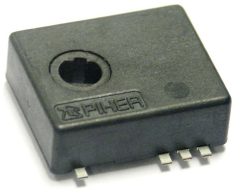
PIHER

MTS-360

Through shaft contactless sensor



STANDARD SPECIFICATIONS

- Linearity*: ±1% absolute (0.5% upon request)
- Simple & Robust Magnetic Design
- Programmable Angular Range from 15 to 360 Degrees (without dead band)
- Programmable Linear Transfer Characteristic

  (some positive slopes & one negative slope can be programmed in the same transfer characteristic; up to 4 programmable points; *see last page*)
- Selectable Analog (Ratiometric), PWM, Serial Protocol
- Programmable switch output
- Angular Resolution
(depends on electrical angle and rotational speed)

  Analog & PWM: up to 12 bits
  Serial Protocol (SPI): up to 14 bits
- Self-Diagnostic features
- Rotational life: up to 50.000.000 cycles (depending on application and mounting)
- Operating temperature: up to -40ºC to +125ºC (others upon request)
- +20V over voltage protection and –10V reverse voltage protection
- Supply voltage: 5V ±10%
- Supply current

  Typ 8.5mA for single version.
  Typ 17mA for redundant version.
- IP50 (others upon request)

* Ferromagnetic materials close to the sensor (i.e. shaft, mounting surface) may affect the sensor linearity. Please contact Piher for further information.

APPLICATION EXAMPLES

- Non-Contacting long life angle/position sensor
- Absolute Rotary Position Sensor
- Turn counter
- Pedal Position Sensor
- Throttle/EGR Valve and Gear Position Sensor
- Float-Level Sensor
- Motor-shaft Position Sensor
- Robotics
- Material handling, industrial equipment and HVAC monitoring & control...

DESCRIPTION

The MTS-360 provides a true breakthrough in contactless sensor technology by combining a through-shaft design with 360º absolute position feedback in an ultra miniature size. The result is the smallest fully featured rotary sensor on the market with reliability up to 50 million cycles.

With its tiny size of only 6mm x 17mm x 18mm (HxWxL), engineers can now integrate a fully featured rotary sensor directly on their PCB without the packaging issues that typically accompany encoders or other absolute position devices. The exceptionally low profile fits easily in places that were previously too small for pre-packaged rotary sensors.

The MTS-360 relies on patented Hall effect technology to enable for the first time true non-contacting through-hole shaft sensing using standard SMD features. The offset through-hole accommodates the vacuum pick up tool, allowing use in automated SMD assembly systems. The standard model features a 4mm double D-flat shaft and an (8) pad SMD footprint that is compatible in most reflow soldering systems.

The new device offers electrical angles up to 360° with no dead band and linearity as low as ±0.5%. Rated for use at -40ºC to +125ºC, the sensor can be programmed with full scale output with angles shorter than 360 degrees. Output is selectable between Analog, PWM up to 12 bits or Serial Protocol (SPI) up to 14 bits and includes a second output channel to provide a programmable switch signal. A redundant version with a dual core sensor in the same package is also available.

This ultra-miniature MTS-360 Rotary Position Sensor is ideal in optical imaging stabilization and precision biomedical devices, optical zoom devices, consumer electronics, instrumentation, HVAC systems, automotive control systems, marine controls, fork lift trucks, farm equipment, cranes, low speed motor feedback, valve position sensors and robotic and automation feedback system.

STANDARDS

- EN 55022 class B, emission radiated (30 ... 230 MHz)
- EN 55022, class B, emission radiated (230 ... 1000MHz)
- EN 61000-4-3, immission HF radiated (80 ... 1000MHz)
- EN 61000-4-4, Burst (on supply lines / signal lines)
- EN 61000-4-5, Surge (on supply lines / signal lines)
- EN 61000-4-6, immission HF conduted (0.15 ... 80MHz)
- EN 61000-4-8. immission magnetic field (50Hz)
- IEC 68-2-6, Vibration (Amax=0.75mm, f=5 ... 2000 Hz)
- IEC 68-2-27 Shock
- JEDEC 22A114 HBM 1500V
- JEDEC 22A115 MM 150V

ESD PRECAUTIONS

Electronic semiconductor products are sensitive to Electro Static Discharge (ESD).
Always observe Electro Static Discharge control procedures whenever handling semiconductor products.

MTS360: HOW TO ORDER

Simple output (analogic / PWM)

MTS360 - _ - _ - _ - ___ - _____ - _____ - __ - _ - ____

Type	Output1	Switch1	Switch ON1	Output function	Electrical rotation angle	Voltage supply	Temp. range	PWM Frecuency (Hz.)1
1 = simple	A = Analogic P = PWM (see note 1)	[empty] = none W = switch	000 001 016 ... 316 360 (see note 2)	C0000 C0001 (see note 3)	ERA015 ERA016 .... ERA360	05	E = -40 to +85ºC K= -40 to +125ºC	F100 ... F999 (see note 4)

Simple output (serial protocol)

MTS360 - _ - _ - _____ - _____ - __ - _

Type	Output1	Output function	Electrical rotation angle	Voltage supply	Temp. range
1 = simple	S = SPI	C0000 C0001 (see note 3)	ERA015 ERA016 .... ERA360	05	E = -40 to +85ºC K= -40 to +125ºC

Redundant output (analogic / PWM)

MTS360 - _ - _ - _ - _ - ___ - _ - ___ - _____ - _____ - __ - _ - ____ - ____

Type	Output1	Output2	Switch1	Switch ON1	Switch2	Switch ON2	Output function	Electrical rotation angle	Voltage supply	Temp. range	PWM Frecuency (Hz.)1	PWM Frecuency (Hz.)2
2 = redundant	A = Analogic P = PWM (see note 1)	A = Analogic P = PWM (see note 1)	[empty] = none W = switch	000 016 ... 360 (see note 2)	[empty] = none W = switch	000 016 ... 360 (see note 2)	C0002 C0003 (see note 3)	ERA015 ERA016 .... ERA360	05	E = -40 to +85ºC K= -40 to +125ºC	F100 ... F999 (see note 4)	F100 ... F999 (see note 4)

Redundant output (SPI)

MTS360 - _ - _ - _ - _____ - _____ - __ - _

Type	Output1	Output2	Output function	Electrical rotation angle	Voltage supply	Temp. range
2 = redundant	S = SPI	S = SPI	C0002 C0003 (see note 3)	ERA015 ERA016 .... ERA360	05	E = -40 to +85ºC K= -40 to +125ºC

Full redundat output (analogic / PWM)

MTS360 - _ - _ - _ - _ - ___ - _ - ___ - _____ - _____ - __ - _ - ____ - ____

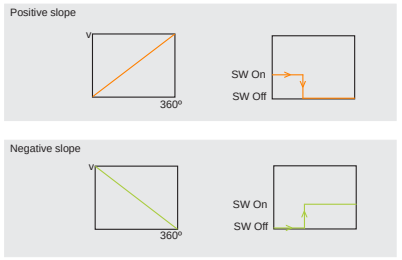
Type	Output1	Output2	Switch1	Switch ON1	Switch2	Switch ON2	Output function	Electrical rotation angle	Voltage supply	Temp. range	PWM Frecuency (Hz.)1	PWM Frecuency (Hz.)2
3 = full redundant	A = Analogic P = PWM (see note 1)	A = Analogic P = PWM (see note 1)	[empty] = none W = switch	000 016 ... 360 (see note 2)	[empty] = none W = switch	000 016 ... 360 (see note 2)	C0002 C0003 (see note 3)	ERA015 ERA016 .... ERA360	05	E = -40 to +85ºC K= -40 to +125ºC	F100 ... F999 (see note 4)	F100 ... F999 (see note 4)

Other configurations will be studied case by case.

(1) The analog output is a ratiometric output, proportional to input supply voltage.

(2) Leave empty if no applicable.

Switch function diagram:



(3) Other output functions available upon request.In the How To Order reference, enter **CXXXX** meanwhile the new output function reference is not defined.

(4) Leave empty if no applicable. Default frequency is 200 Hz

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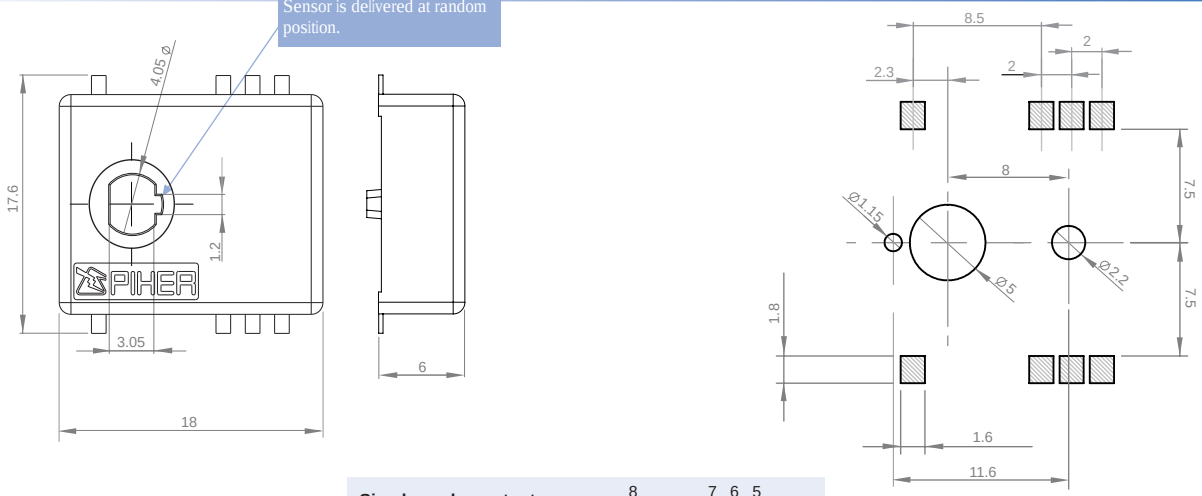
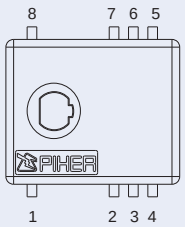
DIMENSIONS

Rotor is shown at zero position.
Sensor is delivered at random position.



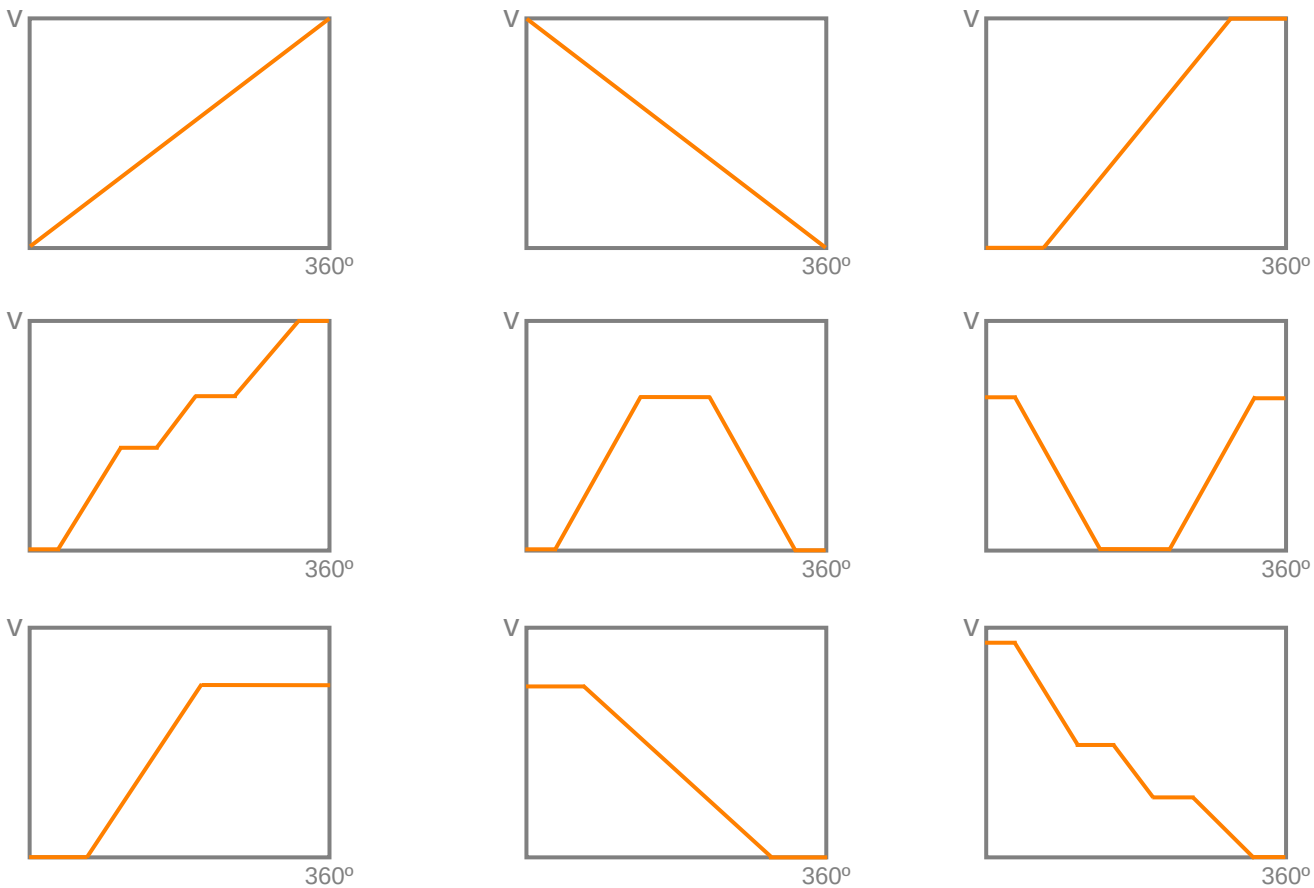
Simple analog output connection scheme

1.- Supply voltage
2.- Supply voltage
3.- Not used *
4.- Not used *
5.- Analog output
6.- Analog output
7.- Ground
8.- Ground

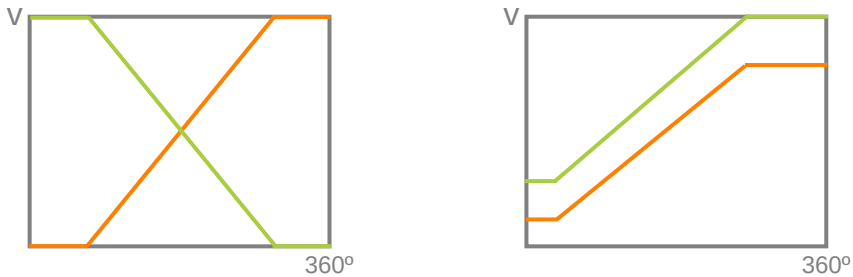


* The output pin needs to be connected to the ground

OUTPUT FUNCTION EXAMPLES

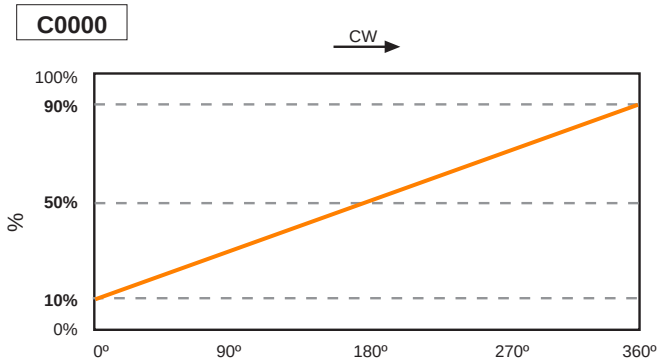


Redundant examples:

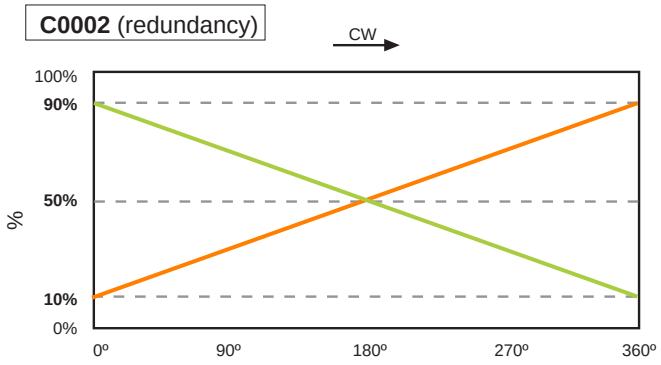


STANDARD OUTPUT FUNCTIONS

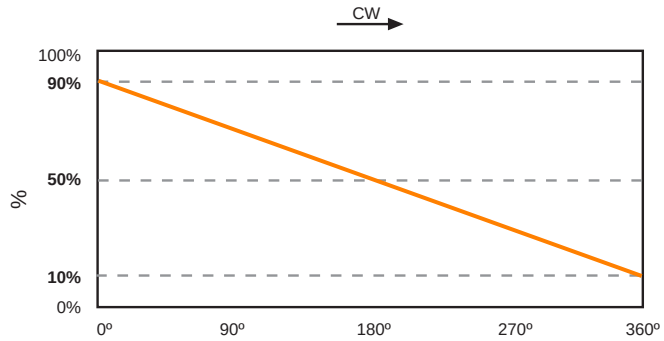
C0000



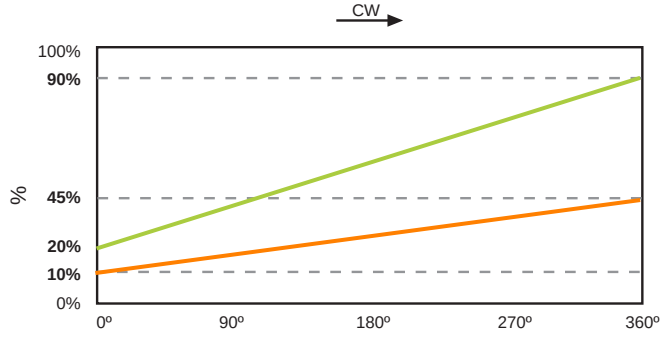
C0002 (redundancy)



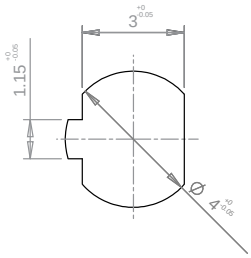
C0001



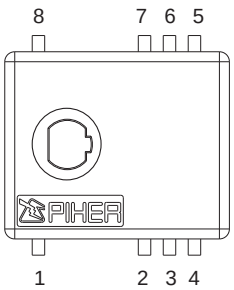
C0003 (redundancy)



RECOMMENDED SHAFT



PINOUT DIAGRAM (SIMPLE VERSIONS)



Pin	Analog	PWM	SPI
1	Supply voltage	Supply voltage	Supply voltage
2	Supply voltage	Supply voltage	Supply voltage
3	Switch output*	Switch output*	/SS
4	Switch output*	Switch output*	SCLK
5	Signal output**	Signal output **	MOSI
6	Signal output**	Signal output **	MOSI
7	Ground	Ground	Ground
8	Ground	Ground	Ground

* If the feature is not used in the application, please connect to ground
** Piher can supply the recommended wiring diagram