs.
- This allows you to control outputs or monitoring sensors just by sending SMS or making phone calls to your ESP32.
- This can be a perfect board to put in a remote location to control an output when you send an SMS or to get sensor readings in your smartphone.

ESP32- Wrover B:

Name	No	Type	Function
Gnd	1	P	Ground
3V3	2	P	Power supply
EN	3	I	Module-enable signal. Active high.
SENSOR_VP	4	I	GPIO36, ADC1_CH0, RTC_GPIO0
SENSOR_VN	5	I	GPIO39, ADC1_CH3, RTC_GPIO3
IO34	6	I	GPIO34, ADC1_CH6, RTC_GPIO4
IO35	7	I	GPIO35, ADC1_CH7, RTC_GPIO5
IO32	8	I/O	GPIO32, XTAL_32K_P (32.768 kHz crystal oscillator input), ADC1_CH4, TOUCH9, RTC_GPIO9
IO33	9	I/O	GPIO33, XTAL_32K_N (32.768 kHz crystal oscillator output), ADC1_CH5, TOUCH8, RTC_GPIO8
IO25	10	I/O	GPIO25, DAC_1, ADC2_CH8, RTC_GPIO6, EMAC_RXD0
IO26	11	I/O	GPIO26, DAC_2, ADC2_CH9, RTC_GPIO7, EMAC_RXD1
IO27	12	I/O	GPIO27, ADC2_CH7, TOUCH7, RTC_GPIO17, EMAC_RX_DV
IO14	13	I/O	GPIO14, ADC2_CH6, TOUCH6, RTC_GPIO16, MTMS, HSPICLK, HS2_CLK, SD_CLK, EMAC_TXD2
IO12 1	14	I/O	GPIO12, ADC2_CH5, TOUCH5, RTC_GPIO15, MTDI, HSPIQ, HS2_DATA2, SD_DATA2, EMAC_TXD3
Gnd	15	P	Ground
IO13	16	I/O	GPIO13, ADC2_CH4, TOUCH4, RTC_GPIO14, MTCK, HSPID, HS2_DATA3, SD_DATA3, EMAC_RX_ER
SHD/SD2 2	17	I/O	GPIO9, SD_DATA2, SPIHD, HS1_DATA2, U1RXD
SWP/SD3 2	18	I/O	GPIO10, SD_DATA3, SPIWP, HS1_DATA3, U1TXD
SCS/CMD 2	19	I/O	GPIO11, SD_CMD, SPICS0, HS1_CMD, U1RTS
SCK/CLK 2	20	I/O	GPIO6, SD_CLK, SPICLK, HS1_CLK, U1CTS
SDO/SD0 2	21	I/O	GPIO7, SD_DATA0, SPIQ, HS1_DATA0, U2RTS
SDI/SD1 2	22	I/O	GPIO8, SD_DATA1, SPID, HS1_DATA1, U2CTS

IO15	23	I/O	GPIO15, ADC2_CH3, TOUCH3, MTDO, HSPICS0, RTC_GPIO13, HS2_CMD, SD_CMD, EMAC_RXD3
IO2	24	I/O	GPIO2, ADC2_CH2, TOUCH2, RTC_GPIO12, HSPIWP, HS2_DATA0, SD_DATA0
IO0	25	I/O	GPIO0, ADC2_CH1, TOUCH1, RTC_GPIO11, CLK_OUT1, EMAC_TX_CLK
IO4	26	I/O	GPIO4, ADC2_CH0, TOUCH0, RTC_GPIO10, HSPIHD, HS2_DATA1, SD_DATA1, EMAC_TX_ER
NC1	27	-	-
NC2	28	-	-
IO5	29	I/O	GPIO5, VSPICS0, HS1_DATA6, EMAC_RX_CLK
IO18	30	I/O	GPIO18, VSPICLK, HS1_DATA7
IO19	31	I/O	GPIO19, VSPIQ, U0CTS, EMAC_TXD0
NC	32	-	-
IO21	33	I/O	GPIO21, VSPIHD, EMAC_TX_EN
RXD0	34	I/O	GPIO3, U0RXD, CLK_OUT2
TXD0	35	I/O	GPIO1, U0TXD, CLK_OUT3, EMAC_RXD2
IO22	36	I/O	GPIO22, VSPIWP, U0RTS, EMAC_TXD1
IO23	37	I/O	GPIO23, VSPID, HS1_STROBE
Gnd	38	P	Ground

DIMENSION:



PACKAGE INCLUDES:

1x SIM800L With ESP32 Wrover B