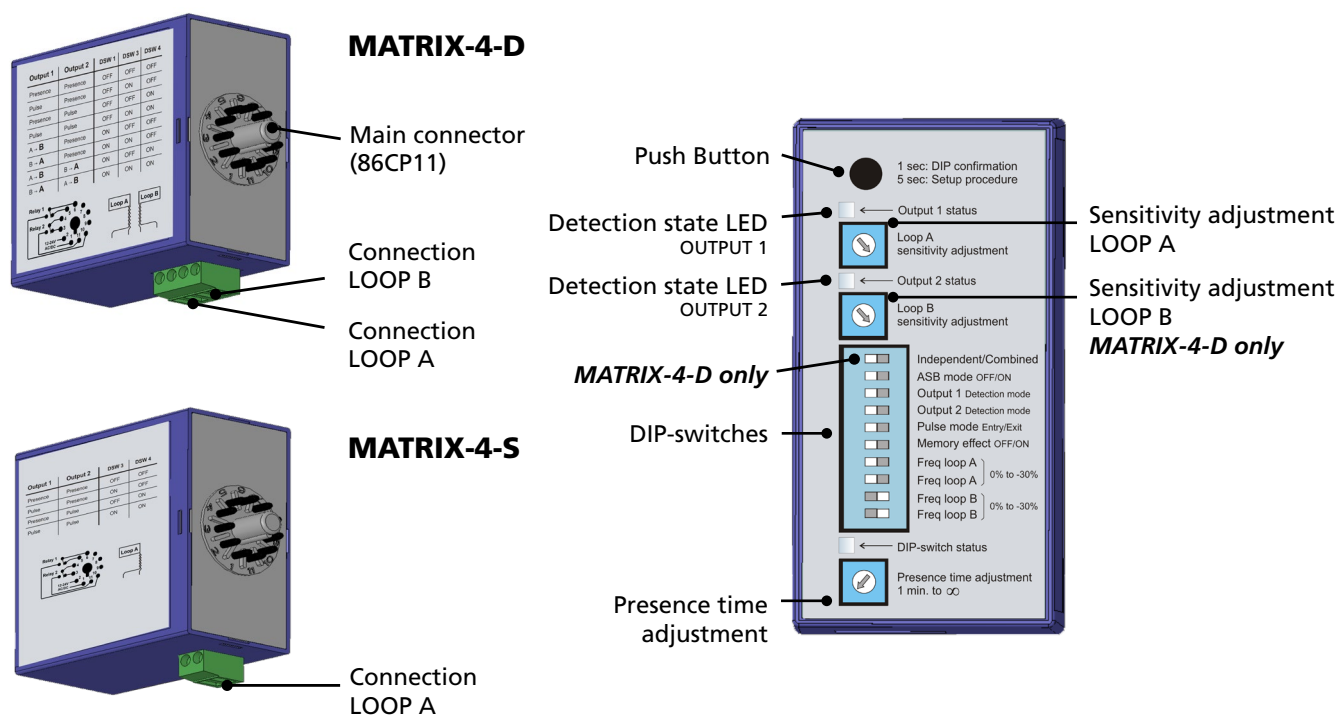


MATRIX-4

DIGITAL INDUCTIVE LOOP SENSOR*

DESCRIPTION



TECHNICAL SPECIFICATIONS

Technology	inductive loop	Storage temperature range	-30 °C to +70 °C
Tuning	automatic	Operating temperature range	-30 °C to +55 °C
Detection mode	presence and motion	2 Output relays (free potential change-over contact)	2 relays, 0.5 @ 42 VAC on resistive load
Presence time	1 min to infinity (permanent presence) in 8 steps	LED indicators	<ul style="list-style-type: none"> • 1 green LED: power • 1 red LED: OUTPUT 1 • 1 red LED: OUTPUT 2
Pulse time output	100 ms	Main connector	standard 11-pin round connector 86CP11
Inductance range	40 µH to 470 µH	Loop connector	2 contacts for each loop, plug-in terminal for section cable up to 2.5 mm ²
Frequency range	20 kHz to 130 kHz	Dimensions	77 mm (H) x 40 mm (W) x 75 mm (D)
Frequency steps	2 for each loop	Weight	< 200 gr
Sensitivity (ΔL/L)	0.004% to 0.512% in 8 steps	Product compliance	RED 2014/53/EU EMC 2014/30/EU
Reaction time	33 ms without memory effect 140 ms with memory effect		
Power supply	12-24 AC/DC +10% - 5%		
Mains frequency	48 to 62 Hz		
Power consumption	< 3 W		
Degree of protection	IP40		

Specifications are subject to changes without prior notice.

LOOPS INSTALLATION TIPS

1. CABLE SPECIFICATIONS FOR LOOP AND FEEDER

- 1.5 mm² cross section area
- Multi-strand cable
- Insulation material: PVC or Silicone
- For the feeder cable, the wire must be twisted at least 15 times by meter
- A foil screened cable is recommended for long feeder runs (earth at equipment end only)
- The feeder cable must be firmly fixed to avoid any false detection (max length: 100m)
- Waterproof cable junction box is required

*Other use of the device is outside the permitted purpose and can not be guaranteed by the manufacturer.

2. DETERMINATION OF THE NUMBER OF LOOP TURNS

WARNING:

For conformity reasons, in any situation, the antenna factor defined as the loop surface multiplied by the number of turns should not exceed $NA = 20$

For example:

Loop A: if $L = 2$ m, $E_a = 1$ m and the number of turns = 4, then the $NA = 2 \times 1 \times 4 = 8 < 20$

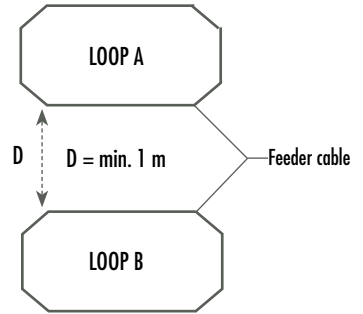
Loop B: if $L = 2$ m, $E_b = 1$ m and the number of turns = 4, then the $NA = 2 \times 1 \times 4 = 8 < 20$

Surface	Number of loop turns
< 3 m ²	4
3 - 5 m ²	3
6 - 10 m ²	2

LOOP A

LOOP B

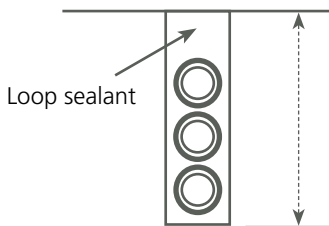
Feeder cable



Rem: Avoid large loops or long feeder (max 100 m), the sensitivity will be affected.

Rem: Make sure the distance D still allows any object to be detected on both loops at the same time with the **directional mode**.

3. SLOT DEPTH

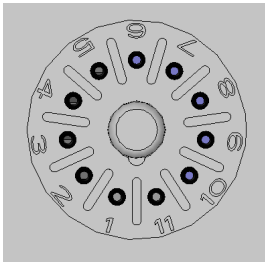


30 - 50 mm depending on cable turns number

Clean and dry slots prior to inserting cable

Rem: Make sure no metallic objects are present in proximity of the loops

WIRING



PIN 1	Power supply	PIN 7	Not used
PIN 2	Power supply	PIN 8	Not used
PIN 3	Relay 2 (NC)	PIN 9	Not used
PIN 4	Relay 2 (COM)	PIN 10	Relay 1 (NO)
PIN 5	Relay 1 (NC)	PIN 11	Relay 2 (NO)
PIN 6	Relay 1 (COM)		

RELAY CONFIGURATIONS - PASSIVE MODE

	NO POWER	NO DETECTION	DETECTION
NO (PIN 10 & 11)			
NC (PIN 3 & 5)			

ADJUSTMENTS

1. THE CONFIGURATIONS (see table on p.4 - MATRIX-4-D only)

Configuration # 1: Independent mode

Configuration # 2: Combined mode

2. THE PUSH BUTTON

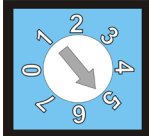
The push button has two functions:

- **Short push** on the push button (max. 2.5 seconds): **confirmation of a setting by rotary or DIP-switch** (only 1 - 6). If a switch value is changed without a manual confirmation by the PB, the green LED flashes, but the sensor continues to work with its prior values.
- **Long push** on the push button (from 2.5 to 10 seconds): **launching of learn mode** after changing a loop frequency or after any modification concerning the loop installation. This function launches a similar self tuning as during the power on sequence.

3. ROTARY SWITCHES

After rotary switch change, confirm the setting with a short push on the push button.

- A rotary switch for adjustment of the **sensitivity** for the **loop A**.
- A rotary switch for adjustment of the **sensitivity** for the **loop B (MATRIX-4-D only)**.
- A rotary switch for adjustment of the **presence time adjustment**: from 1 min to infinity

SENSITIVITY	Memory effect		PRESENCE TIME ADJUSTMENT	
	OFF	ON		
	0	0.512 %	0	1 min
	1	0.256 %	1	5 min
	2	0.128 %	2	10 min
	3	0.064 %	3	1 hour
	4	0.032 %	4	2 hours
	5	0.016 %	5	5 hours
	6	0.008 %	6	20 hours
	7	0.004 %	7	infinity

4. DIP SWITCHES

After each dip switch change, confirm the setting with a short push on the push button.

DIP # 1	Independent or combined mode (see configuration table on p.4 - <i>MATRIX-4-D only</i>)															
DIP # 2	Automatic Sensitivity Boost - ASB (recommended for better trucks detection): during a detection, the sensitivity increases automatically to 8 times the present sensitivity given by the sensitivity rotary switch adjustment. It is limited to the maximum sensitivity ($\Delta f = 0.004 \%$) It goes back to the preset value after detection stops.															
DIP # 3	Relay 1 function: presence, pulse or directional pulse (see configuration table on p.4).															
DIP # 4	Relay 2 function: presence, pulse or directional pulse (see configuration table on p.4).															
DIP # 5	Relays 1 and 2 Pulse type (entry / exit).															
DIP # 6	Memory effect: the sensor keeps in memory the output states recorded just before a power cut. Only functional if ASB is set OFF on DS2.															
DIP # 7&8	<p>Loop A Oscillator frequency These two switches are used to adjust the frequency of the loop oscillator A to avoid any intermodulation with other loop installed in the field.</p> <table border="1"> <thead> <tr> <th>DIP # 7</th> <th>DIP # 8</th> <th>Loop A oscillator frequency (in %)</th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>OFF</td> <td>0 %</td> </tr> <tr> <td>OFF</td> <td>ON</td> <td>-13 %</td> </tr> <tr> <td>ON</td> <td>OFF</td> <td>-23 %</td> </tr> <tr> <td>ON</td> <td>ON</td> <td>-30 %</td> </tr> </tbody> </table>	DIP # 7	DIP # 8	Loop A oscillator frequency (in %)	OFF	OFF	0 %	OFF	ON	-13 %	ON	OFF	-23 %	ON	ON	-30 %
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ON	OFF	-23 %														
ON	ON	-30 %														
DIP # 9&10	<p>Loop B Oscillator frequency (MATRIX-4-D only) These two switches are used to adjust the frequency of the loop oscillator B to avoid any intermodulation with other loop installed in the field.</p> <table border="1"> <thead> <tr> <th>DIP # 9</th> <th>DIP # 10</th> <th>Loop B oscillator frequency (in %)</th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>OFF</td> <td>0 %</td> </tr> <tr> <td>OFF</td> <td>ON</td> <td>-13 %</td> </tr> <tr> <td>ON</td> <td>OFF</td> <td>-23 %</td> </tr> <tr> <td>ON</td> <td>ON</td> <td>-30 %</td> </tr> </tbody> </table>	DIP # 9	DIP # 10	Loop B oscillator frequency (in %)	OFF	OFF	0 %	OFF	ON	-13 %	ON	OFF	-23 %	ON	ON	-30 %
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OFF	OFF	0 %														
OFF	ON	-13 %														
ON	OFF	-23 %														
ON	ON	-30 %														

5. CONFIGURATIONS

		Independent mode - DS # 1 (OFF <=>) MATRIX-4-S and MATRIX-4-D		Combined mode - DS # 1 (=> ON) MATRIX-4-D only	
		OFF <=>	=> ON	OFF <=>	=> ON
DS # 2	ASB mode	OFF	ON	OFF	ON
DS # 3	Rel 1 : Detection mode	Presence Loop A	Pulse Loop A	A -> B	B -> A
DS # 4	Rel 2 : Detection mode	Presence Loop B	Pulse Loop B	Presence (A or B)	Opposite combined**
DS # 5	Rel 1&2 : Pulse mode	Entry***	Exit	Entry	Exit
DS # 6	Memory effect*	OFF	ON	OFF	ON

* Memory Effect Mode: Only functional if ASB is set OFF by DS2.

** See sticker on the product for more details.

*** If both relays are in pulse mode, DS5 setting applies to relay 1. Pulse of relay 2 is the opposite setting. (**MATRIX-4-S only**)

LED SIGNAL

GREEN LED



The green LED indicates that the sensor is powered.
ON: correct line voltage
OFF: internal problem or power line voltage is too low

The green LED flashes when a switch is changed without validation by the PB.

RED LED



The red LED indicates the corresponding output detection state. Each LED is assigned to one output.

When the voltage line is applied, the sensor measures the oscillation frequency of each loop. The result of this measurement is displayed on time by using the corresponding red LED. If a detection occurs during a frequency display procedure, the frequency display is cancelled and the relay status is displayed by the red LED.

FAILURE MODES

- When a loop fault is detected, the corresponding relay of the loop is activated to prevent an accident as long as the fault is not solved. This error is stored during the line voltage OFF/ON procedure only if the memory effect is functional.
- If the frequency oscillator of the loop (A or B) drifts out of its limits (+/- 10 %), the corresponding relay remains in a detection state and the red LED flashes at 5 Hz frequency. When the frequency oscillator goes back to correct values, the MATRIX works normally again.
- If a switch value is changed without manual validation by the PB, the green LED flashes at 5 Hz to signal an error. This information is stored to avoid an automatic validation after a power reset.
- On power ON, if the inductance of the loop is out of the predefined range (40 µH to 470 µH) the LED gives an error signal status following to the table hereafter. The loop remains in this state until the problem is solved.

Loop Default	LED display
The inductance is > 470 µH	LED flashes 3x / 2 sec
The inductance is < 40 µH	LED flashes 4x / 1 sec
Loop oscillator failed	LED flashes 1x / 2sec

- If an internal failure of the µP is detected during the normal operation the 2 relays are activated, the green LED is turned off and the 2 red LED status is undertermined. To restart the µP, you can launch a manual setup by pressing the PB at least 2.5 sec.

BEA SA | LIEGE Science Park | ALLÉE DES NOISETIERS 5 - 4031 ANGLEUR [BELGIUM] | T +32 4 361 65 65 | F +32 4 361 28 58 | INFO@BEA.BE | WWW.BEA-SENSORS.COM



Hereby, BEA declares that this radio equipment is in compliance with Directive 2014/53/EU (RED) and Directive 2011/65/EU (RoHS). The full text of the EU declaration of conformity is available on our website.



This product should be disposed of separately from unsorted municipal waste

