

**Thank you for choosing a NIVELCO instrument.
We are sure that you will be satisfied throughout its use!**

1. INTRODUCTION

The new **NIVOROTA E-700/800** rotary paddle level switch series of well-known **NIVELCO** design can be used for detecting the level of lumpy or powdery materials and granules. Mounted to tanks, silos, and hoppers, it can monitor and control level, filling and emptying of stored materials such as stone, fly ash, sand, coal, feed, beet slice, etc.

A low-power electric motor drives the paddle, which rotates freely in the absence of the material. When the paddle is covered by the medium, the output contact switches from NC state to NO state, and the motor turned off. When the material level drops, the paddle runs free again, the motor is reactivated, and the switch returns to its original state (NC). In the case of low-level detection, the detected material usually covers the blade, with the output contact stays in NO state, and the motor stopped. When the material level drops so much that the blade can rotate freely again, the motor restarts, and the control switch returns to NC position.

The process connection can be threaded (1" or 1½" BSPT), or a mounting plate. The mounting plate can be mounted together with the unit with the thread process connection. For mounting on a bracket, a mounting nut is available depending on the size of the process connection. A suitable paddle should be chosen in accordance with the medium density. The single vane paddle is recommended for higher density granular solids, the 3-vane paddle is recommended for lower density powdered solids. The single vane paddle passes through the 1" hole, and the 3-vane paddle can be mounted only by a mounting plate.

If the insertion length of the Standard version is not enough, the rod or cable extended version can be applied. By using a flexible coupling, the shaft of the device can be protected against hard mechanical effects caused by falling of stone or other coarse material. If the insertion length should be customized for any technological reason, an optional sliding sleeve can be used for extended rod versions, or cutting the cable to the needed length can be performed in case of cable extended versions. The counterweight provides a taut state for the cable to avoid climbing up of the paddle to the medium surface. If additional stiffening of the cable probe is required, a rigid pipe can be ordered as an accessory.

If the medium temperature exceeds 120 °C (248 °F), a high-temperature version should be selected. This type is equipped with heat sink, raised from the process connection, and only available with aluminium housing. Dust Ex versions are available for use in hazardous environments.

2. TECHNICAL DATA

2.1 GENERAL DATA

Version		Standard	Rod extended	Cable extended
Insertion length (L)		200 mm (7.85 inch)	0.4 – 3 m (1.31 – 10 ft)	1 m – 3 m (3.28 – 10 ft)
Number and material of the vanes		1- or 3-vane; 1.4571 (316Ti)		
Process connection		1" BSPT; 1½" BSPT; mounting plate (the BSPT thread can be screwed into a BSP or an NPT thread)		
Material of wetted parts		DIN 1.4571 (316Ti) stainless steel NBR sealing for normal types, FPM sealing for high temperature types		
Medium density (guideline value)		Min. 0.1 kg/dm ³ (min. 0.1 S.G.)		
Medium temperature	Normal	With plastic housing: -20 °C ... +80 °C, With aluminium housing: -20 °C ... +120 °C High temperature type: -20 °C ... +200 °C		
	Dust Ex	As per temperature data for Ex versions table		
Ambient temperature		-30 °C ... +60 °C (-22 °F ... +140 °F)		
Relative humidity		Max. 90%		
Medium pressure		Max. 3 bar (0.3 MPa)		
Power supply range		Nominal value: 230 V AC (50 / 60 Hz) +10% -15%, 120 V AC (50 / 60 Hz) +10% -15% 24 V AC (50 / 60 Hz) +10% -15%, 24 V DC +10% -15%		
Rotation speed		1 rotation/minute (@50Hz)		
Power consumption		Max. 4 VA (4 W)		
Output		microswitch 250 V AC, 5 A		
Paddle-rotation/ shutdown indication		Bi-colour (green/red) LED		
Electrical connection		2x M20 x1.5 plastic cable glands for 6 – 12 mm (0.25 – Ø 0.5 inch) cable diameter 2x ½" NPT internal thread, terminal for 0.5 – 1.5 mm ² (AWG20 – AWG15) wire cross section		
Electrical protection		Class I		
Ingress protection		IP67		
Housing material		Metal: painted aluminium cast; Plastic: fibreglass PBT		
Mass		1.6 kg (3.52 lb)	1.6 kg (3.52 lb) + extension 0.16 kg/dm (1 lb/ft)	2.6 kg (5.73 lb) + extension 0.14 kg/dm (0.94 lb/ft)

NIVOROTA

ROTARY PADDLE LEVEL SWITCH

USER'S MANUAL



Manufacturer:

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2.2 SPECIAL DATA FOR EX CERTIFIED MODELS

Electrical connection	2x M20 x1.5 metal cable glands, cable outer diameter: 8 – 13 mm (0.31 – 0.51 inches)
Ex marking	Ex II 1/2 D Ex tb IIIC IP67

TEMPERATURE DATA FOR EX VERSIONS

TX temperature class	Normal type				High temperature type			
	Max. surface temp.	Medium temperature	Ambient temperature	Waiting time for opening the cover	Max. surface temp.	Medium temperature	Ambient temperature	Waiting time for opening the cover
T6 (85°C)	85 °C	60 °C	30 min.	30 min.	85 °C	60 °C	30 min.	30 min.
T5 (100°C)	100 °C				20 min.			
T4 (135°C)	120 °C	50 °C	5 min.	5 min.	120 °C	60 °C	5 min.	5 min.
T3 (200°C)	-	-	-	-	200 °C	-	-	0 min.

2.3 ACCESSORIES

- User's manual
- Warranty Card
- Declaration of Conformity
- 1-vane or 3-vane paddle (as per order code), 2 pcs. split pin

2.4 ORDER CODE

NIVOROTA E - - (1)

Type	Code	Version / paddle / process connection	Code	Housing	Code	Code	Insertion length	Code	Power supply / Ex	Code
Normal	K	Standard / 1-vane / 1" BSPT	A	Aluminium	7	0	0 m	0	230 V AC	1
High temperature	H	Standard / 1-vane / 1½" BSPT	H	Plastic (2), (3)	8	1	1 m	1	120 V AC	2
		Standard / 3-vane / 1½" BSPT	F			2	2 m	2	24 V AC	3
		Rod extended / 1-vane / 1½" BSPT	R			3	3 m	3	24 V DC	4
		Cable extended / 1-vane / 1½" BSPT	K			4 dm	4	230 V AC/Ex tb IIIC (ATEX)	5	
		Cable extended / 3-vane / 1½" BSPT	L			5 dm	5	120 V AC/Ex tb IIIC (ATEX)	6	
				6 dm	6	24 V AC/Ex tb IIIC (ATEX)	7			
				7 dm	7	24 V DC / Ex	8			
				8 dm	8					
				9 dm	9					

(1) The order code of an Ex version should end in 'Ex'

(2) Not available in Ex version

(3) Not available in high temperature type

Accessories to order:

Paddles:

Name	Code
1-vane paddle	EKA-702-1M-300-00
3-vane paddle (120 mm h.)	EKF-702-1M-300-00
Split pin (3x20)	4cesp3x20ykoy
3-vane paddle (268 mm h.)	EKF-703-1M-300-00

Mounting:

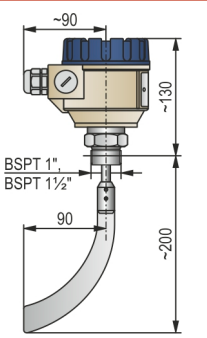
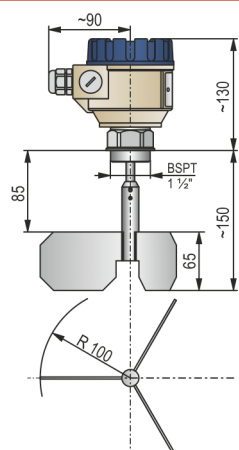
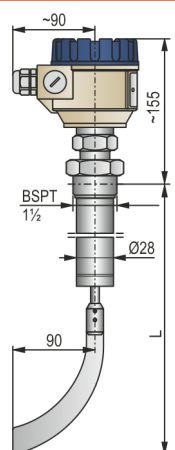
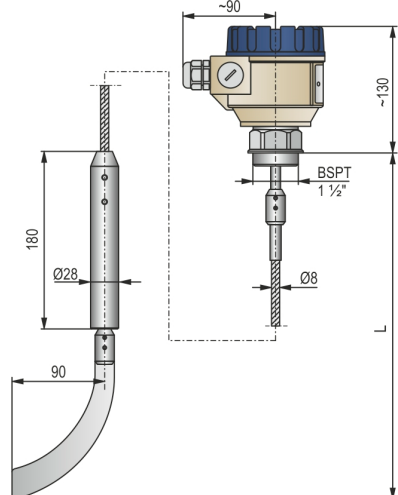
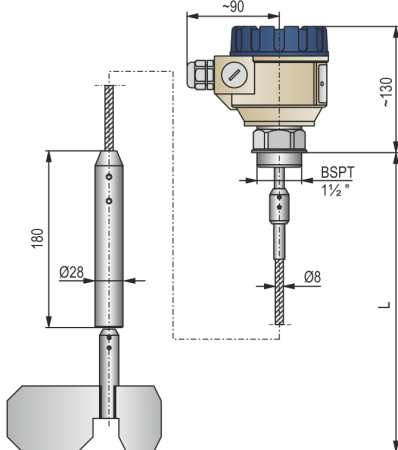
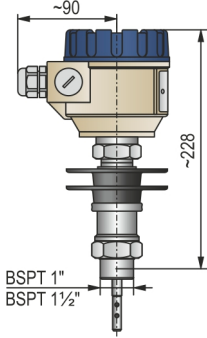
Name	Code
1" female nut / 1.4571	EAM-701
1½" female nut / 1.4571	EAM-702
Sliding sleeve for rod extended version	EAM-703
Mounting plate, 1" hole / 1.4571	EAM-704
Mounting plate, 1" hole / carbon steel	EAM-705
Mounting plate, 1½" hole / 1.4571	EAM-706
Mounting plate, 1½" hole / carbon steel	EAM-707
Mounting plate sealing	EAM-704-0M-003

Accessories

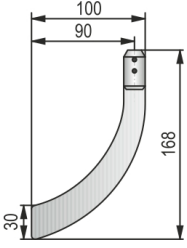
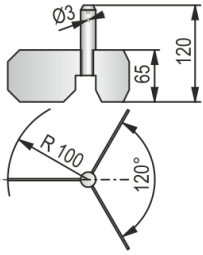
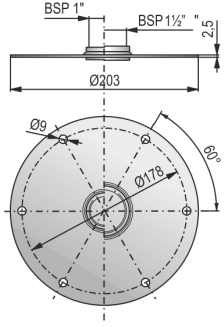
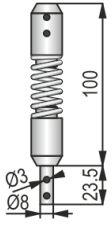
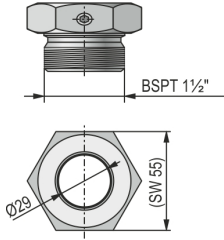
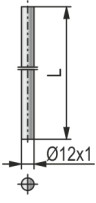
Name	Code
Counterweight	EAW-701
Flexible coupling	EAS-701
Rigid tube 1-vane	EKK-7□□-1M-900-01
Rigid tube 3-vane	EKL-7□□-1M-900-01
Adapters:	
1" BSP - 1½" BSP/1.4571	EAA-601-0M
1" BSP - 1½" NPT/1.4571	EAA-602-0M
1½" BSP - 2" BSP/1.4571	EAA-603-0M
1½" BSP - 3" BSP/1.4571	EAA-609-0M

2.5. DIMENSIONS

2.5.1 UNITS

STANDARD VERSION		STANDARD VERSION WITH ROD EXTENSION
1-vane paddle EK□-□02-□	3-vane paddle EKF-□02-□	1-vane paddle EKR-□□□-□ Insertion length (L): 0.3 - 3.0 m (1 - 10 ft)
		
CABLE EXTENDED VERSION WITH COUNTERWEIGHT		HIGH TEMPERATURE VERSION
1-vane paddle EKK-□□□-□	3-vane paddle EKL-□□□-□	EHQ-7□□-□
		
Standard 1 or 3-vane paddle, rod or cable version		

2.5.2 ACCESSORIES

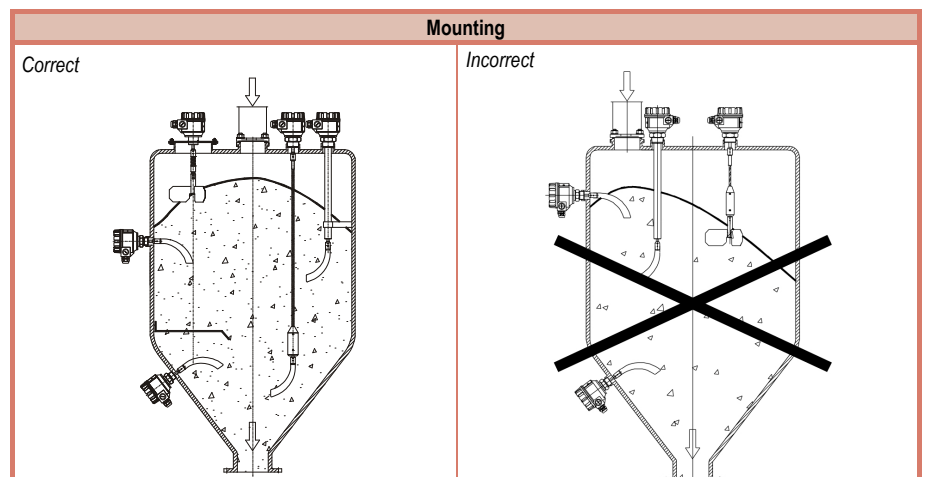
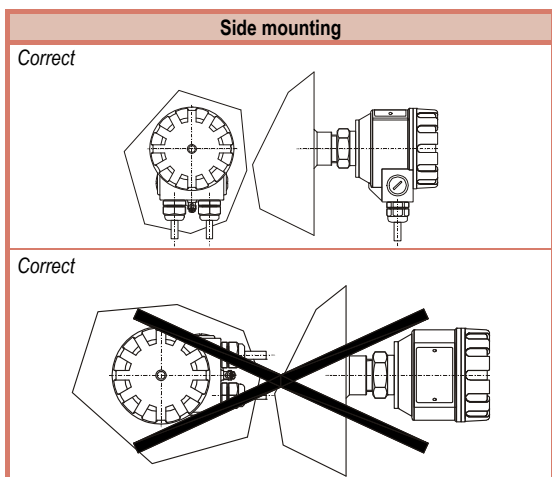
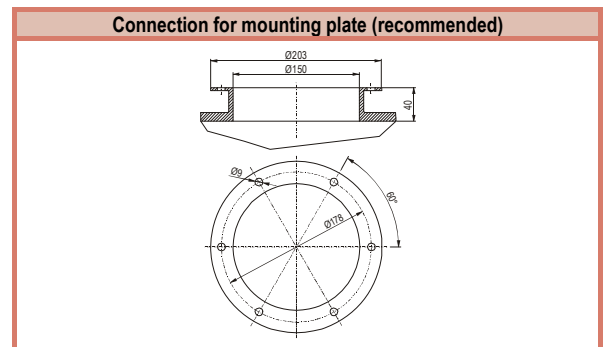
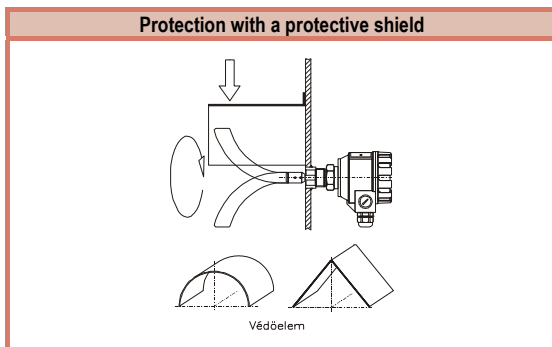
1-vane paddle EKA-702-1M-300-00	3-vane paddle EKF-702-1M-300-00 EKF-703-300-00		Mounting plate EAM-70□-0
			
Flexible coupling EAS-701-0	Sliding sleeve for rod extended version EAM-703-0		Rigid pipe EKK-70□-0, EKL-70□-0
			

3. INSTALLATION

The device can be installed in several ways, depending on the design (vertical, horizontal, angle), with the help of threaded connections, mounting plates, adapters, adjusting units, etc. The unit should be protected against steady material inflow by appropriate selection of the mounting position or by using an overhead protective shield. When the instrument is mounted on the side of the tank, coning or arching of the material should be taken into consideration. A location with the least mechanical vibration is preferred for the unit. After installation, rotate the housing to adjust the cable glands to the correct position.

The single vane paddle passes through the 1", or the 1½" hole. In case of using a mounting plate, proper cut-out (Ø150 mm) is essential because, the 3-vane paddle does not pass through a smaller diameter hole. Do not forget to use the mounting plate seal! When mounted on a bracket or mounting plate, a 1" or 1½" flat nut can be ordered to fix the unit. Less than 9 mm thick mounting plate requires spacers. Above 0.5 m (19.68 inch) rod extension, the rod is advised to be fixed to the tank wall. For high-level switching, standard 1- or 3-vane paddle device is recommended, if necessary, equipped with a flexible coupling or a rod extension to achieve the required detection level. When using the unit for low fail-safe indication, the installation of a deflector element is necessary. Cable version recommended for low-level switching, supplemented with a suitably sized rigid tube if necessary. The use of a rigid tube is recommended when the measured medium forms a steep cone or a surface that is so rigid that the paddle cannot grip and therefore the level tends to deviate significantly from its vertical position. In this case, it is recommended to use a rigid tube for the proper operation.

Besides, there are countless ways to use the device, but you should always be careful about choosing the right process connection and protection of the device.



The housing can be rotated after the mounting! In case of side-mounted units, the cable glands should face down!

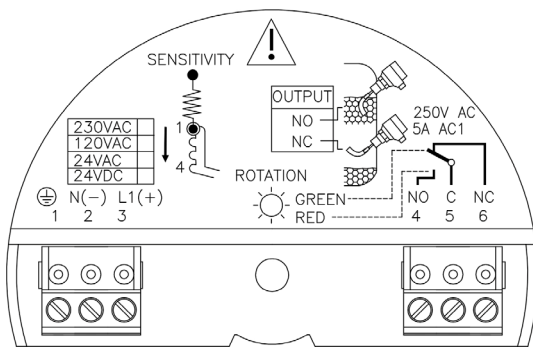
4. MOUNTING

The paddle should be fixed to the device by inserting the two attached pins before installation. By mounting with the mounting plate, the plate must be mounted first, followed by the paddle. In case of cable extended units, the cable can be fixed by the same way with the pins.

For customization the length of the cable extension the cable probe can be shortened from the lower end, first the set screws should be removed from the lower cable-holder. After removing the set screws, the cable can be cut to the required length. It is recommended to use adhesive tape for cutting to prevent the disintegration of the filaments. After cutting the cable, the cable-holder should be assembled with the probe. If a rigid tube is attached to the unit, it must be cut for the according length before re-assembling!

In case of extended rod versions, if modification of the insertion length is needed, it is possible with the optional sliding sleeve accessory. The sliding sleeve needs a 1 1/2" BSP / NPT nozzle. The BSPT thread can be screwed into a suitable BSP or an NPT threaded nozzle with the help of the hexagon neck (SW 55 size wrench is suitable for 1 1/2"). The single vane paddle passes through the hole.

5. WIRING



6. OPERATION

The device should be connected to the protective earth with its internal or external grounding screw! After energizing supply terminals, the unit is fully operational. If the paddle is rotating freely (not immersed in the medium), the status LED lights green. When the medium reaches the paddle, and stops its rotation, the output microswitch changes its state, the motor stops, and the status LED turns to red.

The tension spring provides reliable operation in case of different density media. The default state of the sensitivity adjustment of the tension spring is position 1. This position is suitable for almost all applications. If the measured medium is wet, sticky, and prone to adhere on the paddle, it significantly alters the sensitivity of the device, especially in case of side-mounted or installed at an angle. By adjusting the spring tension (Sensitivity 1-4), the sensitivity of the device can be set to the desired degree. Do not forget the regular cleaning of the device if necessary!

When the density or the granular size of the medium is not in line with the number of paddle-vanes, it may occur that the medium is not able to stop the rotation of the paddle. Therefore, the output switch does not change its state despite that the medium has reached the paddle. By choosing the right device type and sensitivity settings according to the density of the medium, provides reliable switching in most cases. For very low-density material, a custom size paddle required.

Operation status:

Power supply	Status LED	Paddle	Output
ON	Green	Rotates	NO
	Red	Does not rotate	NC
OFF	Dark	Does not rotate	NO

7. SPECIAL CONDITIONS OF EXPLOSION-PROOF USAGE

- The housing of the device should be protected against dust build-ups.
- The housing cover is allowed to remove only in de-energized state and only after the needed waiting time (BK111ATEX0026X Test certificate point 15.5)
- The power supply and the output terminals shall be connected to electrical circuits applying short-circuit protection.

8. MAINTENANCE, REPAIR

The device does not require regular maintenance. In some instances, however, the unit may need occasional cleaning to remove material deposits. All repairs during or beyond the warranty period are to be carried out at the manufacturer's premises.

9. STORAGE

Ambient temperature: -30 °C ... +60 °C (-22 °F ... +140 °F)
Relative humidity: max. 98%

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November 2019.

NIVELCO reserves the right to change technical data without notice!