

# NV57H

## 1 Introduction

The NV57H is an electronic module usable as expansion board of the E57H direction sensor.

A typical application of this device is in a machine room less elevator, where it's mandatory during the maintenance or rescue activities, monitor the direction and the speed of the elevator. An overspeed output is also available.



## 2 Functionality

Connecting all the E57H outputs to the expansion module it will be possible to check speed and direction of the movable object in a discrete way through panel LED or through RS485 command (see Chapter 7). In this second way speed will be shown with a 1/1000 m/s resolution.

The user through the dipswitch Dip1 or through apposite command sent by RS485 interface (see Chapter 7), can select threshold speed, above it a relay output will be activated.

Device has some LED signals and transistor outputs according to the below table. Device can be used in a machine room less (MRL) elevators where it's mandatory for the maintenance person to monitor speed and direction of the lift. Beside these functions an overspeed output is also available.

Overspeed condition indicates that object speed is above the threshold value set by user. This condition is reported in 3 ways: on front panel through the activation of a red LED, on relay output (J1 connector), through RS485 interface with a data starting with "OVT".

Overspeed condition is latched; this means that when reached it remains active until movable object stops to move. Board continues to monitor speed and direction correctly even when overspeed output is active.

In case of output relay broken (so with the impossibility to use this output to detect overspeed condition), if movable object speed exceeds threshold value set, then red LED will blink.

In this condition LED will stop to blink only when both movable object stops to move and board is powered off-on. In case board is powered off and then powered on again with object still in movement, if speed is below threshold, then LED won't blink (it starts again as soon as speed exceed threshold), if it is above it will blink again.

Also in this case, board continues to monitor speed and direction correctly even when overspeed output is active.

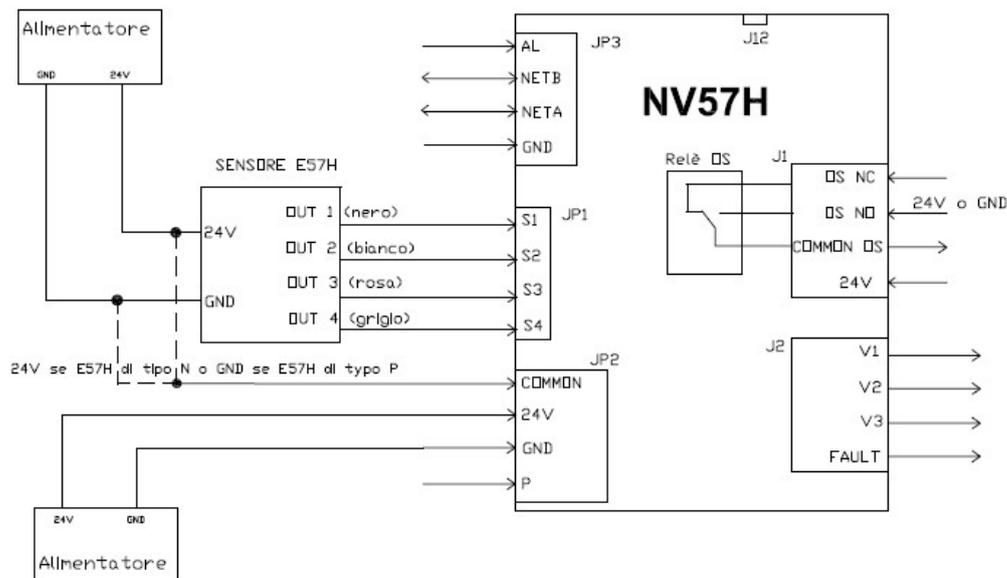
## 3 General Technical Data

General data	
Power supply	9-30VDC
Input current	100mA
Box dimension	Scatola Phoenix ME MAX22, IP 20
Mechanical connection	Connection to DIN guide
Operative temperature	-30°C + 85°C
Storage temperature	-40°C + 120°C
EMC conformity	EN61000-6-3, EN61000-6-2*1, EN12016, EN12015 * *1 to be connected at AC/DC, maximum cable length 30m

## 4 Signaling

Segnaling	Function Description	Output type associated
LEDV1 (green)	The speed of the moving object has exceeded: <ul style="list-style-type: none"> <li>10% of OVT if set by dip-switch and OVT &lt; 0.3 m/s</li> <li>0.1 m/s if OVT &gt; 0.3 m/s and set by dip-switch.</li> <li>V1T if set via RS485 serial</li> </ul>	A transistor Open collector PNP o NPN, I <sub>max</sub> 100mA, V <sub>max</sub> 30V
LEDV2 (green)	The speed of the moving object has exceeded: <ul style="list-style-type: none"> <li>30% of OVT if set by dip-switch</li> <li>V2T if set via RS485 serial</li> </ul>	A transistor Open collector PNP o NPN, I <sub>max</sub> 100mA, V <sub>max</sub> 30V
LEDV3 (green)	La velocità dell'oggetto in movimento ha superato: <ul style="list-style-type: none"> <li>80% di OVT se impostato tramite dip switch V3T se impostato tramite seriale RS485</li> </ul>	A transistor Open collector PNP o NPN, I <sub>max</sub> 100mA, V <sub>max</sub> 30V
LED PW (green)	The power supply voltage is OK	-----
LED OS (red)	Two functionalities are available: <ol style="list-style-type: none"> <li>Object speed above the threshold (overspeed) → red led always on</li> <li>Board is not function correctly, I.E output relay broken → red led blinking</li> </ol>	OS: exchange relay for overspeed contacts 30Vdc 1A, 125VAC 0,5A. FAULT: transistor Open collector PNP o NPN, I <sub>max</sub> 100mA, V <sub>max</sub> 30V
LED D1 (red)	Movement object direction1	-----
LED D2 (red)	Movement object direction2	-----
LED P (in position)	Movable object in a fixed position, (for instance elevator at the floor) available only an external input is available.	-----

## 5 Wiring diagram



**Note:** according to the E57H sensor type (p or N) the Fp2 common has to be connected to GND (P version) or to 24VDC (sensor n type).

## 6 User configurations

### 6.1 DIP switch

Using dip switch will be possible to set overspeed threshold according to the below table.

Configuration	S1	S2	S3	S4	Speed	MODE
0	ON	ON	ON	ON		Threshold set by RS485 command "OVT"
1	OFF	ON	ON	ON	0,05	Threshold set by DIP switch settings
2	ON	OFF	ON	ON	0.1	Threshold set by DIP switch settings
3	OFF	OFF	ON	ON	0,15	Threshold set by DIP switch settings
4	ON	ON	OFF	ON	0,2	Threshold set by DIP switch settings
5	OFF	ON	OFF	ON	0,3	Threshold set by DIP switch settings
6	ON	OFF	OFF	ON	0,4	Threshold set by DIP switch settings
7	OFF	OFF	OFF	ON	1	Threshold set by DIP switch settings
8	ON	ON	ON	OFF	1.3	Threshold set by DIP switch settings
9	OFF	ON	ON	OFF	1.73	Threshold set by DIP switch settings
10	ON	OFF	ON	OFF	1.94	Threshold set by DIP switch settings
11	OFF	OFF	ON	OFF	2.15	Threshold set by DIP switch settings
12	ON	ON	OFF	OFF	2.36	Threshold set by DIP switch settings
13	OFF	ON	OFF	OFF	2.57	Threshold set by DIP switch settings
14	ON	OFF	OFF	OFF	2.78	Threshold set by DIP switch settings
15	OFF	OFF	OFF	OFF	3	Threshold set by DIP switch settings

At the board power on, if DIP switch configuration is any value different to 0, overspeed threshold is set by corresponding DIP switch value according to previous table (speed column which is expressed in m/s). To change threshold value it's necessary to move the switch configuration and then power off and power on the board. Without power off-on new setting is not applied.

If the DIP switch configuration is set to be 0 (that is, as shown in the ON - ON - ON - ON table), the maximum threshold value is established via the RS485 interface.

Via the RS485 serial it is also possible to set the thresholds values to switch on the outputs V1, V2, V3.

If the value scale  $V1 < V2 < V3 < OVT$  is not respected, the values V1, V2, V3 will be automatically calculated based on the selected OVT:  $V1 = 0.1m / s$  or 10% OVT (if  $< 0.3m / s$ ),  $V2 = 30\% * OVT$ ,  $V3 = 80\% * OVT$

At the first switch-on, if you set the configuration to ON - ON - ON - ON, the OVT = 0.

The minimum OVT threshold that can be set via the serial line is 0.08 m / s

### 6.2 Output fault Jumper

It is possible to verify correct functionality of output relay.

To do this, J1 connector ports have to be used, connecting NO input (pin3) to 24V or GND.

If output relay is correctly working, in presence of OS condition overspeed output common (pin2)

will assume 24V or GND voltage level (depending on what connected to NO pin). Otherwise this won't happen causing FAULT output (pin 2 of J2) activation and red OS led will blink.

In order to have correct monitoring of output relay status, so to have correct monitoring of the circuitry which generates FAULT signal, jumper J12 must be used in the following way:

- If relay contact NO (pin 3 of J1) is connected to 24V → J12 shall be closed
- If relay contact NO (pin 3 of J1) is connected to GND → J12 shall be opened

## 7 I/O PIN

JP1		
Pin Name	Description	Type
S1	OUT1 E57H Object in movement direction1	Optoisolated input, NPN o PNP, (Vmax=24V, I=10mA) positive or negative
S2	OUT2 E57H Object in movement direction2	Optoisolated input, NPN o PNP, (Vmax=24V, I=10mA) positive or negative
S3	OUT3 E57H Speed impulse	Optoisolated input, NPN o PNP, (Vmax=24V, I=10mA) positive or negative
S4	OUT4 E57H Speed impulse	Optoisolated input, NPN o PNP, (Vmax=24V, I=10mA) positive or negative

JP2		
Pin Name	Description	Type
P	Device in a defined position	Optoisolated input, NPN o PNP, (Vmax=24V, I=10mA) positive or negative
COM	Common for inputs Sx	GND for PNP sensor, 24V for NPN sensor
24V	Power supply	24V +/- DC not regulated IMax =100mA
GND	GND	

JP3		
Pin Name	Description	Type
L	Auto Learning (used for RFID)	Input (Vmax = 3V)
B	RS485 NETB	Receiver not inverting input and driver not inverting output (Vmax: -7.5V to 12.5V)
A	RS485 NETA	Receiver inverting input and driver inverting output (Vmax: -7.5V to 12.5V)
4	GND	

J1		
Pin Name	Description	Type
NC	overspeed input normal closed	Relay contact NC, 30Vdc 1A, 125VAC 0,5A.
COO	overspeed output: common	Relay contact NC, 30Vdc 1A, 125VAC 0,5A.
NO	overspeed input normal open	Relay contact NO, 30Vdc 1A, 125VAC 0,5A.
24	Input Power supply 24V DC	24V +/- DC not regulated I=100mA

J2		
Pin Name	Description	Type
V1	Output Speed V1	Transistor output NPN o PNP, (Vmax=30V, I=100mA)
V2	Output Speed V2	Transistor output NPN o PNP, (Vmax=30V, I=100mA)
V3	Output Speed V3	Transistor output NPN o PNP, (Vmax=30V, I=100mA)
FA	FAULT Output (output relay fault). NOTE: The output signals a relay fault condition only if the jumper J12 and the overspeed input NO (pin 3 di J1) are used as indicated on the paragraph 4.2	Transistor output NPN o PNP, (Vmax=30V, I=100mA)

## 8 Serial RS485 protocol interface description

Board has the possibility to interface through connector JP3 with an external board using RS485 interface according to the following protocol.

### 8.1 Port set up

Function	Value
Baud rate	115.200Kbit/s
Data bit	8
Even	No
Stop bit	1
Flux control	No

LSB first  
Idle low

### 8.2 Protocol

Protocol will is indicated in the table below:  
TX command is EXPANSION → PC direction  
RX command is PC → EXPANSION direction

#### TX Commands

Byte (ascii)	Field	Field Description
0	SOF	Start of Frame
1,2,3	CMD	Command
4	ACK	Acknowledge
5,6,7,8,9,10,11,12	DATA	DATA
13,14,15,16	CHK	Checksum
17	EOF	End of Frame

#### RX Commands

Byte (ascii)	Field	Field Description
0	SOF	Start of Frame
1,2,3	CMD	Command
4	ACK	Acknowledge
5,6,7,8,9	DATA	DATA
10,11,12,13	CHK	Checksum
14	EOF	End of Frame

**SOF** Start of Frame  
Start Byte  
SOF = “ | ” (ASCII) = 7C (Hex)

### CMD Command

Byte used to specify the command (sent or received). CMD byte is ASCII coded

RX COMAND (PC→NV57H)			
COMAND	CODE (ASCII)	DESCRIPTION	COMPLETE COMMAND
Max speed threshold	OVT	Maximum allowed speed (overspeed threshold, the board only accepts threshold values between 0.08 and 3.000)	OVT~V.VVVCCCC*
Speed threshold V1	V1T	Output activation threshold V1 e LedV1	V1T~V.VVVCCCC*
Speed threshold V2	V2T	Output activation threshold V2 e LedV2	V2T~V.VVVCCCC*
Speed threshold V3	V3T	Output activation threshold V3 e LedV3	V3T~V.VVVCCCC*
Read actual speed	RSP	Read speed	RSP~V.VVVCCCC*
Reed Param	RPA	Read parameter	RPA~0000CCCC*

TX COMAND (NV57H→PC)			
COMAND	CODE (ASCII)	DESCRIPTION	COMPLETE COMMAND
Actual speed and direction	SPD	Direction D1 or D2 speed in m/s	SPD:D1-1.5000333*
Superata la soglia max velocità	OVS	Maximum speed threshold exceeded ("OVS") combined with direction data D1 or D2 and speed in m / s	OVS:D1-1.5000344*
Soglia velocità V1	V1T	Output activation threshold V1 and LedV1	V1T:V.VVVCCCC*
Soglia velocità V2	V2T	Output activation threshold V2 and LedV2	V2T:V.VVVCCCC*
Soglia velocità V3	V3T	Output activation threshold V3 and LedV3	V3T:V.VVVCCCC*
Versione SW	SWV	SW version	SWV:XXXXXCCCC*

### ACK Acknowledge

Acknowledge confirms correct transmission of data. PC → EXPANSION : ACK = "~" (7E Hex),

EXPANSION → PC: ACK = ":" (3A Hex)

Other values mean incorrect transmission

### Data

Depends of the commands, it will be speed and direction data

### CHK Checksum

4byte in ASCII, used to control the correct transmission of message. Value of CHK is the sum of bytes 0-16, in case of sent data, or 0-14 in case of command received, as indicated in the examples:

## 8.1 Command example

				V1T~0.05002C8*
				RSP~000002DF*
		HEX		
SOF		7C	+	
“V”		56	+	
“1”		31	+	
“T”		54	+	
ACK		7E	+	
data		30	+	
data		2E	+	
data		30	+	
data		35	+	
data		30	+	
				RPA~000002CD*
				V2T~0.10002C5*
				V3T~0.15002CB*
				OVT~1.50002E7*
				SPD:D1-1.5000333*
				OVS:D1-1.5000344
TOTCHK	=	02C8		

## 9 Configuration SW

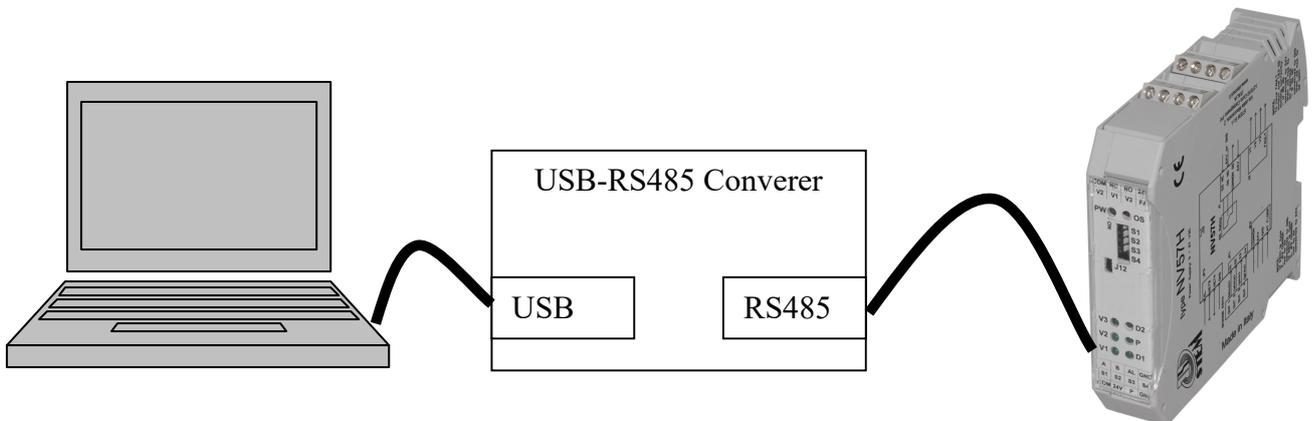
To configure the NV57H it's possible to use the *NV57H\_configuration\_SW* based on the Windows operating system.

It requires a HW interface between PC and NV57H typically a USB-RS485 interface

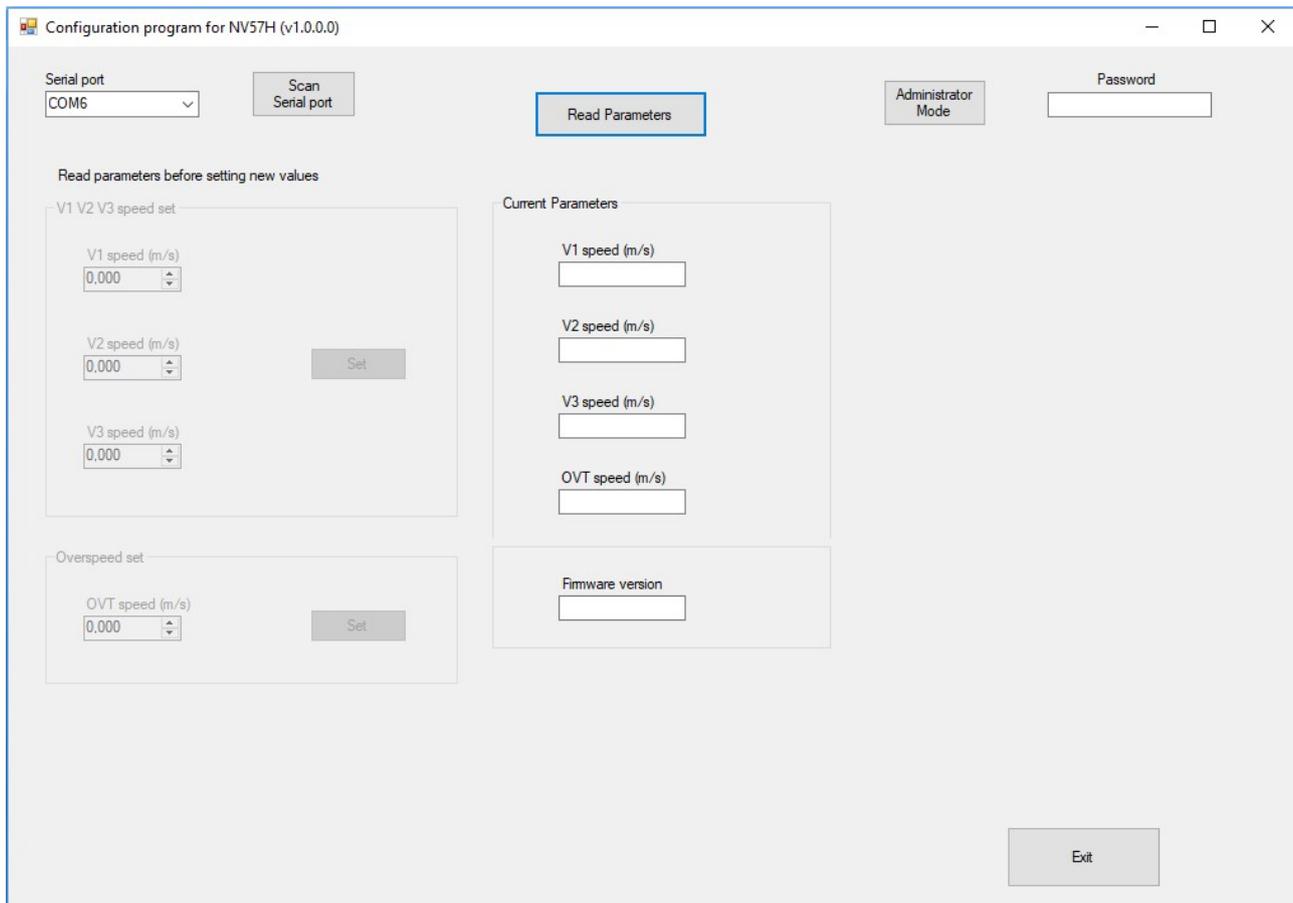
This configuration sw has been tested only in the Windows 7 and Lyndy usb-serial converter (www.lindy.it) code 42845.

We decline all responsibility in case of malfunction of the configuration SW due to problems related to the operating system or to the possible HW interface (USB-RS485) used.

### 9.1 Connection Scheme



## 9.2 NV57H\_conf\_SW



**V1**= Output activation threshold V1

**V2**= Output activation threshold V2

**V3**= Output activation threshold V3

**OVT**= Maximum speed threshold

**Set**= configure the data in the NV57H only if a correct sequence is respected:  $V1 < V2 < V3 < OVT$  and  $0.08 \text{ m/s} < OVT < 3 \text{ m/s}$

**Read parameter**= read the stored configuration data

**It's necessary to refresh the memory switching off and on the NV57H**