Catalogue

Hall Effect Gear Tooth Sensors

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Contents

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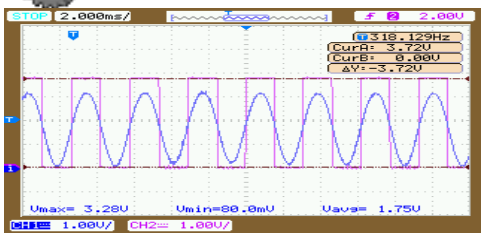
Hall Effect Gear Tooth Sensor CYGTS102DC
with Sinusoid and Square Output Waves

CYGTS102DC Hall Effect Gear Tooth Sensor is designed by using a Hall-Effect sensor element, which can accurately detect the movement of ferrous metal objects. This specially designed gear tooth sensor with a biasing magnet and internal denoising filter is sealed in resin for physical protection and cost effective installation. The CYGTS102DC Sensor works according to the detection of peak magnetic field change.
This Unit functions under power supply from 4.5VDC to 24VDC. Two signals (one sinusoid wave and one square wave) are output directly through the output terminal of the operational amplifier. The sensor will not be damaged if power is inadvertently wired inversely.

Features

- Sensing ferrous metal targets
- Operational amplifier directly output signal
- Good signal-to-noise ratio
- Excellent low speed performance
- Output amplitude not dependent on RPM
- Fast operating speed, over 15kHz
- EMI resistant
- Reverse polarity protection and transient protection
- Wide operating temperature -40°C ~ +125°C.



Applications

Automotive and Heavy Duty Vehicles:

- Camshaft and crankshaft speed and position
- Transmission speed
- Tachometers
- Anti-skid/traction control

Industrial Areas:

- Sprocket speed
- Chain link conveyor speed/distance
- Stop motion detector
- High speed and low cost proximity
- Tachometers, counters.

Absolute Maximum Ratings

Supply Voltage	4.5V ~ 30V
Reverse protection voltage	-30VDC
Output voltage (sinusoid wave)	0V ~ 3.3V
Output voltage (square wave)	0V ~ 22V
Load resistance (sinusoid and square waves)	100Ω, min
Operating Temperature Range	-40°C ~ +125°C

Order Guide

Part number	CYGTS102DC
Supply Voltage	4.5V ~ 24V
Load resistance (sinusoid and square waves)	100Ω, min
Best sense distance (gap)	1.0mm (use target gear 2)
Sense Distance (gap)	0.2mm ~ 3.5mm (use target gear 2)
Rotational Speed (RPM)	10 - 8000
Switching time (frequency 1kHz)	Rise time: 5,5µs max, fall time: 10µs max
Cross Reference	1GT101DC, 1GT103DC, 1GT105DC

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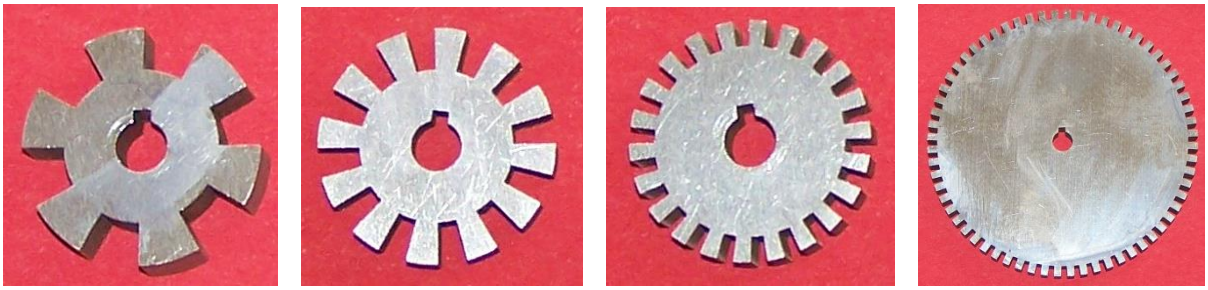
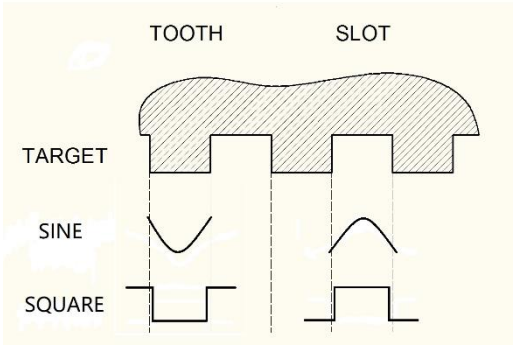
Reference Target Wheels and Sensing Gap (unit: mm)

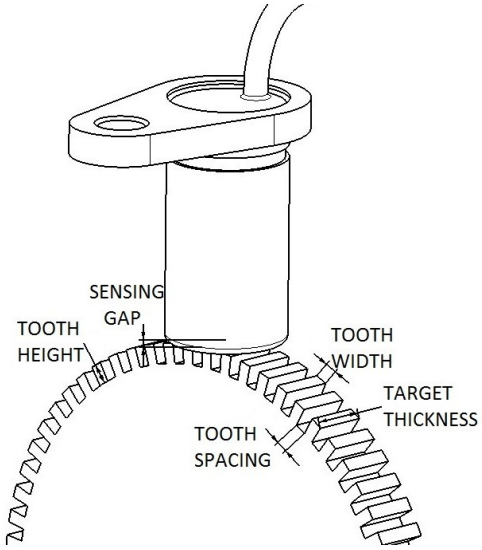
Target wheel	Gear Module	Outer diameter	Tooth Height	Tooth Width	Tooth Spacing	Target Thickness	Teeth Number	Sensing Gap/distance
TW 1	3.833	28	5.0	7.34	7.34	8.0	6	0.2-4.0
TW 2	1.917	28	5.0	3.66	3.67	8.0	12	0.2-3.5
TW 3	1.136	28	3.0	2.0	2.0	8.0	22	0.2-2.0
TW 4	1.227	81.5	3.0	2.0	2.0	8.0	64	0.5-2.0



Characteristics will vary due to target size, geometry, location, and material. Optimum sensor performance is dependent on the following variables which must be considered in combination:

- Target material, geometry, and speed
- Gap between sensor and target
- Ambient temperature
- Magnetic material in close proximity.





Application Notes

This sensor outputs the signal directly from the operational amplifier. Connect 4 wires as shown in the figure.

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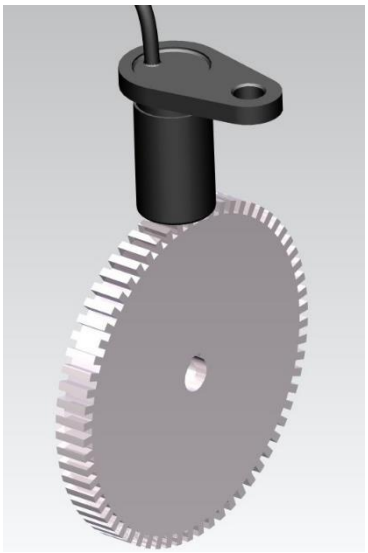
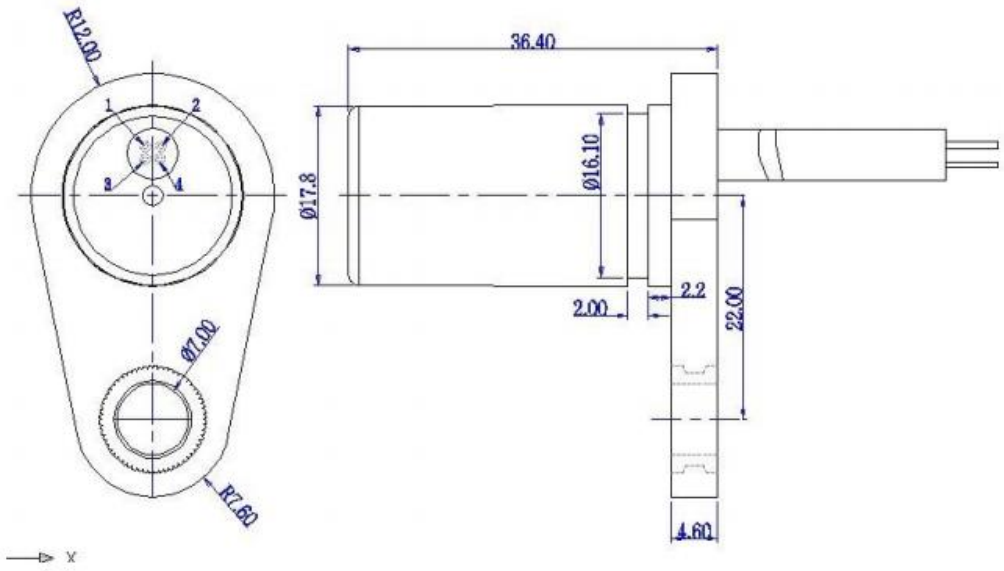
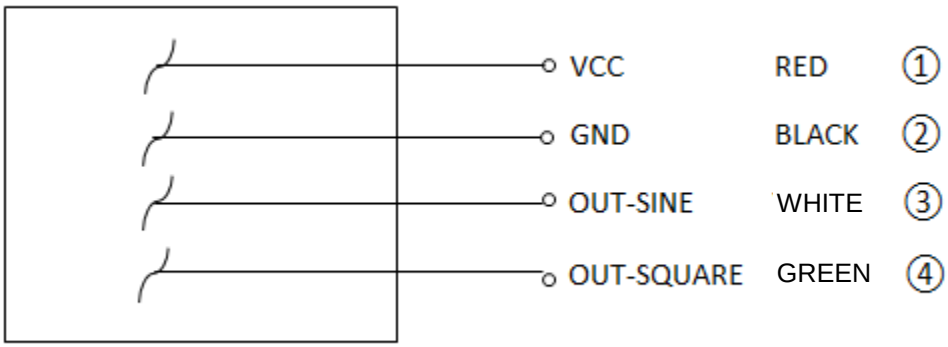
Mounting Dimensions (for reference only)



- The standard length of the lead is 500mm; the cross-sectional diameter is 4mm.





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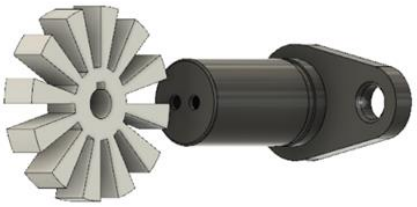
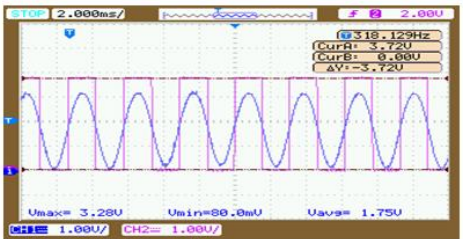
Optical Reflective Gear Tooth Sensor CYGTS102OR

CYGTS102OR optical reflective gear tooth sensor is designed by using a high brightness red LED and a high output linearity phototransistor to detect the speed signal of a white target gear through the reflected light. It is sealed in resin environmentally friendly and has low installation cost. This specially designed optical gear tooth sensor has a wide measurement range and high stability. The sensor works by detecting the intensity of the light reflected from the target wheel.
This Unit functions under power supply from 4.5VDC to 24VDC. Two signals (one sinusoid wave and one square wave) are output directly through the output terminal of the operational amplifier. The sensor will not be damaged if power is inadvertently wired inversely.





Features

- Sensing reflective target wheels
- Operational amplifier directly output signal
- Good signal-to-noise ratio
- Excellent low speed performance
- Output amplitude not dependent on RPM
- Fast operating speed, over 15kHz
- EMI resistant
- Large sensing distance range 1.5mm ~14mm
- Reverse polarity protection and transient protection
- Wide operating temperature -40°C ~ +85°C.

Applications

Automotive and Heavy Duty Vehicles:

- Camshaft and crankshaft speed and position
- Transmission speed
- Tachometers
- Anti-skid/traction control

Industrial Areas:

- Sprocket speed
- Chain link conveyor speed/distance
- Stop motion detector
- High speed and low cost proximity
- Tachometers, counters.

Absolute Maximum Ratings

Supply Voltage	+4.5V~+30V
Reverse Protection Voltage(max)	-30V
Output voltage (sinusoid wave)	0V~+3.3V
Output voltage (square wave)	0V~+22V
Load resistance (sinusoid wave and square wave)	100Ω, min
Operating Temperature Range	-40°C~+85°C

Order Guide

Part number	CYGTS102OR
Supply Voltage	+4.5V ~ +24V
Load resistance (sinusoid wave and square wave)	100 Ω, min
Best sense distance (gap)	3.0mm ~ 7mm (use target gear 3)
Sense Distance (gap)	2.5mm ~ 14mm (use target gear 3)
Rotational Speed (RPM)	10-8000
Switching time (frequency 1kHz)	Rise time: 8,4µs, fall time: 12.8µs

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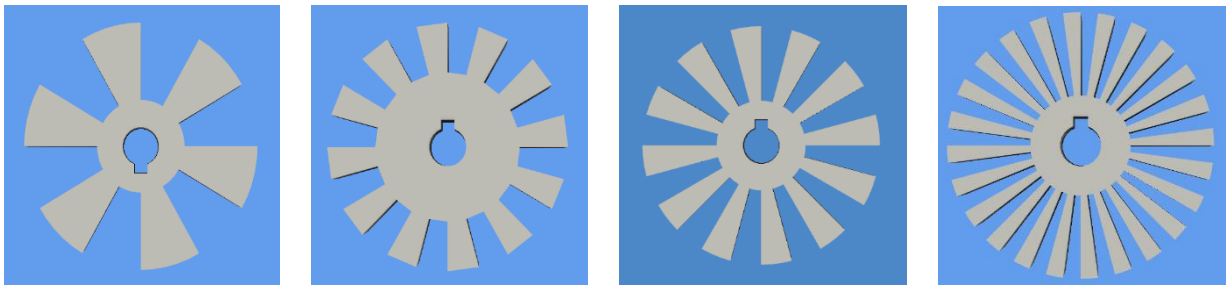
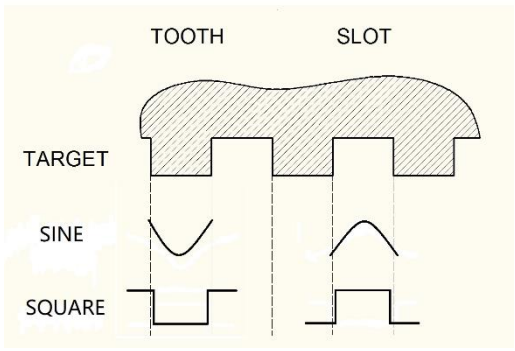
Reference Target Wheels and Sensing Gap (unit: mm)

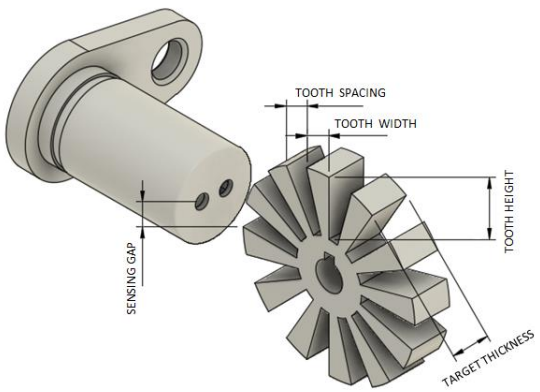
Target wheel	Gear Module	Outer diameter	Tooth Height	Tooth Width	Tooth Spacing	Target Thickness	Teeth Number	Sensing distance
TW 1	4.583	40	12.5	10.47	10.47	8.0	6	3.5-12.5
TW 2	2.667	40	8	3.66	5.23	5.23	12	1.5-7.5
TW 3	2.292	40	12.5	2.0	5.23	5.23	12	2.5-14
TW 4	1.146	40	12.5	2.0	2.62	2.62	24	2.5-6.5



Characteristics will vary due to geometry, location, material and Surface properties. Optimum sensor performance is dependent on the following variables which must be considered in combination:

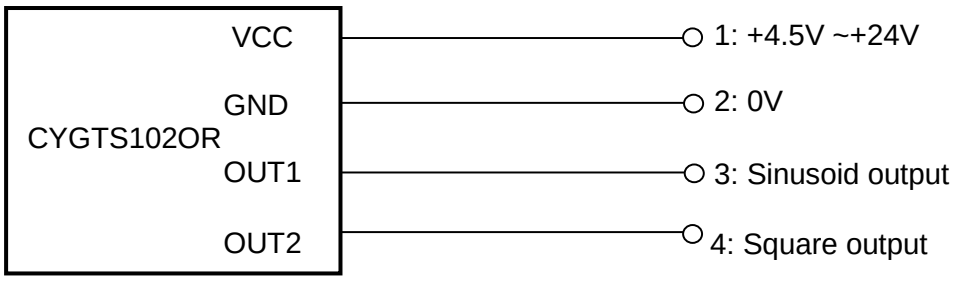
- Target material, geometry, surface properties and speed
- Gap between sensor and target
- Ambient temperature
- Interference from nearby light sources





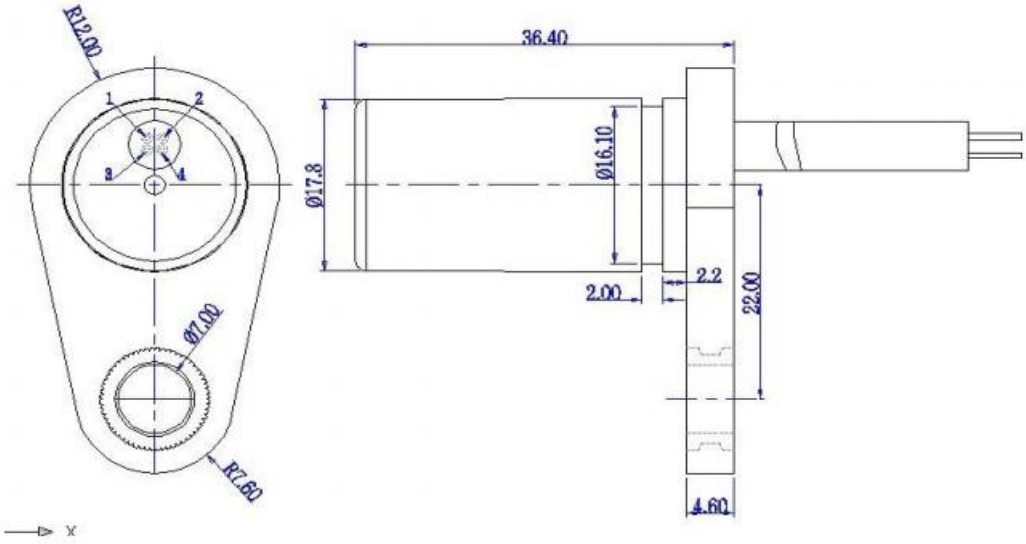
Application Notes

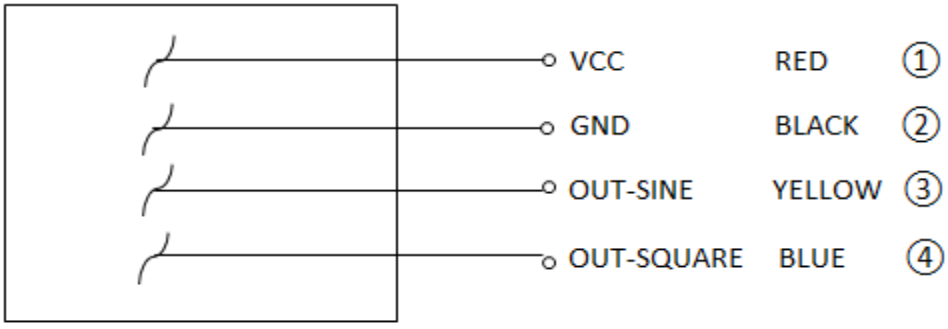
This sensor outputs the signal directly from the operational amplifier. Connect 4 wires as shown in the figure.



Mounting Dimensions (for reference only)

The standard length of the lead is 500mm; the cross-sectional diameter is 4mm.



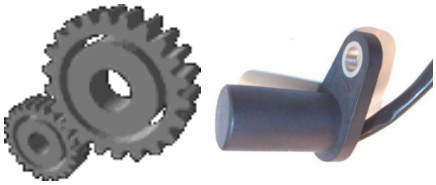


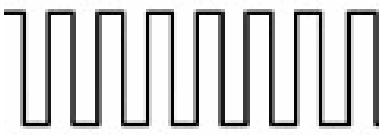
Hall Effect Gear Tooth Sensors CYGTS101DC, CYGTS101PC and CYGTS101RC

Hall Effect Gear Tooth Sensors CYGTS101DC, CYGTS101PC and CYGTS101RC use a magnetically biased Hall Effect integrated circuit to accurately sense movement of ferrous metal targets. This specially designed gear tooth sensor IC with bias magnet and discrete capacitor is sealed in plastic for physical protection and cost effective installation. The GTS IC works according to peak magnetic field detection.
This Unit functions under power supply from 4.5 to 24VDC. Output is digital, current sinking (open collector, NPN) or current sourcing (open collector, PNP) or one of them and RC. Reverse polarity protection is standard. The sensor will not be damaged if power is inadvertently wired backwards.

Features

- Sensing ferrous metal targets
- Digital current sinking output NPN (open collector) or digital current sourcing output PNP (open collector) or digital current sinking or sourcing output with RC
- Good signal-to-noise ratio
- Excellent low speed performance
- Output amplitude not dependent on RPM
- Fast operating speed, over 15kHz
- EMI resistant
- Reverse polarity protection and transient protection
- Wide operating temperature -40°C ~ +135°C.





Applications

Automotive and Heavy Duty Vehicles:

- Camshaft and crankshaft speed and position
- Transmission speed
- Tachometers
- Anti-skid/traction control

Industrial Areas:

- Sprocket speed
- Chain link conveyor speed/distance
- Stop motion detector
- High speed low cost proximity
- Tachometers, counters.

Absolute Maximum Ratings

	GYGTS101DC	CYGTS101PC	CYGTS101RC
Supply Voltage	-30V~+30V		
Output Voltage	-0.5V~+30V		
Output Current	sinking 40mA	sourcing 40mA	sinking or sourcing 40mA
Operating Temperature Range	-40°C~+135°C		

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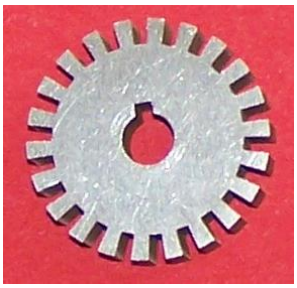
Order Guide

Part number	CYGTS101DC	CYGTS101PC	CYGTS101RC-N (RC & NPN output)	CYGTS101RC-P (RC & PNP output)
Supply Voltage	4.5V ~ 24V			
Output Saturation Voltage	0.4V (sinking 20mA)	0.4V (sourcing 20mA)	0.4V (sinking or sourcing 20mA)	
Sense Distance (gap)	0.2mm ~ 4.0mm (using reference target wheels)			
RPM	10-8000			
Switching time	Rise time: 10µsec. max, fall time: 2µsec. max.			
Cross Reference	1GT101DC, 1GT103DC, 1GT105DC			

Reference Target Wheels and Sensing Gap (unit: mm)

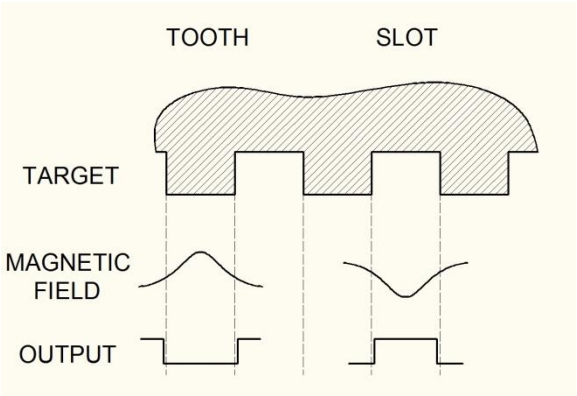
Target wheel	Outer diameter	Tooth Height	Tooth Width	Tooth Spacing	Target Thickness	Teeth Number	Sensing Gap/distance
Target wheel 1	28	5.0	7.34	7.34	8.0	6	0.2-4.0
Target wheel 2	28	5.0	3.66	3.67	8.0	12	0.2-2.5
Target wheel 3	28	3.0	2.0	2.0	8.0	22	0.2-1.0
Target wheel 4	81.5	3.0	2.0	2.0	8.0	64	0.2-1.0

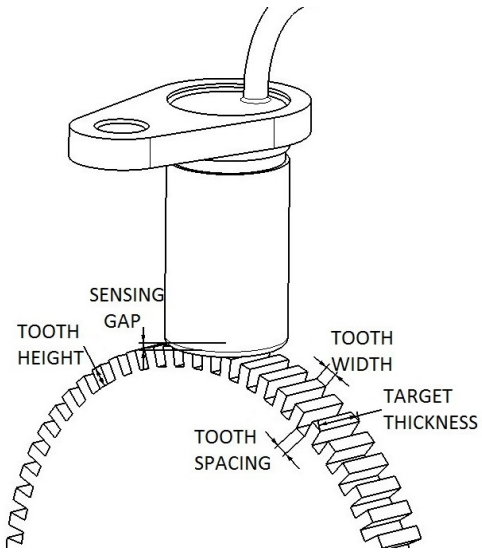





Characteristics will vary due to target size, geometry, location, and material. Optimum sensor performance is dependent on the following variables which must be considered in combination:

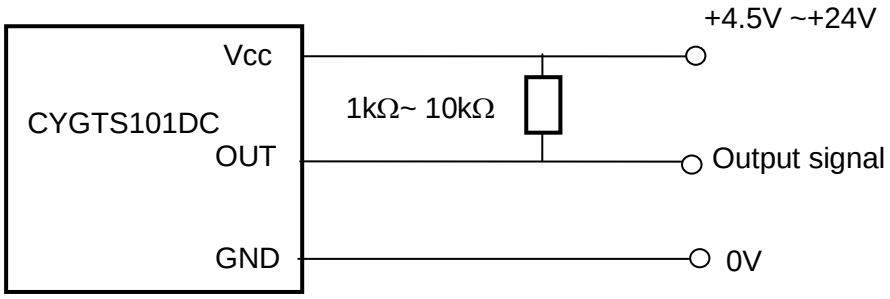
- Target material, geometry, and speed
- Gap between sensor and target
- Ambient temperature
- Magnetic material in close proximity.



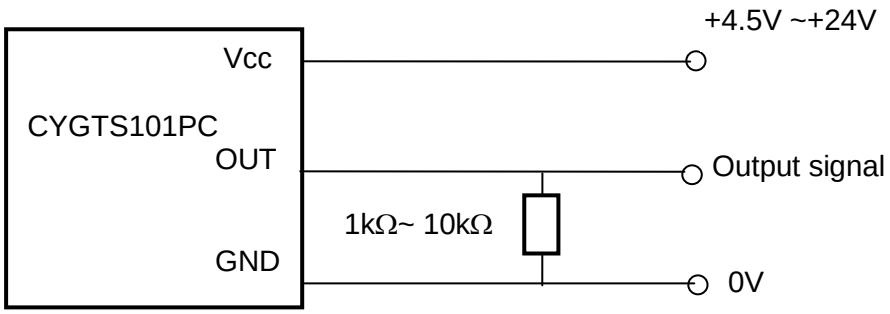


Application Notes

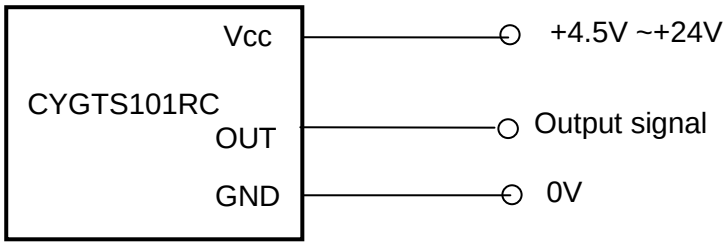
The output of the sensor GYGTS101DC is sinking current NPN (open collector). A pull-up resistor (1kΩ ~ 10kΩ) should be connected to the sensor output circuit (between power supply and output).



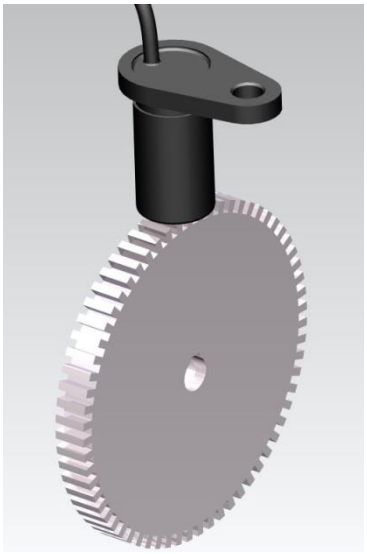
The output of the sensor CYGTS101PC is current sourcing PNP (open collector). A pull-up resistor (1kΩ ~ 10kΩ) should be connected to the sensor output circuit (between output and GND).



The sensor CYGTS101RC has a RC (NPN or PNP) output voltage. A pull-up resistor is built in the sensor. In order to optimize the value of the pull up resistor in advance one should firstly use the sensor CYGTS101DC or CYGTS101PC for test. After optimized the pull up resistor you can use this sensor for your application.



Mounting Dimensions (for reference only)



The standard length of the leads is 150mm; section: 4.7x2.3mm

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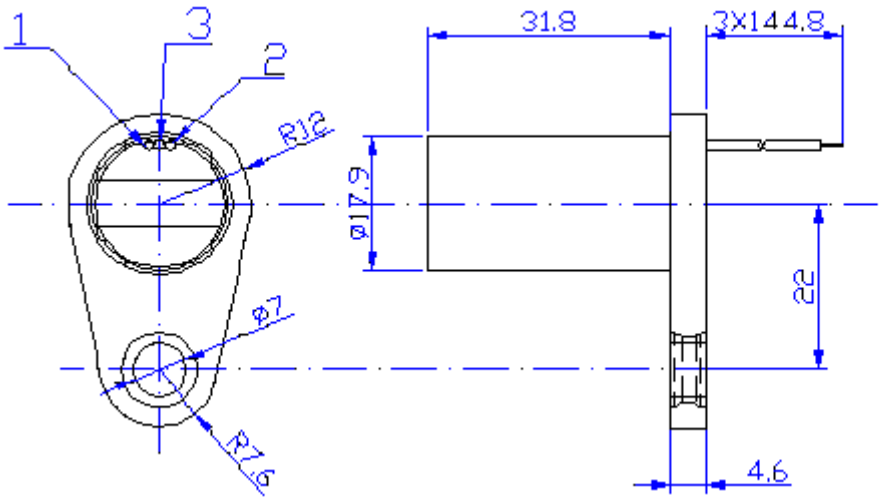
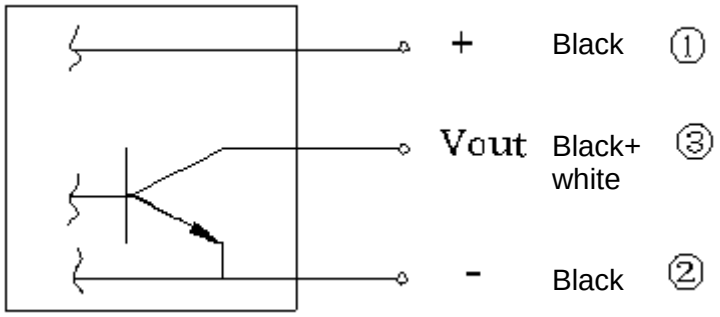


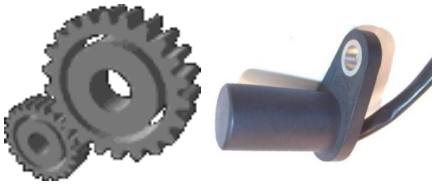


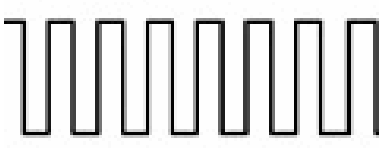
Hall Effect Differential Gear Tooth Sensor CYGTS101DC-S

CYGTS101DC-S Hall Effect Differential Gear Tooth Sensor uses a magnetically biased Hall Effect integrated circuit to accurately sense movement of ferrous metal targets. This specially designed gear tooth sensor IC with bias magnet and discrete capacitor is sealed in plastic for physical protection and cost effective installation. The GTS IC works according to differential magnetic field detection.
This unit functions under power supply from 4.5 to 24VDC. Output is digital, current sinking (open collector, NPN). Reverse polarity protection is standard. The sensor will not be damaged if power is inadvertently wired backwards.

Features

- Sensing ferrous metal targets
- Digital current sinking output NPN (open collector)
- Good signal-to-noise ratio
- Excellent low speed performance
- Output amplitude not dependent on RPM
- Fast operating speed, over 20kHz
- EMI resistant
- Reverse polarity protection and transient protection
- Wide operating temperature -40°C ~ +135°C/150°C.





Applications

Automotive and Heavy Duty Vehicles:

- Camshaft and crankshaft speed and position
- Transmission speed
- Tachometers
- Anti-skid/traction control

Industrial Areas:

- Sprocket speed
- Chain link conveyor speed/distance
- Stop motion detector
- High speed low cost proximity
- Tachometers, counters.

Absolute Maximum Ratings

Supply Voltage	-35V~+30V
Output Voltage	-0.7V~+30V
Output Current	Sinking 50mA
Operating Temperature Range	-40°C~+135°C (custom made -40°C~ +150°C)

Order Guide

Part number	CYGTS101DC-S
Supply Voltage	4.5V ~ 24V
Output Saturation Voltage	<0.6V, typ. 0.25V (under sinking current 40mA)
Sense Distance (gap)	0.2mm ~ 4.0mm (using reference target wheels)
RPM	10-8000
Switching time	Rise time: 10µsec. max, fall time: 2µsec. max.
Cross Reference	1GT101DC, 1GT103DC, 1GT105DC

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Reference Target Wheels and Sensing Gap (unit: mm)

Target wheel	Outer diameter	Tooth Height	Tooth Width	Tooth Spacing	Target Thickness	Teeth Number	Sensing Gap/distance
Target wheel 1	28	5.0	7.34	7.34	8.0	6	0.2-5.0
Target wheel 2	28	5.0	3.66	3.67	8.0	12	0.2-4.0
Target wheel 3	28	3.0	2.0	2.0	8.0	22	0.2-2.4
Target wheel 4	81.5	3.0	2.0	2.0	8.0	64	0.2-2.0




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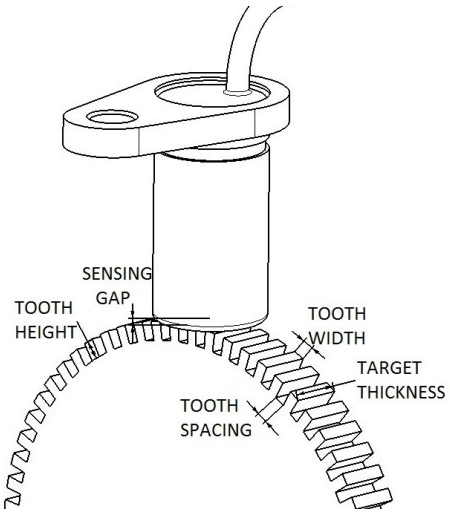
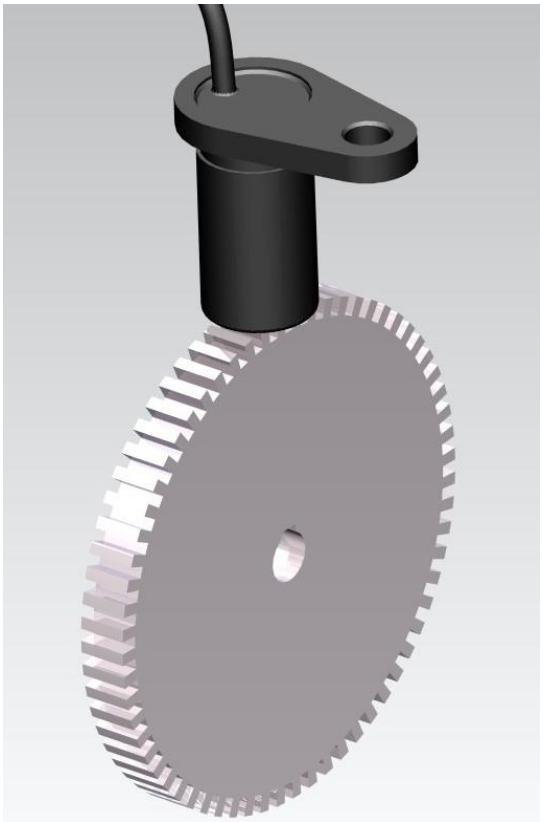
Characteristics will vary due to target size, geometry, location, and material. Optimum sensor performance is dependent on the following variables which must be considered in combination:

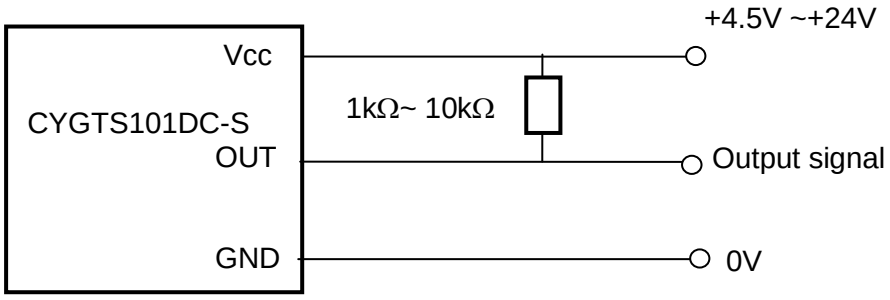
- Target material, geometry, and speed
- Gap between sensor and target
- Ambient temperature
- Magnetic material in close proximity.



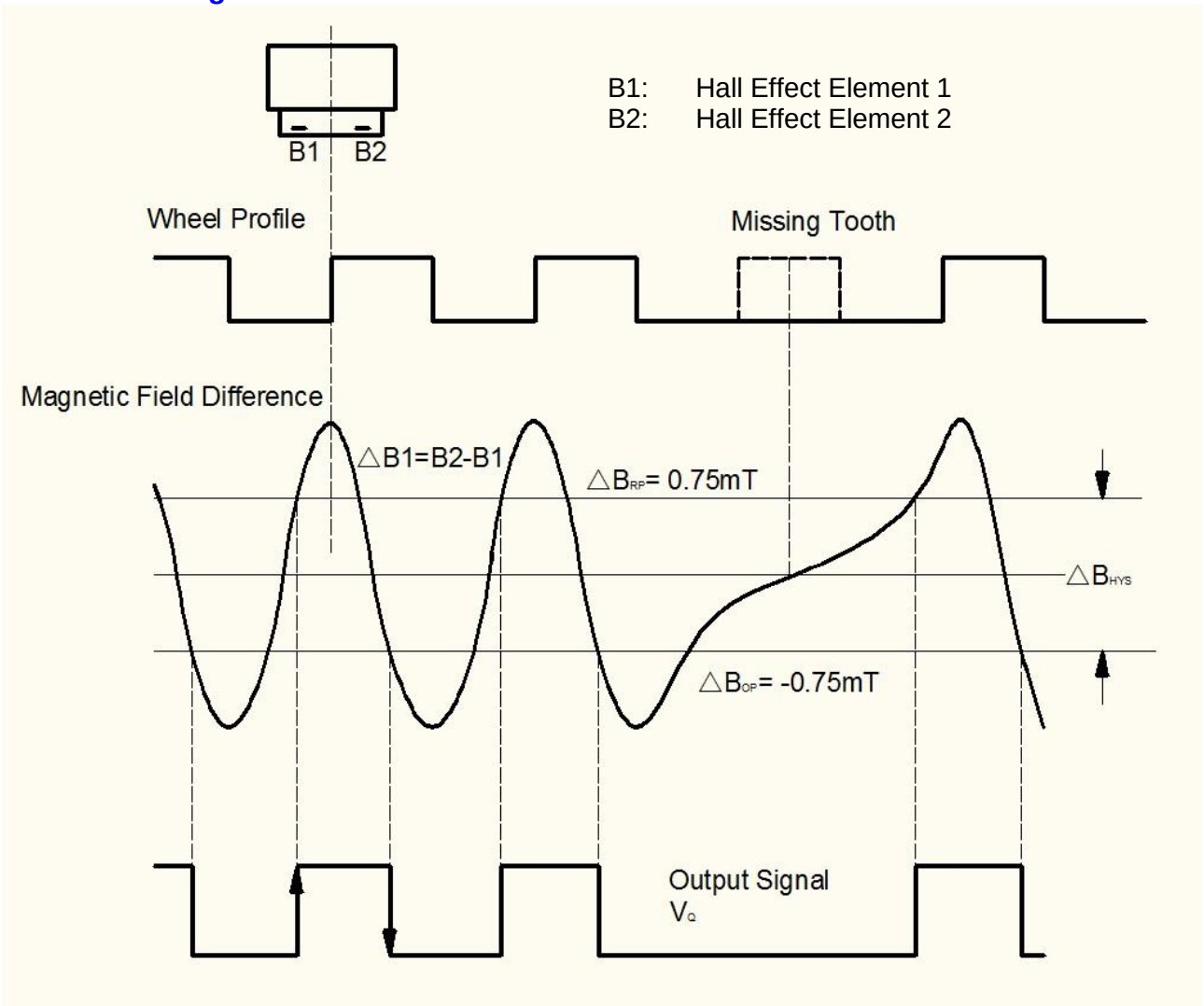


Application Notes

The output of these sensors is sinking current NPN (open collector). A pull-up resistor (1kΩ ~ 10kΩ) should be connected to the sensor output circuit (between power supply and output).



Differential Magnetic Field Detection

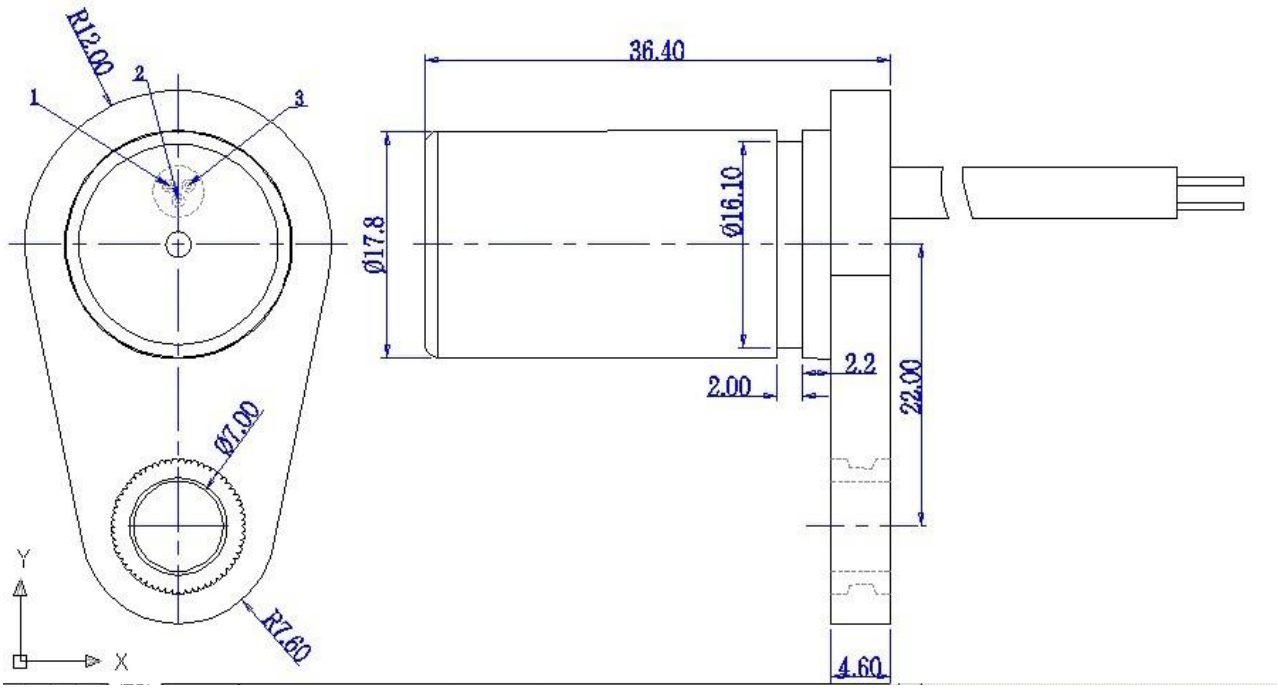


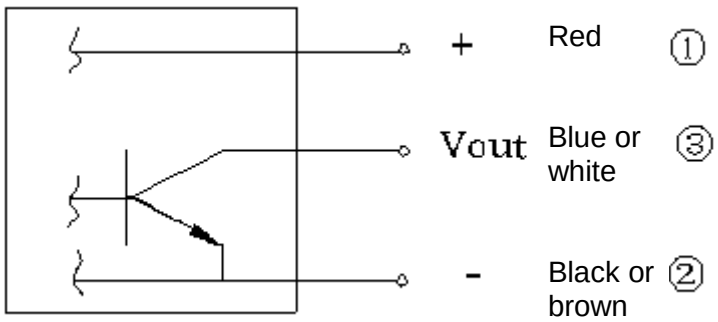
Operating point: B2-B1 < ΔB_{OP} switches the output ON (V_Q = LOW)
Release point: B2-B1 > ΔB_{RP} switches the output OFF (V_Q = HIGH)
$\Delta B_{RP} = \Delta B_{OP} + \Delta B_{HYS}$

Mounting Dimensions (for reference only)

Red:	Power supply
White:	Output
Black:	Ground

The standard length of the leads is 500mm; section: 4.7x2.3mm



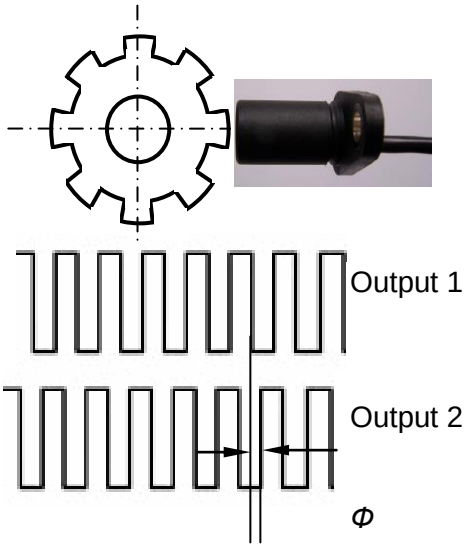


Hall Effect Gear Tooth Speed and Direction Sensors CYGTS104X and CYGTS104U

Hall Effect Gear Tooth Sensors CYGTS104X and CYGTS104U use two magnetically biased Hall Effect integrated circuits (ICs) to accurately sense movement of ferrous metal target (measuring) wheel. These specially designed integrated circuits, with bias magnet and discrete capacitor, are sealed in plastic package for physical protection and cost effective installation. The GTS IC works according to differential magnetic field detection.
This sensor functions under power supply from 4.5 to 24VDC. Two output signals are impulse, current sinking (open collector, NPN), which can be used for rotary speed measurement with direction detection. It has the advantage of reverse polarity protection. The sensor will not be damaged if power is inadvertently wired backwards.

Features

- Sensing ferrous metal target wheels
- Two impulse current sinking outputs NPN (OC) for speed measurement with direction detection
- Good signal-to-noise ratio
- Excellent low speed performance (1Hz)
- Output amplitude not dependent on RPM
- Fast operating speed, over 10kHz
- EMI resistant
- Reverse polarity protection and transient protection
- Wide operating temperature -40°~+135/150°C



Applications

Automotive and Heavy Duty Vehicles:

- Camshaft and crankshaft speed and position
- Transmission speed
- Tachometers
- Anti-skid/traction control

Industrial Areas:

- Sprocket speed
- Chain link conveyor speed/distance
- Stop motion detector
- High speed low cost proximity
- Tachometers, counters.

Definition of Part Number:

Part number	Working temperature	Sensor case length	Distance between Hall ICs
CYGTS104X	-40°C ~ +135°C	36.4mm	1.2mm
CYGTS104XH	-40°C ~ +150°C		
CYGTS104U	-40°C ~ +135°C	36.4mm	5.4mm
CYGTS104UH	-40°C ~ +150°C		

Order Reference Number:

Order reference number = part number / cable length

For instance, CYGTS104X/1000mm is for sensor CYGTS104X with cable length 1m.

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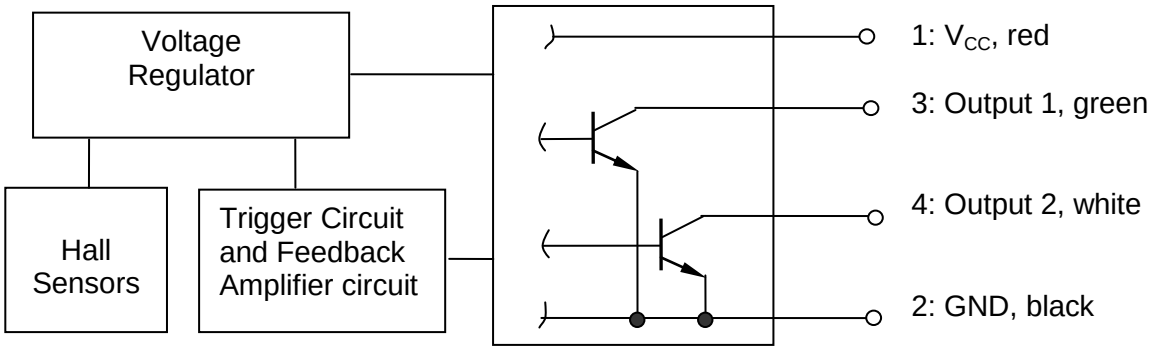
Absolute Maximum Ratings

Supply Voltage	-25V~+30V
Output Voltage	-0.7V～+30V (Output high)
Output Current	Sinking 50mA

Recommended Operating Conditions

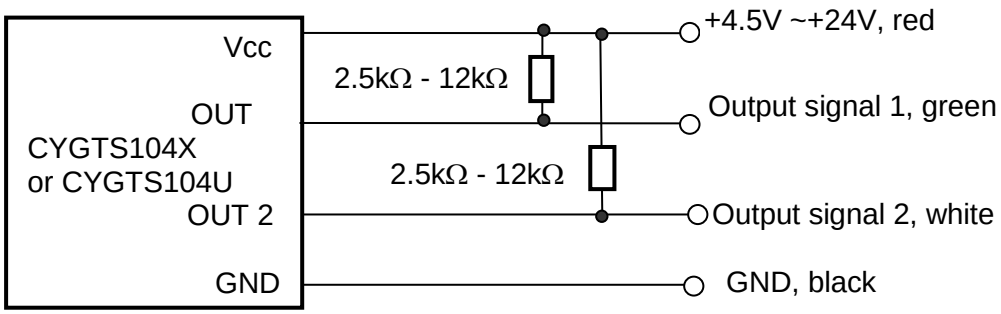
Parameter	Conditions	Min	Typ	Max	Unit
Operating Temperature		-40		+135/+150	°C
Supply Voltage Vcc		4.5		24.0	V DC
Supply Current Icc		1	2.0	3.0	mA
Output Saturation Voltage Vsat	Low Output	≤0.50			V DC
High Output Voltage (Voh)		Voh ≥Vcc-0.5V			V
Frequency range		0.001		10	kHz
Output Current	Low Output			20	mA
Output Leakage Current	High Output			10	μA
Rise Time (at load resistanc 2kΩ)				≤10.0	μs
Fall Time (at load resistanc 2kΩ)				≤10.0	μs

Block Diagram

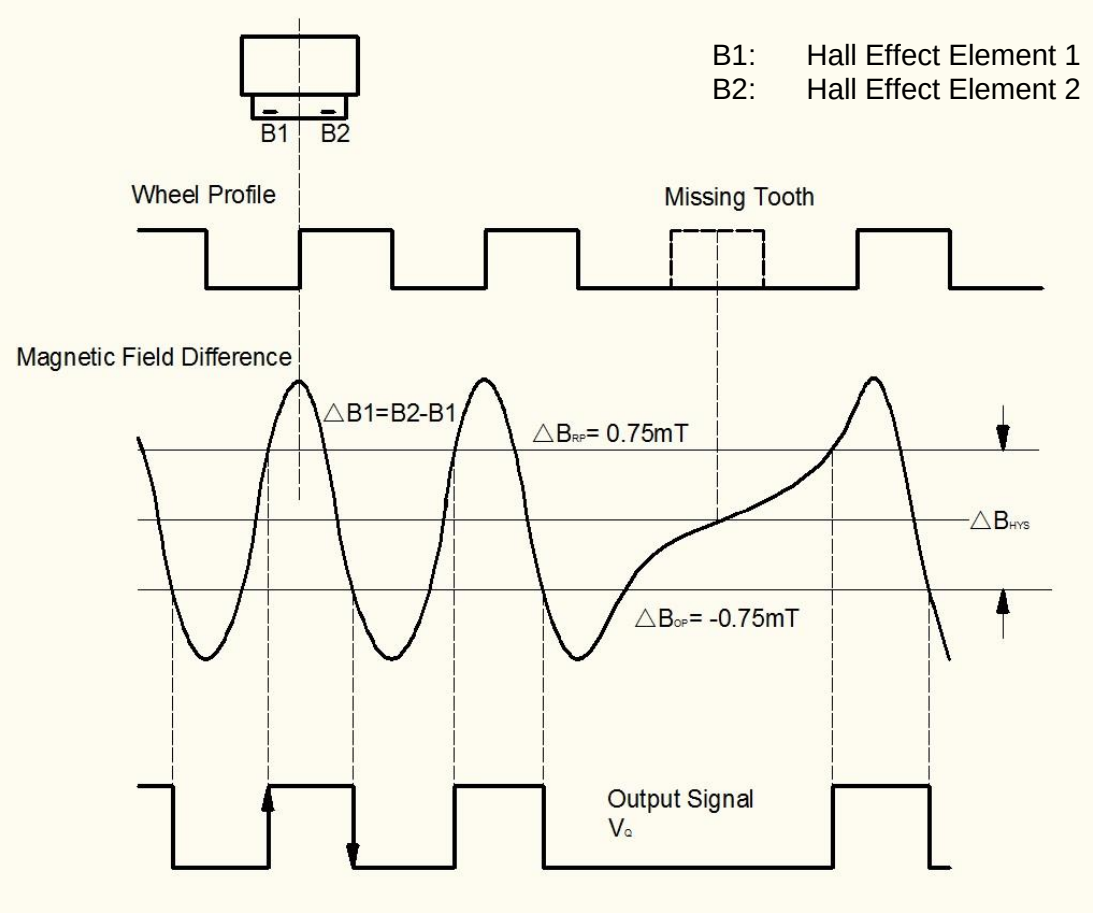


Connection

The output of the sensors is sinking current NPN (open collector). A pull-up resistor (2.5kΩ-12kΩ) should be connected to the sensor output circuit (between power supply Vcc and output).

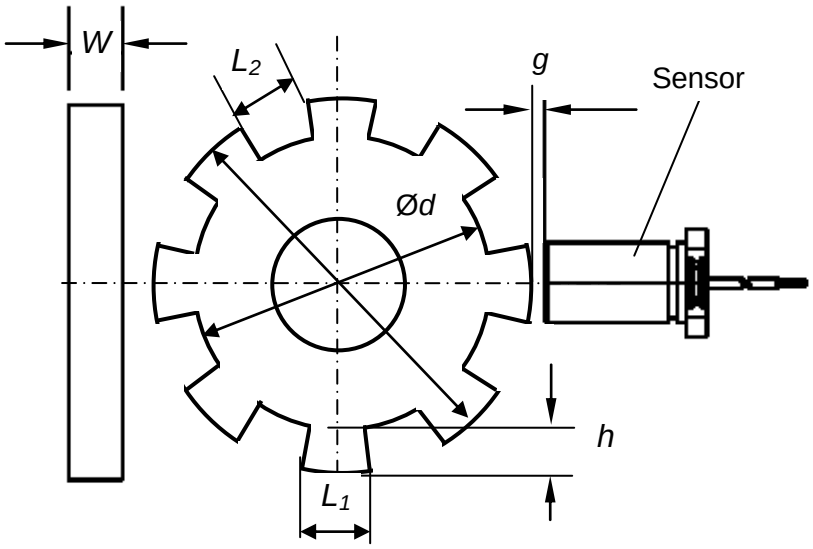


Differential Magnetic Field Detection



Operating point: B2-B1 < ΔB_{OP} switches the output ON (V_Q = LOW)
Release point: B2-B1 > ΔB_{RP} switches the output OFF (V_Q = HIGH)
$\Delta B_{RP} = \Delta B_{OP} + \Delta B_{HYS}$

Sensor Position to Target (Measuring) Wheel



D: Outside Diameter
d: Root Diameter
W: target thickness ≥5mm
h: Tooth height ≥3mm
h=(*D*-*d*)/2
g: Sensing Gap ≥0.1mm
L1: Tooth width
L2: Tooth spacing

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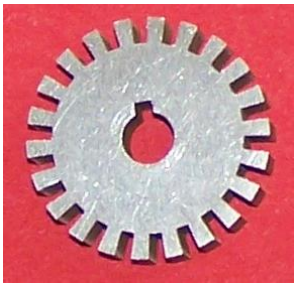
Reference Target Wheels and Sensing Gap (unit: mm)

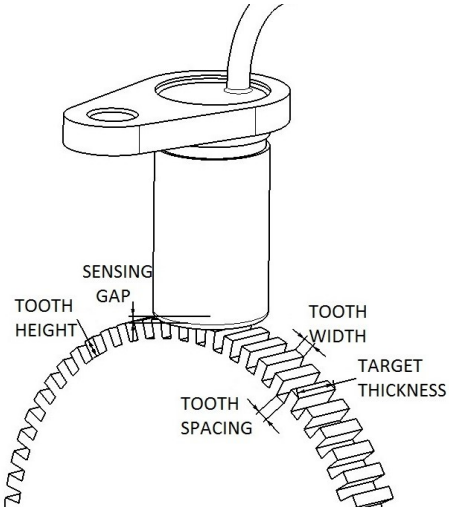
	Target wheel	Outer diameter	Tooth Height	Tooth Width	Tooth Spacing	Target Thickness	Teeth Number	Sensing Gap /distance
CYGTS104X	Target wheel 1	28	5.0	7.34	7.34	8.0	6	0.2-5.0
CYGTS104U								0.5-5.0
CYGTS104X	Target wheel 2	28	5.0	3.66	3.67	8.0	12	0.2-4.0
CYGTS104U								0.5-4.0
CYGTS104X	Target wheel 3	28	3.0	2.0	2.0	8.0	22	0.2-2.3
CYGTS104U								0.5-2.4
CYGTS104X	Target wheel 4	81.5	3.0	2.0	2.0	8.0	64	0.2-2.2
CYGTS104U								0.5-2.0

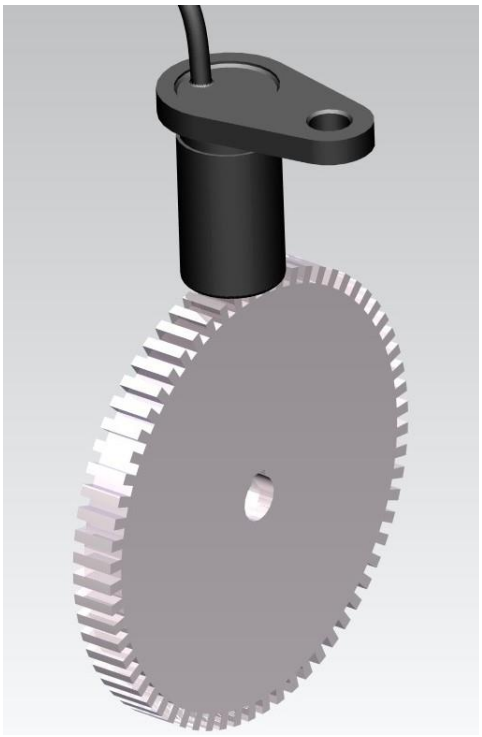




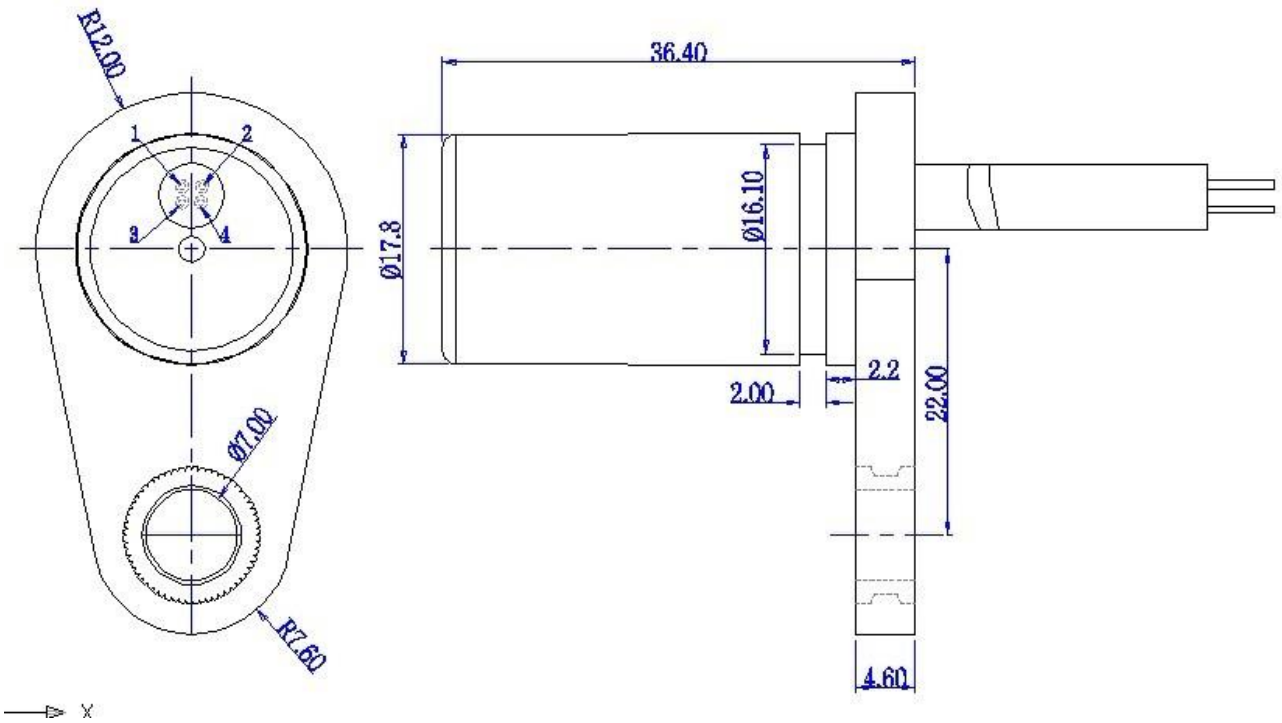

Characteristics will vary due to target size, geometry, location, and material. Optimum sensor performance is dependent on the following variables which must be considered in combination:

- Target material, geometry, and speed
- Gap between sensor and target
- Ambient temperature
- Magnetic material in close proximity.



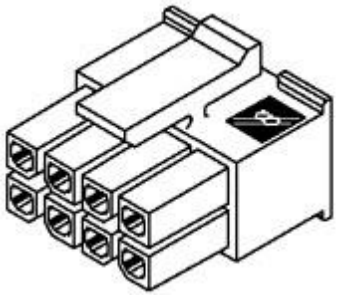


Mounting Dimensions (for reference only)



The standard length of the cable is 1.0m, diameter Ø4.0mm.

The length of cable is custom makeable.



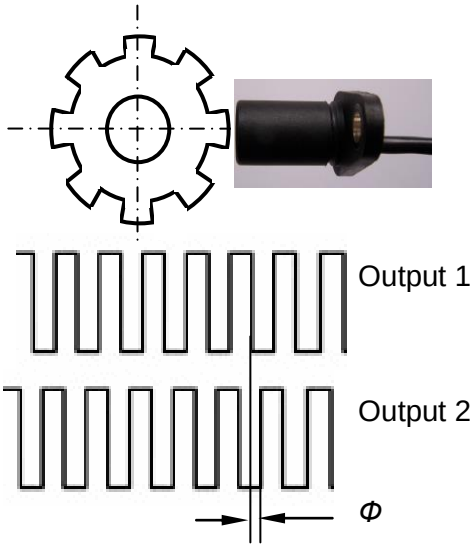
The Molex connector is built with parts: 043025-0600 and 043030-0001

Hall Effect Gear Tooth Speed and Direction Sensors CYGTS104U-S

Hall Effect Gear Tooth Sensor CYGTS104U-S uses two magnetically biased Hall Effect integrated circuits (ICs) to accurately sense movement of ferrous metal target (measuring) wheel. These specially designed integrated circuits, with bias magnet and discrete capacitor, are sealed in plastic package for physical protection and cost effective installation. The GTS ICs work according to differential magnetic field detection.
This sensor functions under power supply from 4.5 to 24VDC. Two output signals are impulse, current sinking (open collector, NPN), which can be used for rotary speed measurement with direction detection. It has the advantage of reverse polarity protection. The sensor will not be damaged if power is inadvertently wired backwards.

Features

- Sensing ferrous metal target wheels
- Two impulse current sinking outputs NPN (OC) for speed measurement with direction detection
- Good signal-to-noise ratio
- Excellent low speed performance (1Hz)
- Output amplitude not dependent on RPM
- Fast operating speed, over 10kHz
- EMI resistant
- Reverse polarity protection and transient protection
- Wide operating temperature -40°~+135/150°C



Applications

Automotive and Heavy Duty Vehicles:

- Camshaft and crankshaft speed and position
- Transmission speed
- Tachometers
- Anti-skid/traction control

Industrial Areas:

- Sprocket speed
- Chain link conveyor speed/distance
- Stop motion detector
- High speed low cost proximity
- Tachometers, counters.

Definition of Part Number:

Part number	Working temperature	Sensor case length	Distance between Hall ICs
CYGTS104U-S	-40°C ~ +135°C	28.4mm	5.4mm
CYGTS104UH-S	-40°C ~ +150°C		

Order Reference Number:

Order reference number = part number / cable length

For instance, CYGTS104U-S/1000mm is for sensor CYGTS104U-S with cable length 1000mm

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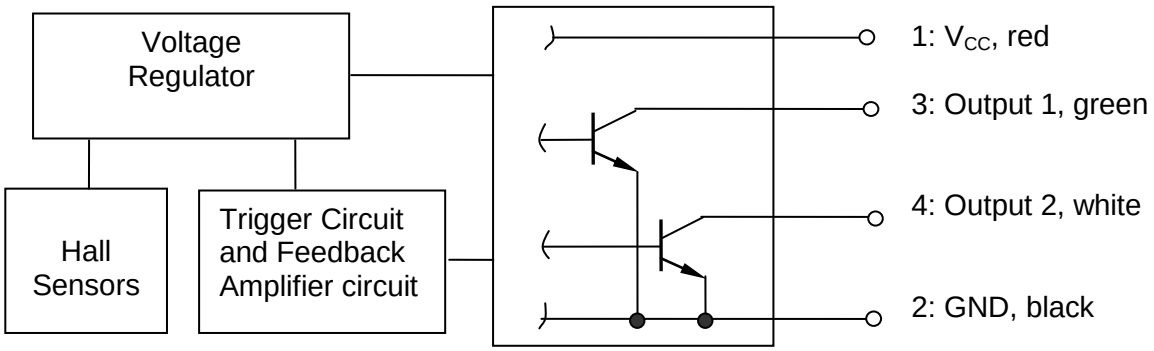
Absolute Maximum Ratings

Supply Voltage	-25V~+30V
Output Voltage	-0.7V~+30V (Output high)
Output Current	Sinking 50mA

Recommended Operating Conditions

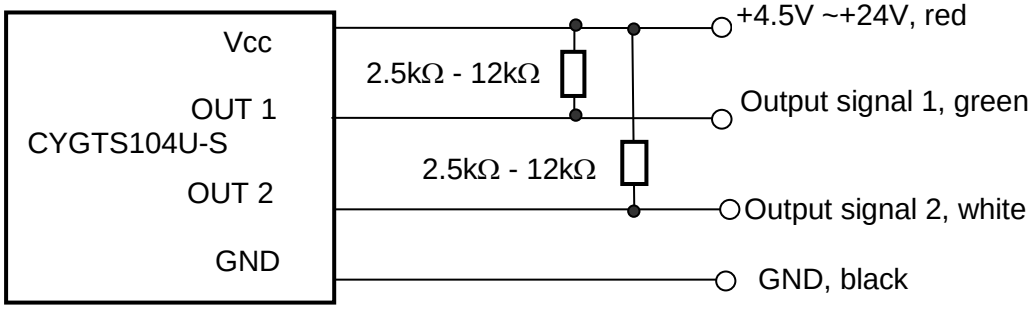
Parameter	Conditions	Min	Typ	Max	Unit
Operating Temperature		-40		+135/+150	°C
Supply Voltage Vcc		4.5		24.0	V DC
Supply Current Icc		1	2.0	3.0	mA
Output Saturation Voltage Vsat	Low Output	≤0.50			V DC
High Output Voltage (Voh)		Voh ≥Vcc-0.5V			V
Frequency range		0.001		10	kHz
Output Current	Low Output			20	mA
Output Leakage Current	High Output			10	µA
Rise Time (at load resistanc 2kΩ)				≤10.0	µs
Fall Time (at load resistanc 2kΩ)				≤10.0	µs

Block Diagram

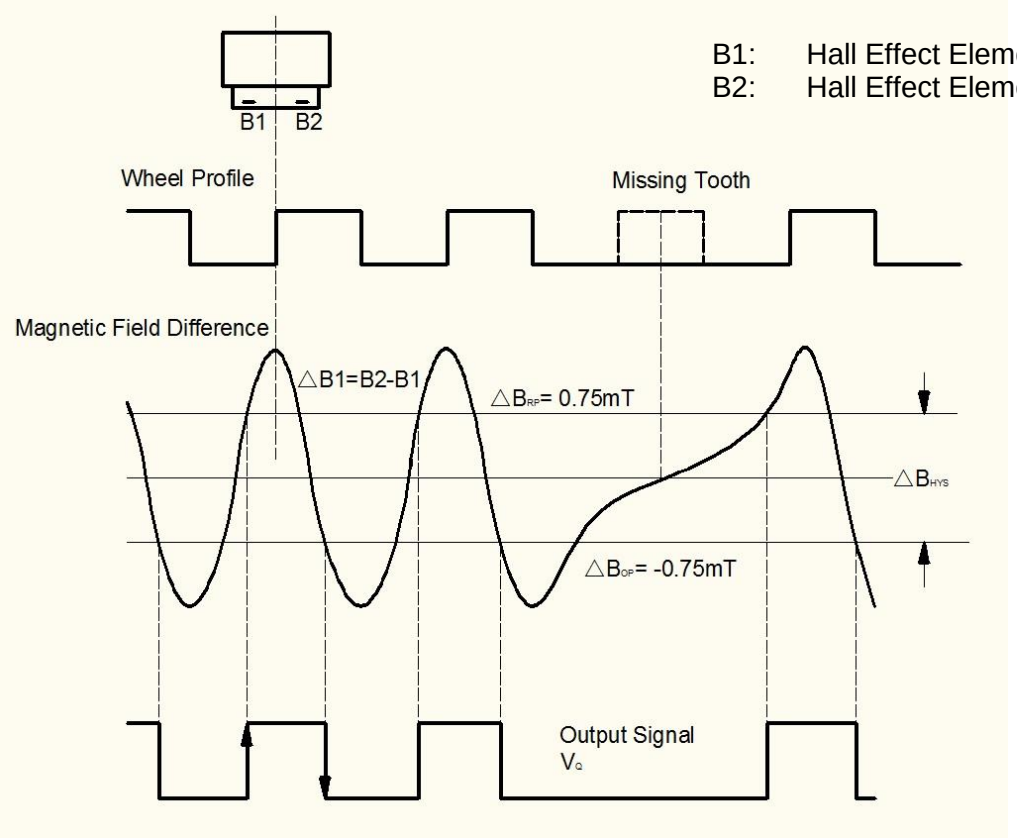


Connection

The output of the sensors is sinking current NPN (open collector). A pull-up resistor (2.5kΩ-12kΩ) should be connected to the sensor output circuit (between power supply Vcc and output).

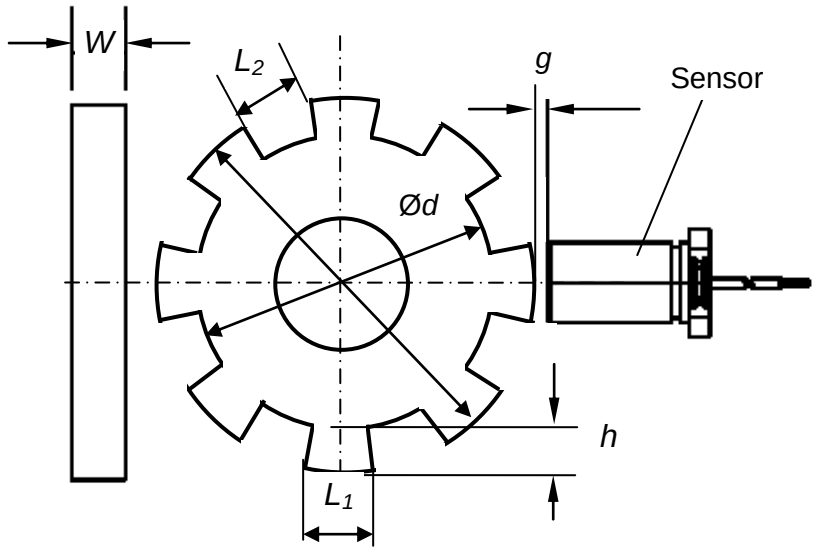


Differential Magnetic Field Detection



Operating point: B2-B1 < ΔB_{OP} switches the output ON (V_Q = LOW)
Release point: B2-B1 > ΔB_{RP} switches the output OFF (V_Q = HIGH)
$\Delta B_{RP} = \Delta B_{OP} + \Delta B_{HYS}$

Sensor Position to Target (Measuring) Wheel



D: Outside Diameter
d: Root Diameter
W: target thickness ≥5mm
h: Tooth height ≥3mm
h=(*D*-*d*)/2
g: Sensing Gap ≥0.1mm
L1: Tooth width
L2: Tooth spacing

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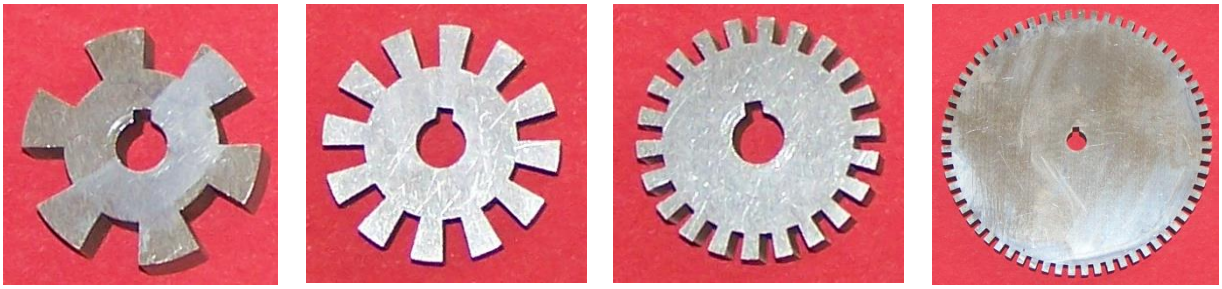
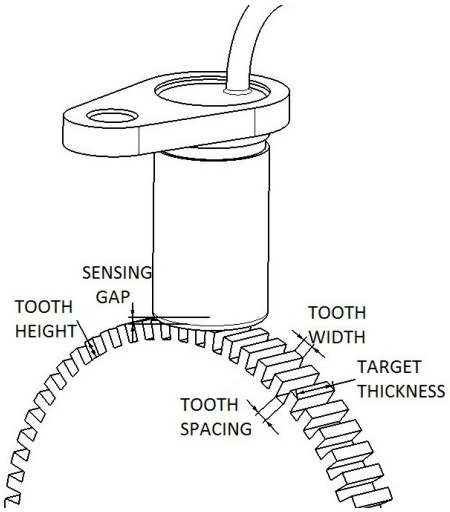
Reference Target Wheels and Sensing Gap (unit: mm)

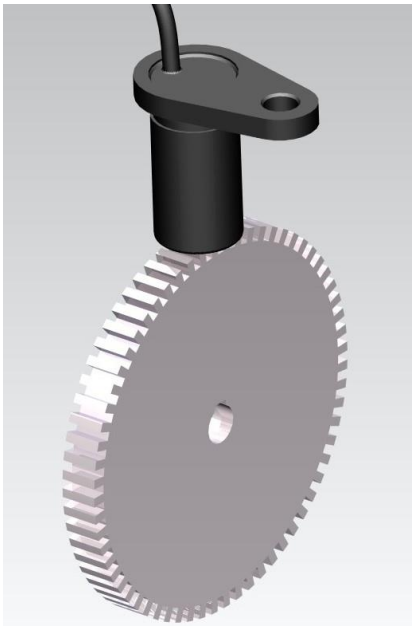
Target wheel	Outer diameter	Tooth Height	Tooth Width	Tooth Spacing	Target Thickness	Teeth Number	Sensing Gap/distance
Target wheel 1	28	5.0	7.34	7.34	8.0	6	0.5-5.0
Target wheel 2	28	5.0	3.66	3.67	8.0	12	0.5-4.0
Target wheel 3	28	3.0	2.0	2.0	8.0	22	0.5-2.4
Target wheel 4	81.5	3.0	2.0	2.0	8.0	64	0.5-2.0



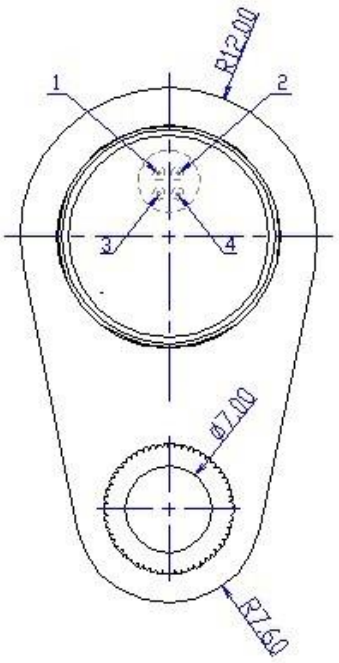
Characteristics will vary due to target size, geometry, location, and material. Optimum sensor performance is dependent on the following variables which must be considered in combination:

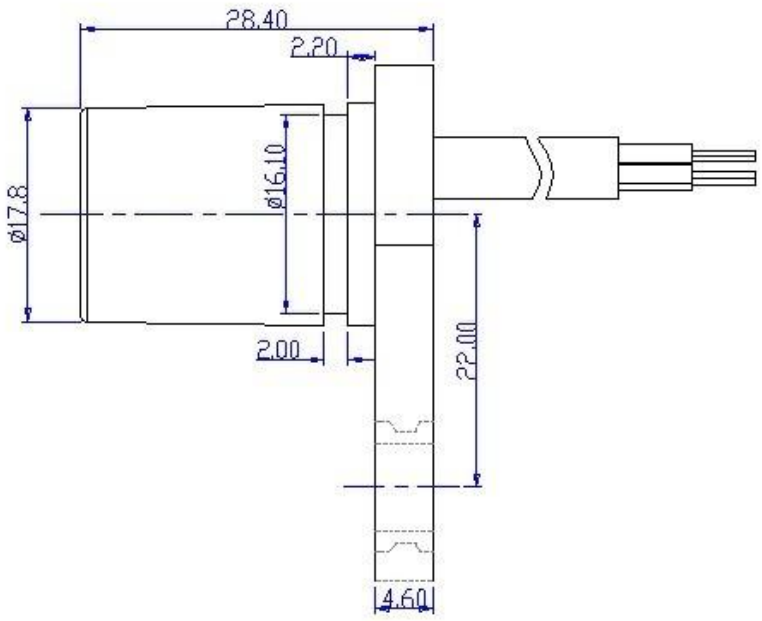
- Target material, geometry, and speed
- Gap between sensor and target
- Ambient temperature
- Magnetic material in close proximity.





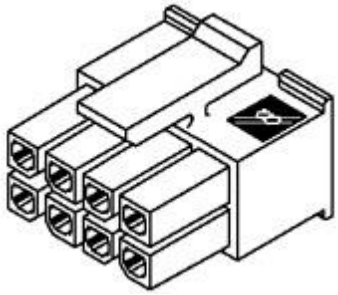
Mounting Dimensions (for reference only)





The standard length of the cable is 1.0m, diameter Ø4.0mm.

The length of cable is custom makeable.



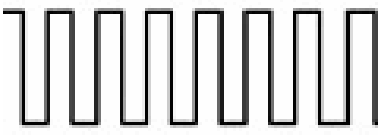
The Molex connector is built with parts: 043025-0600 and 043030-0001

Hall Effect Gear Tooth Sensors CYGTS99

CYGTS99 Hall Effect Gear Tooth Sensor uses a magnetically biased Hall Effect integrated circuit to accurately sense movement of ferrous metal targets. This specially designed integrated circuit, with bias magnet and discrete capacitor, is sealed in plastic or metal package for physical protection and cost effective installation.
The units function under power supply from 6V to 24V DC. Output is digital, current sinking (open collector). Reverse polarity protection is standard. The sensor will not be damaged if power is inadvertently wired backwards.

Features

- Sensing ferrous metal targets
- Digital current sinking output (open collector)
- Good signal-to-noise ratio
- Excellent low speed performance
- Output amplitude not dependent on RPM
- Fast operating speed, over 100kHz
- EMI resistant
- Reverse polarity protection and transient protection
- Wide operating temperature -40°C ~ +135°C.



Applications

Automotive and Heavy Duty Vehicles:

- Camshaft and crankshaft speed and position
- Transmission speed
- Tachometers
- Anti-skid/traction control

Industrial Areas:

- Sprocket speed
- Chain link conveyor speed/distance
- Stop motion detector
- High speed low cost proximity
- Tachometers, counters.

Absolute Maximum Ratings

Supply Voltage	-30V~+30V
Output Voltage	-0.5V~+30V
Output Current	Sinking 12mA
Operating Temperature Range	-40°C~+135°C (-40°C ~ +150°C realizable)

Order Guide

Part number	Flat pins: CYGTS99-F, CYGTS99-xxxx-F Round pins: CYGTS99-R, CYGTS99-xxxx-R
Supply Voltage	6V~24V
Output Saturation Voltage	0.4V (Load off)
Sense Distance	1mm~2mm (-40°C~135°C/150°C,10~8000rpm Use reference target wheel)
Cross Reference	Siemens VDO Sensors

Reference Target Wheel

Tooth Height	Tooth Width	Tooth Spacing	Target Thickness	Teeth Number
0.20in (5.08mm)	0.10in (2.54mm)	0.70in (17.78mm)	0.25in (6.35mm)	60

Characteristics will vary due to target size, geometry, location, and material.

Test Conditions

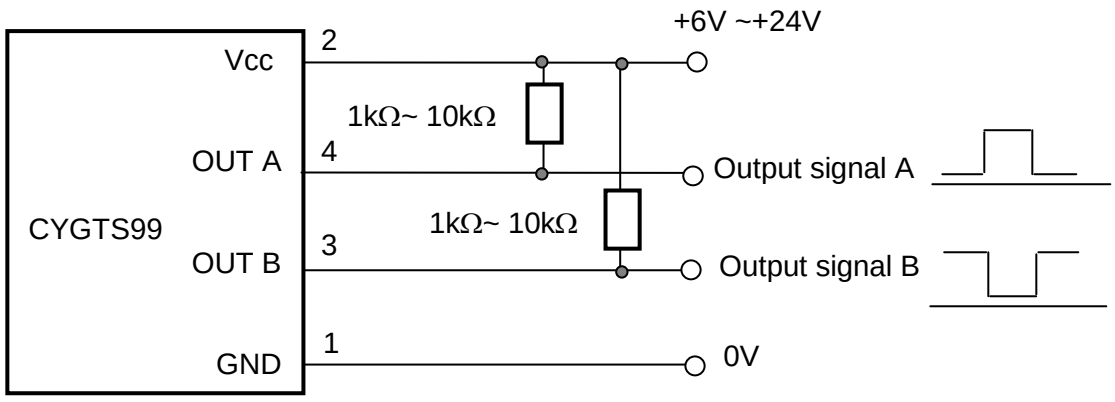
Air gap	0.04 to 0.08 in. (1.02 to 2.03mm)
Voltage Supply	+6V to +24V
RPM	10 min., 3600 max.

Optimum sensor performance is dependent on the following variables which must be considered in combination:

- Target material, geometry, and speed
- Gap between sensor and target
- Ambient temperature
- Magnetic material in close proximity.

Application Notes

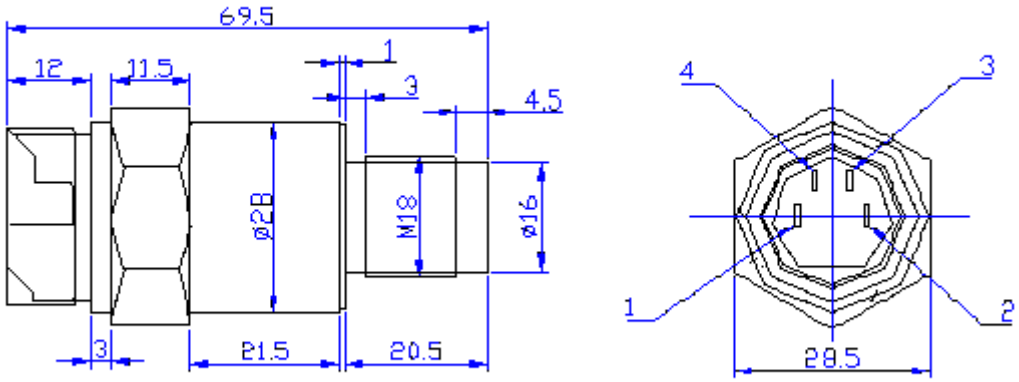
The output of these sensors is sinking current (open collector). A pull-up resistor (1kΩ ~ 10kΩ) should be connected to the sensor output circuit (between power supply + and output).

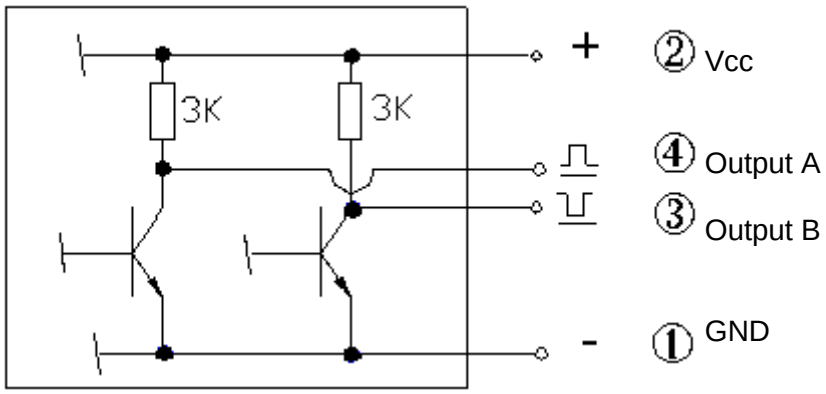


Mounting Dimensions (for reference only)

a) With Flat Pins

CYGTS99-F



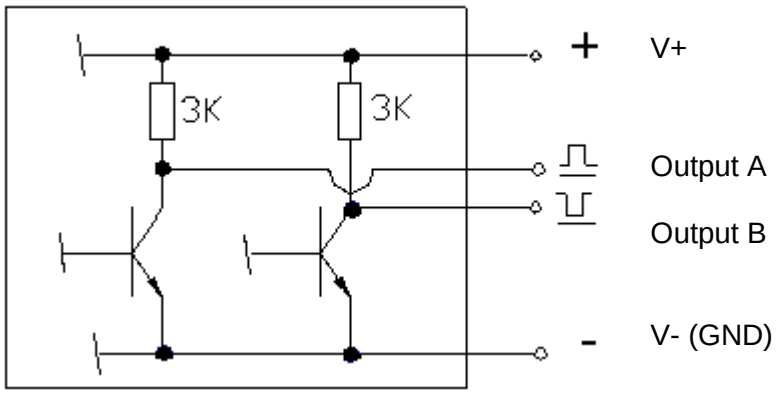


CYGTS99 sensors with different length

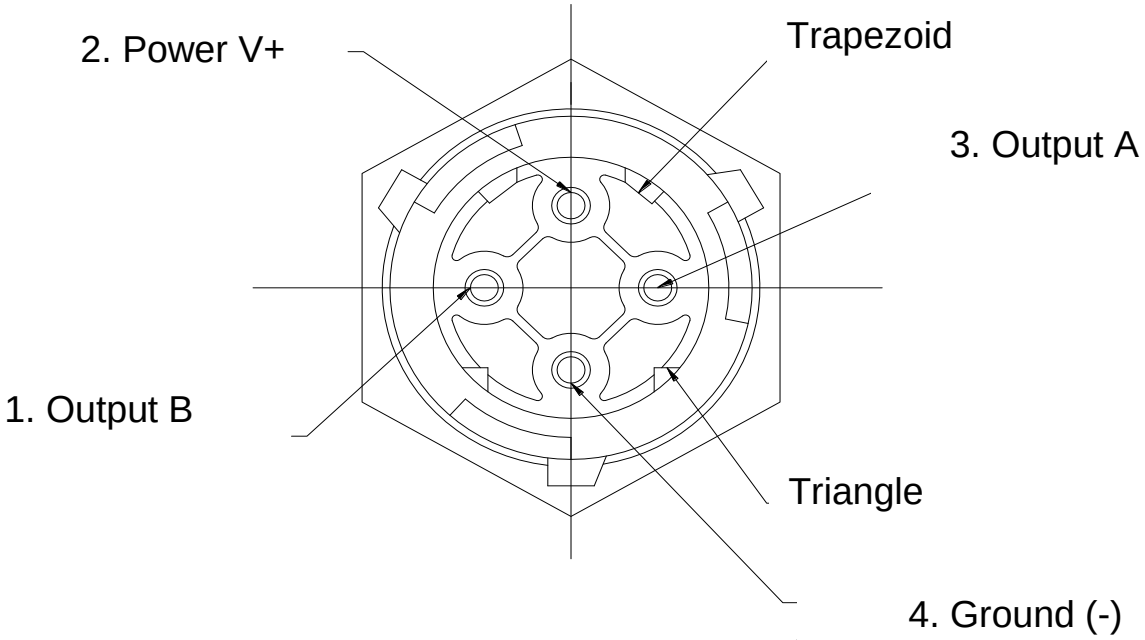
Part number	Product picture	Description
CYGTS99-198-F		Gear Tooth speed sensor L: 19,8 mm
CYGTS99-250-F		Gear Tooth speed sensor L: 25 mm
CYGTS99-350-F		Gear Tooth speed sensor L: 35 mm
CYGTS99-632-F		Gear Tooth speed sensor L: 63,2mm
CYGTS99-900-F		Gear Tooth speed sensor L: 90 mm
CYGTS99-1150-F		Gear Tooth speed sensor L: 115 mm

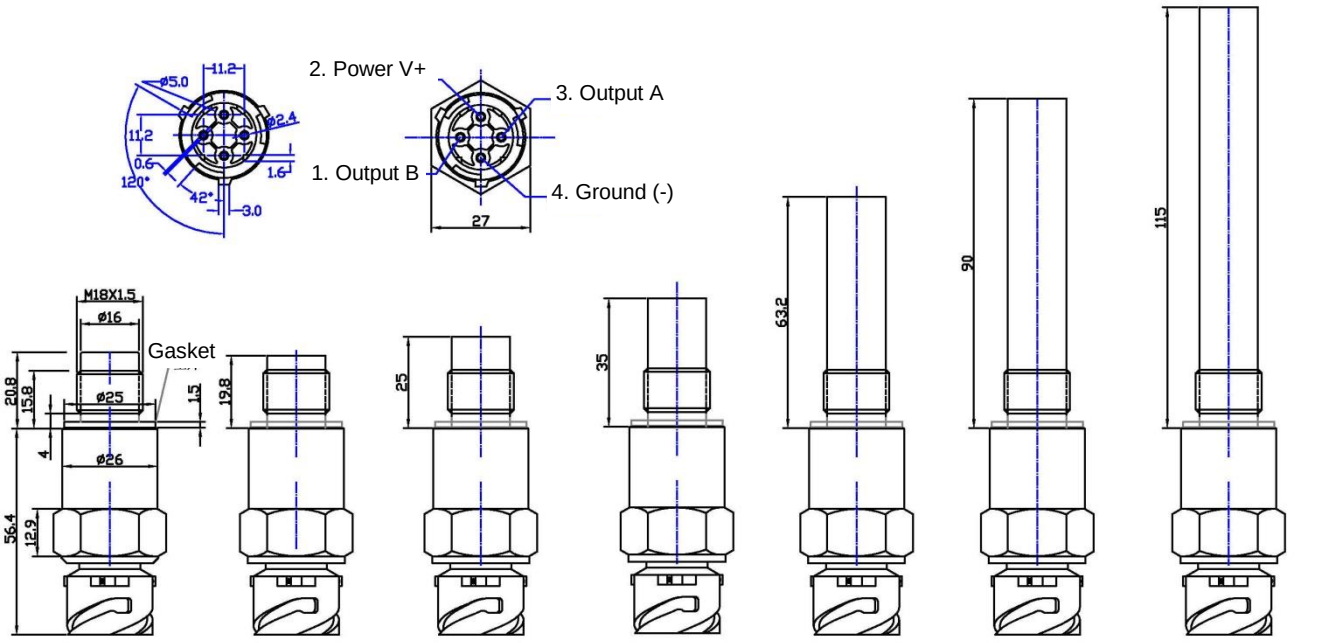
b) With Round Pins and female connector CYGTS99C

CYGTS99-R



Female Connector CYGTS99C




2. Power V+
3. Output A
1. Output B
4. Ground (-)
Gasket
M18X1.5
Ø16
Ø25
Ø26
CYGTS99-208-R
CYGTS99-198-R
CYGTS99-250-R
CYGTS99-350-R
CYGTS99-632-R
CYGTS99-900-R
CYGTS99-1150-R

Hall Effect Gear Tooth Speed Sensors CYGTS211/212

Hall Effect gear tooth sensors CYGTS211/212 are applied to the non-contact speed measurement of rotational gears. The measuring range is 1-20000rpm and the output square-wave signal can be directly connected with TTL, CMOS electric circuits and general tachometers to constitute the tachometric measuring and control systems.

The CYGTS sensors use the standard cylinder structure and have advantages of the waterproofing, dustproof, guards against the greasy dirt. They can reliably work in adverse circumstances, specially are suitable for industry control and military applications.

Measuring Principle

CYGTS211/212 gear tooth sensors use a magnetically biased Hall Effect integrated circuit to accurately sense rotational movement of ferrous metal gears. This specially designed integrated circuit with bias magnet is sealed in metal package for physical protection and cost effective installation.

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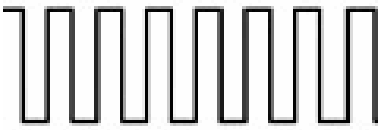
Thanks to the advanced Hall Effect measurement technology, these sensors can distinguish the addendum and tooth valley of the rotated gear and transform them to a square-wave output signal. Corresponding to a pair of addendum and tooth valley the sensor outputs a period of square-wave signal (namely conversion ratio K=1). The Hall Effect gear velocity sensors can be used to measure gears with a **modulus ≥0.5mm**.

These Units function under power supply from 5VDC to 30 VDC. Output is digital, current sinking (OC or RC). Reverse polarity protection is normally integrated. The sensor will not be damaged if power is inadvertently wired backwards.



Features

- Sensing ferrous metal targets
- Digital current sinking output (OC or RC)
- Good signal-to-noise ratio
- Excellent low speed performance
- Output amplitude not dependent on RPM
- Reverse polarity protection and output short circuit protection

Applications

- Camshaft and crankshaft speed and position
- Transmission speed
- Tachometers, counters
- Anti-skid/traction control
- Sprocket speed
- Chain link conveyor speed/distance
- Stop motion detector
- High speed low cost proximity

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General Specifications

Rated sensing distance	≤3mm (determined by reference target wheel)
Response frequency	1Hz ~ 20kHz
Measuring range	1~20000 rpm (using 60P/R gear)
Output signal	Square wave, duty cycle 50%±20%
Working display	LED
Protection function	CYGTS2xxB: working voltage polarity protection and output short-circuits protection
Operating Temperature Range	-20°C ~ +75°C
Environmental protection performance	waterproofing, dustproof, guards against greasy dirt, anti-50G machinery impact

Electric Properties

Parameter	Part number			
	CYGTS211A	CYGTS211B	CYGTS212A	CYGTS212B
Power supply	5V ±0.25V DC	8V~30VDC	5V±0.25V	8V~30VDC
Static consumption current (mA)	≤30	≤30	≤30	≤30
Max. output current (mA)	15	100	15	100
High output voltage VOH (V)	Dependent on the connected user's circuit			
Low output voltage VOL (V)	≤0.4	≤0.6	≤0.4	≤0.6
Rise time (μs)	≤1.0	≤1.0	≤1.0	≤1.0
Fall time (μs)	≤1.0	≤1.0	≤1.0	≤1.0
Output Type	OC	OC	RC	RC

Requirement of Measuring Target Wheel

Gear modulus	Tooth profile	Tooth thickness	Gear material
≥1mm	helical gear, Trapezoidal column spur gear	≥3mm	ferromagnetic material

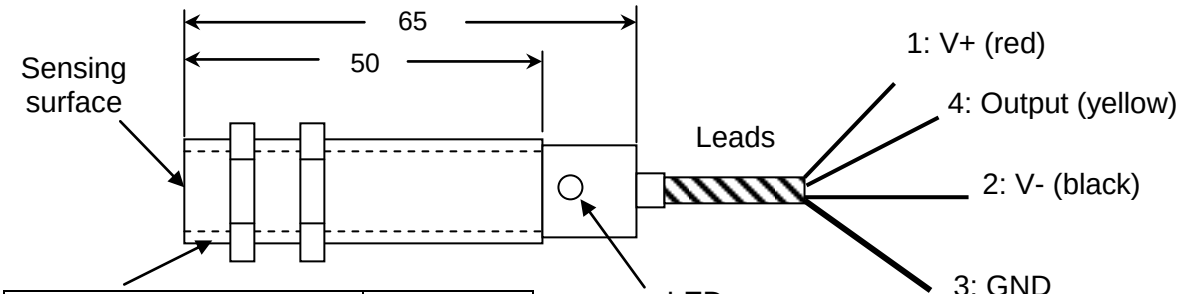
Reference Target Wheel (for sensor calibration)

Gear modulus	Tooth profile	Tooth thickness	Gear material
1mm	helical column spur gear	10mm	St20

Optimum sensor performance is dependent on the following variables which must be considered in combination:

- Target material, geometry, and speed
- Gap between sensor and target
- Ambient temperature
- Magnetic material in close proximity.

Mounting Dimensions (for reference only)



CYGTS211A/B-M16	M16x1
CYGTS211A/B-M12	M12x1
CYGTS212A/B	M16x1

Application Notes

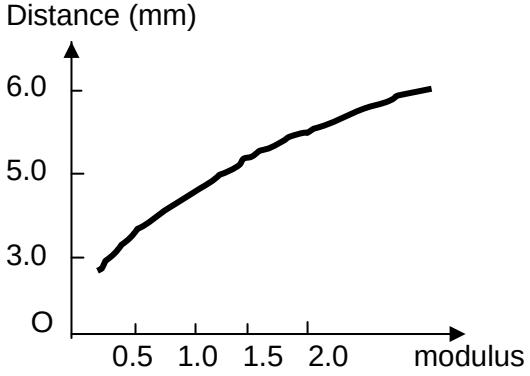
Installation

The sensor should be installed in the correct way. Please use the delivered screw to fix the sensor on the instalment hole. The attachment system must be non-magnetic material (copper, aluminium, stainless steel and so on). The sensing surface of the sensor should be oriented/adjusted to the tooth face. The space between the tooth face and the sensing surface of the sensor should not be bigger than the maximum measuring distance.

Gear Selection

The suitable gear selection has a very tremendous influence to the speed measurement because the sensor measuring object is a gear.

First, the biggest affect to the measurement is the gear modulus. The right figure shows the relation between the modulus and measuring distance. Therefore, a bigger gear modulus should be selected in the condition permission situation (m ≥1).



Next, the gear active status can also have certain influence. Generally speaking, the measured gear is already used in the machine, or it is perhaps a special-purpose measuring gear. The gear can be directly fixed on the axis (axis transmission) or through other gear meshing rotations (tooth transmission). When the gear is in a meshing rotation, the tooth face attrition can cause the change of the duty cycle of the output signal. Therefore a special-purpose measuring gear should be directly installed on the measured axis when the duty cycle has a high requirement.

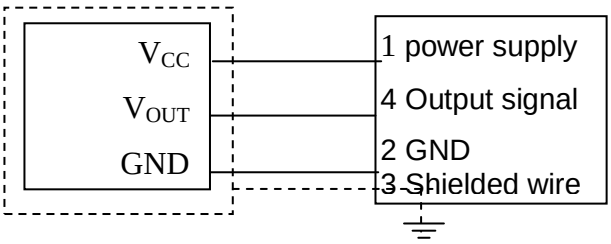
In addition, a smaller measuring distance should be used if the revolution axis has a bigger radial free movement. In this case magnetic material with high permeability should be used to make the target gear.

The measuring range changes with the teeth number N and can be determined by

Min. speed: γ_{min}**= 60/N** (rpm) Max. speed：γ_{max}**=1.2×10^6/N** (rpm)

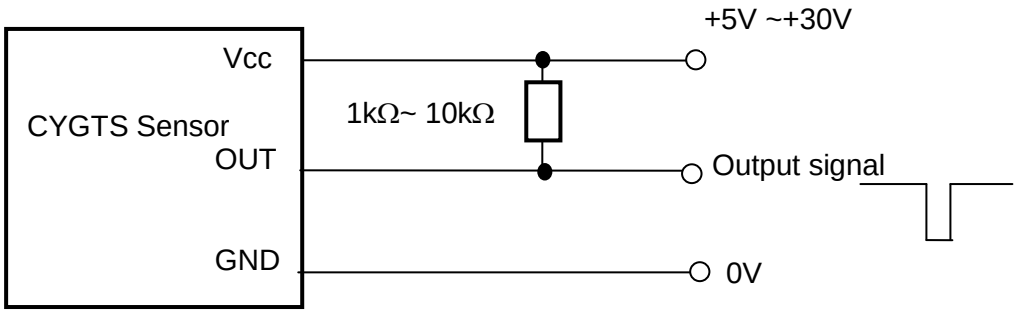
Connection

The CYGTS series product uses the single-point ground for electromagnetic shield. The sensor case is connected to the shield leads. The user is supposed to connect the shield leads to system ground at the receiving input, see the concrete wiring shown in the right figure.

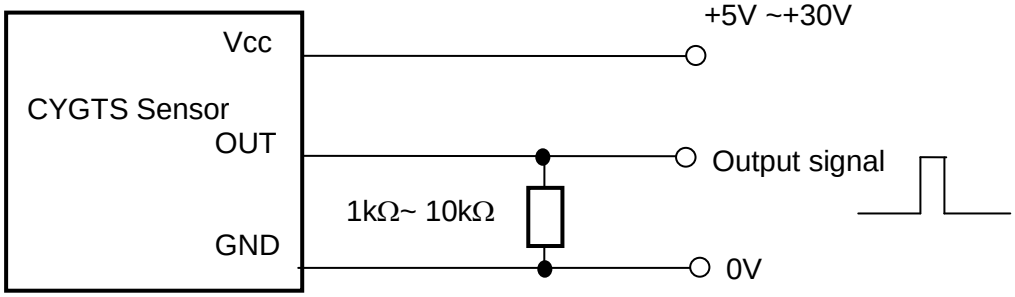


If there is stronger electromagetic interference or the distance between sensor and the measuring instrument is farther, an OC output (open collector) is suggested to use. In this case a pull-up resistor (1kΩ ~ 10kΩ) should be connected to the sensor output circuit (between power supply + and output).

NPN Output



PNP Output



Order Information

Part number of sensor CYGTS211

CYGTS 211	n	- x	O	M
(1)	(2)	(3)	(4)	(5)

(1)	(2)	(3)	(4)	(5)
Series name	Power supply	Output pole	Output type	Screw
CYGTS211	n=A: 5VDC n=B: 8 ~ 30VDC	x=N: NPN x=P: PNP	O: OC	2: M12x1mm 6: M16x1mm

Example 1: CYGTS211B-NO2, Hall Effect Gear Tooth Sensor CYGTS211 with Specifications:

Power supply 8 ~ 30VDC
NPN Output
OC open collector output
M12x1mm screw

Part number of sensor CYGTS212

CYGTS 212	n	x	R	6
(1)	(2)	(3)	(4)	(5)

(1)	(2)	(3)	(4)	(5)
Series name	Power supply	Output pole	Output type	Screw
CYGTS212	n=A: 5VDC n=B: 8 ~ 30VDC	x=N: NPN x=P: PNP	R: RC	6: M16x1mm

Example 2: CYGTS212A-NR6, Hall Effect Gear Tooth Sensor CYGTS212 with Specifications:

Power supply 5VDC
NPN Output
RC output
M16x1mm screw

Hall Effect Gear Tooth Speed Sensors CYGTS288

Hall Effect gear tooth sensors CYGTS288 are applied to the non-contact speed measurement of rotational gears. The measuring range is 1-20000rpm and the output square-wave signal can be directly connected with TTL, CMOS electric circuits and general tachometers to constitute the tachometric measuring and control systems.

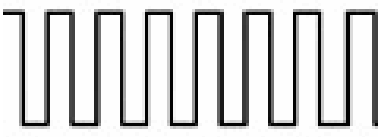
The CYGTS288 sensors use the standard cylinder structure and have advantages of the waterproofing, dustproof, guards against the greasy dirt. They can reliably work in adverse circumstances, specially are suitable for industry control and military applications.

Measuring Principle

CYGTS288 gear tooth sensors use a magnetically biased Hall Effect integrated circuit to accurately sense rotational movement of ferrous metal gears. This specially designed integrated circuit with bias magnet is sealed in metal package for physical protection and cost effective installation.

Thanks to the advanced Hall Effect measurement technology, these sensors can distinguish the addendum and tooth valley of the rotated gear and transform them to a square-wave output signal. Corresponding to a pair of addendum and tooth valley the sensor outputs a period of square-wave signal (namely conversion ratio K=1). The Hall Effect gear velocity sensors can be used to measure gears with a modulus ≥1mm.

These Units function under power supply from 4.5VDC to 30VDC. Output is digital, current sinking (OC or RC). Reverse polarity protection is normally integrated. The sensor will not be damaged if power is inadvertently wired backwards.



Features

- Sensing ferrous metal targets
- Digital current sinking output (OC or RC)
- Good signal-to-noise ratio
- Excellent low speed performance
- Output amplitude not dependent on RPM
- Reverse polarity protection and output short circuit protection

Applications

- Camshaft and crankshaft speed and position
- Transmission speed
- Tachometers, counters
- Anti-skid/traction control
- Sprocket speed
- Chain link conveyor speed/distance
- Stop motion detector
- High speed low cost proximity

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Email: info@chenyang.de
http://www.chenyang.de

General Specifications

Rated sensing distance	≤3mm (determined by reference target wheel)
Response frequency	1Hz ~ 20kHz
Measuring range	1~20000 rpm (using 60P/R gear)
Output signal	Square wave, duty cycle 50%±20%
Working display	LED
Protection function	Working voltage polarity protection and output short-circuits protection
Operating Temperature Range	-40°C ~ +125°C
Environmental protection performance	waterproofing, dustproof, guards against greasy dirt, anti-50G machinery impact

Electric Properties

Parameter	Value (range)
Power supply (DC) Vcc(V)	4.5 ~ 30
Static consumption current Is (mA)	≤ 30
Max. output current Iomax (mA)	100
High output voltage VOH (V)	Vcc – 0.5
Low output voltage VOL (V)	≤ 0.6
Rise time tr (μs)	≤ 2
Fall time tf (μs)	≤ 2
Output polarity.	NPN or PNP
Output Type	OC or RC
Screw size (mm)	M12 x 1, M16 x 1, M18 x 1

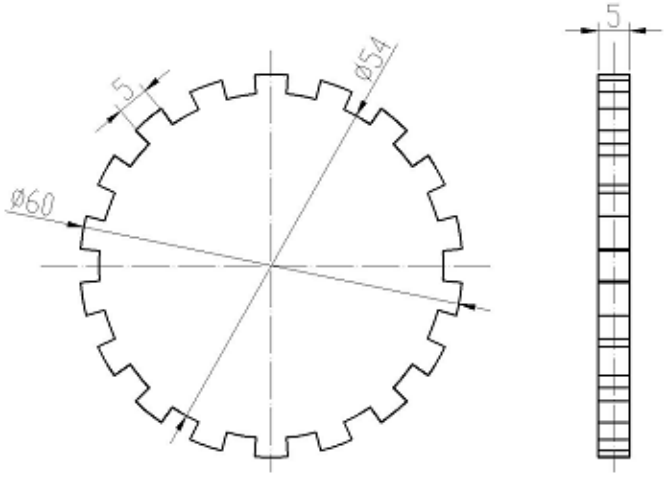
Requirement of Measuring Target Wheel

Gear modulus	Tooth profile	Tooth thickness	Gear material
≥1mm	helical gear, Trapezoidal column spur gear	≥3mm	ferromagnetic material

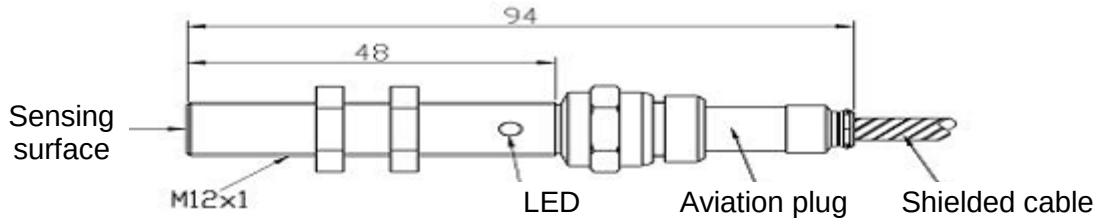
Reference Target Wheel (for sensor calibration)

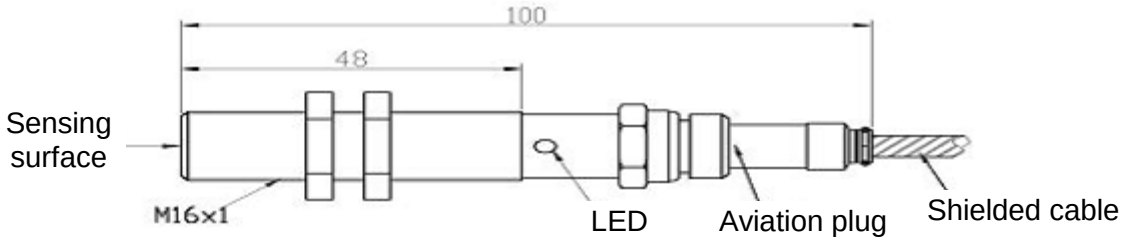
Optimum sensor performance is dependent on the following variables which must be considered in combination:

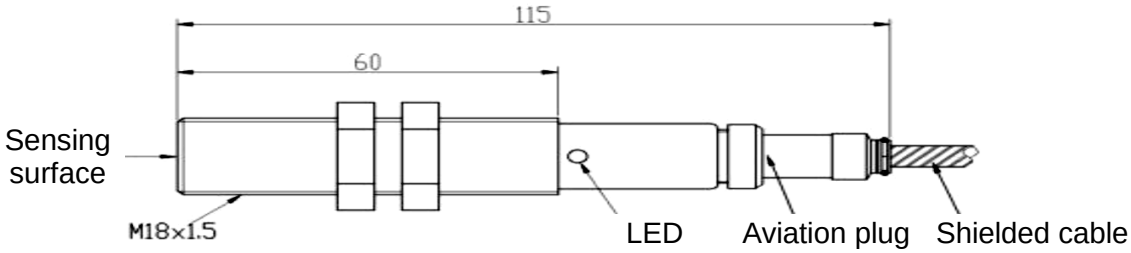
- Target material, geometry, and speed
- Gap between sensor and target
- Ambient temperature
- Magnetic material in close proximity.

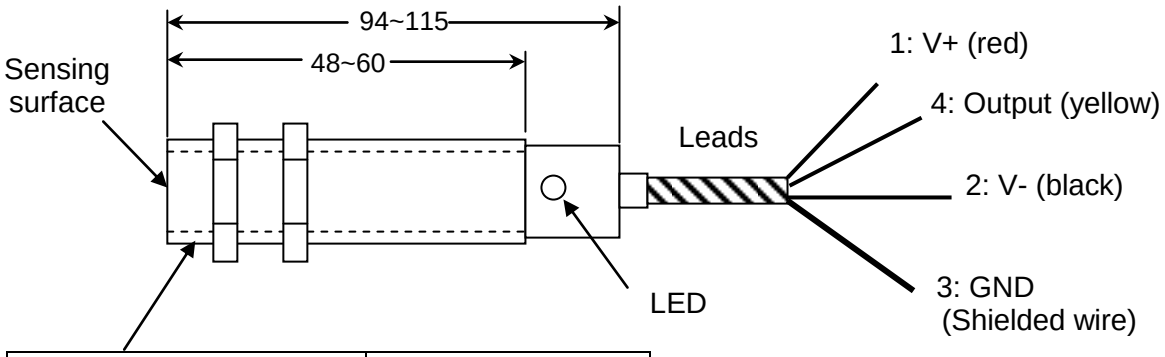


Mounting Dimensions (for reference only)

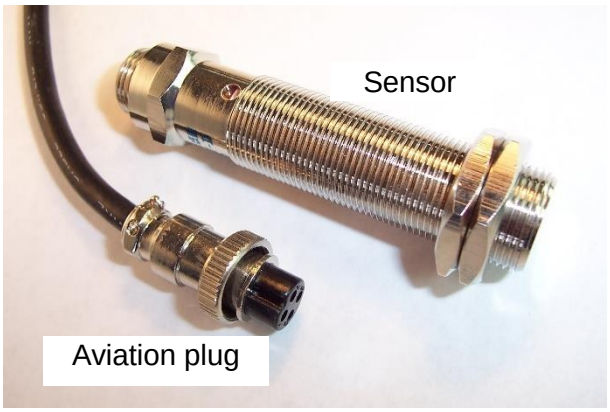








CYGTS288-NO12	M12x1
CYGTS288-NR12	
CYGTS288-PO12	
CYGTS288-PR12	
CYGTS288-NO16	M16x1
CYGTS288-NR16	
CYGTS288-PO16	
CYGTS288-PR16	
CYGTS288-PR18	M18x1



Application Notes

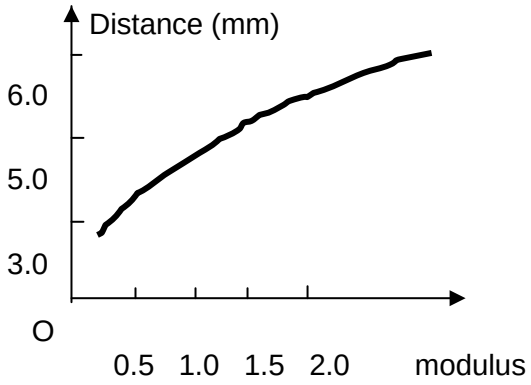
Installation

The sensor should be installed in the correct way. Please use the delivered screw to fix the sensor on the instalment hole. The attachment system must be non-magnetic material (copper, aluminium, stainless steel and so on). The sensing surface of the sensor should be oriented/adjusted to the tooth face. The space between the tooth face and the sensing surface of the sensor should not be bigger than the maximum measuring distance.

Gear Selection

The suitable gear selection has a very tremendous influence to the speed measurement because the sensor measuring object is a gear.

First, the biggest affect to the measurement is the gear modulus. The right figure shows the relation between the modulus and measuring distance. Therefore, a bigger gear modulus should be selected in the condition permission situation (m ≥1).



Next, the gear active status can also have certain influence. Generally speaking, the measured gear is already used in the machine, or it is perhaps a special-purpose measuring gear. The gear can be directly fixed on the axis (axis transmission) or through other gear meshing rotations (tooth transmission). When the gear is in a meshing rotation, the tooth face attrition can cause the change of the duty cycle of the output signal. Therefore a special-purpose measuring gear should be directly installed on the measured axis when the duty cycle has a high requirement.

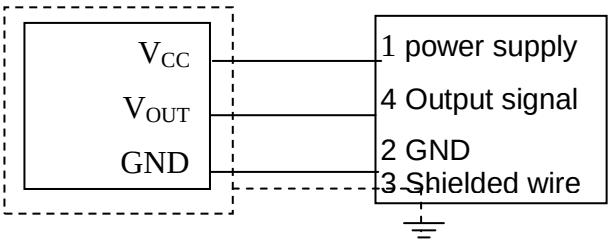
In addition, a smaller measuring distance should be used if the revolution axis has a bigger radial free movement. In this case magnetic material with high permeability should be used to make the target gear.

The measuring range changes with the teeth number N and can be determined by

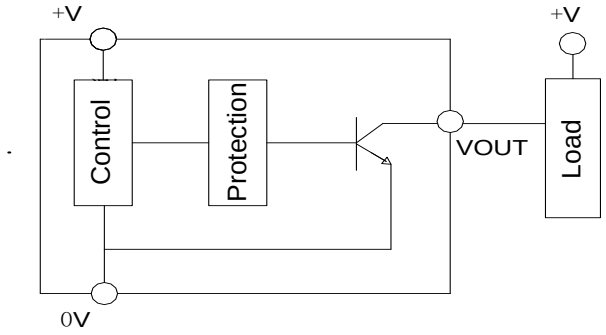
Min. speed: $\gamma_{min} = 60/N$ (rpm) Max. speed : $\gamma_{max} = 1.2 \times 10^6/N$ (rpm)

Connection

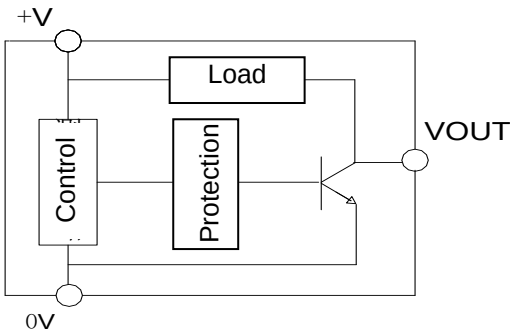
The CYGTS288 series product uses the single-point ground for electromagnetic shield. The sensor case is connected to the shield leads. The user is supposed to connect the shield leads to system ground at the receiving input, see the concrete wiring shown in the right figure.



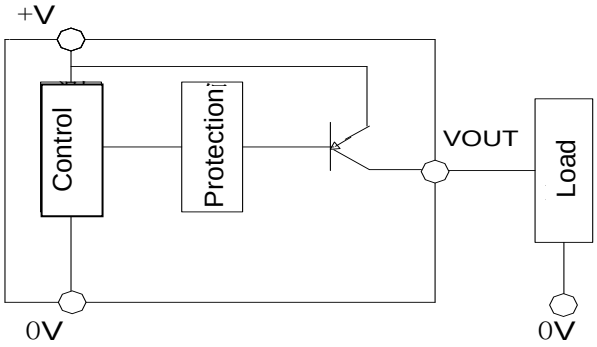
Circuits of OC and RC Output:



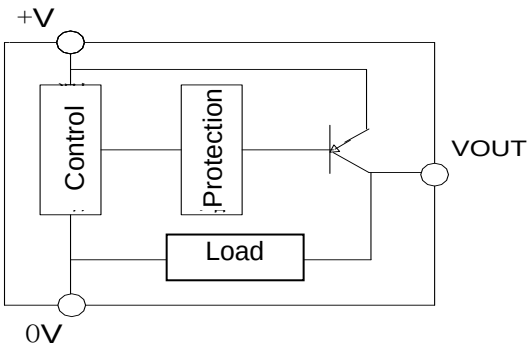
NPN (OC) Output



NPN (RC) Output



PNP (OC) Output

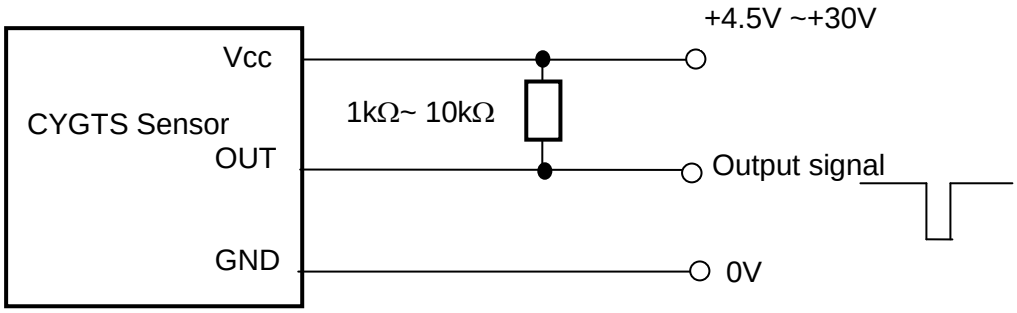


PNP (RC) Output

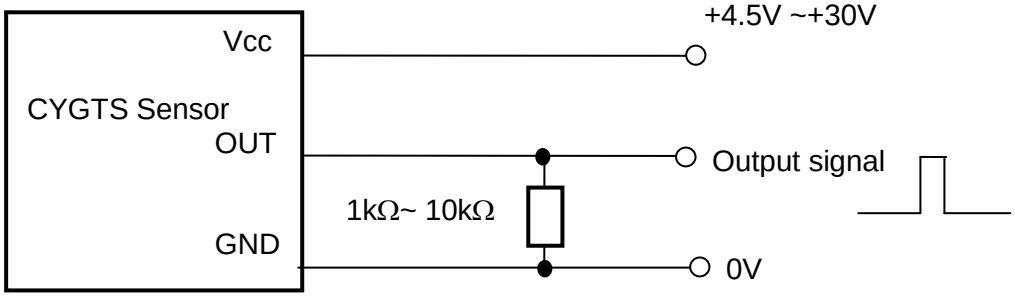
If there is stronger electromagetic interference or the distance between sensor and the measuring instrument is farther, an OC output (open collector) is suggested to use. In this case a pull-up or

pull-down resistor (1kΩ ~ 10kΩ) should be connected to the sensor output circuit (between power supply + and output).

NPN Output



PNP Output



Order Information

Part number of sensor CYGTS288

CYGTS288	-	x	O	M
(1)		(2)	(3)	(4)

(1)	(2)	(3)	(4)
Series name	Output pole	Output type	Screw
CYGTS288	x=N: NPN x=P: PNP	O: OC R: RC	12: M12x1mm 16: M16x1mm 18: M18x1mm

Example: CYGTS288-NO12, Hall Effect Gear Tooth Sensor CYGTS288 with
Power supply 4.5 ~ 30VDC
NPN Output, OC open collector output
M12x1mm screw