

# Dual Hall, Quadrature Output, Speed and Direction Sensor

## Description

The **Q** series is a dual differential hall sensor that provides speed and direction information using a quadrature output with signals 90° phase shifted from each other. Target direction is determined by output lead/lag phase shifting.

This product is designed for applications where extremely high resolution is required at wide frequency ranges, 0 kHz to 15 kHz, and large air gaps. BiCMOS Hall-effect technology, using advanced digital signal processing for dynamic off-set cancellation, provides enhanced air gap performance and phase shift accuracy over most conditions.

The robust package is automotive under-the-hood grade for most environmental conditions as well as EMI (electromagnetic interference) hardened. Package design includes an o-ring seal for pressure applications and a fixed mounting flange. Multiple connection options, including wire harness and integral connector versions could be customized.



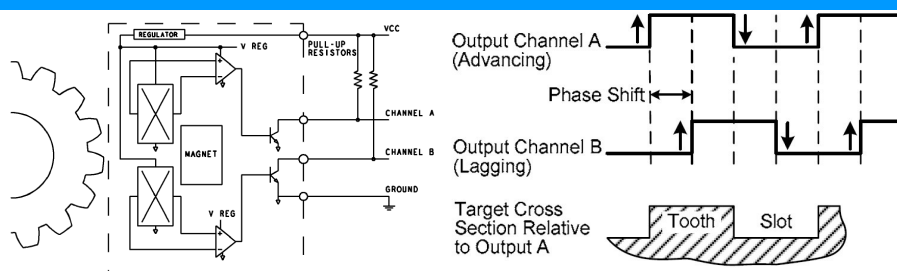
## Electrical Specification

Supply voltage	4.5 ... 18V DC	Max. continuous supply voltage 18 V
Reverse voltage	-18 V max. continuous	
Current consumption	13.6 mA	Without pull-up resistors, ambient temperature 25°C
Frequency Range	0 ... 15 kHz	higher frequencies about 10 kHz may be dependent on target geometry and air gap
Load Current	20mA Max	
Output signal type	2 square waves	open collector
Output signal level	0.5 ... Vs - 0.5 V	
Duty cycle	50% ±10%	
Phase shift	90° ±20°	using recommended target tooth/slot dependent on load resistor
Rise time	10 µs typ.	
Fall time	1 µs typ.	

## Environment Conditions

Operating temperature	-40 ... 150°C
Thermo saline Dunk	5 dunks, 105°C to 0°C air to liquid, 5% saline
Salt fog	96hr DIN IEC 6872-11
Degree of protection	IP65
Vibration	30g 10-2KHz
Mechanical Shock	50g
EMI radiated	100 V/m peak, 400Hz ... 2GHz
EMI bulk current injection	60mA, 20 ... 400MHz
EMI ESD	16/8KV air/contact, against the connector (150pF, 330 Ohm)
Fast transient burst	EN 61000-4-4 Level 4

## Circuit diagram and Sensor Output



## Feature

- Hall-effect magnetic sensing technology
- Dual differential Hall provides enhanced target resolution
- Advanced performance dynamic offset self calibration
- Air gap up to 2 mm [0.08 in]
- Near zero speed
- -40 °C to 150 °C continuous operating temperature
- Automotive under-the-hood packaging integrity
- EMI hardened
- High frequency switching capability (up to 15 kHz)
- Multiple connector options
- Short circuit protection
- Reverse voltage protection
- Open collector output
- Low jitter output
- O-ring seal

## Application

- 2-channel speed detection of gearwheels with small module and high resolution.
- Applications mobile operating machines and electric drives
- Steering position
- Tachometers/counters
- Encoders
- Speed and Direction of gears and shafts transmissions, hydraulic motors, pumps and gear boxes.

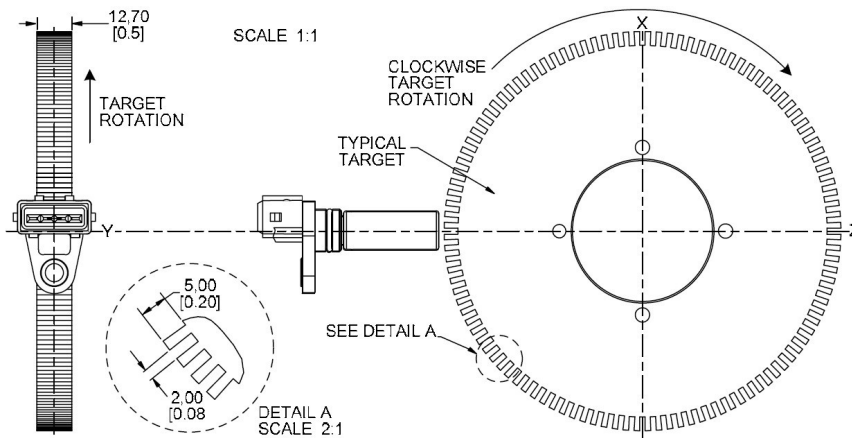
## Pin Identification:

- 1: Red : +Vcc
- 2: Black: Ground
- 3: Brown: Channel A
- 4: Yellow: Channel B

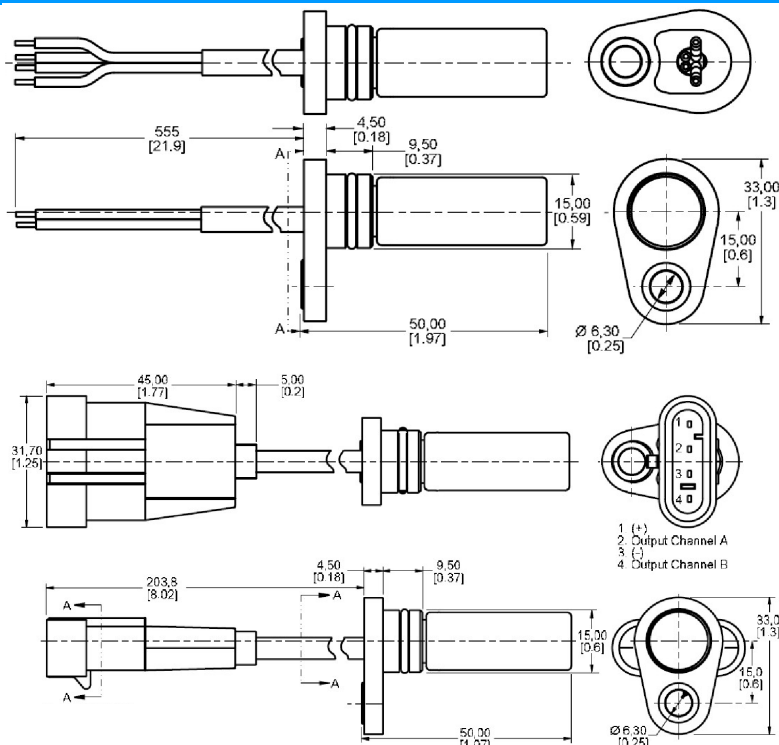
## Mounting Characteristics

Air gap	0...2.0mm
Target tooth thickness	2.0mm, other geometry may be suitable
Target slot thickness	2.0mm, other geometry may be suitable
Tooth height	>3. 0 mm, shorter tooth height may limit max. air gap performance
Target width	>8.0mm, narrow targets may limit axial offsets
Mounting principle	Asymmetric flange for directional dependence
Sensor misposition to target	±1. 5 mm, dependent on target geometry
Tightening torque	Max. 10Nm
Bending radius of connection cable	≥ 15mm
O-Ring	16 x 2mm silicone

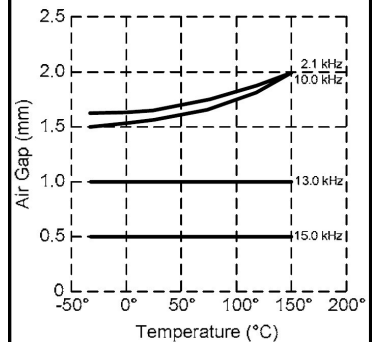
## GENERAL MOUNTING GEOMETRY



### Mechanical dimensions in mm:




### Temp./Air gap/Freq. Derating Curve



**Par Number definition:**

Q45-03: 300mm leadwire  
Q45-05: 500mm leadwire  
Q45-07: 700mm leadwire  
Q45-xxx: customized

PERSONAL IN-  
JURY

 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.**



## 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.**