

Load cell with one replaceable amplifier

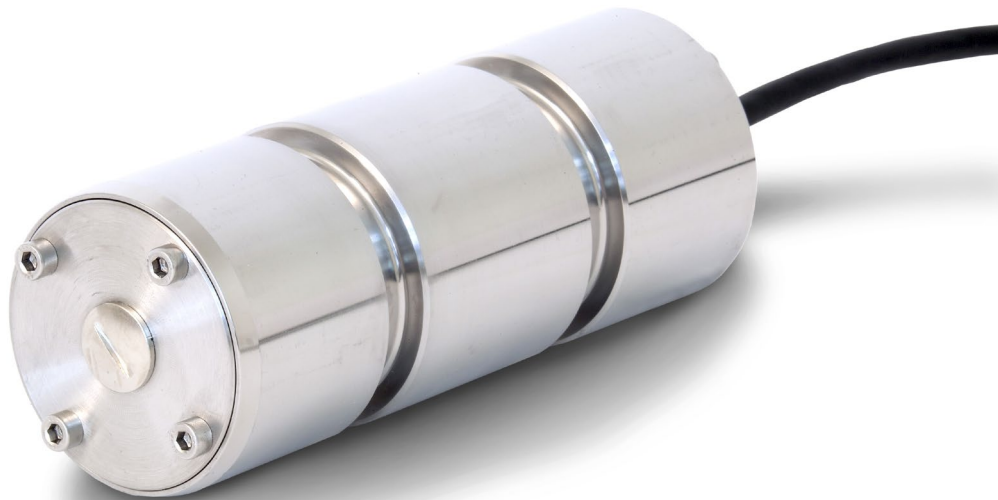
**KOSD-RA**

**KIMD-RA**

Load cell with two replaceable amplifiers

**KOSD-RAD**

**KIMD-RAD**



User manual



# Contents

Precautions

Intended use

General .....	1
Mechanical data .....	1
Specification.....	2
Electrical connection and supply voltage .....	3
Intrinsic safety .....	3
Amplifier ATEX/UKEX Label.....	4
Load cell ATEX/UKEX Label .....	4
Load cell connection .....	5
Application examples.....	5
Mechanical installation and maintenance.....	6
HART Communication .....	6
Appendix 1. ATEX/ UKEX / IECEx Certificate.....	7

# PRECAUTIONS

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



## WARNING

Only permit qualified personnel 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 can result in bodily harm.

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

# INTENDED USE

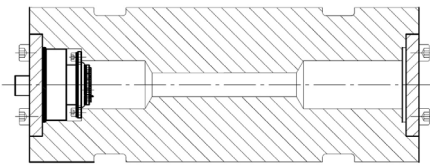
KxxD-RA(D) line of load cells are intended for industrial systems. Its basic function is force measuring or weighing applications. The built in replaceable transducer(s) converts the measured mechanical load to an outgoing 4 to 20 mA signal with HART<sup>®</sup> communication.

## Changes to current manual version

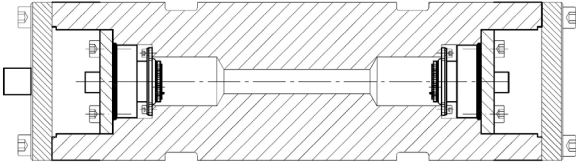
Information regarding UKEX added. Maximum power supply for standard application (non Intrinsic-safe) clarified on page 2.

# General

KxxD-RA(D) is a line of load cells (LC) with a high degree of protection. They incorporate resistive strain gauges, measuring the shear force. They can be delivered with different types of replaceable amplifiers (LCAMP) with 2-wire 4 - 20 mA current loop output. The load cell and amplifier are powered over the current loop.



RA configuration example

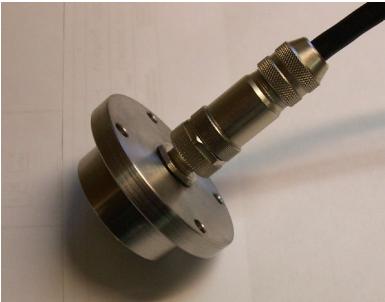


RAD configuration example with protection lids

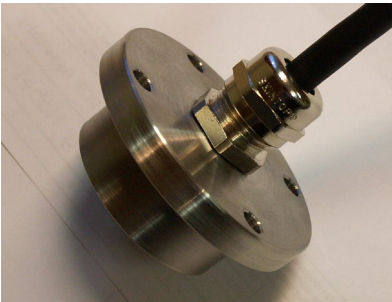
The load cell contains all necessary calibration data to allow easy amplifier replacement without recalibration. The amplifier includes HART communication and NAMUR error signalling. These load cells are approved for use in an explosive gas or dust area, provided that suitable intrinsic safety barriers or insulators are used. The RA-version is a single bridge and single current loop unit, and the RAD-version is a dual bridge and dual current loop unit.

The load cell can be used with replaceable signal amplifiers as follows:

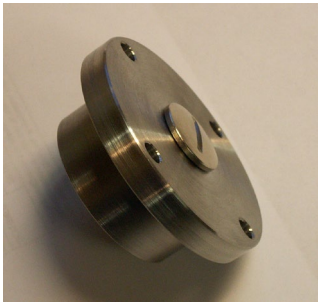
- KxxD-RA: Primary LCAMP110 with 4-pin M12 connector.
- KxxD-RA: Primary LCAMP120 with fixed shielded 4-wire cable.
- KxxD-RAD: Primary LCAMP110 and 120 with Secondary LCAMP110,120 or 130. (when using secondary LCAMP110 or 120, see Note on page 6)



LCAMP110



LCAMP120



LCAMP130



LC amplifier interface

CE- and UKCA-marking according to ATEX and EMC Directives, see appendix 1. HART® is a registered trademark of the HART Communication Foundation.

# Mechanical data

KxxD-RA(D) load cells are often custom made for specific applications. For complete mechanical data on these load cells, refer to the detailed technical specification from Vishay Nobel AB.

## Specifications

<b>Approvals:</b>				
ATEX intrinsic safety	EN 60079-0, EN 60079-11, EN 50303 Ex ia I Ma, Ex ia IIC T4 Ga, Ex ia IIIC T79°C Da			
U <sub>i</sub>	30V			
P <sub>i</sub>	0.7W			
I <sub>i</sub>	100mA			
C <sub>i</sub>	57nF (≤66nF including cable)			
L <sub>i</sub>	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			
<b>Environmental conditions:</b>				
PARAMETER	Min.	Typ.	Max.	UNIT
Environmental protection / IP rating (assembled load cell)		IP 67		
Operating Temperature (T <sub>amb</sub> )	-45		+70	°C
	-49		+158	°F
In intrinsic-safe application (T <sub>amb</sub> )	-45		+70	°C
	-49		+158	°F
<b>Analog output:</b>				
Current	3.2		22.8	mA
Rated output (RO)		20		mA
Zero		4		mA
<b>System parameters:</b>				
Accuracy	See LC datasheet			
Response time				
Fast mode		5		ms
HART® compliant mode		50		ms
Noise				
Fast mode		0.05		% of RO
HART® compliant mode		0.02		% of RO
Supply voltage (E)	V			
Standard application	E = 0.0236*R+10.5	24	42 <sup>(2)</sup>	V
Intrinsic-safe application		24	30	V
Load impedance (R)	Ohm			
Standard application	0		R = (E-10.5)/0.0236 (HART max 600)	Ohm
HART® communication	230	250		Ohm
Insulation resistance	4			Gohm
<b>Load cell strain gauge:</b>				
Impedance		2000		Ohm
<b>ATEX conditions:</b>				
Cable length (L) for Ex ia IIC			L = 9.0 / (nF/m) <sup>(1)</sup>	m
Cable length (L) for Ex ia IIB			L = 503 / (nF/m) <sup>(1)</sup>	m
Insulation test		500		Vrms

(1) Cable capacitance value per meter in nF

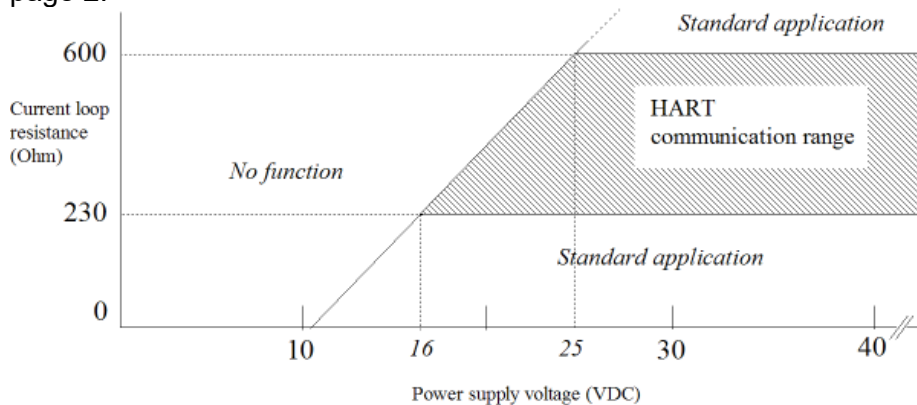
(2) Maximum supply voltage is (0.0236\*R+30) if lower than 42V

## 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 in the load cell has a current loop output, calibrated to 4 mA at zero load and 20 mA at nominal load.

Connector Pin-out and wires color code:	
<u>External electrical connection:</u>	
<b>LCAMP110:</b> M12 (Binder p/n:09-3431-700-04 or equivalent)	
<b>LCAMP120:</b> Shielded 4-wire 0,35mm <sup>2</sup> cable through cable gland	
<b>LCAMP130:</b> None	
<u>LCAMP110: Connector pin number</u>	<u>LCAMP120: Cable wire colour</u>
<b>1:</b> Secondary Current loop - (KxxD-RAD)	<b>Yellow:</b> Secondary Current loop - (KxxD-RAD)
<b>2:</b> Secondary Current loop + (KxxD-RAD)	<b>Green:</b> Secondary Current loop + (KxxD-RAD)
<b>3:</b> Primary Current loop +	<b>White:</b> Primary Current loop +
<b>4:</b> Primary Current loop -	<b>Brown:</b> Primary Current loop -

A current loop resistance over 600 Ohm can be used, provided the supply voltage is high enough, see figure below. For correct current loop resistance, use load impedance calculation formula on page 2.



## Intrinsic safety

All load cells KxxD-RA(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 and on the replaceable amplifier. For the -RAD version, the safety description is applicable to each circuit (amplifier). Only load cells with assembled amplifier(s) are intrinsically safe for Zone 0 (gas) and protected by enclosure for Zone 10 (dust) with a safety description according to certificate DNV 21 ATEX 50821X and DNV 22 UKEX 76724X.

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




1. Potential electrostatic charging hazard exists on load cell versions with outside potted cavities. No rubbing with electrostatic materials is allowed on these surfaces.
2. The free end of the cable must be installed such that the terminations are afforded a degree of protection of at least IP20.
3. Use of secondary current loop on the primary side when using LCAMP110 or LCAMP120 as secondary amplifier on KxxD-RAD is not allowed.

Internal capacitance and inductance are  $C_i=57\text{nF}$  and  $L_i=4.4\mu\text{H}$ . Following condition applies for external cable connection:




1. Total cable capacitance must not exceed 9.0nF for use in ATEX zone IIC
2. Total cable capacitance must not exceed 503nF for use in ATEX zone IIB.

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

### Amplifier ATEX/UKEX Label:

LCAMPXXX 20XX	Vishay Nobel AB
IECEX DNV 21.0017X	Karlskoga Sweden
DNV 21 ATEX 50821X	
DNV 22 UKEX 76724X	IP67
	$-45^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$
<b>CE</b> 0598	<b>UK CA</b> 1180
 II 1G Ex ia IIC T4 Ga	Ui: 30V
 II 1D Ex ia IIIC T79°C Da	Ii: 100 mA
 I M1 Ex ia I Ma	Pi: 0,7W
	Ci: 57 nF
	Li: 4,4 μH

### Load cell ATEX/UKEX Label:

Vishay Nobel AB Karlskoga Sweden		 II 1G Ex ia IIC T4 Ga
xxx xxx 20xx	<b>CE</b> 0598	<b>UK CA</b> 1180
	IECEX DNV 21.0017X	 II 1D Ex ia IIIC T79°C Da
WARNING - POTENTIAL	DNV 21 ATEX 50821X	 I M1 Ex ia I Ma
ELECTROSTATIC HAZARD	DNV 22 UKEX 76724X	Ui:30V Ii:100 mA Pi:0,7W
SEE INSTRUCTIONS	$-45^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$ IP67	Ci:57 nF Li:4,4μH

# 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.

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



NOTE: When using LCAMP110 or 120 as secondary amplifier (instead of LCAMP130 in figures below) only the primary current loop (pin 3, 4 or white, brown) shall be connected in both ends of the load cell.

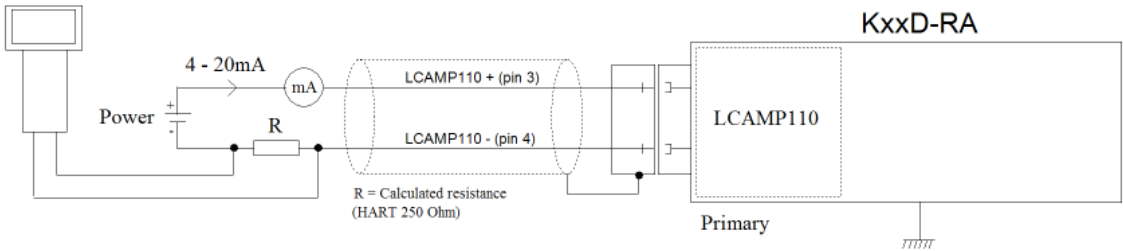
If used in a noisy 50Hz..60Hz environment with isolated power, it is recommended to connect plastic 220nF/630V capacitors between current loop return signal (current loop -) and ground.

**NOTE: The capacitors shall not be connected in ATEX hazardous area.**

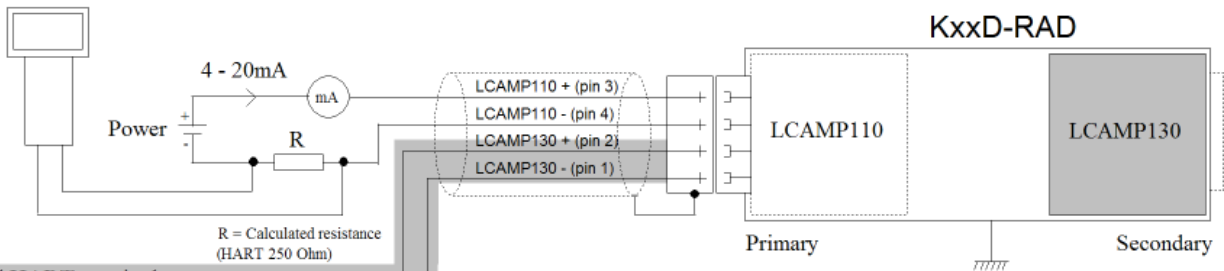
## Application examples:

Load cell KxxD-RA (LCAMP110) and KxxD-RAD (LCANP110 and LCAMP130) with M12 connector, used in a **non-hazardous** area, are shown below. The load cell connector inputs are polarity and over voltage protected.

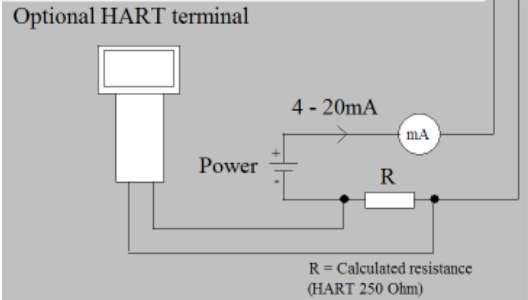
Optional HART terminal



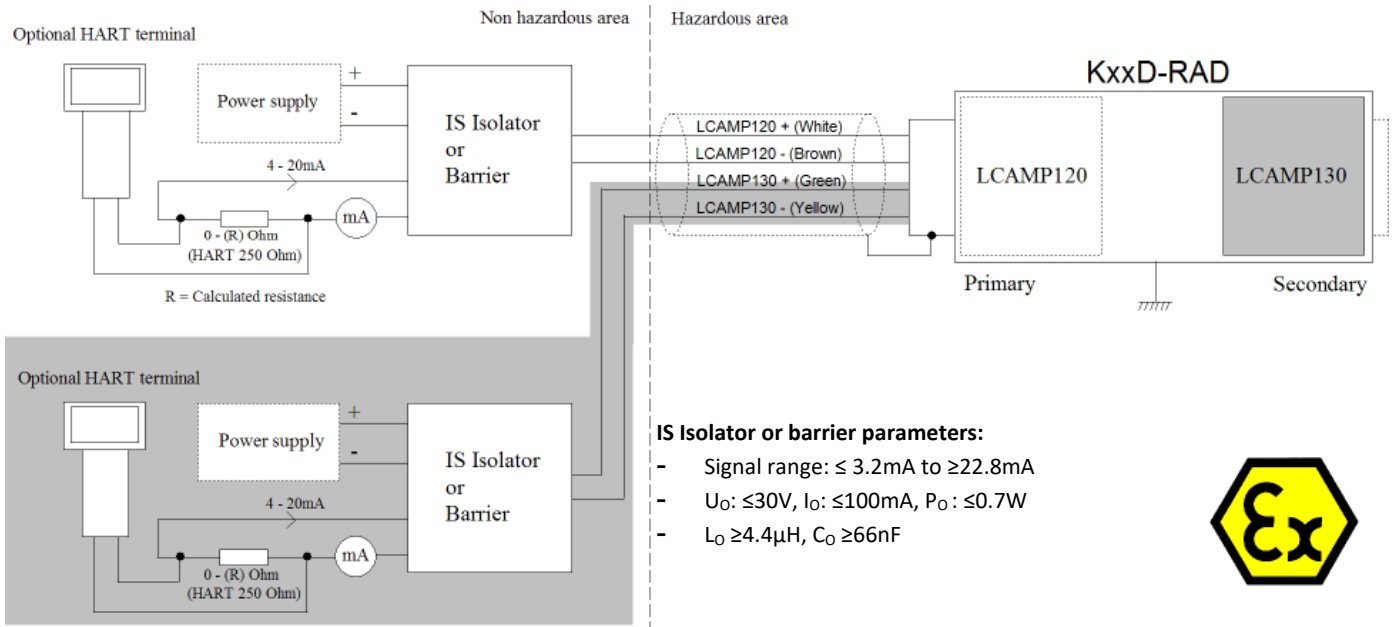
Optional HART terminal



Optional HART terminal



Load cell KxxD-RAD with integrated cable (LCAMP120 and LCAMP 130), used in **hazardous** area, are shown below. The shielded cable is connected to the load cell and must not be connected elsewhere. An isolating IS unit is shown in the example below. The load cell cable parts are polarity and over voltage protected.



## Mechanical installation and maintenance

Load cells of the line KxxD-RA(D) are designed to be supported at both ends and loaded at the middle of the cylindrical body. An arrow on one end plate 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. It should be used to prevent the cylindrical load cell body from rotating in the supports.

Standardised 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-RA(D), do not rub with electrostatic materials.

## HART communication

Standard HART® communication on the outgoing current loop signal is supported for external communicating with the replaceable amplifier. A handheld communicator or a PC modem using HART® protocol revision 7.3 or later should be used.

Detailed command information is available in the technical documentation.

## **ATEX Certificate**

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

Certificate number: DNV 21 ATEX 50821X.

## **UKEX Certificate**

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

Certificate number: DNV 22 UKEX 76724X.

## **IECEX Certificate**

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

Certificate number: IECEX DNV 21.0017X.

Publication 601144r14  
© Vishay Nobel AB, 2025-10-13  
Subject to changes without notice.