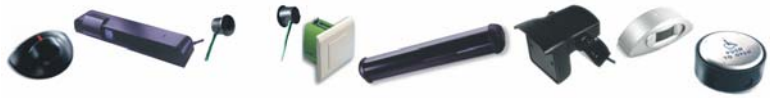
APPLICATION NOTE

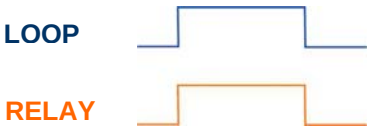


MATRIX-D output configuration

The MATRIX is an inductive loop sensor. This product detects the presence of metallic objects like vehicles, trucks and bicycles.

The MATRIX-D is a dual inductive loop sensor (loop A and loop B) and the MATRIX-S is a single inductive loop sensor.

This sensor has 2 relays which can function in presence mode or pulse mode:

<table>
<tr><th>Relay in presence mode</th><th colspan="2">Relay in pulse mode</th></tr>
<tr><td>The relay stays active as long as the presence of a vehicle is detected on the loop.</td><td colspan="2">The relay sends a pulse of 100 or 500ms, when the vehicle enters or exits the loop.</td></tr>
<tr><td rowspan="2"> 
</td><td>Input Pulse</td><td>Output Pulse</td></tr>
<tr><td> 
</td><td> 
</td></tr>
</table>

The MATRIX-D can function in 3 different modes:
- independent mode
- combined mode
- combined mode with directionality (from loop A to loop B)

1. Independent mode (Dip Switch 10: OFF)

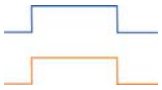
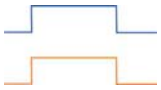
In the independent mode, the 2 loops are independent from one another.

Each loop or channel has:
- its own relay output
- its own sensitivity potentiometer
- its own detection LED

When the application requires 2 loops, the MATRIX-D is always preferable to 2 MATRIX-S. The MATRIX-D prevents all interferences between loops and therefore all unwanted detection, while it offers the same adjustment flexibility as 2 MATRIX-S.

In this mode, each relay refers to a loop: relay 1 to loop A and relay 2 to loop B.

DIP SWITCH 10 = OFF
DIP SWITCH 9 = OFF => 100ms pulse or
DIP SWITCH 9 = ON => 500ms pulse

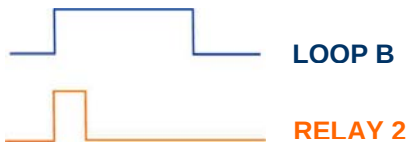
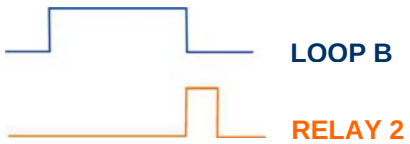
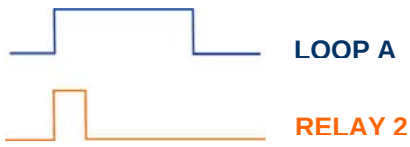
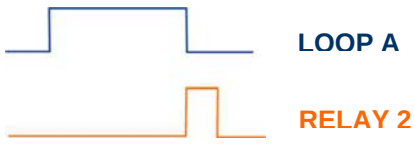
LOOP A / RELAY 1				LOOP B / RELAY 2			
DS5	**DS6**	**Mode**		**DS 7**	**DS8**	**Mode**	
OFF	OFF or ON	Presence		OFF	OFF or ON	Presence	
ON	OFF	Input pulse		ON	OFF	Input pulse	
ON	OFF	Output pulse		ON	OFF	Output pulse	

2. Combined Mode (Dip Switch 10: ON)

In the combined mode, both loops are linked with each other.

Relay 1 always functions in presence mode and is controlled by the 2 loops. This relay is active as soon as a presence detection is observed on one of the 2 loops or on both loops at the same time.

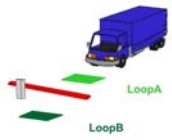
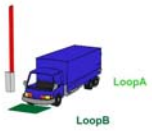
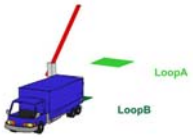
Relay 2 always functions in pulse mode, either in input pulse or in output pulse on loop A or B.

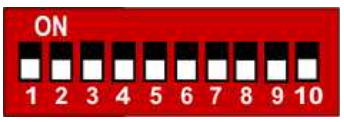
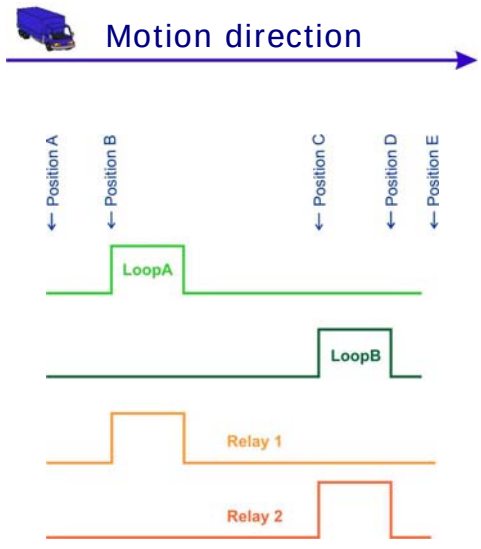
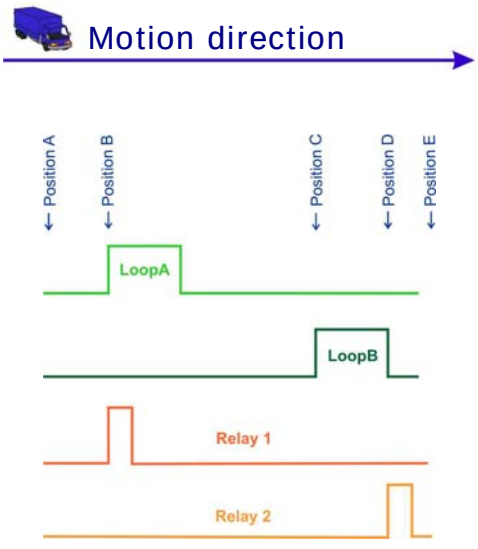
RELAY 2			
DS7	**DS8**	**Mode**	
OFF	OFF	Input pulse loop B	
OFF	ON	Output pulse loop B	
ON	OFF	Input pulse loop A	
ON	OFF	Output pulse loop A	

3. Combined mode with directionality (Dip Switch 10: ON ; Dip Switch 6: ON)

In this combined mode, it is possible to add a sense of directionality to relay 2 (Dip switch 6). The pulse on relay 2 will be sent, only if the vehicle moves from loop A to loop B.
To measure this directionality, it is necessary to have a simultaneous detection on both loops for a short period of time.

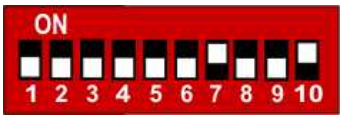
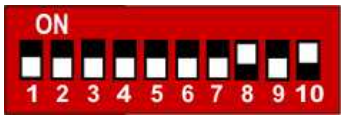
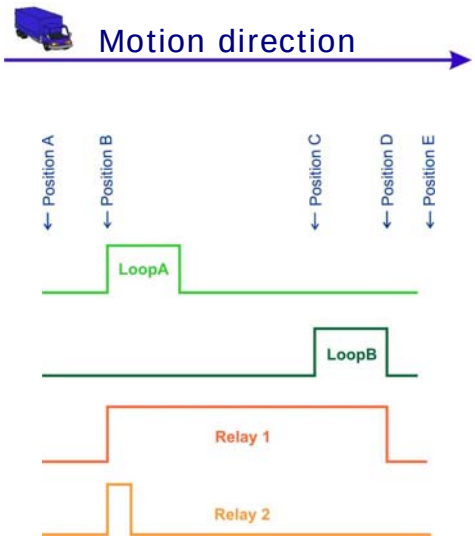
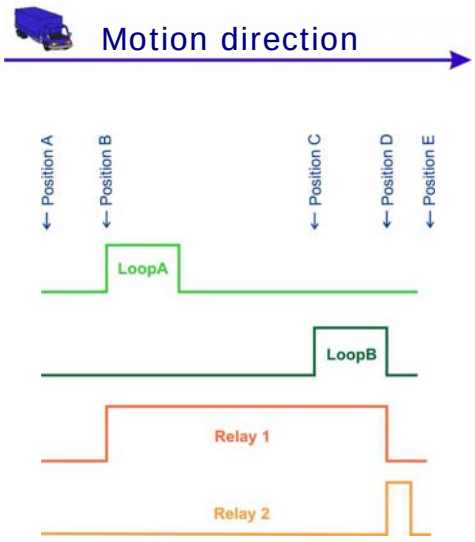
4. Example of barrier with loop on each side

POSITION A	POSITION B	POSITION C	POSITION D	POSITION E
				

INDEPENDANT MODE (DS10 OFF)	
Both relays function in presence mode **(DS5 OFF ; DS7 OFF)**.	Both relays function in pulse mode **(DS5 ON ; DS7 ON)**. Relay 1 sends a pulse when the truck enters loop A **(DS6 OFF)**. Relay 2 sends a pulse when the truck exits loop B **(DS8 ON)**.
	
	

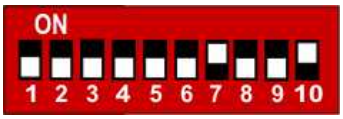
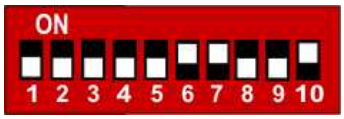
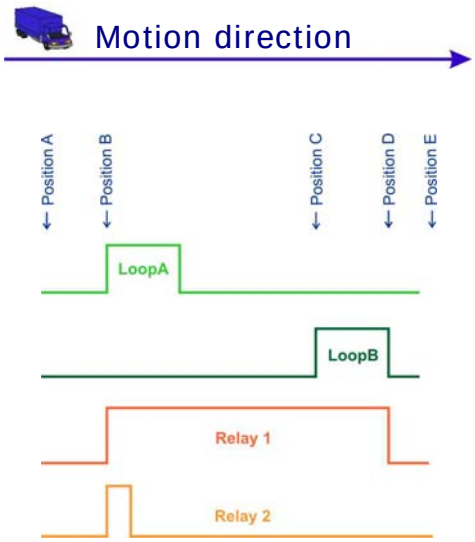
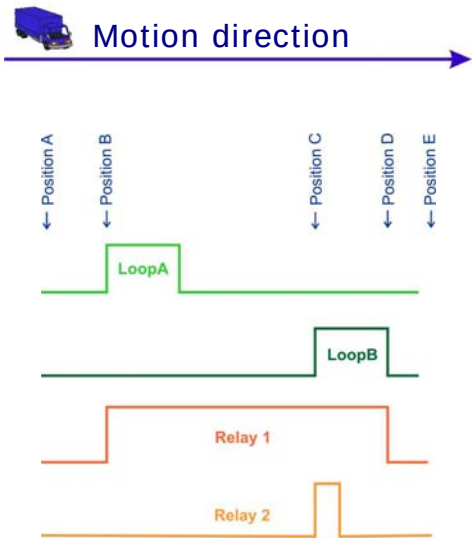
COMBINED MODE (DS10 ON)
NO DIRECTIONALITY (DS6 OFF)

Relay 1 always functions when the truck is present on both loop A and loop B. The distance between the loops is smaller than the length of the truck; the truck is therefore detected simultaneously by both loops during a certain period of time.

Relay 2 sends a pulse when the truck enters **(DS8 OFF)** loop A **(DS7 ON)**.	Relay 2 sends a pulse when the truck exits **(DS8 ON)** loop B **(DS7 OFF)**.
	
	

COMBINED MODE (DS10 ON)

Relay 1 always functions when the truck is present on both loop A and loop B. The distance between the loops is smaller than the length of the truck; the truck is therefore detected simultaneously by both loops during a certain period of time.
Relay 2 sends a pulse when the truck enters **(DS8 OFF)** loop A **(DS7 ON)**.

NO DIRECTIONALITY (DS6 OFF)	DIRECTIONALITY from A -> B (DS6 ON)
	Because of the directionality, relay 2 can only send its pulse when the sensor has verified that the direction is correct (when the truck enters loop B, while still being on loop A). Relay 2 does not send its pulse when: - the direction is not correct - the sensor can not verify the direction, because the loops are too far apart from each other and the truck does never touch both loops at the same time.
	
	

HALMA GROUP COMPANY
BEA SA – LIEGE Science Park – Allée des Noisetiers 5 – B-4031 Angleur - T: +32 4 361 65 65 – F: +32 4 361 28 58 – info@bea.be - www.bea.be