InteliSENS®

DGK-i4 Series

PROTON PRODUCTS

Non-Contact CCD & LED Diameter Measurement

- 10,000 Measurements per Axis per Second
- No Moving Parts - No Wear
- Precision Optics Gorilla Glass Protected
- Industry 4.0 Data Communications
- Stand Alone Device
- Simple PLC Integration

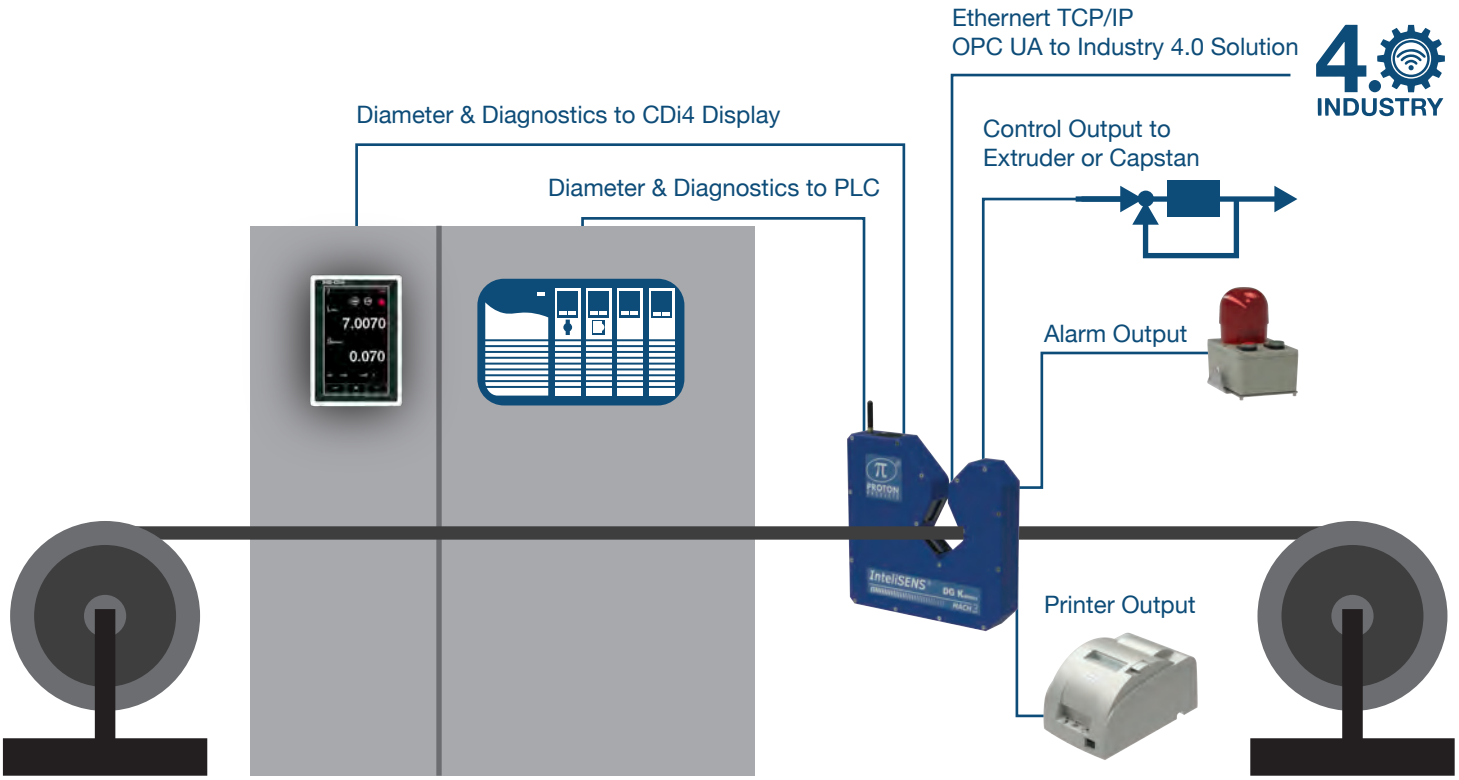
DGK-i4 Series

Non-Contact Diameter Gauge

The InteliSENS® Dual Axis Diameter Gauge does much more than measure diameter. LED and CCD Technology coupled with our specially designed Optics provide Super Fast diameter and position measurement. This technology has no moving parts, no wear, and no drift. The extremely powerful FPGA processor used in the DGK Diameter Gauges enables Super Fast Measurements. 5,000 scans per second per axis in the standard configuration can be increased to 10,000 scans per second per axis. Additional options add functionality to measure, control, and alarm & report on product quality.

Applications

Smart Sensor Technology



Wire Drawing

Insulation

Stranding

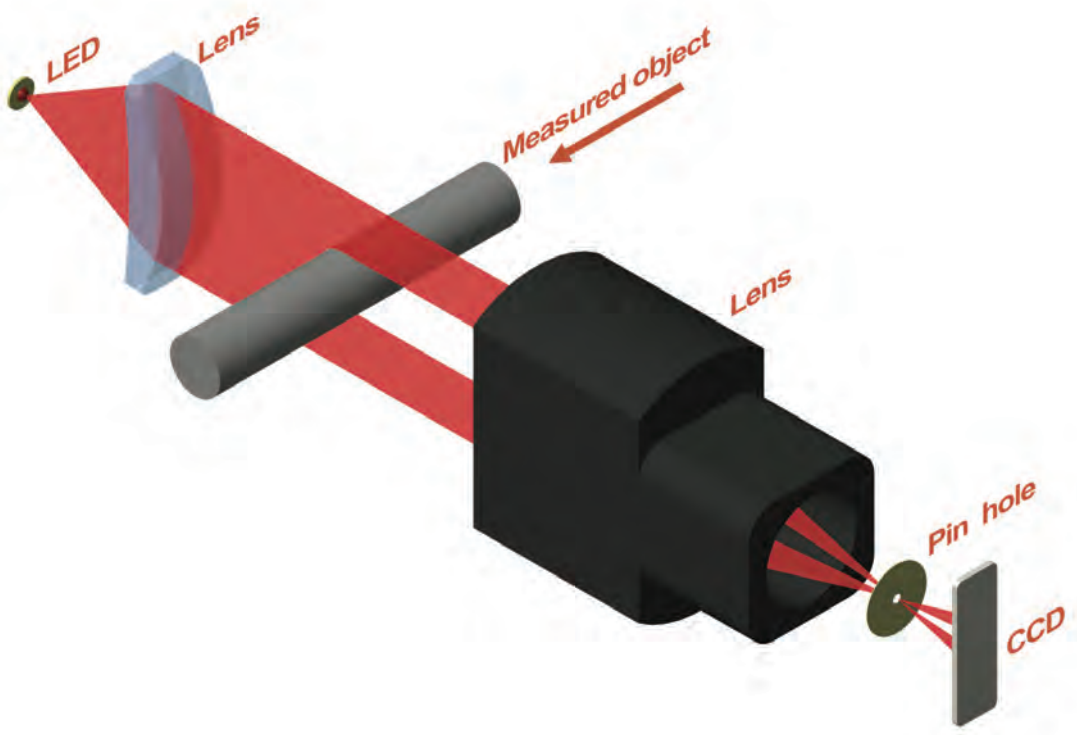
Jacketing

Hose and Tube

Measuring Principle

Unlike traditional laser diameter gauges, which use a mechanically scanned laser beam, the InteliSENS® DGK-i4 diameter gauge uses an entirely solid-state technique. A LED light source is used to generate a broad collimated light beam that fully illuminates the measurement zone. The shadow generated by an object inserted into this light beam is imaged by a CCD, and the resulting electrical signal is digitally processed to measure diameter. This solid-state approach results in the following advantages over traditional laser diameter gauges:

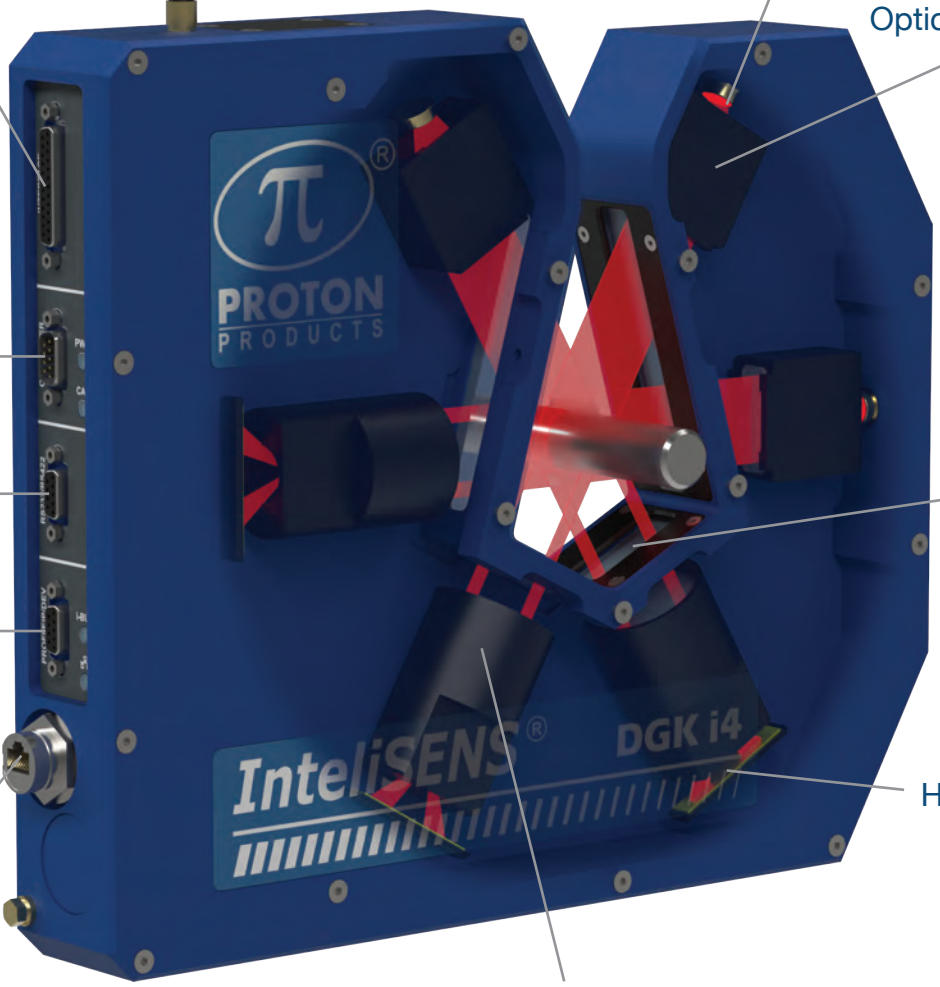
- Higher measurement speeds (not limited by mechanical scan time).
- Higher reliability and MTBF of the gauge as it suffers no wear from moving parts.
- No laser precautions are required as a non-laser light source is used.



A novel LED light, and optical lens design produces a broad light beam across the measured part surface. The CCD receiver module is scanned up to 10,000 times per second per axis to measure diameter and position. With no moving parts, a reliable, accurate, and repeatable measurement is achieved.

DGK2015-i4 DGK2030-i4 DGK2060-i4 DGK3030-i4 DGK3060-i4

Advanced Technology



Interface
2x Logic Input
4x Relay Output
1x Analog Speed Input
1x Pulse Speed Input
Opt. PI Feedback Control
Opt. Analog Output

WiFi

Precision Machine Body

LED Light Source

Proton Designed Optical Transmitting Unit

CAN/Power

RS232/RS485

iBus
Profibus
Profinet
Ethernet IP

Gorilla Glass Lens Protection

High Density CCD

Ethernet
OPC-UA
Modbus

High Speed FPGA Signal Processing

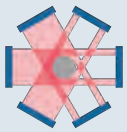
Proton Designed Focal Optics

Specifications

Performance

2 axis

DGK2015-i4	DGK2030-i4	DGK2060-i4	DGK2120-i4	DGK2200-i4



3 axis

	DGK3030-i4	DGK3060-i4	DGK3120-i4	DGK3200-i4

Minimum Diameter	0.2mm 7.8mil	0.2mm 7.8mil	0.3mm 11.8mil	5mm 0.039"	5mm 0.039"
Maximum Diameter	15mm 5/8”	30mm 1 3/16"	60mm 2 23/64"	120mm 4 23/32"	180mm 7 7/8"
Accuracy	1µm	1µm	± (3µm + 0.01% of object diameter)	± (50µm + 0.05% of object diameter)	± (50µm + 0.05% of object diameter)
Resolution	0.01µm	0.01µm	0.01µm	0.01µm	0.01µm
Max Scan Speed	20,000 Scans/Sec	20,000 Scans/Sec 30,000 Scans/Sec	20,000 Scans/Sec 30,000 Scans/Sec	3,000 Scans/Sec 4,500 Scans/Sec	3,000 Scans/Sec 4,500 Scans/Sec
Measurement Mode	Solid, Glass, Helix (Twisted, Multicore, Envelope Diameter)				
Units	Diameter Measurement selectable mm, Inch Speed and Length selectable m/min, ft/min				

Electrical and Operating Requirements

DGK2015 / DGK2030 / DGK2060 / DGK3030 / DGK3060

Power Supply	Power Consumption	Operating Temperature	Environmental Protection
18 - 30 Vac	30 Watts	5°C - 45°C (41°F - 113°F)	IP 65

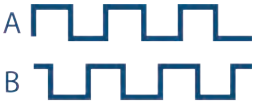
DGK2120 / DGK2200 / DGK3120 / DGK3200

Power Supply	Power Consumption	Operating Temperature	Environmental Protection
100 - 2400 Vdc (50-60HZ)	100 Watts	5°C - 45°C (41°F - 113°F)	IP 65

Connectivity

Analog Speed Input

Analogue Speed input 0 -10vdc
Required for Helix Mode, Tolerance Location and Optional SMFD, Statistics and PI Feedback Diameter Control options.



Pulse Input

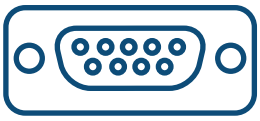
250kHz max frequency, 30v or 50v max pulses on two distinct inputs.
Required for Helix Mode, Tolerance Location and Optional SMFD, Statistics and PI Feedback Diameter Control options.

Logic Inputs

2 x Logic Inputs
Maximum Input Voltage 30Vdc
User Selectable - Length Reset and Print

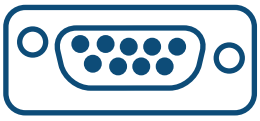
Relay Output

4 x Relay Outputs
Maximum Voltage 24Vdc Current 1A
User selectable - Gauge OK, Upper Tolerance, Lower Tolerances, Single Measurement Flaw Detection (SMFD)



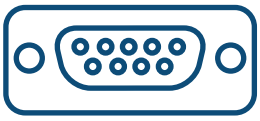
Serial i/o

1 x RS232 / RS485
User selectable - MODBUS RTU, PROTON ASCII Code or Label Printer Note: RS485 Not available when PROFIBUS is enabled



CANBUS

1 x CANBUS Port
Connects to Proton Products CDi4 Display or other Proton Products Inc Equipment.



iBUS

1 x iBUS Port
Connect to a PLC using PROFIBUS, PROFINET, or EtherNET IP,
data update rate, maximum 500/sec. Flexible Data Configuration, Big Endian, Little Endian

Ethernet

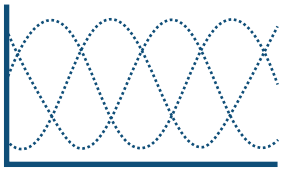
1 x Ethernet port
Connect to PC, Network, PLC, Cloud Service
User selectable - Modbus TCP/IP or OPC-UA for Industry 4.0 solutions

WiFi

Connect to a PC or Mobile Device using WiFi or use the Proton Products Gauge App available for iOS and Android. Ideal for gauge configuration and diagnostics.

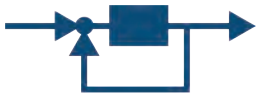
Enhanced Features

Gauge Head Add on Hardware



3 Analog Outputs

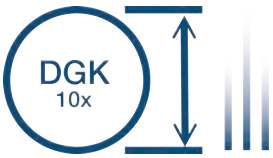
3 analog (±10V) outputs can be set to X, Y, Z axis output for 2 and 3 axis gauges. Average diameter, diameter error, ovality and ovality error



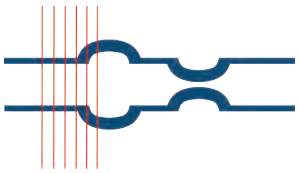
Control Loop

Feedback Control monitors the actual measured diameter compared to a Preset Value and provides a Control Output Signal that can be used to trim the motor output and maintain the product diameter within the Preset Value

Gauge Head Add on Software

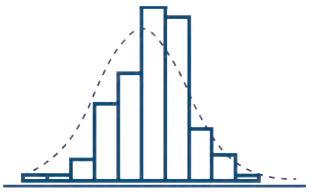


The 10k scanning option upgrades the standard gauge to enable a high scan rate that can be used for effective flaw and defect detection, each scan takes just 1ms to obtain and output a new diameter reading.



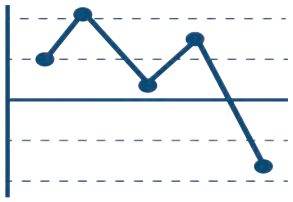
SMFD

Single Measurement Flaw Detection (SMFD) analyzes each individual measurement and compares it with the running average. If a Single Measurement is greater than the running average and above a threshold value a Flaw is Detected.



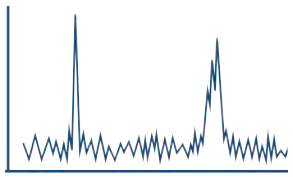
Statistics

Maximum, Minimum, Mean, Standard Deviation, Cp, and Cpk is collected during a selectable time or length period. The results are updated on the SiDi CDi4 Universal Display, PCIS Software and can be transmitted digitally.



SPC

Statistical Process Control (SPC) enhances the Feedback Control option. Statistical Process Control, "measures" Process Capability and automatically adjusts the control set point to maximize material savings while maintaining control within upper and lower limits.



FFT Analysis

Fast Fourier Transform (FFT) analyzes the diameter data for periodicity. Providing Amplitutde verses Frequency data and a graphical representation on the SiDi CDi4 Universal Display Unit or PCIS Software.

Industry 4.0

More than 200 Data Words are available to communicate with your Industry 4.0 Solution. Data Words are divided the into distinct function groups to make it easy to select the ones you want.

Gauge ID Data Words	Model Number, Serial Number, Firmware APP version, Firmware Core Version, Firmware Date
Calibration Data	Last Calibration Date, Days Since Last Calibration, Total Run Time, Calibration Alarm
Diagnostic Data Words	No Reading, No Object, Lens Dirty, Gauge Too Hot
Wired Network Info	IP Address, Netmask, Gateway
WiFi Network Info	IP Address, Netmask, Gateway, SSID
Measurement Data	Diameter, Diameter Error, Error Status

Smart Sensors Enable Smart Factories

"Industry 4.0 the Fourth Industrial Revolution is real. In its various shapes, forms, and definitions, it's happening, accelerating worldwide, and Proton Products is an active player in this movement. A Smart Sensor is a Bridge between the Physical World (Measurement of Products and Processes) and the Digital World (MES, ERP Factory Management Systems). The more connected these worlds are, the more informed we become, improving our decision processes which ultimately enable us to reach our goals."

Proton Products Inc.

Contact us

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