

# KRABO

NETWORKING BOLTS

**KRABO® NETWORKING BOLTS** IS AN EMBEDDED TECHNOLOGY TO TRANSFORM ANY FASTENER INTO AN INTELLIGENT, AUTONOMOUS, AND SELF-SUFFICIENT SENSOR.



**REMOTE BOLT**  
TENSION MONITORING



**NON-INVASIVE**  
**EMBEDDED** TECHNOLOGY



**ALTERNATIVE TO**  
**STANDARD** BOLTS



**ENGINEERED FOR**  
**MASS PRODUCTION**

KRABO SUPPLIES NATIVE SENSORIZED BOLTS AS WELL AS RETROFITS EXISTING CONVENTIONAL BOLTS **WITHOUT AFFECTING THE MECHANICAL PROPERTIES**, FOR BOTH NEW INSTALLATIONS AND EXISTING APPLICATIONS.



**DIGITAL DATA ELABORATION**



**WIRELESS COMMUNICATION**



**ENERGY SELF-SUFFICIENT**



[www.krabo.it](http://www.krabo.it)

## FEATURES

- Operating on bolt up to Ultimate Tensile Load (UTS).
- Measure absolute bolt load in kN up to 95% of Yield Strength (YS), load loss up to UTS.
- Up to 99% accuracy depending on bolt size.
- Standard product fits for:
  - Hexagon-head bolts equal or greater than M20.
  - Studs equal or greater than M39.
- Smaller sizes, different head types implementable after technical validation.
- Configurable sample rate, from 1 sample per second.
- Up to 30m wireless communication.
- Up to 10 years battery life, extendable with solar harvesting.
- KRABO® cloud data elaboration and display with configurable alerts.

		STANDARD PRODUCT	CUSTOMIZATION AT REQUEST
MAIN CHARACTERISTICS	OPERATING LOAD RANGE	0 : UTS	
	OPERATING TEMPERATURE	-30°C : +70°C	-40°C : +105°C
	ENERGY SOURCE	COIN BATTERY	SOLAR HARVESTING
	BATTERY LIFE	9 YEARS (1 SAMPLE/DAY) 7 YEARS (1 SAMPLE/HOUR) 9 MONTHS (1 SAMPLE/MIN) <sup>(1)</sup>	LARGER BATTERY FOR EXTENDED LIFE OR HARSH WEATHER
MEASUREMENT CHARACTERISTICS	ABSOLUTE LOAD MEASUREMENT RANGE	0 : 95%YS	
	LOAD LOSS MEASUREMENT RANGE	0 : UTS	
	LOAD ACCURACY	95% : 99% OF PROOF LOAD <sup>(2)</sup>	
	LOAD PRECISION	0,5% OF PROOF LOAD	
	TEMPERATURE ACCURACY	±0,3°C	
	TEMPERATURE PRECISION	0,1°C	
	SAMPLE RATE RANGE	1 SAMPLE/SECOND : 1 SAMPLE/DAY	
CONNECTIVITY CHARACTERISTICS	COMMUNICATION PROTOCOL	ZIGBEE®	BLUETOOTH®, OTHER WIRELESS PROTOCOLS
	WIRELESS COMMUNICATION RANGE	30M <sup>(3)</sup>	RANGE EXTENDER
	GATEWAY CASE	IP65 PLASTIC BOX	IP68 PLASTIC OR METAL BOX
	GATEWAY POWER SUPPLY	100/220VAC (50/60 HZ)	DC AND OTHER
	GATEWAY NETWORK	ETHERNET, WI-FI®	4G-LTE
FASTENER CHARACTERISTICS	DIAMETER	≥ M20 (HEXAGONAL HEAD) ≥ M39 (STUD)	SMALLER SIZES, DIFFERENT HEAD TYPES AND LENGTHS CAN BE IMPLEMENTED AFTER TECHNICAL EVALUATION
	LENGTH	50MM : 500MM	

(1) AT 25°C, -50% AT -10°C.

(2) DEPENDING ON BOLT SIZE.

(3) BETWEEN BOLT AND GATEWAY IN OPEN FIELD.

**KRABO S.r.l.**

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