T-1781 e	**Instruction for Use** **Combined Sensor TORMAX 7501**	★★★★★ TORMAX AUTOMATIC
Area of application	**iMotion 2202, 2202.A, 2301, 2302, 2401** **TORMAX 2101, TORMAX 2201**	TORMAX | CH-8180 Bülach www.tormax.com info@tormax.com
Release	5 September 2016	
Use	Planning, installation, maintenance	

Translation of the original instructions for use

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Purpose

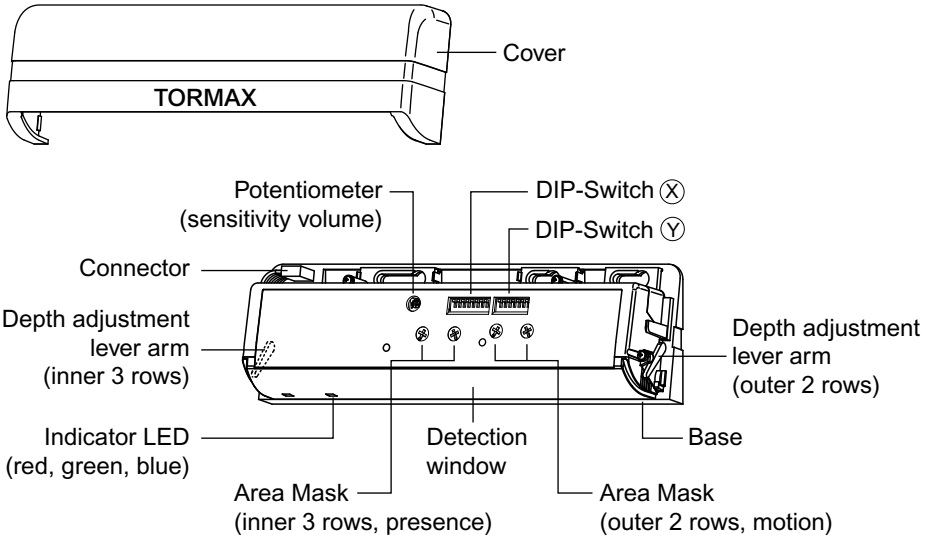
The TORMAX 7501 combined sensor is suitable both as a door-opening command device and also for the protection of automatic TORMAX sliding and folding doors. Please note, that this sensor should not be used for automatic sliding doors in escape routes without break-out hardware.

Function

The TORMAX 7501 is a combined sensor with a direction-sensitive active, infrared curtain for motion detection and a controlled, active, infrared curtain for the presence detection of people and objects located nearby the door. The detection of motion and presence can be rotated independently in one axis.

To ensure satisfactory security levels in accordance with EN16005, DIN18650, ANSI A156.10 the sensor has to be used on both sides (inside/outside).

Parts Description



Accessories

Mounting template

Instructions for use

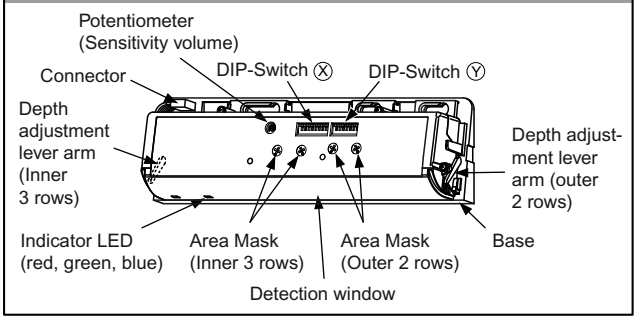
Cable
2.5 m 8’ 2"

Mounting screws
(2 pcs.)

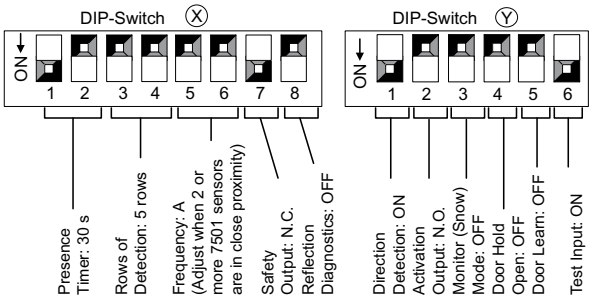
T1781_7e

Quick Installation Guide

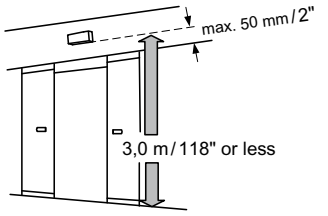
1. Parts Description



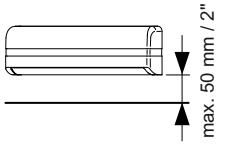
2. Main DIP-Switch Settings



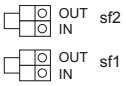
3. Mounting the Sensor



Mounting of the sensor within 50 mm / 2" of the bottom of the door drive unit cover.

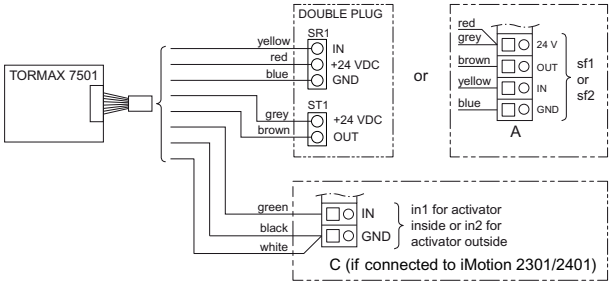


4. Configuration Control Unit



1. Insert bridges
2. Detect safeties
   - iMotion: Code 031
   - TORMAX 2101: Code 3
   - TORMAX 2201: Code 9/3
3. Remove bridges and connect sensors.

5. Connection to the Door Control System



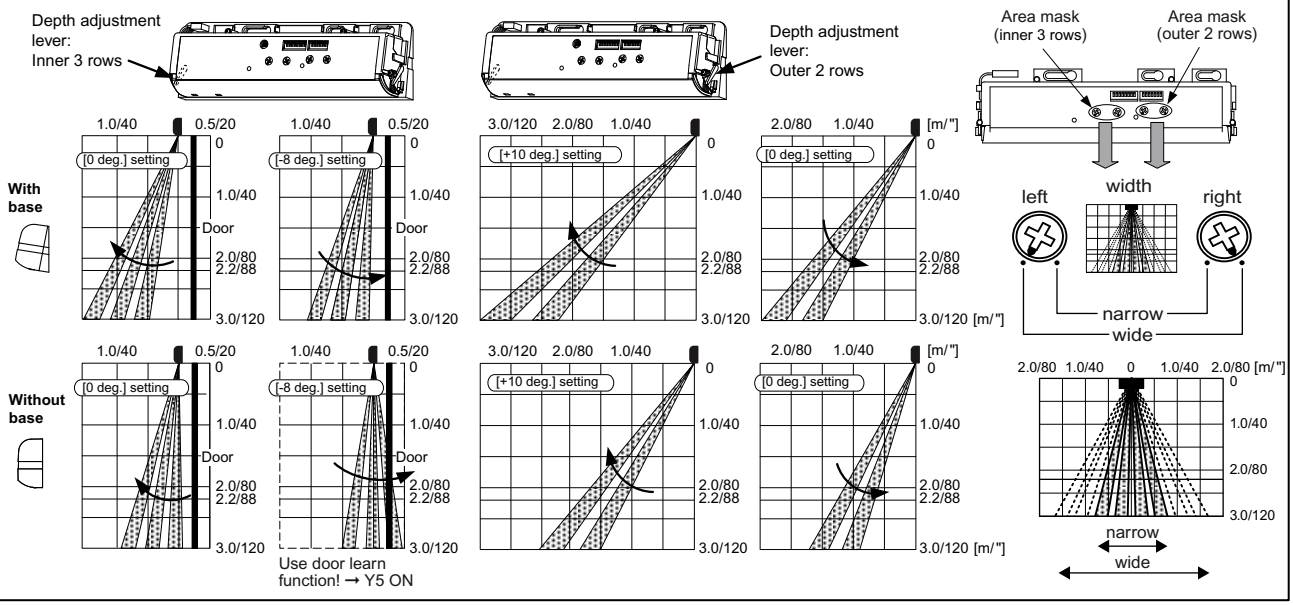
6. LED Indicators

Green:	Standby (ready to detect)
Blue:	ROW 4,5 Detecting, door opening
Red:	ROW 1,2,3 Detecting, safety

Additional information

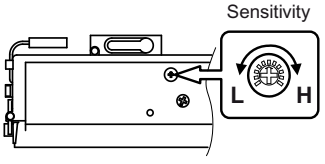
Orange:	Sensor is detecting moving door
Green blinking:	Door learn (Y5 is ON)
Orange blinking (fast):	Change of DIP-Switch settings.
Orange blinking (slow):	Door Hold (Y4 is ON).
Green/Red blinking (fast):	Internal sensor error.
Green/Red blinking (slow):	Reflected infrared signal from floor is very weak.

7. Setting the Desired Detection Area



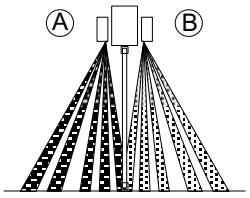
8. Verification of Operation

After installation is completed “walk test” the sensor detection area. If the detection area is not as expected adjust the detection area or increase the rows of detection using DIP-Switch X 3 and X 4.
If the detection area is still not as expected then the sensor sensitivity can be increased by turning the potentiometer clockwise. When the sensor detects even though there is nothing in the detection area the sensor sensitivity can be decreased by turning the potentiometer in the anti-clockwise direction.
EN 16005, DIN 18650, ANSI A156.10: The test block CA (300 × 200 × 700 mm / 12" × 7.9" × 28") must be detected at any time. The test block must not be hit by the door independently of the position because the reference body CA represents the human body.



Installation

The requirements of EN 16005, DIN 18650, ANSI A156.10 are only met if a TORMAX 7501 combination detector is installed both inside and outside the door.



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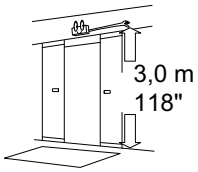
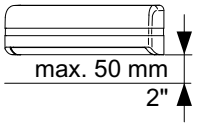
Mounting Precautions

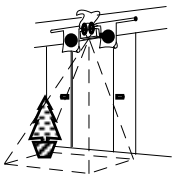
Mounting height is 3 m/118" or lower.



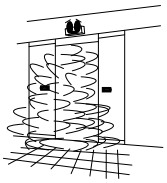
Mount within 50 mm/2" from the bottom of the door drive cover.



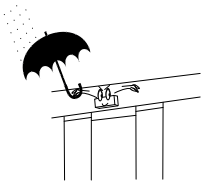
Ensure there are no moving objects in the detection zone.



Ensure no condensation gets onto the sensor.

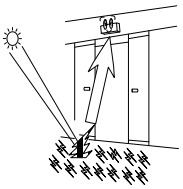


If the sensor is exposed to excessive rain install a weather cover.

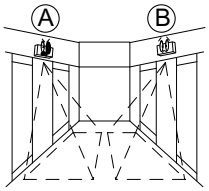


If possible ensure no accumulation of snow or water on the floor.

Ensure the minimum of reflected sunlight from the floor.



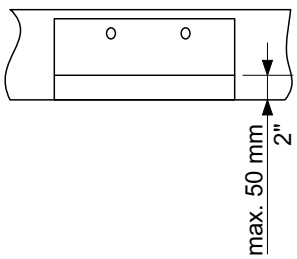
Use different frequency settings for sensors in close proximity.



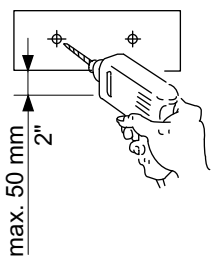
Mounting Information

Drilling may cause electric shock. Be careful of hidden wires inside the door drive cover.

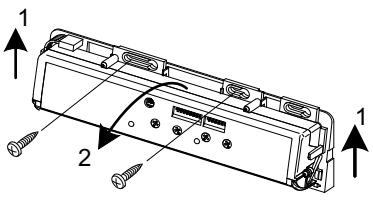
(1) Attach the mounting template with its bottom flush with the bottom edge of the door drive cover.



(2) Drill holes for mounting (ø 3.5 mm)(ø 1/8") and wiring (ø 10 mm)(ø 3/8") holes.



(3) If you need to remove the sensor body from its base then lift the sensor body from the base and tilt it forward to remove as illustrated.



(4) Attach the sensor with the mounting screws provided.

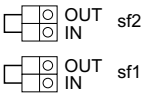
without base

with base

see page 5 and 6

Configuration Control Unit

Plug bridges with SF1 and/or SF2 → IN with OUT respectively.



Turn on the power and carry out auto configuration or on subsequent teaching of the sensors, only the detection of the sensors can optionally be started.

iMotion: Code 031

TORMAX 2101: Code 3

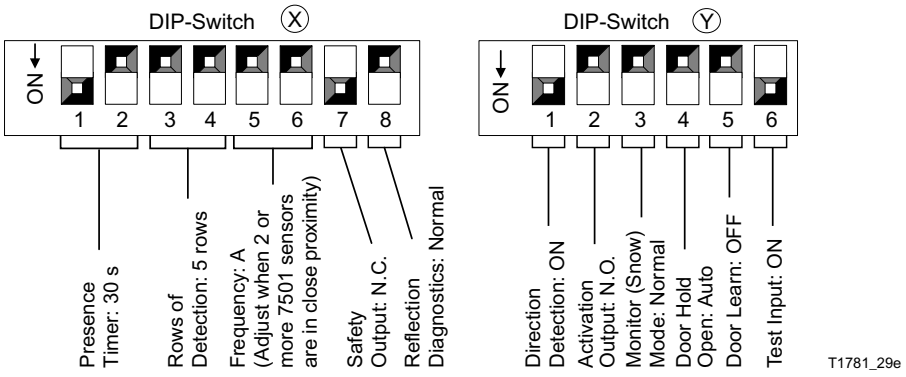
TORMAX 2201: Code 9/3

Check LED display on the drive → when actively tested, the LED goes out briefly after the open position has been reached.

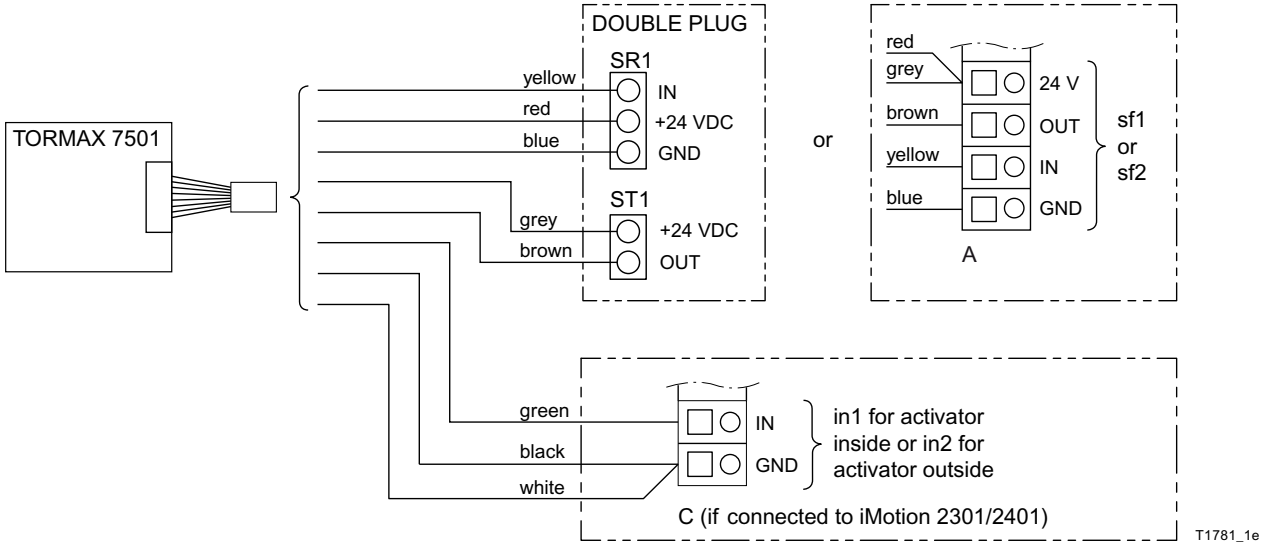
After the safety features have been detected successfully, turn off the power, remove bridges and connect the sensor.

Sensor Configuration

1. The sensor is preset (check).
   – suitable for TORMAX hardware and EN 16005, DIN 18650, ANSI A156.10
   – with direction recognition
   – without door learn function (with base plate and therefore recognition through the door is not possible)
2. Set X 5 to ON for second sensor → change of frequency.



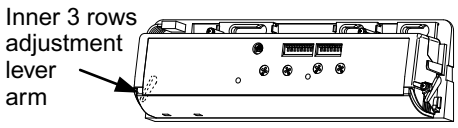
Connection Diagram



Detection Area Adjustment

Safety Detection Area – Depth Adjustment of Inner 3 Rows

Display: red LED



with base

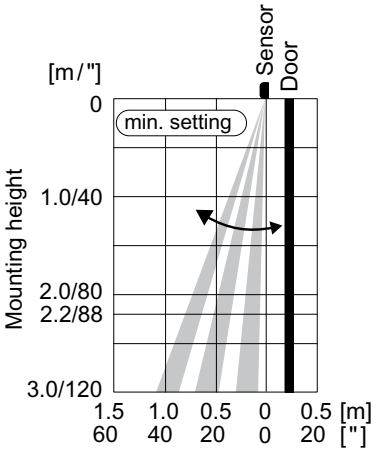


fig. 1

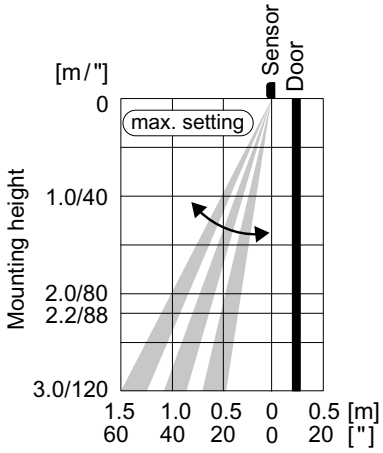


fig. 2

The maximum setting range can be used to compensate for uneven surfaces.

without base

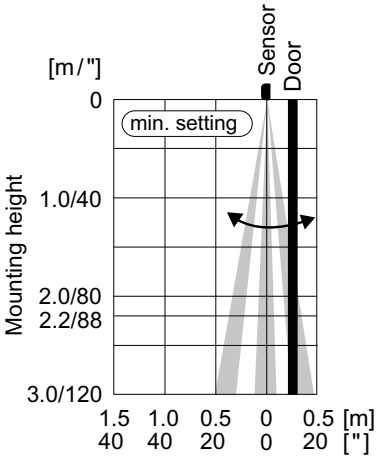


fig. 3

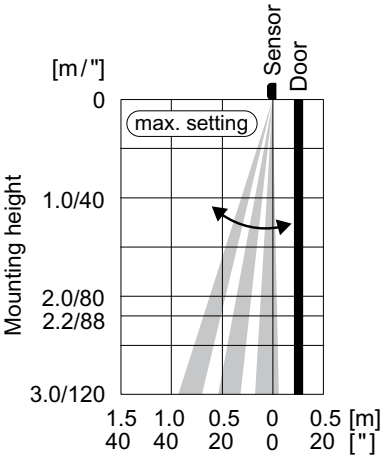


fig. 4

The maximum setting range can be used to compensate for uneven surfaces.

Use door learn function!
Y 5 to ON (see p. 7, 10)

How to adjust the safety detection area depth

“Door Learn” is turned OFF

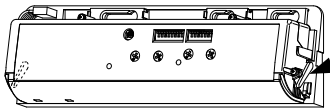
- Push the lever on the left all the way back towards the door until door ghosting occurs. The sensor base plate can be removed if necessary.
- Adjust the infrared field incrementally forward (using the lever on the left) until a situation of no door ghosting is achieved (see fig. 1). This means that the most inner detection row (row 1) is **focused just in front of the moving door leaf**.
- Alternatively an infrared spot finder can be used to adjust the detection field.

“Door Learn” is turned ON

- When “Door Learn” is turned ON (see fig. 3, for further information see page 7) push the lever on the left side of the sensor all the way back towards the door. If door ghosting occurs, it means that row 2 is detecting door movement.
- Incrementally move the lever on the left side of the sensor forward until door ghosting no longer occurs.
- Alternatively an infrared spot finder can be used to adjust the detection field.

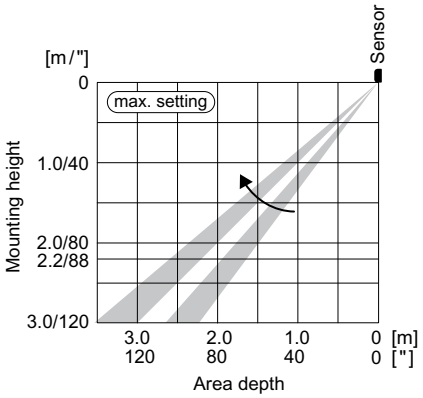
Activation Detection Area – Depth Adjustment of Outer 2 Rows

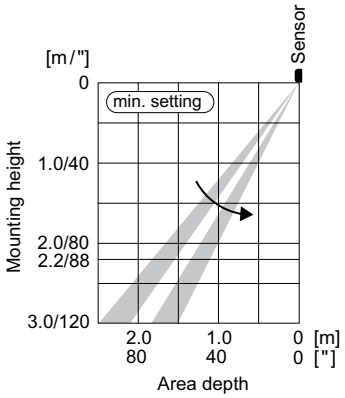
Display: blue LED



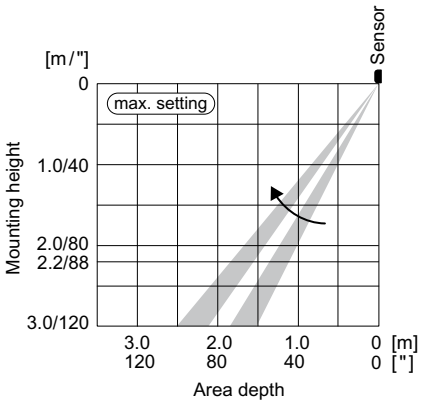
Outer 2 rows adjustment lever arm

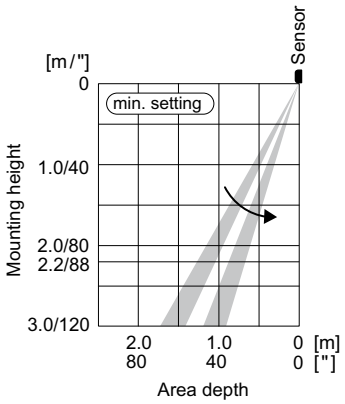
with base



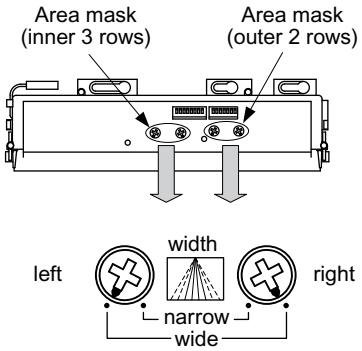


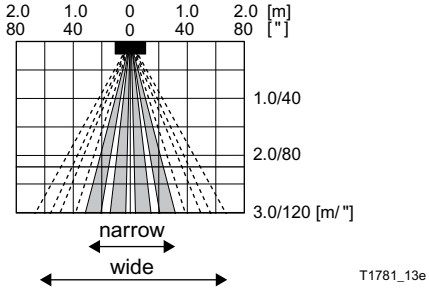
without base





Area Width Adjustment





Resource

- Spotfinder

Tool for positioning the IR area

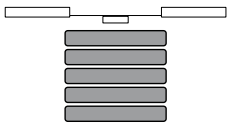
The above illustrated detection areas represent the actual position of the infrared beams. The actual detection area observed will vary depending on the sensor installation environment, object been detected and sensor settings.

Please ensure that the detection area is set to conform to EN 16005, DIN18650, ANSI A156.10.

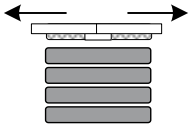
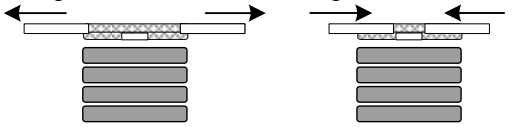
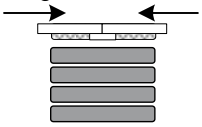
Applying the “Door Learn” Function

The door learn function allows the first row of detection to be focused inside the door close area without detecting the door movement.

“Door Learn” is OFF (Refer to section DIP-Switch Settings)

Upon power ON, the green LED lights up indicating that the sensor is in standby mode and ready to detect.	
● green LED on 	**Presence Detection**: It takes 10 s after sensor power up for presence detection to be initiated on all rows of detection. If before 10 s has elapsed someone walks into the detection area it will take about 5 s after the person leaves the detection zone for presence detection to be functional.

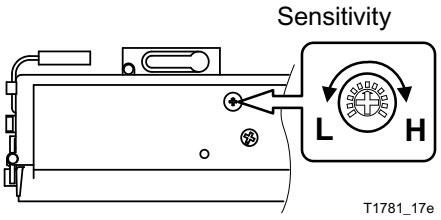
“Door Learn” is ON (Refer to section Dip-Switch Settings, Y 5)

Upon power ON, the red LED indicates a door open relay output to begin the door learn process.	Green LED flashes for about 37 s as the “door learn” process is carried out. Door opens/closes.	Door learn process complete, sensor in standby mode.
● red LED on 	☀ green LED flashes ☀ green LED flashes 	● green LED on 

⚠	**Presence Detection:** During the “Door Learn” process the outer 4 rows of detection on the Tormax 7501 sensor switch from motion detection to presence detection 10 s after power on. The inner “door learn” row of detection will switch from motion to presence detection after the “Door Learn” process is carried out.
	“Door Learn” Failure and Recovery: If a person enters the detection area during the “Door Learn” process it may not be successfully completed. In this case the sensor will carry out the door learn process on door activations by a person in order to build an accurate image of the door open and door close position.
Note	When Door Learn is turned on, the sensitivity level of the inner row of detection is only at maximum when the outer rows of detection are activated.

Verification of Operation

⚠ After installation is completed “walk test” the sensor detection area. If the detection area is not as expected adjust the detection area or increase the rows of detection using DIP-Switch X 3 and X 4. If the detection area is still not as expected then the sensor sensitivity can be increased by turning the potentiometer clockwise. When the sensor detects even though there is nothing in the detection area the sensor sensitivity can be decreased by turning the potentiometer in the anti-clockwise direction.



EN 16005, DIN 18650, ANSI A156.10:
The test block CA (300 × 200 × 700 mm, 12 × 7.7 × 28") must be detected at any time. The test block must not be hit by the door independently of the position because the reference body CA represents the human body.

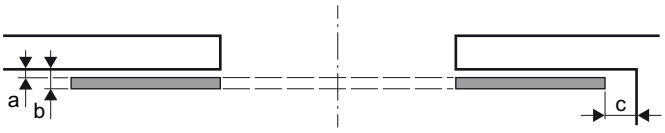
LED Indicators

Green:	Standby
Green blinking:	Door learn (when DIP-Switch Y 5 is ON)
Blue:	Row 4,5 detecting, door opening
Red:	Row 1,2,3 detecting, safety device
Orange:	Detection row 1 (row 2 when door learn is ON) is detecting door movement
Orange blinking (fast):	Indicates a change of dip switch settings
Orange blinking (slow):	Door hold open setting is activated (when DIP-Switch Y4 is ON)
Green/Red blinking (fast):	Internal sensor error
Green/Red blinking (slow):	Reflected infrared signal from the floor is very low

Trouble-Shooting

Problem	LED status	Possible cause	Solution
The door does not open when a person enters the detection area.	OFF	The sensor plug has not been properly connected	Insert the plug correctly or re-connect.
		Incorrect power supply voltage	Supply the sensor with the correct power (AC / DC 12 – 24 V).
		Incorrect sensor wiring	Check the sensor wiring carefully.
The door opens and closes without any recognizable reason.	Door opens/red Door closes/green	Something is moving in the coverage range.	Remove the moving object from the detection area.
		Sensitivity too high for the installation environment.	Reduce the sensor sensitivity with the potentiometer (see page 8 below)
		Dust, frost or droplets of water on the sensor lens.	Clean the sensor lens and install weather protection if necessary.
		The coverage range overlaps with the range of another sensor	Make sure that the individual sensors have different frequency settings.
		Snow flakes, insets or leaves etc. recognized.	Set the DIP-Switch Y 3 monitoring mode to “Snow”.
The LED is orange when the door closes or opens.	orange	Recognition row “Row 1” (“Row 2” if the “Door Learn function” is ON) is focussed too closely on the door.	Set the recognition depth for the 3 inner rows further from the door.
The door opens and remains open.	red	The recognition coverage is changed and the presence timer is set to infinity (∞).	Switch the sensor on again or set the presence timer to 30 or 60 seconds.
		Incorrect sensor wiring.	Check the sensor wiring carefully.
		The reflected signal is saturated.	Remove highly reflective objects from the recognition range or reduce the sensor sensitivity with the potentiometer and restart the sensor.
	Rapidly flashes green/red	Internal sensor error.	Replace the sensor.
	Slowly flashes green/red	Reflection of the infrared signal transmitted from the ground is too low.	Reduce the sensor sensitivity with the potentiometer and restart the sensor. If the error remains, set the DIP switch X 8 to “low reflection”.
	orange flashes (slowly)	Setting mode (DIP-Switch Y 4 set to ON).	Switch DIP-Switch Y 4 “setting mode” off (OFF).

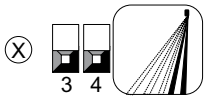
Use of TORMAX 7501 for Safeguarding the Secondary Closing Edge



a: less than 8 mm (5/8") or greater than 25 mm (1") (finger protection)
b: greater than 100 mm (4") → safeguarding needed
c: less than 200 mm (8") → safeguarding needed

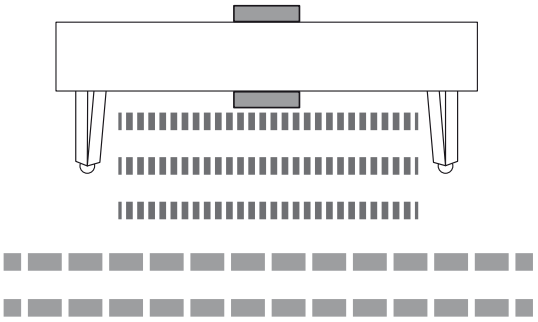
T1781_26e

- Do not connect the green wire (door opening).
- Switch off rows 3, 4, 5: X 3 and X 4 to OFF



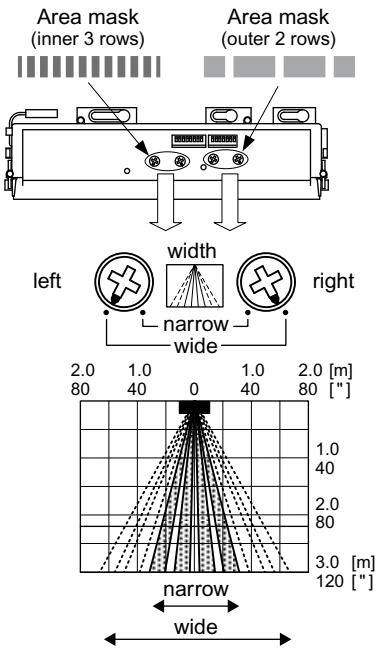
Use of TORMAX 7501 for Folding Doors

- Sensor mounted on the drive side: Limit the detection area of the inner 3 rows left and right to the passage width!



T1781_4

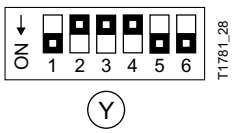
Detection area width adjustment



T1781_3

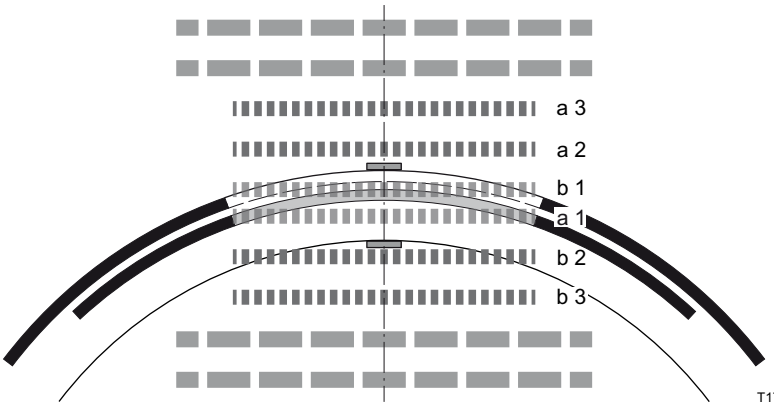
Use of TORMAX 7501 for Curved Sliding Doors

- Remove base on both sensors and activate door learn function:
  → DIP-Switch Y 5 to ON.

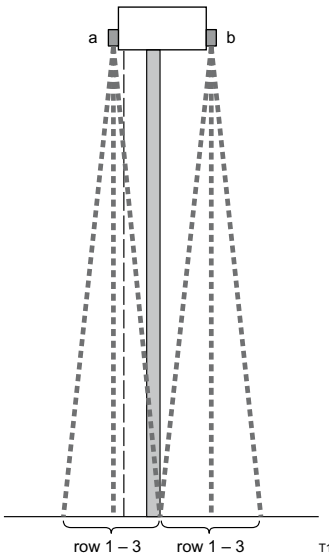


T1781_28

- Change frequency on one sensor:
  → DIP-Switch X 5 to ON



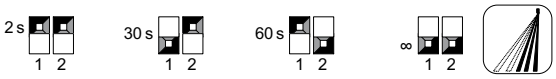
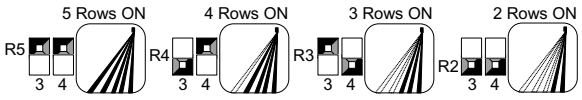
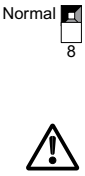
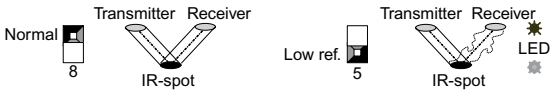
T1781a_5

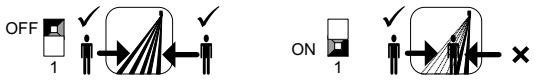
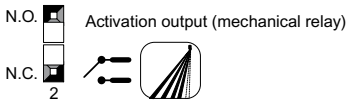
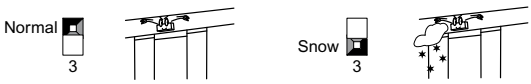
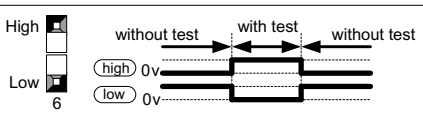


T1781_6e

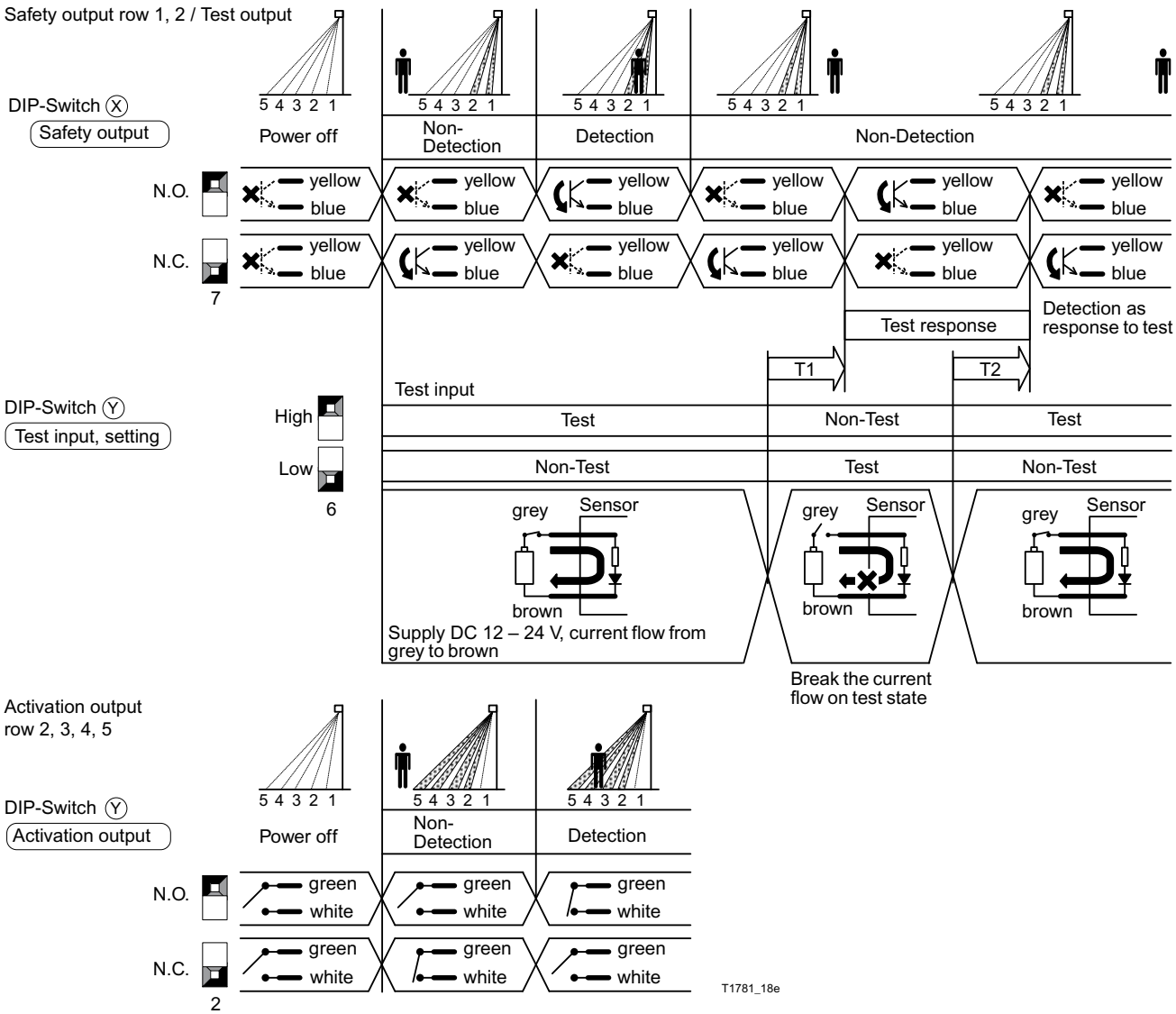
Detailed Sensor Information

DIP-Switch Settings

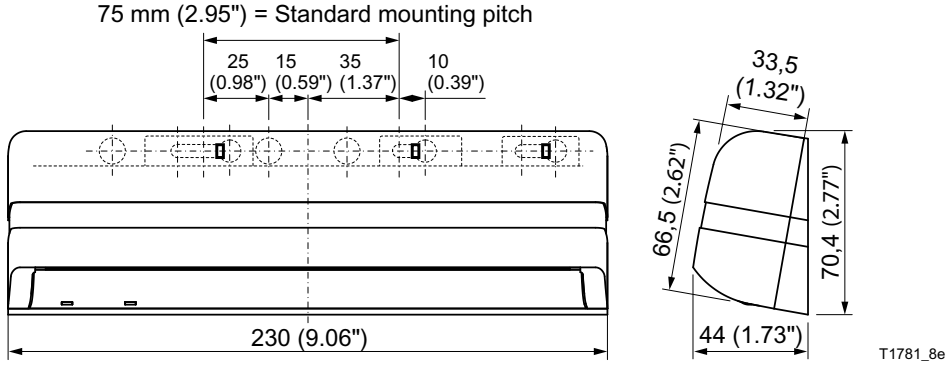
Function	DIP-Switch X Factory setting	Description	Possible Setting Options X
Presence timer		The sensor will detect a stationary object for the period of the preset presence timer setting on the inner 3 rows. To comply with EN16005, DIN 18650, ANSI A156.10 set the presence timer to 30s or more.	
Quantity of detection rows		The number of rows of detection can be set to 5, 4, 3, 2 depending on detection area requirements.	
Frequency		If two sensors are installed in close proximity to each other select different frequency settings for each sensor to prevent cross interference.	
Safety relay output		Refer to chapter “Timing Chart of events” for full details on safety output.	
Reflection diagnostics		A low reflected infrared signal is indicated by a slow flashing Red/Green LED. To filter this low reflection error, set this dip switch to “Low Reflection” (ON). To comply with EN 16005, DIN 18650, ANSI A156.10 set to “Normal”.	

Function	DIP-Switch Y Factory setting	Description	Possible Setting Options Y
Direction detection		When set to ON, pedestrians moving away from the sensor will not be detected. For pedestrian safety purposes when “Door Learn” is set to ON the 1st and 2nd row of detection will detect pedestrians regardless of direction of movement.	
Activation relay output		Refer to chapter “Timing Chart of events” for full details on Activation Output.	
Monitor mode		Set to Snow in instances where false door activations can result from blowing snow, leaves or rubbish in the door close area.	
Door hold (maintenance)		Switch to OPEN to hold the door in the open position. (maintenance function)	
Door learn		Door learn allows the first row of detection to be focused inside the door close area without detecting the door movement. When Door learn is turned ON, the sensitivity level of the inner row of detection is only at maximum when the outer rows of detection are activated.	
Test input setting from door control system		When connected to a door control system without a TEST input, set to “High”. When connected to a door control system with a TEST input, set to “Low” (ON). Refer to chapter “Timing Chart of events”. To comply with EN 16005, DIN 18650, ANSI A156.10 set to “ON”.	

Timing Chart of Events



Dimensions



Specifications

Model name	Combined Sensor TORMAX 7501	
Detection method	Active infrared reflection	
Installation height	3.0 m (118") max. / 2.0 m (78") min.	
Supply voltage	AC/DC 12 to 24 V ±10 % 50/60 Hz	
Power consumption	DC 12 V – max. 110 mA, AC 12 V – max. 2.1 VA DC 24 V – max. 60 mA, AC 24 V – max. 2.1 VA	
Output holding time	Approx. 0.5 s	
Response time	0.1 s – 0.2 s	
Presence timer	Outer 2 Rows	1 s
	Inner 3 Rows	2 s, 30 s, 60 s or ∞
Output	Row 1, 2	Open collector: 7.5 mA, max. resistor load Opto coupler (NPN) Voltage: 55 VDC max. current : 50 mA Max. dark current: 100 nA, max. resistance load
	Row 2, 3, 4, 5	Relay normally open DC 50 V 0.1 A (resistor load)
Test input	max. 6 mA at 24 V DC	
Operating temperature	–20 to +60 °C (-4 to 140 deg. F)	
Operating humidity	Below 80 %	
IP-protective class	IP54 (with base)	
Safety category	Category 2, performance level “d” (according to EN ISO 13849-1:2008)	
Weight	0.25 kg (0.55 lb.)	
Colour	Black	

TORMAX
AUTOMATIC

CE

Declaration of Conformity

Directive 2004/108/EC (Electromagnetic Compatibility Directive)

Product:	Combined sensor
Type designation:	TORMAX 7501
Serial number:	from lot No. 15030
Manufacturer:	Landert Motoren AG Unterweg 14 CH-8180 Bülach
Base document:	Directive 2004/108/EC (Electromagnetic Compatibility Directive)
Other standards:	EN 61000-6-2 EN 61000-6-3 EN 16005:2012 Chapter 4.6.8 and Annex C EN ISO 13849-1:2008 EN 12978:2003+A1:2009 DIN 18650-1:2010 Chapter 5.7.4
Voluntarily assigned testing laboratories:	Swiss association for Quality Assurance Certificates, CH-3052 Zollikofen TÜV NORD CERT GmbH, D-45141 Essen

We declare in sole responsibility, that the above mentioned product which is referred to in this declaration, is in conformity with the above mentioned directive.

Bülach, 7 April 2015

Dr. Philippe H. Heiniger
CEO TORMAX

Dr. Christian Schaal
Head of Engineering

TORMAX | Landert Motoren AG | CH-8180 Bülach
Phone +41 (0)44 863 51 11 | Fax +41 (0)44 861 14 74
info@tormax.com | www.tormax.com