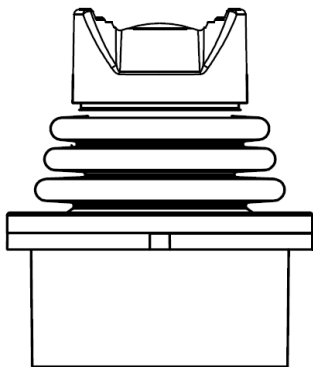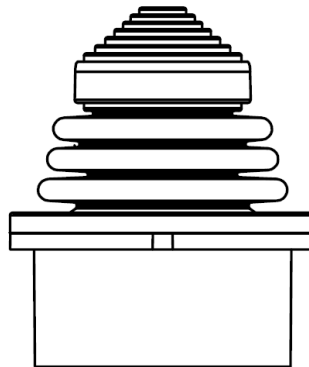# Smc25 series
Hall effect miniature proportional joystick
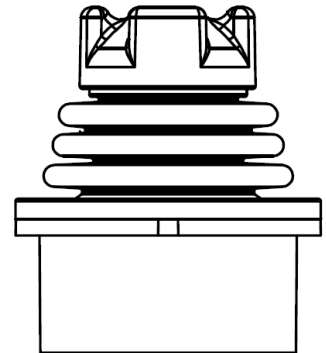
2 Axis Hall Joystick

SMC25A-   SMC25B-   SMC25C-

The SMC25 Series Thumbstick is a proportional two axes joystick in a miniature package. Featuring non-contacting   Hall effect technology for long life performance, the SMC25 Series Thumbstick is available with multiple   linear output options including single and dual (redundant) outputs. It is similar in size and operation to "gamepad" controls, but in a rugged industrial package. Typical applications include pendant and remote controls as well as joystick handle and arm rest integration
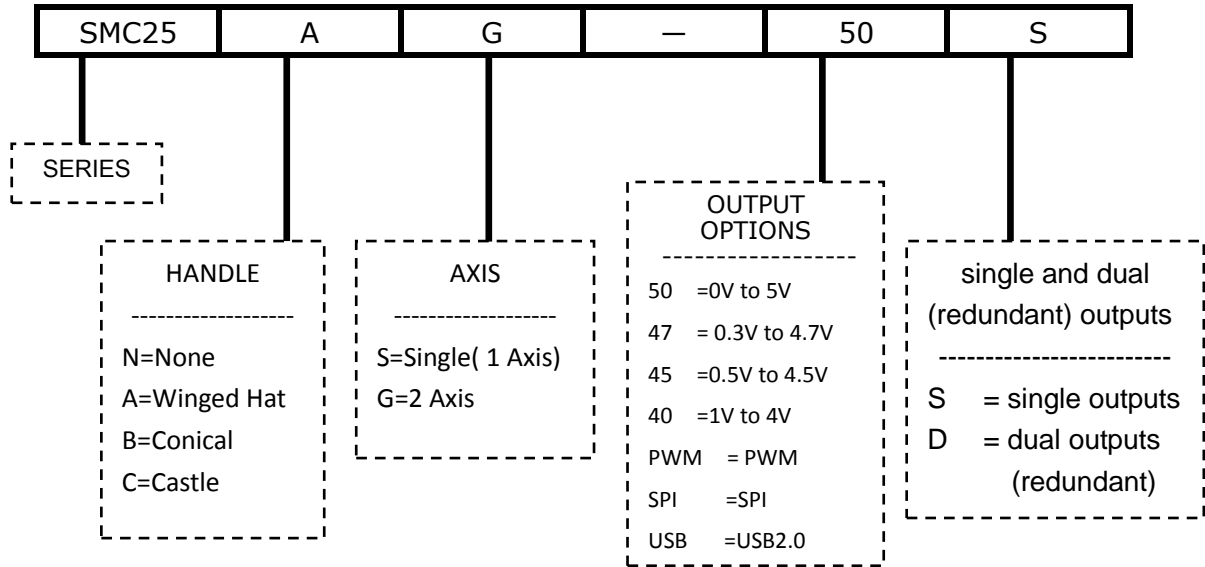
KEY FEATURES
✧   2 axes
✧   3D Hall sensors (contactless)
✧   Non-contact Hall effect technology
✧   Submersible to 1m (3.28ft) per IP68
✧   Pressure washable to IP69K
✧   Redundant outputs available
✧   Rear or drop-in mounting available
✧   Interface：   analog (0-5V)、USB、PWM

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Smc25 series
Hall effect miniature proportional joystick

OPTION SELECTION

SMC25	A	G	–	50	S

SERIES

HANDLE

N=None
A=Winged Hat
B=Conical
C=Castle

AXIS

S=Single(1 Axis)
G=2 Axis

OUTPUT OPTIONS
----
50   =0V to 5V
47   = 0.3V to 4.7V
45   =0.5V to 4.5V
40   =1V to 4V
PWM   = PWM
SPI   =SPI
USB   =USB2.0

single and dual (redundant) outputs
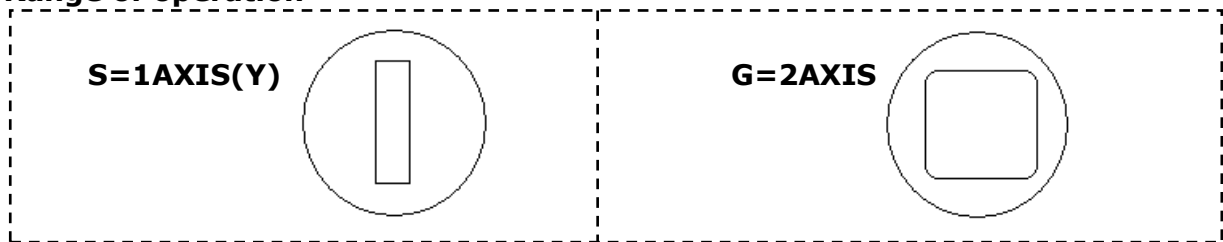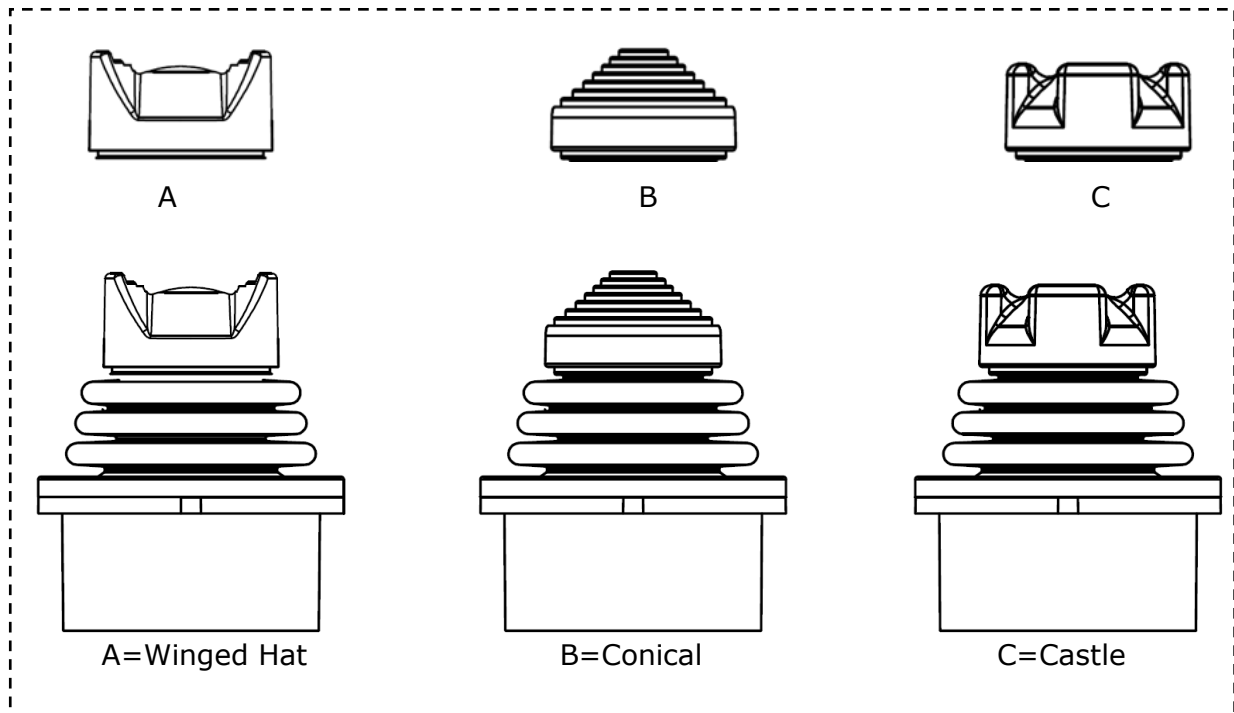------------------------
S   = single outputs
D   = dual outputs
        (redundant)

Contact factory for PWM configuration.
SPI 3line (SDO,SCK,SS),Contact factory for SPI Protocol.

Range of operation

S=1AXIS(Y)

G=2AXIS

HANDLE

A

B

C

A=Winged Hat

B=Conical

C=Castle

Smc25 series
Hall effect miniature proportional joystick

MECHANICAL (FOR X, Y AXES)

Operating Force	3.1N±0.5N (0.70lbf±0.11lbf)
Maximum Vertical Load	200N (45lbf)
Maximum Horizontal Load	150N (33.7lbf)*
Mechanical Angle of Movement	±25° (50° total)
Life Cycles	>1 million
Mass/weight	18.25g ± 3.0g (0.64oz±0.11oz)
Lever Action (Centering)	Spring Centering

ENVIRONMENTAL

Operating Temperature	-40°C to +85°C (-40°F to +185°F)
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Sealing	IP68, IP69K**
EMC Immunity Level	EN61000-4-3
EMC Emissions Level	EN61000-6-3:2001
ESD	EN61000-4-2

ELECTRICAL SENSOR

Resolution	1.22mV
Supply Voltage Range	5.00V±0.01V
Reverse Polarity Max	-10V
Overvoltage Max	20V
Output Impedance	2Ω
Return to Center Voltage Tolerance	±250mV
Error Signal	1.0%

* Force applied to the top of the cap at full displacement.

** All options are IP68 and IP69K rated, however Drop-in mounting does not prevent panel ingress.

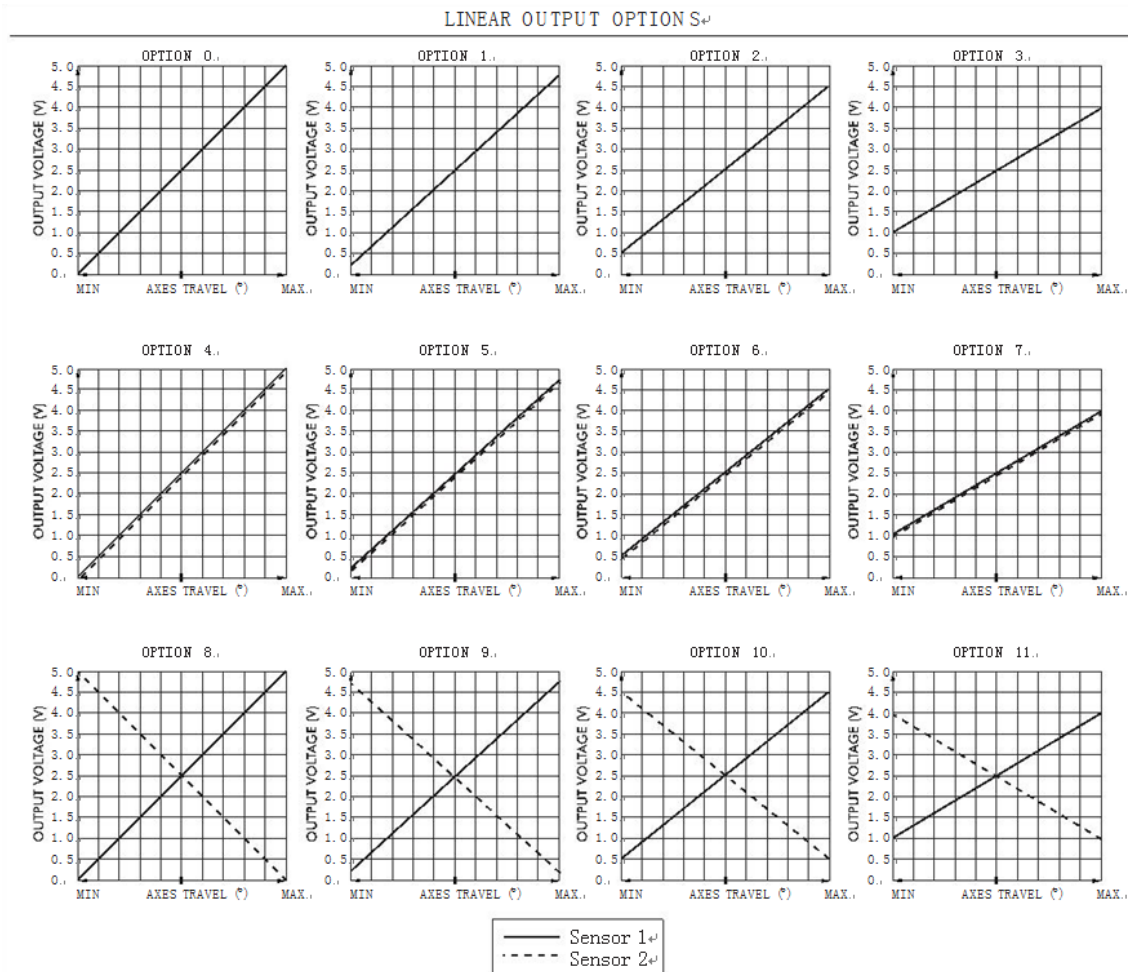Note: The company reserves the right to change specifications without notice.

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Analog signal output:

LINEAR OUTPUT OPTIONS
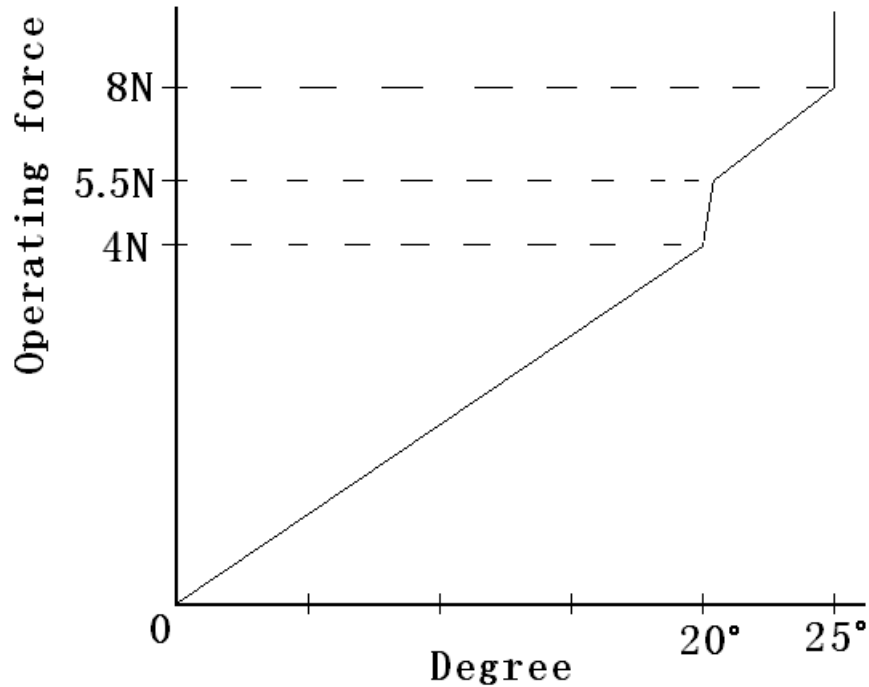

— Sensor 1
- - - - Sensor 2

PWM Output Mode

✧ The output signal is a digital signal with Pulse Width Modulation (PWM).

✧ the output stage is an open drain NMOS transistor (low side), to be used with a pull-up resistor to VDD.

✧ PWM level : high level at 100%

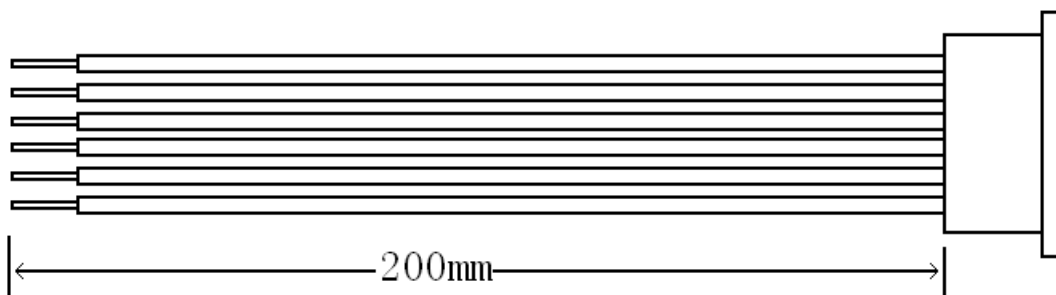✧ The PWM frequency is 20KHZ ,The other frequency Contact factory

Operating force and angle drawing

Connector

Dual (redundant) output :Analog Voltage/PWM

1.	**Red**	**+5V**
2.	**Black**	**GND**
3.	**Yellow**	**X Signal 1**
4.	**Green**	**Y Signal 1**
5.	**Blue**	**X Signal 2**
6.	**Brown**	**Y Signal 2**

200mm

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Smc25 series
Hall effect miniature proportional joystick

Connector: Single output
Model No:XHP-5

7.75

4.1
5.7

Circuit No.1 mark

2.5
A
B
C
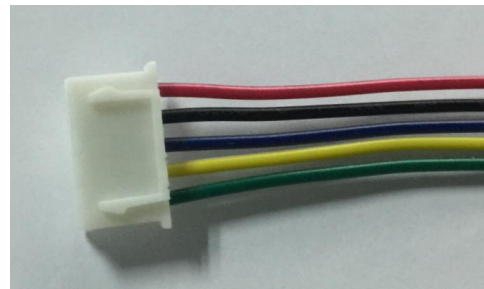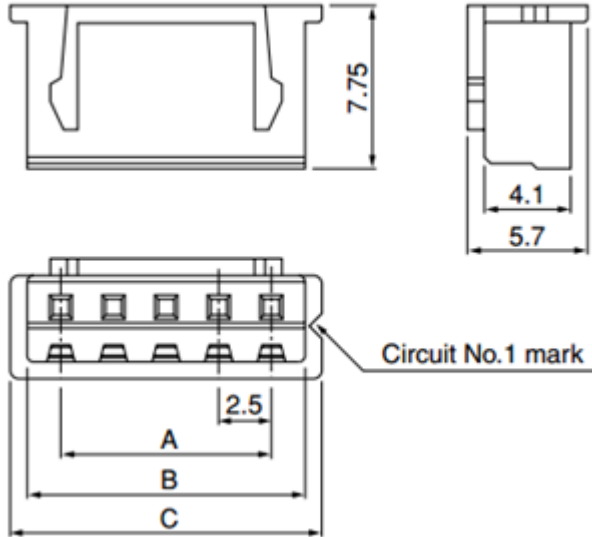
A=10.0   B=13.2   C=14.8   Q'ty/bag=1000

Analog Voltage/PWM

1.	Red	+5V
2.	Black B	GND
3.	Blue	NC
4.	Yellow	X Signal
5.	Green	Y Signal

200MM
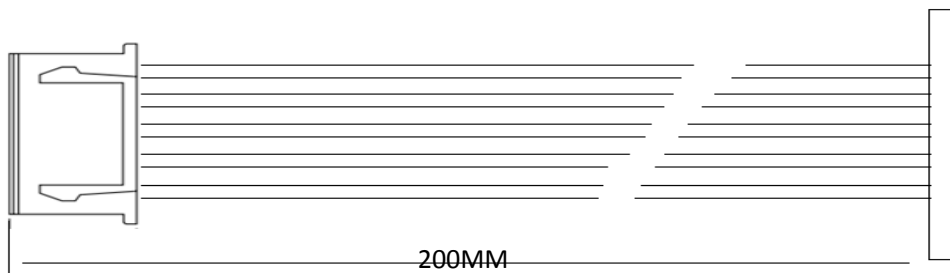
USB interface (Single output)

1.	Red	V+
2.	Black B	GND
3.	Blue	D-
4.	Yellow	D+
5.	Green	NC

36.27
50°
18.78
30.00
3.60
11.50
Ø25.30

DROP-IN

24.64
24.64
Ø25.65

FEAR MOUNT

24.64
24.64
Ø20.00

DROP-IN   REAR MOUNT
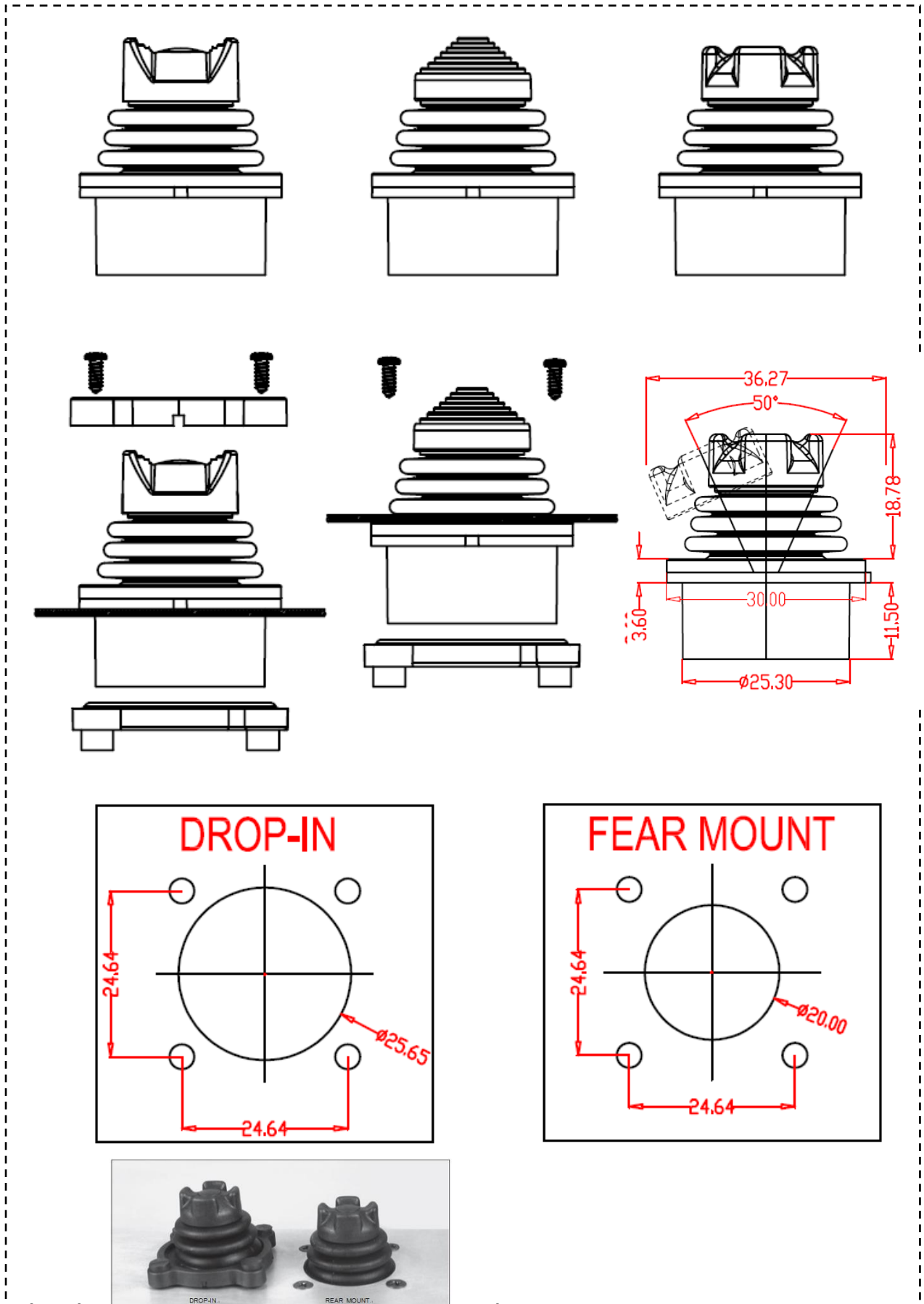
SPI   Serial Protocol   SPI

1. Introduction

The SMC25-SPI features a digital Serial Protocol mode. The SMC25-SPI is considered as a Slave node.

The serial protocol of the SMC25-SPI is a three wires protocol (/SS, SCLK, MOSI):

· /SS pin is a 5 V tolerant digital input

· SCLK pin is a 5 V tolerant digital input

· MOSI pin is a 5 V tolerant open drain digital input/output

The basic knowledge of the standard SPI specification is required for the good understanding of the present section.

2. SERIAL PROTOCOL Mode

the Joystick work in Slave mode

5. /SS (Slave Select)

• /SS pin is a 5 V tolerant digital input, Low level is enable.

• SCLK pin is a 5 V tolerant digital input

• MOSI-MISO pin is a 5 V tolerant open drain digital input/output

16.8. Timing

To synchronize communication, the Master deactivates /SS high for at least t5 (1.5 ms). In this case, the Slave will be ready to receive a new frame. The Master can re-synchronize at any time, even in the middle of a byte transfer.

Note: Any time shorter than t5 leads to an undefined frame state, because the Slave may or may not have seen /SS inactive.
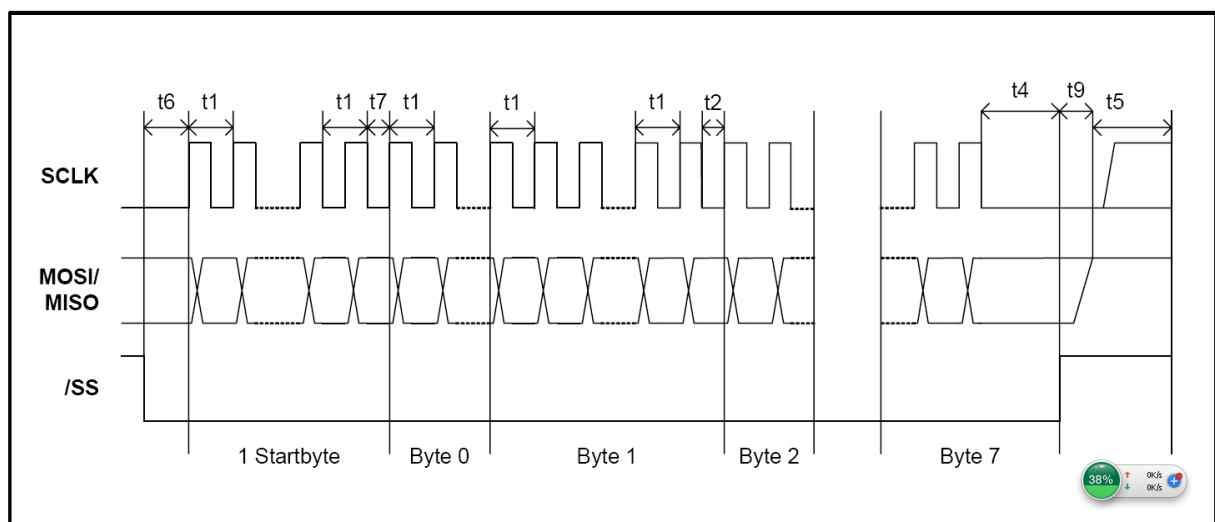
Timings	Min[31]	Max	Remarks
t1	~~2.3 µs~~ / 6.9 µs	-	No capacitive load on MISO. t1 is the minimum clock period for any bits within a byte.
t2	~~12.5 µs~~ / 37.5 µs	-	t2 the minimum time between any other byte
t4	~~2.3 µs~~ / 6.9 µs	-	Time between last clock and /SS=high=chip de-selection
t5	~~300 µs~~ / 1500 µs	-	Minimum /SS = Hi time where it's guaranteed that a frame re-synchronizations will be started.
t5	0µs	-	Maximum /SS = Hi time where it's guaranteed that NO frame re-synchronizations will be started.
t6	~~2.3 µs~~ / 6.9 µs	-	The time t6 defines the minimum time between /SS = Lo and the first clock edge
t7	~~15 µs~~ / 45 µs	-	t7 is the minimum time between the StartByte and the Byte0
t9	-	<1 µs	Maximum time between /SS = Hi and MISO Bus High-Impedance
T$_{StartUp}$	-	< 10 ms / 16 ms	Minimum time between reset-inactive and any master signal change

.9. Slave Reset

On internal soft failures the Slave resets after 1 second or after an (error) frame is sent. On internal hard failures the Slave resets itself. In that case, the Serial Protocol will not come up. The serial protocol link is enabled only after the completion of the first synchronization

10. Frame Layer

The Figure 17 gives the timing diagram for the SPI Frame. The latch point for the angle measurement is at the last clock before the first data frame byte.
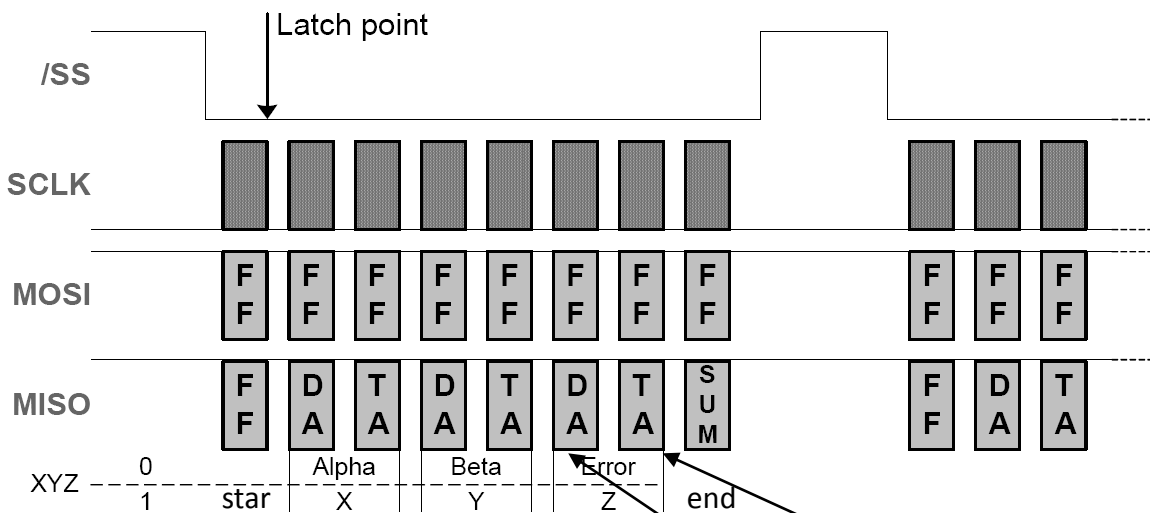

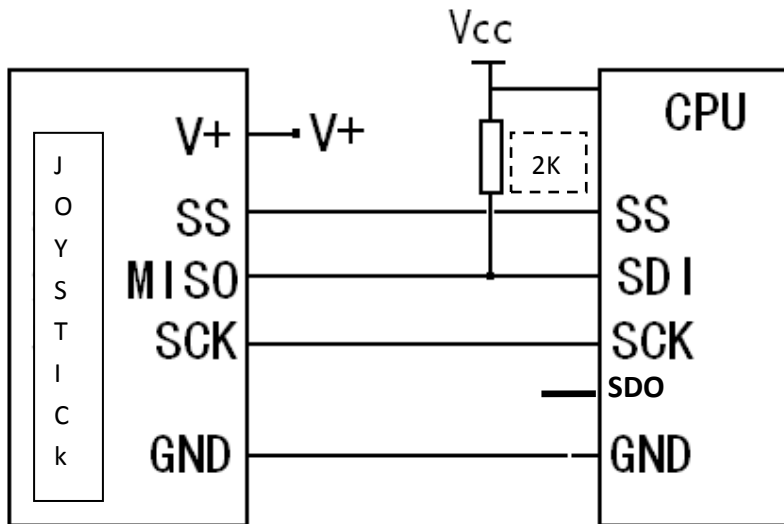Figure 17 - Timing Diagram for the SPI Frame

X,Y =0X0000-0XFFFF , Z=0X0000   SCLK<=1Mhz   low byte   high byte
SUM=XXL+XXH+YYL+YYH+ZZL+ZZH   (low byte)
Example :   FF 00 80 01 80 00 00 01
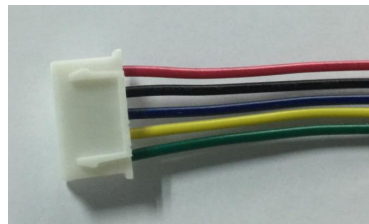
SPI Connection diagram

Connector Model No:XHP-5

SPI interface (Single output)

Connector Model No:XHP-5

1.	Red	V+
2.	Black	GND
3.	Blue	SS
4.	Yellow	SCK
5.	Green	MISO