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

1. INTRODUCTION

The SAK-305 HART modem is able to establish communication line between HART-capable field devices and process controller computer. Two possible application modes:

– As a HART-USB modem, connected into the USB input of a PC. In this case the modem does not need external power supply. The device is galvanically isolated from both (USB and HART) sides.
– As a HART-RS485 modem, connected into a suitable device with RS485 interface input. The communication protocol is **HART** on the RS485 line. The RS485 network is a 2-wire (half duplex) system. In this case the device needs external power supply. The device is galvanically isolated from both (HART and Power supply) sides.

The SAK-305-6 HART modem is an associated apparatus. It shall be placed outside the hazardous area and can be connected to HART-capable field devices placed inside the hazardous area.

2. TECHNICAL DATA

2.1. GENERAL DATA

HART-USB MODEM	Power supply		Supplied from USB
	Current consumption		< 60 mA
	Electrical connection	PC	USB A-B cable
		HART line	Twisted, shielded pair with 0.5…2.5 mm^2 wire cross section Resistance max.75 Ω, Capacitance max. 200 nF
HART-RS485 MODEM	Power supply (U_p)		10-30V DC
	Power consumption		< 1.5 W
	Electrical connection	Supply	0.5…2.5 mm^2 wire cross section
		RS485 interface	Twisted, shielded pair with 0.5…2.5 mm^2 wire cross section
		HART line	Twisted, shielded pair with 0.5…2.5 mm^2 wire cross section Resistance max.75 Ω, Capacitance max. 200 nF
	RS485 terminal resistance		124 Ω
	RS485 max. cable length		1000 m
HART resistance			250 Ω
Ambient temperature			-20 °C…+70 °C
Housing material			PPO
Mechanical connection			DIN (EN 60715) rail mountable
Ingress protection			IP20
Electrical protection			Class III.
Mass			0.1 kg

2.2 SPECIAL DATA FOR EX CERTIFIED MODELS

Ex marking	⟨Ex⟩ II (1) G [Ex ia Ga] IIC
Intrinsically safe limit data	U_i=30V, I_i=100mA, P_i=1W, L_i=200µH, C_i=2nF
U_m	253V AC

2.3 ACCESSORIES

User's manual   Declaration of Conformity
Warranty Card   USB A-B cable (1.8m)

2.4 ORDER CODE

SAK-305-

Standard	2
Ex ia	6

2.5 DIMENSION

58   35   88
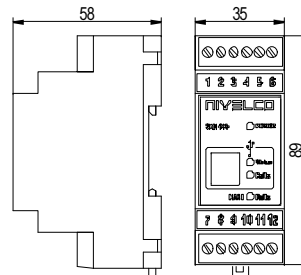
2.6 CONDITIONS OF EX APPLICATION

The device should be placed outside the hazardous area and should be connected to intrinsically safe [Ex ia] certified and approved devices! The device should be protected against direct sunlight!
The power supply and ambient temperature values can not exceed the limitations of the technical data table!

3. WIRING

3.1 WIRING EXAMPLE
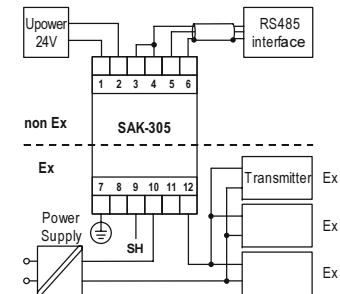
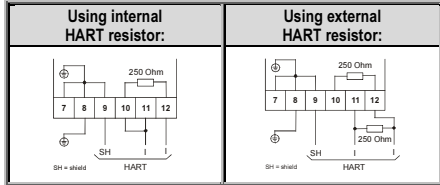## 3.2 WIRING OF HART INPUT

The HART input is polarity-independent. Shielding of the input wire should be connected with SH point.

3.2.1 FOR STANDARD VERSION

If there is no HART resistance in the loop, it is possible to connect an internal HART resistor:

| Using internal HART resistor:	Using external HART resistor:

3.2.1 IN CASE OF EXPLOSION-PROOF DEVICE

There is a built-in 250 Ohm HART resistor inside. Using HART multi-drop communication, there can be maximally 4 transmitters connected:

Connection explosion-proof transmitters:
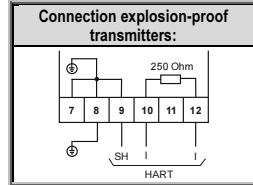
3.3 WIRING OF POWER SUPPLY AND RS485

Wiring of power supply should be done in accordance to the drawings. The unit is protected against reverse-polarity, so incorrect wiring can not cause any damage. Reducing reflections on the RS485 line, both ends of the cable should be connected with terminal resistances. Since multiple devices can be connected into a RS485 line, only terminal devices should be connected with terminal resistors.

RS485 line at terminal device:	RS485 line at intermediate device:
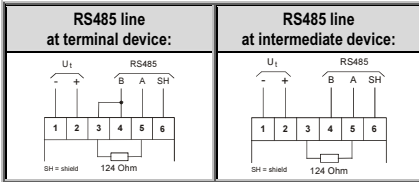
4. OPERATION

The device meets the requirements of HART communication. It is applicable as a HART-USB modem, or as a HART-RS485 modem. Without USB connection, it operates as a HART-RS485 modem. If it is connected with the USB connector and got power supply from USB, it switches automatically into HART-USB modem mode. If USB cable is removed,it returns into HART-RS485 modem mode. The POWER LED indicates the existence of the external power supply. If external power supply is connected, POWER LED is green in both modem modes.

4.1 HART-USB MODEM

Connecting to PC and for using USB communication, a USB-virtual COM port driver is needed. This is available on the attached CD/DVD of NIVELCO HART-capable devices (EView LIGHT install program), or can be downloaded from http://ftdichip.com.

Connecting to the USB port of a PC, the Status LED flashes red for a while, then it lights continuously green. The HART Rx/Tx LED flashes orange for a while after the connection, then it goes off. The Rx/Tx LED of USB and Rx/Tx LED of HART lit red or green depending on the communication direction, and do not light if there is no communication on the line. The communication of USB and HART lines are indicated independently from each other.

Operation of the LED-s:

LED	Inactive mode	Active mode		
		No Communication	Receive from PC	Send to PC
USB Status	Red	Green		
USB Rx/Tx	Not lit	Not lit	Red	Green
HART Rx/Tx	Not lit	Not lit	Red	Green

4.2 HART-RS485 MODEM

Connecting the unit to the external power supply, POWER LED lights green, the HART Rx/Tx LED flashes orange for a while, then it goes off. Then the Rx/Tx LED of HART lits red or green depending on the communication direction, and does not lit if there is no communication on the line.

Operation of the LED-s:

LED	External power supply			
	OFF	ON		
		No commu-nication	Receive from RS485	Send to RS485
POWER	Not lit	Green		
USB Status	Not lit	Not lit		
USB Rx/Tx	Not lit	Not lit		
HART Rx/Tx	Not lit	Not lit	Red	Green

5. MAINTENANCE, REPAIR

The unit does not require regular maintenance. All repairs will be carried out at the manufacturer's premises.

6. STORAGE

Ambient temperature: -20…+70°C
Relative humidity: max. 98%

7. WARRANTY

NIVELCO provides warranty of 3 (three) years in compliance with details described in the Warranty Card.