



Automatic passenger counting

# IRMA 6

## Data sheet

IRMA6-SENSOR-HD-00-ETH-IO-00

IRMA6-SENSOR-HD-00-ETH-00

**iris** INTELLIGENT  
SENSING

Ostendstrasse 1 – 14  
12459 Berlin | Germany  
[www.iris-sensing.com](http://www.iris-sensing.com)

Rev. 1.3  
16.09.2019

## Model

### Sensor:

IRMA 6


### Sensor variant:


for Ethernet


### Function:

Automatic passenger counting system with 80.000 px ToF (Time-of-Flight)-technology for vehicle and railway application, consisting of sensor unit and interface unit. Generates real-time counting data for further processing via Ethernet to on-board computer. Mounted above doors.


## Used symbols


 Please note

 See annex

 Information

 Instruction

 See document on our website

 Please note down

 Download

## Disclaimer

The information contained in this document is based on product data resulting from the development and approval phases as well as the production of initial samples. These specifications do not claim to be error-free and will need to be updated or corrected. Such modifications may be made by iris-GmbH without notice. Characteristic or typical values given are based on our experience and are approximate values to be expected; they are by no means guaranteed by iris-GmbH.

## Contact

iris-GmbH  
Ostendstrasse 1–14  
12459 Berlin  
Germany

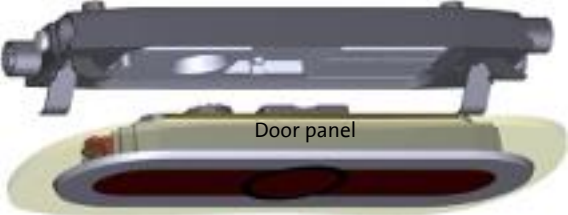
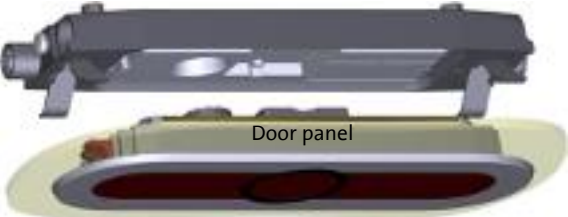
Phone: +49 30 5858 14-0  
e-mail: [service@irisgmbh.de](mailto:service@irisgmbh.de)

# Table of content

1	Components.....	4
1.1	Key figures in brief .....	4
1.2	Interface units .....	5
1.3	Sensor unit.....	6
2	Connections .....	7
3	Technical data .....	8
3.1	General.....	8
3.2	Ethernet.....	10
3.3	Door signal input.....	11
4	Norms and standards.....	12
4.1	EMC.....	12
4.2	Climatic and mechanical tests.....	13
4.3	Insulation test.....	15
4.4	Test of protection class.....	15
4.5	Eye safety.....	16
4.6	Fire protection behavior .....	16
5	Communication protocols and standards.....	17
6	Dimensions.....	18
7	Spare parts.....	19
7.1	IRMA6-SENSOR-HD-00-ETH-IO-00 (5300_00).....	19
7.2	IRMA6-SENSOR-HD-00-ETH-00 (5300_01).....	19

# 1 Components

## 1.1 Key figures in brief

Item no.	Sensor type	Illustration	Outlet 1	Outlet 2	Outlet 3	Outlet 4
5300_00	IRMA6- SENSOR-HD- 00-ETH-IO-00		Power supply, (m), M12, a-coded, 5 pin	Door contact/ DoorClear, (f), M12, b-coded, 5 pin	nc	Ethernet, (f), M12, d-coded, 4 pin
5300_01	IRMA6- SENSOR-HD- 00-ETH-00		Power supply, (m), M12, a-coded, 5 pin	nc	nc	Ethernet, (f), M12, d-coded, 4 pin

## 1.2 Interface units

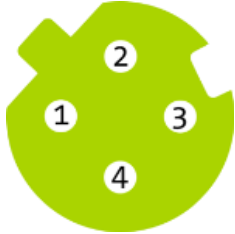
Sensor type	Connectors	Illustration	Connectors
IRMA6-SENSOR-HD-00-ETH-IO-00	<p>Ethernet interface</p> <hr/> <p>nc</p>		<p>Power supply</p> <hr/> <p>DoorClear / Door contact</p>
IRMA6-SENSOR-HD-00-ETH-00	<p>Ethernet interface</p> <hr/> <p>nc</p>		<p>Power supply</p> <hr/> <p>nc</p>



## 2 Connections

Pin assignment of the interface units:

**M12 Ethernet (female, d-coded, 4 pin)**



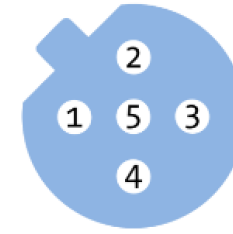
Pin	Signal
Housing:	Shield
Pin 1:	TD+
Pin 2:	RD+
Pin 3:	TD-
Pin 4:	RD-
-	-

**M12 Power (male, a-coded, 5 pin)**



Pin	Signal
Housing:	Shield
Pin 1:	not connected
Pin 2:	VCC
Pin 3:	GND
Pin 4:	not connected
Pin 5:	not connected

**M12 GPIO (female, b-coded, 5 pin)**



Pin	Signal
Housing:	Shield
Pin 1:	Door signal +
Pin 2:	Door signal-
Pin 3:	Door clear +
Pin 4:	Door clear -
Pin 5:	not connected

## 3 Technical data

### 3.1 General

Parameter	Symbol	min.	typ.	max.	Comments
<b>Operating conditions</b>					
Operating temperature range (according DIN EN50155)	$T_B$ in °C (°F)	-25 (-13)		+70 (+158)	$T_B$ = operating temperature
Interface transmission rate Ethernet	in Mbit/s			100	
MTBF <sup>1</sup>	in h		$1.25 \times 10^6$		at +25 °C (+77 °F)
<b>Storage, transport</b>					
Temperature range (according DIN EN50155)	$T_L$ in °C (°F)	-40 (-40)		+85 (+185)	TL = transport and storage temperature
<b>General information</b>					
Weight	in g (approx.)	-	484.5 g	500 g (with IO)	
Resolution	pixel			320x240	
Dimensions over all	LxWxH in mm		217 x 62 x 32,2mm		

<sup>1</sup> Mean Time Between Failures (MTBF): The expected operating time between two consecutive failures



Parameter	Symbol	min.	typ.	max.	Comments
Housing material		Aluminium die cast			
Material of optical openings		Makrolon 2405			color 450601
Backcover		Xydar ®G-930-LCP-GF30			Glass fibre reinforced plastic
Protection class of housing (according IEC 60529)		IP65			when mounted
Field of view	degree	75°x 60°(cross x lengthwise)			
Connections		Interface: M12 d-coded, 4 pin female (Ethernet) Power: M12 a-coded, 5 pin male			
Mounting height	in m	1.80	-	2.40	Min.: 1.80m as long as passengers are able to walk upright underneath. Future option: 3.00 m
Vehicle integration / System architecture		Connection via API (UIP protocol), VDV301, Web-interface (https)			
Relative humidity		max. 95%			
IK protection class		IK5			
Required illumination		none			

**Table 1: Technical data of the sensor**

## 3.2 Ethernet

Parameter	Symbol	min.	typ.	max.	Comments
Supply voltage DC	$U_{Vp+}$ in V	+16	+24; +36	60	external power supply
Power consumption	$P_N$ in W		7	14	with vehicle door open and +24 V supply voltage, +25 °C (+77 °F) ambient temperature
Dimensions over all	LxWxH in mm	217 x 62 x 32,2mm			
Connections		M12 D-coded, 4 pin female (Ethernet)			
Data-interface					
Power:		M12 a-coded, 5 pin male			

### 3.3 Door signal input

This section only applies to following sensor variant:

- IRMA6-SENSOR-HD-00-ETH-IO-00 5300\_00

Parameter	Symbol	min.	typ.	max.	Comments
		M12 b-coded, 5 pin female			
Input			bipolar (+/-)		
Input level low	V	0		(+/-) 2	
Input level high	V	7		(+/-) 60	Protection limit at load 60V
Switching frequency	Hz			50	Switching frequency
Insulation against I/O	V			60	Insulation against I/O
Current	mA			140	Current
Isolation against V <sub>cc</sub> and ground (housing)	kV			2	

## 4 Norms and standards

All data are design goals. Reports or certifications are available at serial launch.

### 4.1 EMC

#### Compliance with standards, device tests

Field	Standard, test standard	Comments
Noise radiation, immunity to interference	EN 50121-3-2:2017	Electromagnetic compatibility (railway applications)
	EN 50155:2017 Pkt. 5.1.1.4, Cl. S2 Pkt. 5.1.3, Cl. C1	Immunity to variations of voltage supply/interruption of voltage supply (railway applications)
	2014/30/EU	EMC directive, basis for CE marking
	EBA EMV:06 2014-06	EMC directive based of rules from the Federal Railway Authority (Germany). The Federal Railway Authority is the German supervisory, licensing and safety authority for railways and railway undertakings
Motor vehicle	ECE R 10:2017-02-17	<b>E1)</b> Regulation No 10 of the Economic Commission for Europe of the United Nations (UNECE) - Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility Approval No.: under test

Table 2: Compliance with EMC standard

## 4.2 Climatic and mechanical tests

### Compliance with standards, device tests

Field	Standard, test standard	Comments
	EN 50155: 2017 (Railway applications OT3 (4) IEC 60068-2-1, -2-2: 2008)	
Climatic standards	IEC 60068-2-1	<b>Cold</b>
	EN 50155 item 13.4.4	Test Ad (function)
	EN 50155 item 12.2.14	Test Ab (storage)
	IEC 60068-2-2	<b>Dry heat</b>
	EN 50155 item 12.2.4	Test Be (function) and Test Bb (storage +85°C, 185°F)

**Table 3: Compliance with climatic standards**

---

**Compliance with standards, device tests**


---

Field	Standard, test standard	Comments
	(EN 50155:2017 (Railway application) IEC 61373: 2010 (Railway application) IEC 60068-2-6: 2007 IEC 60068-2-64, -2-27: 2008 IEC 60721-3-5: 1997)	
Mechanical standards	EN 50155 item 12.2.11/ IEC 61373 item 9, Cl. B, Cat. 1/ IEC 60068-2-64	Vibration, broad band noise, endurance test - Test Fh
	EN 50155 item 12.2.11/ IEC61373 item 10, Cl. B, Cat.1/ IEC 60068-2-27	Shock test - Test Ea
	EN 50155 item 12.2.11 / IEC 61373 item 8, Cl. B, Cat. 1/ IEC 60068-2-64	Vibration, broad band noise, functional test - Test Fh
	IEC 60721-3-5 Tab. 6, Cl. 5M3/ IEC 60068-2-64	Vibration, random - Test Fh
	IEC 60721-3-5 Tab. 6, Cl. 5M3/ IEC 60068-2-6	Vibration, sinusoidal - Test Fc
	IEC 60721-3-5 Tab. 6, Cl. 5M3/ IEC 60068-2-27	Shock test - Test Ea (spectrum 1), (spectrum 2) without external shock loads

**Table 4: Compliance with mechanical standards**

## 4.3 Insulation test

### Compliance with standards, device tests

Field	Standard, test standard	Comments
Insulation test	EN 50155:2017 item 12.2.9	Railway application

Table 5: Insulation test

## 4.4 Test of protection class

### Compliance with standards, device tests

Field	Standard, test standard	Comments
	(IEC 60529: 1989 + A1: 1999 ++ A2:2013)	
Degrees of protection provided by enclosures	IEC 60529 §13.4	Shock hazard protection test
	IEC 60529 §14.2.5	IP65 test

Table 6: Compliance with standards - protection class (IP)

## 4.5 Eye safety

### Compliance with standards, device tests

Field	Standard, test standard	Comments
Eye safety	EN 60825-1:2014	Safety of laser products , class 1

Table 7: Compliance with standards - Eye safety

## 4.6 Fire protection behavior

### Compliance with standards, device tests

Field	Standard, test standard	Comments
Fire protection on railway vehicles Conformity evaluation	<b>DIN EN 45545-2:2016-02</b> (Railway application)	Fire protection on railway vehicles Conformity evaluation

Table 8: Compliance with standards - Fire protection behaviour



## 5 Communication protocols and standards

The sensor will be equipped with an Ethernet port (find further information in chapter: Interface units, p. 5.).

Supported communication protocols are:

- DHCP for network auto-configuration
- HTTP for sensor configuration via web browser, communication with other equipment and API calls
- MQTT for IoT communication (under development)
- SNTP for clock synchronization (under development)
- SNMP for monitoring (under evaluation)

Supported application communication protocols are:

- **Quick integration protocol (QIP)** for on-board computer integration
  - Over-the Air (push) architecture using MQTT (counting result payload is ITxPT compliant)
  - On Board (pull) architecture using HTTP/XML (counting result payload is ITxPT compliant)
- **ITxPT** for fully compliant vehicles (under planning):
  - Over-the Air (push) architecture using MQTT
  - On Board (pull) architecture using HTTP/XML
- **VDV301/IBIS-IP** (under planning)
- **UIP<sup>RETROFIT</sup>**: minimal UIP support for retrofit projects.

Some protocols listed above may not be available yet.

## 6 Dimensions

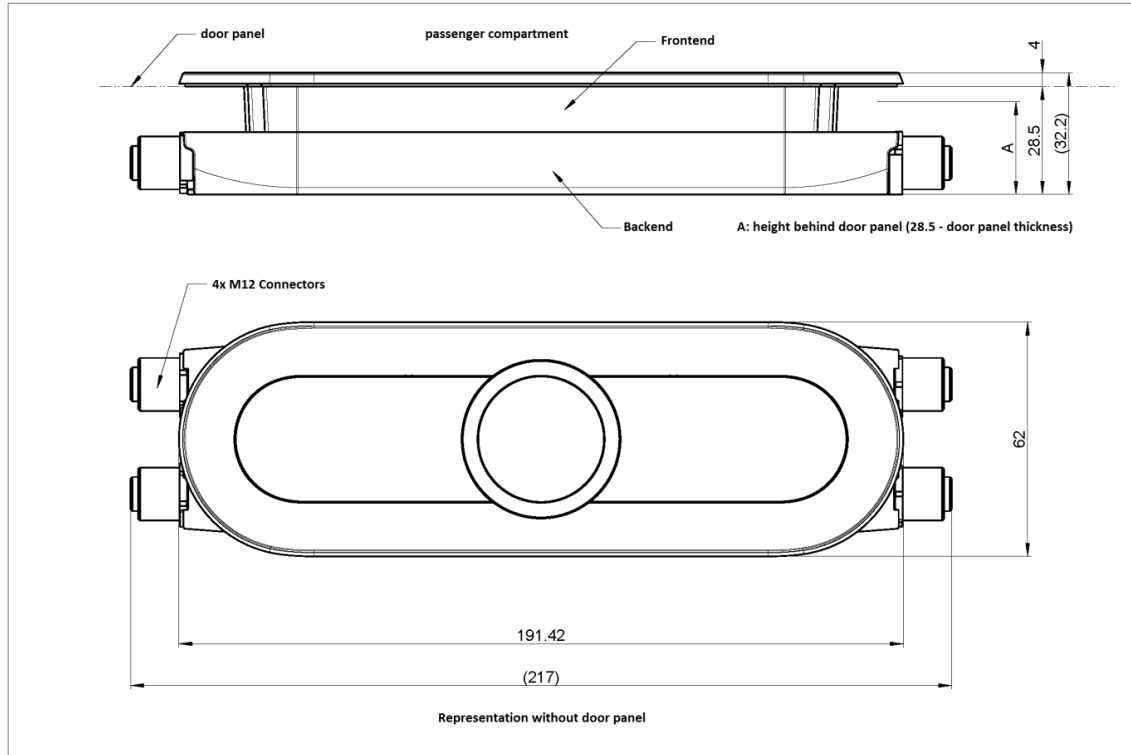


Fig. 2: Dimensions

Dimensions visible part	4mm x 62mm x 191,42mm HxWxL
Dimensions behind the door panel	26,8 to 20,5 mm x 50 mm x 217 mm HxWxL H= A= 28.5 mm – door panel thickness in mm

## 7 Spare parts

### 7.1 IRMA6-SENSOR-HD-00-ETH-IO-00 (5300\_00)

Item no.	Spare part name	Description
5400_00	IRM6-S-HD-00	Sensor unit
5500_00	IRM6-I-ETH-IO-00	Interface unit

### 7.2 IRMA6-SENSOR-HD-00-ETH-00 (5300\_01)

Item no.	Spare part name	Description
5400_00	IRM6-S-HD-00	Sensor unit
5500_01	IRM6-I-ETH-00	Interface unit