

Load cell with one built in amplifier

KOSD-FA

KIMD-FA

KEND-FA

Load cell with two built in amplifiers

KOSD-FAD

KIMD-FAD

KEND-FAD



User manual

Contents

Precautions

Intended use

General.....	1
Specification.....	3
Intrinsic safety.....	4
Load cell ATEX/UKEX Label.....	4
Electrical connection and supply voltage.....	5
Load cell connection.....	6
Application examples.....	6
Mechanical installation and maintenance.....	7
Mechanical data.....	7
Appendix 1. Declaration of Conformity.....	8
Appendix 2. ATEX / IECEx /UKEX	9

PRECAUTIONS

READ this manual BEFORE operating or servicing this unit.
FOLLOW these instructions carefully.
SAVE this manual for future reference.



WARNING

Only qualified personnel are permitted to install and service this unit.
Exercise care when making checks, tests and adjustments
that must be made with power on.
Failing to observe these precautions could result in bodily harm.

DO NOT allow untrained personnel to operate,
clean, inspect, maintain, service, or tamper with
this unit.

INTENDED USE

KxxD-FA(D) line of load cells are intended for industrial systems. Its basic function is force measuring or weighing applications. The built in amplifiers(s) converts the measured mechanical load to an outgoing, 4 to 20 mA signal.

Changes to current manual version

Information regarding UKEX added. Maximum power supply for standard application (non Intrinsic-safe) clarified on page 3. The most common colors for cables added on page 5.

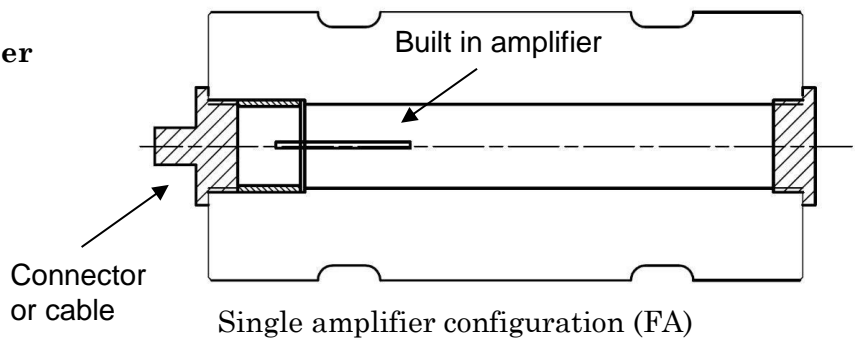
General

KxxD-FA(D) is a line of load cells (KIMD, KOSD and KEND) with a high degree of protection. They incorporate resistive strain gauges, measuring the shear force or tension. They are equipped with one or two amplifiers each using 2-wire 4 - 20 mA current loop output with low NAMUR error signalling.

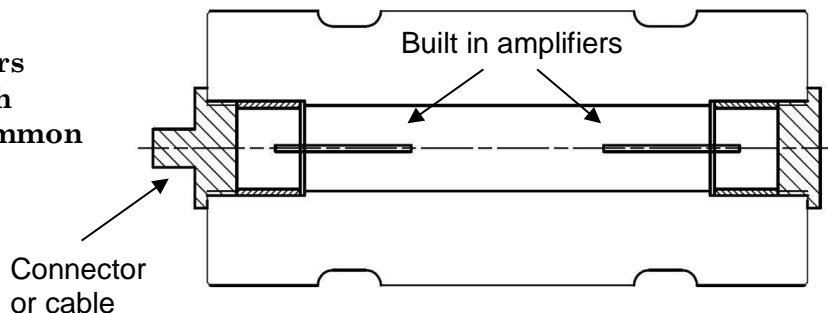
The FA-versions have one electrical circuit and the FAD-version two separate electrical circuits. For the FAD-version the safety parameters are applicable to each circuit individually. The current loops are insulated from each other.

The following KxxD-FA(D) load cell configurations are available:

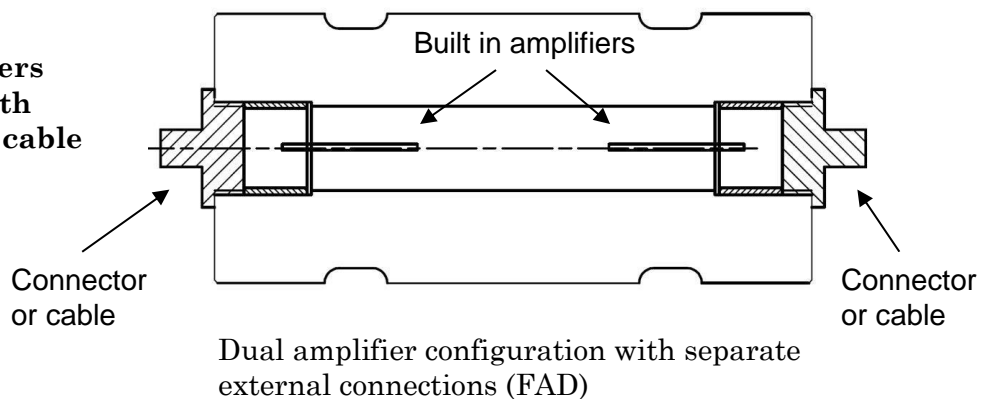
Single bridge and amplifier with connector or cable connection



Dual bridge and amplifiers (primary/secondary) with common connector or common cable connection



Dual bridge and amplifiers (primary/secondary) with individual connector or cable connections.



The load cells can be supplied with connector or cable connection (see also page 6 and 7).



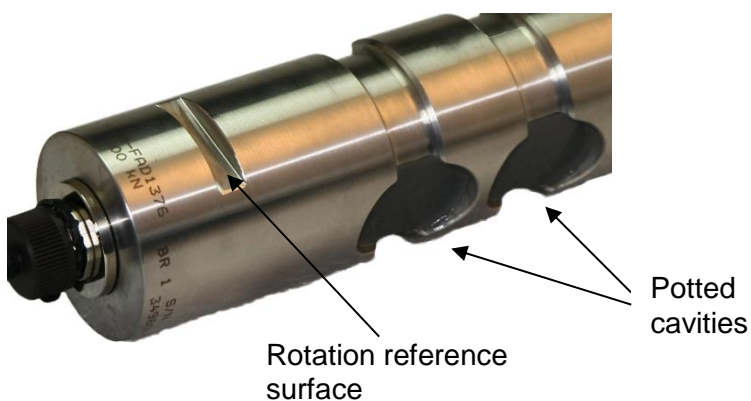
4-pin connector



Cable connection

- KxxD-FA with one 4-pin connector or cable (only 2 pins/wires used)
- KxxD-FAD with one 4-pin connector or cable connection
- KxxD-FAD with two 4-pin connectors or dual cable connections (only 2 pins/wires used)
- KxxD-FAD with one 4-pin connector and single cable connection (only 2 pins/wires used)

These load cells are approved for use in an explosive hazardous area, provided that suitable intrinsic safety barriers or insulators are used and no rubbing with electrostatic materials occurs on outside potted cavities surfaces.



CE- and UKCA-marking according to ATEX and EMC Directives, see appendix 1.

Specifications

Approvals:				
ATEX intrinsic safety	EN 60079-0, EN 60079-11, EN 50303 Ex ia I Ma, Ex ia IIC T5 Ga, Ex ia IIIC T84°C Da			
U _i	30V			
P _i	0.7W			
I _i	100mA			
C _i	56.5nF (≤66nF including cable)			
L _i	4.4 μH			
IECEx intrinsic safety	IEC 60079-0, IEC 60079-11			
Electromagnetic compatibility (EMC)	EN 61326-1			
Emission	CISPR 11 class B			
Immunity	EN 61000-4-2 Electrostatic discharge EN 61000-4-3 RF electromagnetic field EN 61000-4-4 Fast transients EN 61000-4-6 RF conducted disturbances EN 61000-4-8 Power frequency magnetic field			
Environmental conditions:				
PARAMETER	Min.	Typ.	Max.	UNIT
Environmental protection / IP rating		IP 67		
Operating Temperature (T _{amb})	-45 -49		+70 +158	°C °F
Analog output:				
Current	3.6		21	mA
Rated output (RO)		20		mA
Zero		4		mA
System parameters:				
Accuracy	See LC calibration data sheet			
Response time (10% – 90%)		3.5		ms
Noise		0.06		% of RO
Supply voltage (E)				V
Standard application	E = 0.0236*R+10.5	24	42 ⁽²⁾	V
Intrinsic-safe application		24	30	V
Load impedance (R)	0	250	R = (E-10.5)/0.0236	Ohm
Insulation resistance	1			Gohm
Load cell strain gauge:				
Impedance		2000		Ohm
ATEX conditions:				
Cable length (L) for group IIC			L = 9.5 / (nF/m) ⁽¹⁾	m
Cable length (L) for Group IIB and III			L = 500 / (nF/m) ⁽¹⁾	m
Cable length (L) for Group I			L = 3000 / (nF/m) ⁽¹⁾	m
Insulation test		500		Vrms

(1) Cable capacitance value in nF per meter.

(2) Maximum supply voltage is (0.0236*R+30) if lower than 42V

Intrinsic safety

All load cells KxxD-FA(D) can be approved for use in explosive gas or dust area. The last 'X' in the type code (see load cell ATEX label) is a number to identify the specific model. They can be ordered either with a cable connector or with an integrated cable. The safety description is labelled on the load cell. For the –FAD version, the safety description and connection is applicable to each current loop circuit (amplifier).

Internal capacitance and inductance are $C_i=56.5\text{nF}$ and $L_i=4.4\mu\text{H}$. Following condition applies for external cable connection:

1. Total cable capacitance must not exceed 9.5nF for use in Group IIC
2. Total cable capacitance must not exceed $0.5\mu\text{F}$ for use in Group IIB and III
3. Total cable capacitance must not exceed $3\mu\text{F}$ for use in Group I






The 4-wire cable inductance is negligible compared to the allowed upper limit.

The 'X' conditions in the ATEX certificate are listed in item 17.

1. Potential electrostatic charging hazard. No rubbing with electrostatic materials is allowed on outside potted cavities surfaces (see page 2)
2. The free end of the cable must be installed such that the terminals afforded a degree of protection of at least IP20 according to IEC 60529:2004
3. The load cell shall only be connected to equipment that has adequate safety parameters according to the load cell's safety parameters

Only load cells used as instructed in this manual and according to amended certificate DNV 21 ATEX 50814X and DNV 22 UKEX 76719X are intrinsically safe.

Load cell ATEX/UKEX Label

Vishay Nobel AB Karlskoga Sweden					 II 1G Ex ia IIC T5 Ga
xxx	xxx	20xx			 II 1D Ex ia IIIC T84°C Da
WARNING - POTENTIAL ELECTROSTATIC HAZARD SEE INSTRUCTIONS			0598	1180	 I M1 Ex ia I Ma
			IECEx DNV 21.0018X DNV 21 ATEX 50814X DNV 22 UKEX 76719X $-45^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$ IP67		$U_i: 30\text{V}$ $I_i: 100\text{ mA}$ $P_i: 0,7\text{W}$ $C_i: 56,5\text{ nF}$ $L_i: 4,4\mu\text{H}$

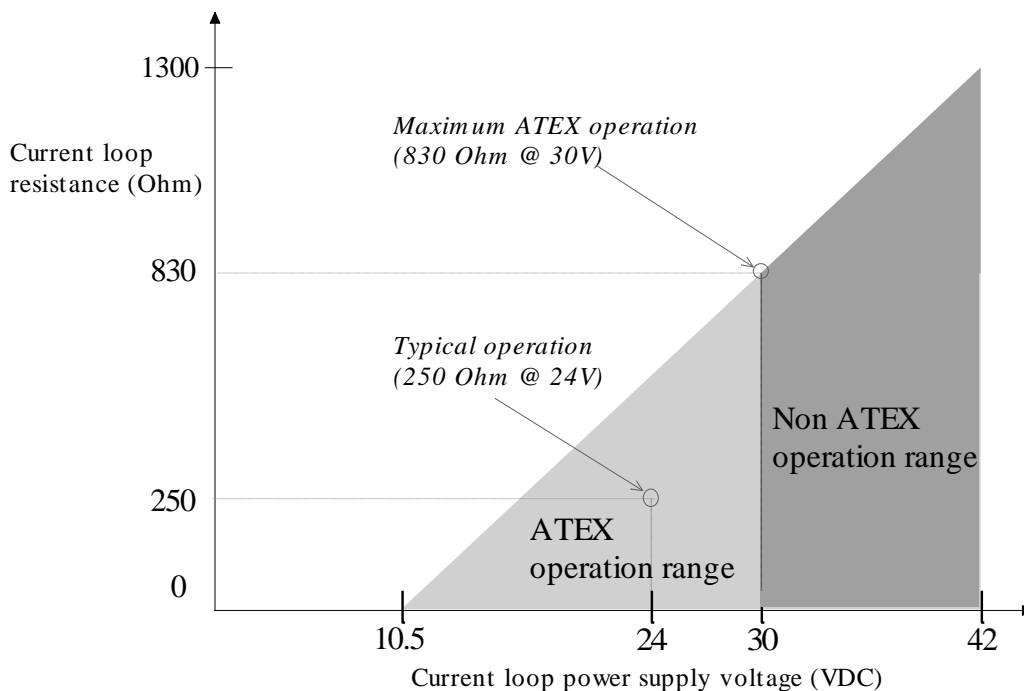
Electrical connection and supply voltage

A two-wire circuit is used to connect the load cell amplifier to a suitable power supply and measuring equipment. The amplifier(s) in the load cell have current loop output, calibrated to 4 mA at zero load and 20 mA at nominal load.

Connector pin-out and wires color code:	
<u>Electrical connection</u>	
Connector: (Binder p/n: 09-3431-700-04 or equivalent IP67 qualified)	
Cable: Shielded 4-wire 0,35mm ² cable through IP67 qualified cable gland	
<u>Connector pin number *</u>	<u>Cable: Cable wire color *</u>
1: Secondary current loop return - (FAD)	White/Red or Yellow: Secondary current loop return - (FAD)
2: Secondary current loop input + (FAD)	Green/White or Green: Secondary current loop input + (FAD)
3: Primary current loop input +	Red/Green or White: Primary current loop input +
4: Primary current loop return -	Black or Brown: Primary current loop return -

* Deviations may occur in customer specific types.

A current loop resistance up to 1300 Ohm can be used, provided the supply voltage is high enough, see figure below. For maximum allowed current loop resistance, use load impedance calculation formula on page 3.



Load cell connection

The load cell two-wire 4-20mA current loop shall be connected using a shielded cable. The cable should be routed at least 100 mm from other cables, so that electromagnetic interference is avoided. Cable shield is connected to the load cell body and shall not be grounded in the other end. The load cell connector housing is connected to the load cell body and the cable shield shall be connected in the cable connector but not be grounded in the other end. Cable shield is then grounded in one point only (load cell).

If used in a noisy 50Hz..60Hz environment with isolated power, it is recommended to connect a plastic 220nF/630V capacitor between current loop return signal (current loop -) and ground. For FAD this is applicable on each individual circuit.

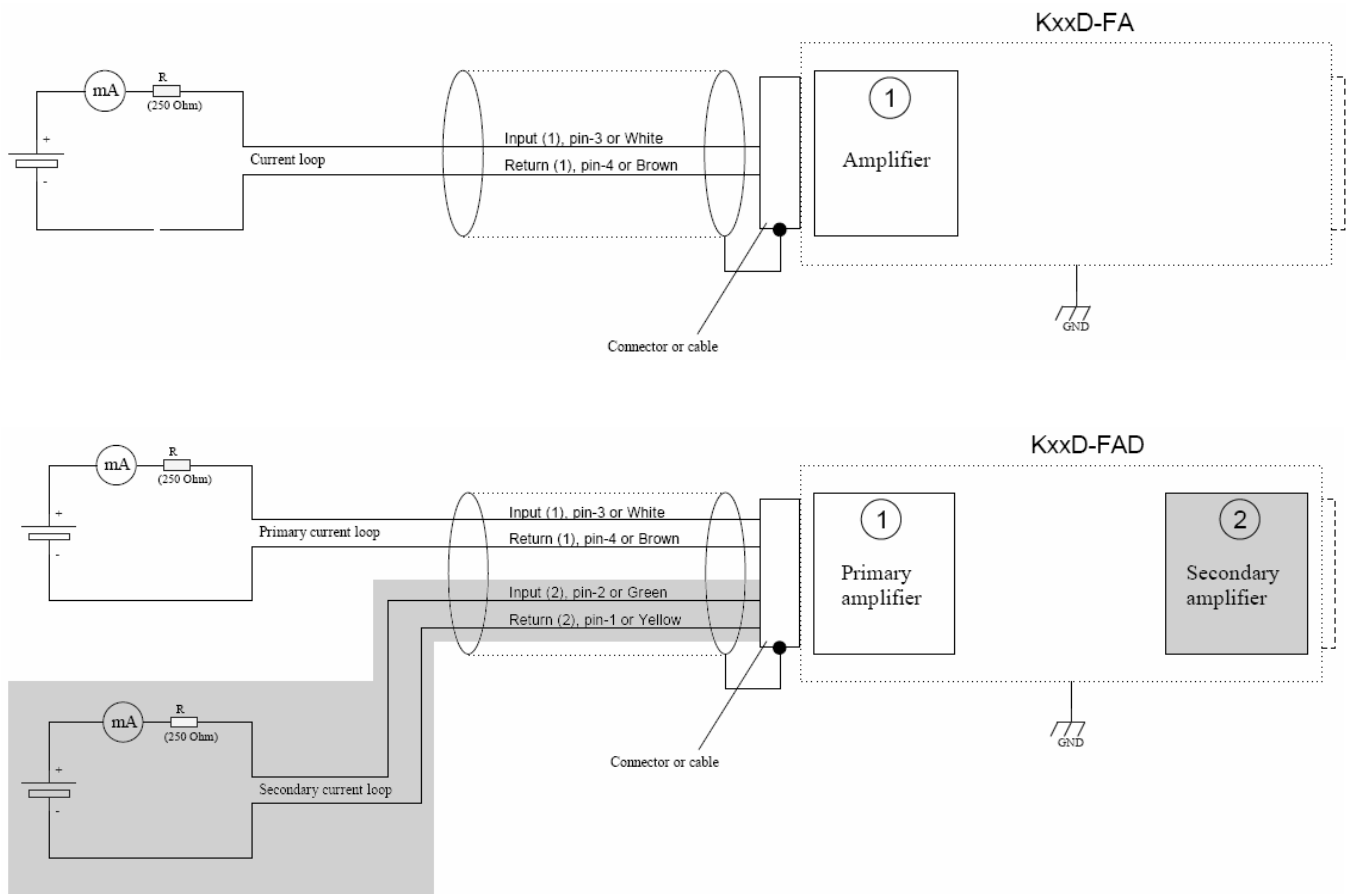


NOTE: The 50Hz..60Hz environment filter capacitors shall not be connected when the load cell is used in ATEX hazardous area

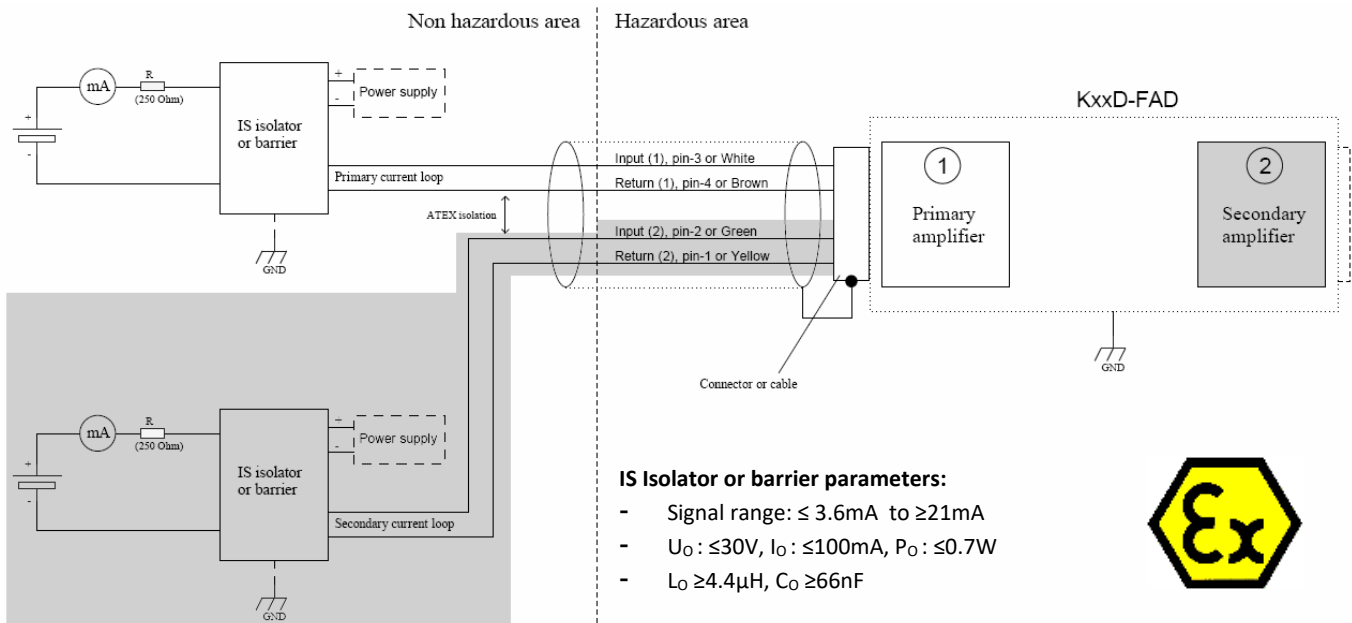
For installation in an explosive gas/dust or mining area, only trained personnel may perform dimensioning of cables and barriers. A descriptive system document should be prepared by the system designer.

Application examples

Load cell KxxD-FA (one built in amplifier) and KxxD-FAD (two built in amplifiers), used in a **non-hazardous** area, are shown below. The load cell connector inputs are polarity and over voltage protected.



Load cell used in **hazardous** area is shown below. The cable shield is connected to the load cell body and shall not be connected in the other end. Connection to barrier or isolating IS unit is shown in the example below.



Load cell as a safety component can be used in both **hazardous** and **non-hazardous** areas and be connected to the measuring control system as a passive transmitter.

Mechanical installation and maintenance

Load cells of the line KxxD-FA(D) are designed to be supported at both ends and loaded at the middle of the cylindrical body (KIMD, KOSD) or being pulled in both ends where the load cell is measuring the tension force (KEND). An arrow on one or both ends defines the correct direction of the resulting force from the applied load.

At the cable/connector end of the load cell, a flat reference surface is provided (KIMD, KOSD). It should be used to prevent the cylindrical load cell body from rotating in the supports (see page 2)

Standardized adapters for some load cell types are available, others can be custom designed and produced by Vishay Nobel. On request the mechanical shape of a load cell can also be altered to suit an existing structure.



Potential electrostatic hazard on KIMD-FA(D), do not rub with electrostatic materials.

Mechanical data

KxxD-FA(D) series of load cells are often custom made for specific applications. For complete mechanical data on these load cells, refer to the detailed technical specification.

Declaration of Conformity

We Vishay Nobel AB
P.O. Box 423, SE-691 27 KARLSKOGA
Skrantahöjdsvägen 40, SE-691 46 KARLSKOGA SWEDEN

declare under our sole responsibility that the products

Load Cell KOSD-FA
Load Cell KIMD-FA
Load Cell KEND-FA
Load Cell KOSD-FAD
Load Cell KIMD-FAD
Load Cell KEND-FAD

to which this declaration relates are in conformity with the following standards
or other normative documents:

The essential requirements in the EMC Directive 2014/30/EU
EN 61326-1:2013

The essential requirements in the ATEX Directive 2014/34/EU with later amendments
EN IEC 60079-0: 2018
EN 60079-11: 2012
EN 50303: 2000

Group I Category M1: Ex ia I Ma
Group II Category 1: Ex ia IIC T5 Ga, Ex ia IIIC T84°C Da

IEC – Type examination Certificate: IECEx DNV 21.0018X
EC – Type examination Certificate: DNV 21 ATEX 50814X
UKCA - Type examination Certificate: DNV 22 UKEX 76719X

Notified body for EC type Examination: DNV, NB No. 2460, Høvik Norway
Notified Body for production: SGS Fimko Oy, NB No. 0598, Helsinki FINLAND
Notified Body for production UK: SGS Baseefa Limited, NB No. 1180, Buxton UK

The essential requirements in the RoHS Directive 2011/65/EU Restriction of the use of certain
hazardous substances in electrical and electronic equipment.
EN 50581:2012

The product is supplied by up to 42 VDC (30 VDC intrinsic safety) and is therefore not
covered by the requirements in the Low Voltage Directive 2014/35/EU.

On behalf of the above named company, I declare that, on the date the equipment
accompanied by this declaration is placed on the market, the equipment conforms to all
technical and regulatory requirements of the above listed directives.

KARLSKOGA, 1st of December 2022


Per Fredriksson, Managing Director

ATEX Certificate

The ATEX certificate for the KxxD-FA(D) Load cell can be found on the BLH Nobel homepage: <https://blhnobel.com/resources/certificates>

Certificate number: DNV 21 ATEX 50814X.

IECEX Certificate

The IECEX certificate for the KxxD-FA(D) Load cell can be found on the official IECEX web site: <http://iecex.com>

Certificate number: IECEX DNV 21.0018X.

UKEX Certificate

The UKEX certificate for the KxxD-FA(D) Load cell can be found on the BLH Nobel homepage: <https://blhnobel.com/resources/certificates>

Certificate number: DNV 22 UKEX 76719X.

