Intelligent Speed Sensor

JAQUET TECHNOLOGY GROUP

IQ Speed Sensor™ Intelligent enough to be simple

At one glance

Technology	Hall effect Sensor with Built in processor
Supply voltage	5.5 .. 32 VDC
Connection	Cable
Operating Temperature	-40 .. +125 °C
Protection class	IP68
Special features	11 additional functions Analogue output Temperature measure-ment

Technology

With the IQ Speed Sensor™ JAQUET has brought a new generation of speed sensors to the market place. It's factory programmable microprocessor enables the IQ Speed Sensor ™ to perform as a complete speed sensing and monitoring solution, offering 10 different speed signal related functions - plus a temperature measurement capability. You can either select just one - or a combination of 4 functions.

By sensing an involute gear wheel, IQ sensors generate speed proportional output signals and intelligent control functions. They exhibit a static characteristic, allowing guaranteed operation down to 0Hz. The IQxxA or IQxxD provides one analog or digital output, whilst the IQxxF offers 4 factory configurable digital and analog outputs including a Process Temperature Measurement. The front end comprises of 2 sensing channels and so the sensor is not rotationally symmetrical.

The typekey holds besides the size, the number of possible functions and the wiring information also a 5 character wide programm number which specifies the program stored in the processor. The program number will be assigned during the definition process of the IQ Speed Sensor™.

IQ xxD.00	One output with one function – 1, 2, 3 ,5, 7		
IQ xxA.00	One output with one function – 8..10		
IQ xxF.00	Output	A1	One from functions 1..4
		A2	One from 1..3, or 5..7
		A3	One from 1..3, or 5..7 – or as input to control function 4
		A4	One from 8..11

Type overview

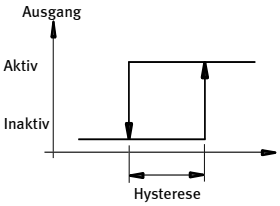
Type	Connection	Housing	Weight [g]	Operating-Temp. [°C]	Remarks
IQ 12D.00 ..... S	cable 2m	M12 x 1 mm	125 g	-40 .. +125	1 function digital available
IQ 12A.00 ..... S	cable 2m	M12 x 1 mm	125 g	-40 .. +125	1 function analogue available
IQ 16D.00 ..... S	cable 2m	M16 x 1 mm	160 g	-40 .. +125	1 function digital available
IQ 16A.00 ..... S	cable 2 m	M16 x 1 mm	160 g	-40 .. +125	1 function analogue available
IQ 16F.00 ..... S	cable 2 m	M16 x 1 mm	160 g	-40 .. +125	4 functions available
IQ 18A.00 ..... S	cable 2 m	M18 x 1 mm	180 g	-40 .. +125	1 function analogue available
IQ 18D.00 ..... S	cable 2m	M18 x 1 mm	180 g	-40 .. +125	1 function digital available
IQ 18F.00 ..... S	cable 2m	M18 x 1 mm	180 g	-40 .. +125	4 functions available
IQ 22A.00 ..... S	cable 2m	M22 x 1 mm	200 g	-40 .. +125	1 function analogue available
IQ 22D.00 ..... S	cable 2m	M22 x 1 mm	210 g	-40 .. +125	1 function digital available
IQ 22F.00 ..... S	cable 2m	M22 x 1 mm	210 g	-40 .. +125	4 functions available

14 0001 3702

JAQUET AG Thannerstrasse 15 CH-4009 Basel (Schweiz) Tel: +41 61 306 8822 Fax +41 61 306 8818 www.jaquet.com

Function catalogue of the IQ Speed Sensors™

The function catalogue holds at the moment 11 functions which are described here after. Due to the open architecture - with a microprocessor- it is however possible to define futher functions. Should your measurement or monitoring problem not be described herein, it will be useful to ask JAQUET specialsts for a specific solution.

Function	Parameter and Parameter values	Remarks
1 Direct speed frequency		Unfiltered channel. This value is best for fast analyses of speed signals.
2 Vibration free frequency		Filtered channel. Removes vibration effects of a speed signal.
3 Direction of rotation signal	Reference direction CW or CCW = 0 or 1	
4 Simulated Frequency	1 kHz ... 10 kHz	Available only for the execution IQ xxF As the connection point A3 is connected to 0V at the output apeares the frequency which has been set as parameter. At a floating A3 the output A1 delivers the actual speed information.
5 Signal with frequency division	Division factor 2 ... 100 in increments of 1	The measured Frequency is divided by the chosen factor.
6 Second phase shifted speed signal		Available only for the execution IQ xxF The nominal phase shift between the two signals is 40° , the minimal phase shift is 20°
7 Limit value 	Process vaues: Speed 1..15000 Hz Temperature -40 .. +125° C Hysteresis 10 .. 100 % Rotational regularity 0.5 .. 25%	Final value resolution: 1 Hz in the range of 1 .. 15000 Hz 1 ° C in the range of -40 ..+125° At 100 % Hysteresis, System Reset (Power off) required after switching to initialize the function. Regularity is derived from n (64..256) measurements For regularity the following values applies: 1 Hz .. 1200 Hz = min. 0.5 % 1200 Hz .. 2400 Hz = min. 1 % 4800 Hz .. 9600 Hz = min. 4 % 9600 Hz .. 15000 Hz = min. 8 %
8 Speed as analogue value 4 .. 20 mA	Start value: Value in Hz corresponding to 4 mA. End value: Value in Hz corresponding to 20 mA.	The start value can be 0 .. 50 % of the end value. The end value can be 1 .. 15 kHz Output current resolution is 8 bits. Time constant fixed at 0.05s. Max. output voltage 24V
9 Speed with sense of direction as analogue value 4 .. 12 .. 20 mA	Speed value in Hz in reverse direction corresponding to 4 mA Speed value in positive direction corresponding to 20 mA	Stand still = 0 Hz corresponding to 12 mA Values between 1 .. 15 kHz are possible
10 Rotational regularity 4 .. 20 mA	Start value is 0% End value in % corresponding to 20 mA: 8 .. 25 % Measuring points: 64 .. 256	For a number of n (64..256) measuring points in a sequence a value is defined with the formula: (RPMmax - RPMmin)/RPM * 100
11 Temperature	Start value in °C corresponding to 4 mA End value in °C corresponding to 20 mA	Values possible between -40 .. +125° C Output time constant: 200 ms Accuracy 1°C

14 0001 3702

Technical Data

Supply voltage	5.5 – 32 Vdc
Current consumption	max. 30 mA (without load – add I source for total current drain)
Signal output	• Digital outputs A1, A2, A3 : square wave from push/pull output stages, DC coupled with supply (negative pole = reference potential), load current max. 25mA. Output voltage HI: › Supply voltage – 0.5 Volt with I ‹ 25 mA Output voltage LO: ‹ 0.5 Volt with I ‹ 25 mA protected against short circuit and reverse polarity • The signal A3 can be used as an input to switch the Reference Frequency on : The input is active when 0V is applied. Current output A4 : 4-20 mA, DC coupled with supply (negative pole = reference potential), max. load 820 Ohms
Frequency range	0 Hz .. 15 kHz
Noise immunity (EMC)	• Electrostatic discharge to the sensor housing, cable screen or conductors: to ± 4 kV peak, in accordance with IEC/EN 61000-4-2, interference level 2. • Radiated electromagnetic field: to 30 V/m, 80 % AM, 1 kHz in the range 1 MHz to 1000 MHz corresponding to IEC/EN61000-4-3, level 3 Fast transients / HF-Bursts, with capacitive coupling to the sensor cable : to ± 4 kV peak, corresponding to IEC/EN 61000-4-4, level 4
Isolation	Housing, cable screen and electronics galvanically isolated (500V/50 Hz/ 1 Min.)
Operating temperature	-40 .. +125 °C
Housing	Stainless steel 1.4305, front side hermetical sealed, electronic components potted in a chemical and age proof synthetic resin. Dimensions according to drawing and model.
Protection class	IP68 (Head), IP67 (cable exit).
Vibration immunity	5 g in the range 5...100Hz, 10 g in the range 100...2000 Hz.
Shock immunity	50 g during 20 ms, half sine wave.
Pole wheel	Ferromagnetic toothed wheel, involute gear form preferred, axial movement ‹ 0,2 mm, eccentricity ‹ 0,2 mm. Minimum pole wheel width: 8 mm For Module 1 : Sensor gap: 0,1....1,0 mm For Module 2 : Sensor gap: 0.1... 2.0 mm

Installation and wiring

Connection	The sensor leads are susceptible to external interference. For this reason the following points should be noted: • Uninterrupted screened cable should be used for the sensor connections wherever possible. The screen should only be terminated at the instrument on the terminal provided or 0 Volt. • The sensor leads must be laid as far as possible from large electrical machines and never laid parallel to high current cables. The maximum permissible cable length is a function of the sensor voltage, cable run, cable capacitance and inductance and the maximum sensor frequency. In any case it is advantageous to keep the distance from sensor to electronics as short as possible. The sensor cable can be extended using an IP20 rated terminal box (to DIN 40050 or IEC 529). The following Jaquet extension cables are recommended: JAQUET Art.-Nr. 824L-35053, 4 wire; 824L-35535, 6 wire, AWG24, 0.24mm2.

14 0001 3702

Installation

This sensor contains a Differential-Hall-Element. Therefore the housing must be orientated to the pole wheel as shown in the drawings below. Incorrect positioning impairs the functionality of the sensor.

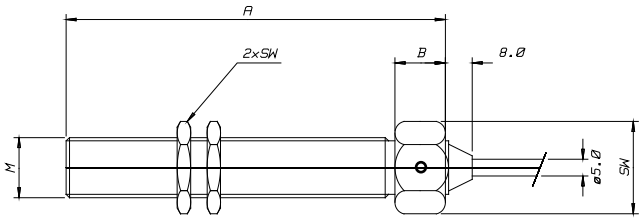
With gear or slotted wheels and radial mounting the sensor should be mounted with the front centre over the centre of the pole wheel. Dependent on the gear width, a degree of axial movement is permissible. The centre of the sensor must however remain a minimum of 3 mm from the edge of the wheel under all operating conditions.

It is important to ensure a rigid, vibration free mounting of the sensor.

The sensors are insensitive to oil, grease etc. and can be used in demanding environmental conditions. Should the cable also come into contact with aggressive materials, then Teflon cable must be used. During sensor installation the smallest possible gap should be set. The gap should be selected such that the face of the sensor cannot come into contact with the pole wheel, even under worst case operating conditions.

The system calibration is not influenced by the air gap.

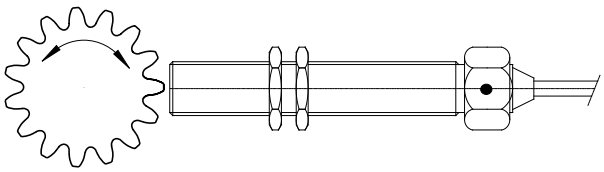
Dimensions / Wiring diagram



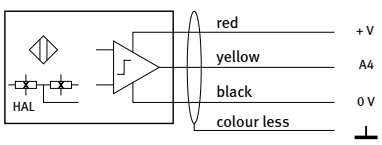
Dimensions

Type	Thread	Hex	Dim A	Dim B
IQ 12x.00 ..... S	M 12 x 1	17 mm	100 mm	10 mm
IQ 16x.00 ..... S	M 16 x 1	19 mm	113 mm	13 mm
IQ 18x.00 ..... S	M 18 x 1	24 mm	113 mm	15 mm
IQ 22x.00 ..... S	M 22 x 1	27 mm	113 mm	18 mm

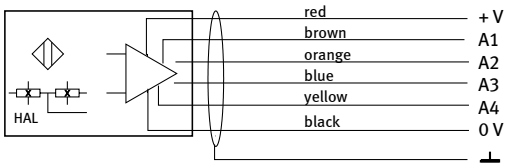
Orientation of pole wheel against reference point



IQ 12A.00 ..... S, IQ 12D.00 ..... S, IQ 16A.00 ..... S, IQ 16D.00 ..... S, IQ 18A.00 ..... S, IQ 18D.00 ..... S IQ 22A.00 ..... S, IQ 22D.00 ..... S



IQ 16F.00 .....S, IQ 18F.00 ..... S, IQ 22F.00 ..... S



14 0001 3702