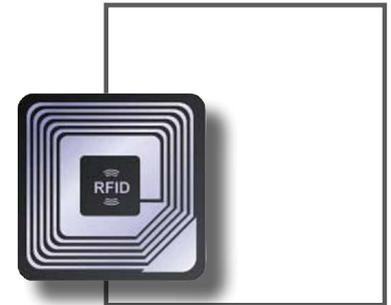




MANUAL

Read/Write Ranges
Passing Speed
RFID





Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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Mounting conditions transponder

The reading distance between the read head and transponders depends on various factors. Two factors are particularly crucial: metal and liquids.

A humid environment affects the range. A moist pallet as a carrier of a transponder, in contrast to a dry pallet, reduces the range of up to 80%.

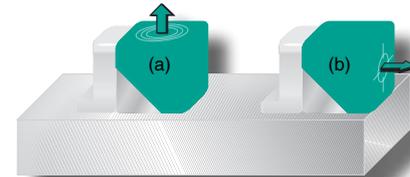
The range is also lower when the transponder is installed close to or directly on metal. With increasing distance of the transponder to a metallic surface, the reading field reaches its maximum expansion. A reasonable distance between the transponder and a metallic surface is 20 mm. For example, round transponders then reach approximately 90% of the reading distance that is achieved in a non-metallic environment.

For many of our transponder special spacers are available on www.pepperl-fuchs.com that can be used in accordance with this behavior. Furthermore there are special transponders for inductive systems available, for installation in metal as well as for the surface mounting on metal.

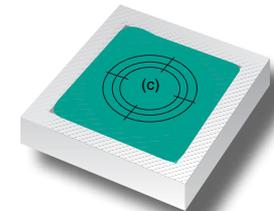
Mounting conditions read / write heads

When mounting read / write heads note both the minimum distance to a metallic environment and to adjacent read / write heads. You can find this value on the datasheets of the read / write head.

Cube-shaped heads, which are built onto steel, have at least 75% of the nominal working distance, when they are orientated away from the metal surface **(a)** or orientation in the plane of the metal surface when the head is mounted flush **(b)**.

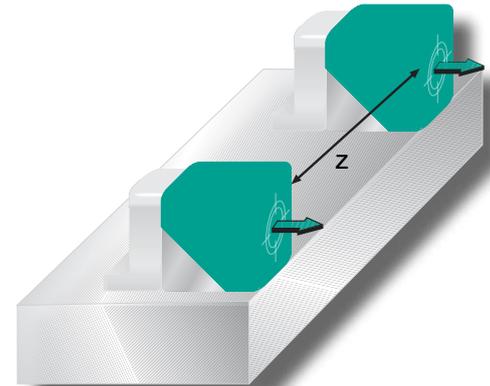
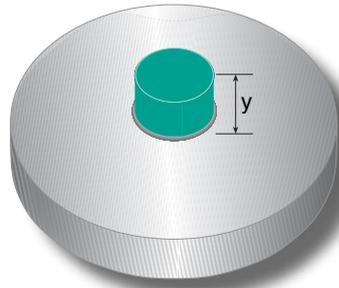
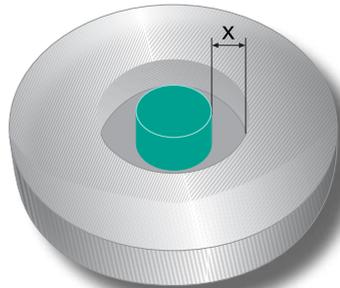


The design FP has at least 75% of the nominal working distance, even if it is completely embedded flush in metal **(c)**.



Installation/Surface Mounting Conditions for more than 75% Read Distance

Housing	x		y	z
	IPH-... & ISH-...	IQH*-...		
M18	> 14 mm	> 16 mm	Height of the plastic flap	see data sheet
M30	> 15 mm	-	Height of the plastic flap	see data sheet
F61	> 30 mm	> 34 mm	Surface mounting	see data sheet
L2	> 50 mm	>57 mm	Surface mounting only	see data sheet
FP	0 mm	0 mm	Embedded	see data sheet
F15	> 100 mm	> 115 mm	Surface mounting only	see data sheet



Reaction Time and Passing Speed

Read/write values depend on the type of technology used in the IDENT system (see Table). However, the same calculation formula is used to calculate the possible passing speed regardless of the technology used. Passing speed is calculated by:

$$v_{\max} = \frac{\text{Read field width [m]}}{\text{Read time [s]}}$$

If the passing motion takes place at approximately half the maximum read range, then for inductive systems, the applicable read field width is approximately equivalent to the side length of the read head. For example: the F15 read head is 0.14 m and the fixed code reading time is 40 msec.

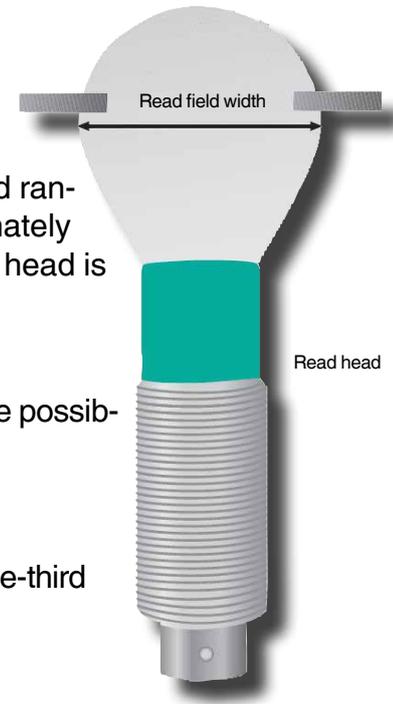
$$v_{\max} = 0.14 \text{ m} / 0.04 \text{ sec} = 3.5 \text{ m/s}$$

However, in practice one half of the passing speed should be used due to the possible effects of noise in the environment:

$$v_{\text{practice}} = v_{\max} / 2 = 1.75 \text{ m/s}$$

In systems with the operating frequency of 13.56 MHz acc. to ISO 15693, one-third of the passing speed is recommended for practical use:

$$v_{\text{practice}} = v_{\max} / 3 = 1.17 \text{ m/s}$$



Passing Speed, Calculation examples

The following examples show how you can calculate the passing speed of your application. All read/write times are in milliseconds [ms].

125 KHz / System P

- Read / write head in F15 design, side length 140 mm
- Tag with 100 mm diameter

	IPC02	IPC03	IPC11
reading Read only code	40	130	40
reading N x 4 byte blocks ¹⁾	-	(N x 30) + 100	-
writing N x 4 byte blocks ¹⁾	-	(N x 100) + 100	-
writing 5 byte IPC11	-	-	250

¹⁾ Data volumes < 4 bytes can not be transferred

Reading Read only code:

Reading time $t = 40 \text{ ms} = 0.04 \text{ s}$
 $s = 140 \text{ mm} = 0.14 \text{ m}$

$$v_{\text{practical}} = \frac{0.14 \text{ m}}{(2 \times 0.04 \text{ s})} = 1.75 \text{ m/s}$$

Reading 8 byte:

Reading time $t = (2 \times 30 \text{ ms}) + 100 \text{ ms} = 160 \text{ ms} = 0.13 \text{ s}$
 $s = 140 \text{ mm} = 0.14 \text{ m}$

$$v_{\text{practical}} = \frac{0.14 \text{ m}}{(2 \times 0.16 \text{ s})} = 0.438 \text{ m/s}$$

250 KHz / System S

- Read / write head in FP design, side length 80 mm

reading Read only code ICC	7
reading Read only code IDC-...-1K	13
reading N x 4 byte blocks ¹⁾	N x 13
writing N x 4 byte blocks ¹⁾	(N+1) x 50
writing 3 byte with „special read“	5

¹⁾ Data volumes < 4 bytes can not be transferred

Reading Read only code:

Reading time $t = 7 \text{ ms} = 0.007 \text{ s}$
 $s = 80 \text{ mm} = 0.08 \text{ m}$

$$v_{\text{practical}} = \frac{0.08 \text{ m}}{(2 \times 0.007 \text{ s})} = 5.7 \text{ m/s}$$

Reading 8 byte:

Reading time $t = (2 \times 13 \text{ ms}) = 26 \text{ ms} = 0.026 \text{ s}$
 $s = 80 \text{ mm} = 0.08 \text{ m}$

$$v_{\text{practical}} = \frac{0.08 \text{ m}}{(2 \times 0.026 \text{ s})} = 1.5 \text{ m/s}$$

13,56 MHz acc. to ISO 15693 / System Q

- Read / write head in FP design, side length 80 mm

	IQH1
reading Read only code	9.5
reading N x 4 byte blocks ¹⁾	$(N \times 1.3) + 6.7^{2)}$
writing N x 4 byte blocks on IQC22 ¹⁾	$(N \times 17.2) + 1.7$
writing N x 4 byte blocks on IQC21/IQC24 ¹⁾	$(N \times 20.3) + 1.1$
reading N x 8 byte blocks on IQC33	$(N \times 14) + 16$
writing N x 8 byte blocks on IQC33	$(N \times 28) + 16$

¹⁾ Data volumes < 4 bytes can not be transferred

²⁾ IQC21 + IQC22 (EEPROM)

Reading Read only code:

Reading time $t = 9.5 \text{ ms} \approx 0.01 \text{ s}$

$s = 80 \text{ mm} = 0.08 \text{ m}$

$$v_{\text{practical}} = \frac{0.08 \text{ m}}{(3 \times 0.01 \text{ s})} = 2.67 \text{ m/s}$$

Reading 1 block of 8 byte:

Reading time $t = (1 \times 14 \text{ ms}) + 16 \text{ ms} = 30 \text{ ms} = 0.03 \text{ s}$

$s = 80 \text{ mm} = 0.08 \text{ m}$

$$v_{\text{practical}} = \frac{0.08 \text{ m}}{(3 \times 0.03 \text{ s})} = 0.89 \text{ m/s}$$

13,56 MHz acc. to ISO 14443 / System Q

- Read / write head in FP design, side length 80 mm

	IQH2
reading Read only code	25
reading N x 4 byte blocks on IQC41 ¹⁾	(N x 0,9) + 32
writing N x 4 byte blocks on IQC41 ¹⁾	(N x 7.8) + 28
reading N x 4 byte blocks on IQC42 ¹⁾	(N x 1.7) + 31
writing N x 4 byte blocks on IQC42 ¹⁾	(N x 2.9) + 30

¹⁾ Data volumes < 4 bytes can not be transferred

Reading IQC42 memory (752 byte = 47 data blocks = 16 commands):

Reading time $t = 16 \times ((3 \times 1.7 \text{ ms}) + 31 \text{ ms}) = 0.58 \text{ s}$
 $s = 80 \text{ mm} = 0.08 \text{ m}$

$$v_{\text{practical}} = \frac{0.08 \text{ m}}{(2 \times 0.58 \text{ s})} = 0.069 \text{ m/s}$$

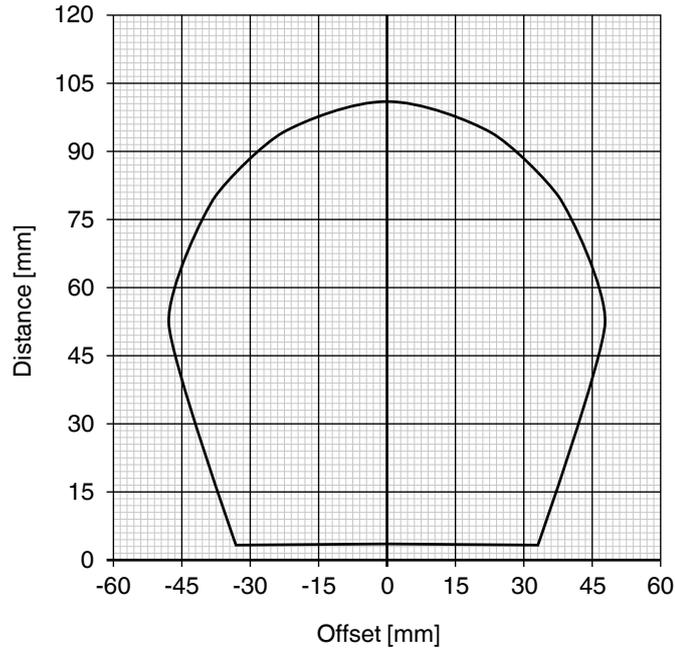
Writing IQC42 memory (752 byte = 47 data blocks = 16 commands):

Writing time $t = 16 \times ((3 \times 2.9 \text{ ms}) + 30 \text{ ms}) = 0.62 \text{ s}$
 $s = 80 \text{ mm} = 0.08 \text{ m}$

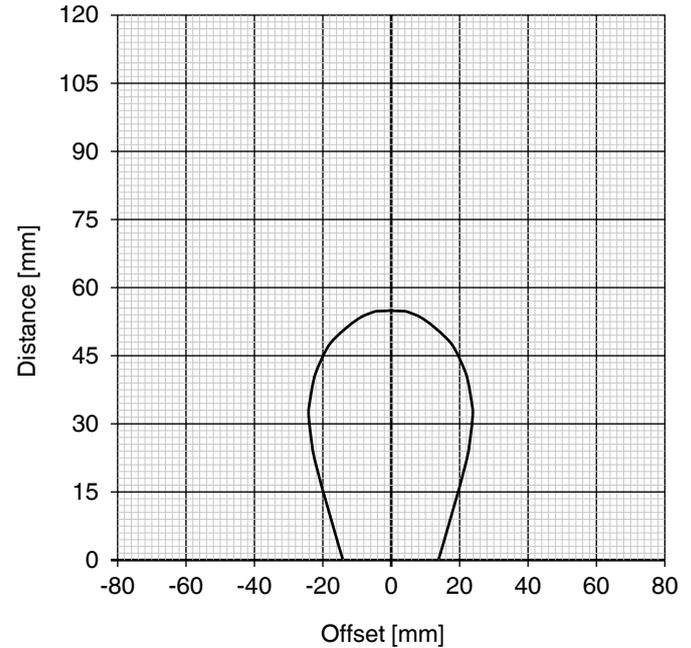
$$v_{\text{practical}} = \frac{0.08 \text{ m}}{(2 \times 0.62 \text{ s})} = 0.065 \text{ m/s}$$

Examples Reading Range:

Reading range IPC03-50P
with read head IPH-FP-V1 in air



Reading range IQC21-30P
with read head IQH1-F61-V1 in air





Note

In the following tables you will find the read and write ranges of the most common combinations of our read / write heads and transponders. The distances are measured under laboratory conditions. Read and write ranges within an actual application may differ from these values for various reasons. If in doubt, please contact our product specialists at Pepperl+Fuchs.

Read/write ranges in/on plastic (125 kHz read/write tag at 25 °C, in mm)

Read/write head	IPH-18GM-V1		IPH-30GM-V1		IPH-F61-V1		IPH-L2-V1		IPH-FP-V1		IPH-F15-V1		IPH-F90A-V1		IPH-F97-V1	
	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing
IPC02-3GL	0...10	-	0...15	-	0...15	-	0...25	-	-	-	-	-	0...20	-	0...10	-
IPC02-12	0...14	-	0...18	-	0...18	-	0...25	-	0...22	-	-	-	0...30	-	0...17	-
IPC02-16	0...30	-	0...40	-	0...40	-	0...35	-	0...30	-	0...33	-	0...35	-	0...24	-
IPC02-20P	0...20	-	0...30	-	0...30	-	0...30	-	0...35	-	0...38	-	0...40	-	0...25	-
IPC02-26-T6	0...30	-	0...40	-	0...40	-	0...45	-	0...60	-	0...60	-	0...60	-	0...28	-
IPC02-30P	0...35	-	0...40	-	0...40	-	0...45	-	0...60	-	0...70	-	0...60	-	0...50	-
IPC02-50P	0...50	-	0...65	-	0...65	-	0...70	-	0...90	-	0...110	-	0...90	-	0...75	-
IPC02-C1	0...40	-	0...55	-	0...55	-	0...60	-	0...80	-	0...95	-	0...80	-	0...60	-
IPC11-12	0...14	0...12	0...18	0...15	0...18	0...15	0...20	0...15	0...22	0...18	-	-	0...22	0...18	0...18	0...10
IPC11-30	0...28	0...20	0...40	0...25	0...40	0...25	0...45	0...30	0...50	0...35	0...70	0...50	0...50	0...35	0...47	0...35
IPC11-50	0...40	0...30	0...55	0...40	0...55	0...40	0...60	0...45	0...80	0...60	0...110	0...90	0...90	0...80	0...70	0...60
IPC11-50CD	0...38	0...30	0...50	0...40	0...50	0...40	0...55	0...45	0...70	0...60	0...100	0...80	0...70	0...60	0...60	0...50
IPC03-12.4	0...16	0...12	0...22	0...16	0...22	0...16	0...24	0...17	0...20	0...11	-	-	0...20	0...11	0...12	0...8
IPC03-16GK	0...16	0...12	0...22	0...16	0...22	0...16	0...24	0...17	0...20	0...11	-	-	0...20	0...11	0...12	0...8

Legend: - Combination not recommended

Read/write ranges

Read/write head	IPH-18GM-V1		IPH-30GM-V1		IPH-F61-V1		IPH-L2-V1		IPH-FP-V1		IPH-F15-V1		IPH-F90A-V1		IPH-F97-V1	
	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing
IPC03-24	0...25	0...20	1...35	1...25	0...35	0...25	0...40	0...30	0...45	0...35	-	-	0...45	0...35	0...22	0...35
IPC03-30GK	0...25	0...20	1...35	1...25	0...35	0...25	0...40	0...30	0...45	0...35	-	-	0...45	0...35	0...24	0...16
IPC03-30GK-T1	0...25	0...20	1...35	1...25	0...35	0...25	0...40	0...30	0...45	0...35	-	-	0...45	0...35	0...24	0...16
IPC03-20K*	0...20	0...18	0...30	0...25	0...30	0...25	0...35	0...30	0...55	0...50	0...50	0...40	0...35	0...30	0...33	0...25
IPC03-20P	0...20	0...18	0...30	0...25	0...30	0...25	0...35	0...30	0...55	0...50	0...50	0...40	0...35	0...30	0...33	0...25
IPC03-30P	0...35	0...30	0...40	0...35	0...45	0...40	0...50	0...45	0...70	0...65	0...75	0...65	0...45	0...30	0...50	0...40
IPC03-50P	0...50	0...40	2...78	2...64	0...75	0...65	0...80	0...80	0...110	0...100	0...135	0...125	0...120	0...110	0...95	0...85
IPC03-54	0...50	0...40	2...78	2...64	0...75	0...65	0...80	0...70	0...90	0...80	0...105	0...95	0...95	0...85	0...75	0...65
IPC03-54-T8	0...50	0...40	2...78	2...64	0...75	0...65	0...70	0...65	0...80	0...70	0...100	0...90	0...80	0...70	0...67	0...58
IPC03-58	0...50	0...40	2...78	2...64	0...75	0...65	0...80	0...70	0...100	0...90	0...125	0...115	0...105	0...96	0...95	0...85
IPC03-C1	0...40	0...35	0...50	0...45	0...50	0...45	0...60	0...55	0...80	0...70	0...115	0...105	0...85	0...75	0...75	0...65

Legend: - Combination not recommended

Read/write ranges in/on plastic (250 kHz read/write tag at 25 °C, in mm)

Read/write head Read only / Read/write tag	ISH-18GM-V1		ISH-F61-V1		ISH-FP-V1	
	reading	writing	reading	writing	reading	writing
IDC-8-1K	2...12	2...8	3...9	3...8	-	-
IDC-10-1K	2...12	2...8	3...9	3...8	-	-
IDC-12-1K	2...16	2...12	3...15	3...13	-	-
IDC15-1K	3...19	3...17	3...18	3...16	5...30	5...20
IDC-16GK-1K	2...16	2...12	3...15	3...13	-	-
IDC-24-1K	5...24	5...23	4...28	4...26	0...58	5...36
IDC-30GK-1K	5...27	5...25	5...30	5...28	5...50	5...43
IDC-30GK-1K-T1	5...27	5...25	5...30	5...28	5...50	5...43
IDC-30F-1K	5...27	5...25	5...30	5...28	5...50	5...43
IDC-50-1K	8...40	8...34	10...42	10...40	12...95	15...80
IDC-50F-1K	8...40	8...34	10...42	10...40	12...95	15...80
IDC-58-1K	5...37	5...31	7...39	7...35	8...92	12...77

Legend: - Combination not recommended

Read/write ranges in/on plastic (13,56 MHz read/write tag at 25 °C, in mm)

Read/write head ISO 15693 Read only / Read/write tag	IQH1-18GM-V1		IQH1-F61-V1		IQH1-FP-V1		IQH1-F15-V1	
	reading	writing	reading	writing	reading	writing	reading	writing
IQC21-12.4	0...10	0...10	0...11	0...11	-	-	-	-
IQC21-16	0...30	0...30	0...35	0...35	0...60	0...60	0...56	0...56
IQC21-30P	0...40	0...40	0...50	0...50	0...85	0...85	0...110	0...110
IQC21-39	0...23	0...23	0...35	0...35	0...50	0...50	0...60	0...60
IQC21-39-T1	0...23	0...23	0...35	0...35	0...50	0...50	0...60	0...60
IQC21-50P	0...50	0...50	0...55	0...55	0...100	0...100	0...150	0...150
IQC21-50F-T10	0...50	0...50	0...65	0...65	0...110	0...110	0...150	0...150
IQC21-58	0...32	0...32	0...50	0...50	0...70	0...70	0...92	0...92
IQC21-85-T13	0...53	0...53	0...72	0...72	0...115	0...115	0...170	0...170
IQC21-F125	0...17	0...17	0...25	0...25	0...40	0...40	0...35	0...35
IQC24-27-T12	0...26	0...26	0...37	0...37	0...52	0...52	0...96	0...96
IQC22-22-T9	0...32	0...32	0...40	0...40	0...65	0...65	0...77	0...77
IQC22-C1	0...55	0...55	0...85	0...85	0...110	0...110	0...160	0...160
IQC22-C4	0...45	0...45	0...70	0...70	0...110	0...110	0...160	0...160
IQC33-10	0...13	0...13	0...17	0...17	-	-	-	-

Legend: - Combination not recommended

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Read/write ranges

Read/write head	IQH1-18GM-V1		IQH1-F61-V1		IQH1-FP-V1		IQH1-F15-V1	
	reading	writing	reading	writing	reading	writing	reading	writing
ISO 15693								
Read only / Read/write tag								
IQC33-16	0...25	0...25	0...40	0...40	0...50	0...50	0...56	0...56
IQC33-20	0...25	0...25	0...30	0...30	0...45	0...45	0...48	0...48
IQC33-30	0...25	0...25	0...35	0...35	0...60	0...60	0...90	0...90
IQC33-50	0...45	0...45	0...60	0...60	0...95	0...95	0...135	0...135
IQC33-50F-T10	0...45	0...45	0...65	0...65	0...100	0...100	0...145	0...145
IQC35-10	0...15	0...15	0...20	0...20	0...20	0...20	-	-

Legend: - Combination not recommended

Read/write head	IQH2-18GM-V1		IQH2-F61-V1		IQH2-L2-V1		IQH2-FP-V1	
	reading	writing	reading	writing	reading	writing	reading	writing
ISO 14443								
Read only / Read/write tag								
IQC43-30P	0...18	0...18	0...22	0...22	0...27	0...27	0...33	0...33
IQC43-50P	0...20	0...20	0...26	0...26	0...34	0...34	0...42	0...42
IQC42-C1	0...11	0...11	0...17	0...17	0...26	0...26	0...34	0...34

Legend: - Combination not recommended

Read/write ranges on plastic (868 MHz read/write tag at 25 °C, in mm)

Read/write head	IUH-F190-V1-EU 20 mW ERP		IUH-F190-V1-EU 50 mW ERP		IUH-F190-V1-EU 200 mW ERP	
	reading	writing	reading	writing	reading	writing
IUC76-50-FR1	0...1900	0...400	0...2300	0...600	0...2000	0...1000

Read/write head	IUH-F190-V1-FR1 30 mW ERP		IUH-F190-V1-FR1 100 mW ERP		IUH-F190-V1-FR1 200 mW ERP		IUH-F190-V1-FR1 300 mW ERP	
	reading	writing	reading	writing	reading	writing	reading	writing
IUC76-50-FR2	0...680	0...440	0...1120	0...800	0...1880	0...1040	0...2000	0...1240
IUC77-25L100-GBL	0...880	0...680	0...1720	0...1080	0...2000	0...1840	0...2100	0...2000
IUC77-25L110-GBL	0...920	0...720	0...1760	0...1200	0...2000	0...1880	0...2120	0...2000
IUC76-C8-T14-GBL	0...800	0...480	0...1360	0...800	0...1920	0...1080	0...2040	0...1360

Read/write ranges, flush installation in steel (125 kHz read/write tag at 25 °C, in mm)

Read/write head	IPH-18GM-V1		IPH-30GM-V1		IPH-F61-V1		IPH-L2-V1		IPH-FP-V1		IPH-F15-V1		IPH-F90A-V1		IPH-F97-V1	
	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing
IPC02-3GL	0...7	-	0...10	-	0...10	-	-	-	-	-	-	-	-	-	-	-
IPC03-12.4	0...14	0...10	0...17	0...12	0...15	0...10	1...15	1...10	1...12	1...6	-	-	-	-	-	-
IPC03-16GK	0...14	0...10	0...17	0...12	0...15	0...10	1...15	1...10	1...12	1...6	-	-	-	-	-	-
IPC03-24	0...15	0...11	0...22	0...20	0...20	0...15	1...20	1...15	1...21	0...15	-	-	1...18	1...13	0...10	0...7
IPC03-30GK	0...22	0...17	0...27	0...22	2...27	0...22	2...27	0...22	0...30	0...23	-	-	0...25	0...20	0...12	0...8
IPC03-30GK-T1	0...22	0...17	0...27	0...22	2...27	0...22	2...27	0...22	0...30	0...23	-	-	0...25	0...20	0...12	0...8

Legend: - Combination not recommended

Read/write ranges, flush installation in steel (250 kHz read/write tag at 25 °C, in mm)

Read/write head Read only / Read/write tag	ISH-18GM-V1		ISH-F61-V1		ISH-FP-V1	
	reading	writing	reading	writing	reading	writing
IDC-8-1K	2...9	2...6	-	-	-	-
IDC-10-1K	2...9	2...6	-	-	-	-
IDC-12-1K	2...11	2...9	3...12	3...6	-	-
IDC15-1K	3...14	3...13	5...18	4...12	-	-
IDC-16GK-1K	0...15	0...12	0...16	0...12	-	-
IDC-24-1K	5...19	5...18	4...22	4...19	-	-
IDC-30GK-1K	5...21	5...19	5...25	5...20	-	-
IDC-30GK-1K-T1	5...21	5...19	5...25	5...20	-	-
IDC-30F-1K	5...21	5...19	5...25	5...20	-	-

Legend: - Combination not recommended



Note

Installing the transponders in aluminium reduces the read and write ranges by a further 30 % compared to steel mounting.

Read/write ranges, flush installation in steel (13,56 MHz read/write tag at 25 °C, in mm)

Read/write head	IQH1-18GM-V1		IQH1-F61-V1		IQH1-FP-V1		IQH1-F15-V1	
	reading	writing	reading	writing	reading	writing	reading	writing
ISO 15693								
Read only / Read/write tag								
IQC21-12.4	0...8	0...8	-	-	-	-	-	-
IQC21-39	0...27	0...27	0...33	0...33	6...45	6...45	25...45	25...45
IQC21-39-T1	0...27	0...27	0...33	0...33	6...45	6...45	25...45	25...45
IQC33-10	5...7	5...7	-	-	-	-	-	-

Legend: - Combination not recommended

Read/write ranges, directly on steel (125 kHz read/write tag at 25 °C, in mm)

Read/write head	IPH-18GM-V1		IPH-30GM-V1		IPH-F61-V1		IPH-L2-V1		IPH-FP-V1		IPH-F15-V1		IPH-F90A-V1		IPH-F97-V1	
	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing
IPC02-26-T6	0...22	-	0...28	-	0...28	-	0...30	-	0...35	-	0...17	-	0...26	-	0...18	-
IPC02-30P	0...23	-	0...32	-	0...32	-	0...33	-	0...28	-	0...30	-	0...23	-	0...22	-
IPC02-50P	0...23	-	0...32	-	0...32	-	0...40	-	0...48	-	0...60	-	0...45	-	0...27	-
IPC03-30P	0...19	0...10	0...30	0...22	0...30	0...22	0...30	0...22	0...18	0...10	-	-	0...19	0...10	0...18	0...13
IPC03-50P	0...18	0...10	0...24	0...15	0...24	0...15	0...38	0...30	0...50	0...40	0...22	0...15	0...33	0...25	0...22	0...15
IPC03-54	0...38	0...30	0...55	0...45	0...55	0...45	0...70	0...60	0...80	0...70	0...90	0...80	0...80	0...70	0...52	0...36
IPC03-54-T8	0...35	0...27	0...45	0...35	0...45	0...35	0...55	0...45	0...70	0...60	0...75	0...65	0...70	0...60	0...36	0...25
IPC03-58	0...50	0...40	0...70	0...60	0...70	0...60	0...75	0...65	0...105	0...95	0...125	0...115	0...105	0...95	0...74	0...52

Legend: - Combination not recommended

Read/write ranges, directly on steel (250 kHz read/write tag at 25 °C, in mm)

Read/write head Read only / Read/write tag	ISH-18GM-V1		ISH-F61-V1		ISH-FP-V1	
	reading	writing	reading	writing	reading	writing
IDC-58-1K	5 .. 34	5 .. 24	7 .. 42	7 .. 31	7 .. 72	0 .. 55

Legend: - Combination not recommended

Read/write ranges, directly on steel (13,56 MHz read/write tag at 25 °C, in mm)

Read/write head Read only / Read/write tag	IQH1-18GM-V1		IQH1-F61-V1		IQH1-FP-V1		IQH1-F15-V1	
	reading	writing	reading	writing	reading	writing	reading	writing
ISO 15693								
IQC21-30P	0...11	0...11	1...16	1...16	-	-	-	-
IQC21-50P	-	-	0...17	0...17	5...28	5...28	-	-
IQC21-58	0...36	0...36	0...48	0...48	0...72	0...72	10...95	10...95
IQC21-50F-T10	-	-	0...12	0...12	5...28	5...28	-	-
IQC21-85-T13	-	-	0...19	0...19	0...32	0...32	-	-
IQC21-F125	0...24	0...24	0...32	0...32	5...48	5...48	-	-
IQC33-50F-T10	-	-	0...11	0...11	5...48	5...48	-	-

Legend: - Combination not recommended

Read/write ranges, directly on steel (868 MHz read/write tag at 25 °C, in mm)

Read/write head / Read/write tag	IUH-F190-V1-EU 20 mW ERP		IUH-F190-V1-EU 50 mW ERP		IUH-F190-V1-EU 200 mW ERP	
	reading	writing	reading	writing	reading	writing
IUC72-F151-M-FR1	0...400	-	0...800	0...400	0...1200	0...600
IUC72-F152-M-FR1	0...100	-	0...200	0...100	0...600	0...500
IUC76-50-M-FR1	0...200	0...100	0...400	0...200	0...700	0...500
IUC76-F157-M-FR1	0...2200	0...600	0...2600	0...800	0...2400	0...2200
IUC76-F203-M-FR1	0...500	0...300	0...700	0...500	0...1000	0...600

Read/write head / Read/write tag	IUH-F190-V1-FR1 30 mW ERP		IUH-F190-V1-FR1 100 mW ERP		IUH-F190-V1-FR1 200 mW ERP		IUH-F190-V1-FR1 300 mW ERP	
	reading	writing	reading	writing	reading	writing	reading	writing
IUC76-F157-M-FR2	0...880	0...400	0...1760	0...800	0...2000	0...1040	0...2080	0...1360
IUC76-50-M-FR2	0...320	-	0...520	0...240	0...720	0...320	0...880	0...400
IUC72-F152-M-FR2	0...120	0...80	0...400	0...320	0...560	0...440	0...720	0...560
IUC76-F203-M-FR2	0...240	0...200	0...480	0...320	0...640	0...440	0...720	0...560
IUC77-F151-M-GBL	0...240	-	0...400	0...360	560	0...480	0...640	0...600

Legend: - Combination not recommended

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

Read/write ranges, directly on steel with 10 mm spacing (125 kHz read/write tag at 25 °C, in mm)

Read/write head	IPH-18GM-V1		IPH-30GM-V1		IPH-F61-V1		IPH-L2-V1		IPH-FP-V1		IPH-F15-V1		IPH-F90A-V1		IPH-F97-V1	
	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing	reading	writing
IPC02-12	0...9	-	0...12	-	0...12	-	0...25	-	-	-	-	-	-	-	-	-
IPC02-16	0...25	-	0...35	-	0...35	-	0...35	-	2...20	-	-	-	0...33	-	0...20	-
IPC02-20P	0...15	-	0...30	-	0...30	-	0...35	-	2...30	-	-	-	0...34	-	0...22	-
IPC02-26-T6	0...15	-	0...40	-	0...40	-	0...45	-	2...45	-	-	-	0...50	-	0...30	-
IPC02-30P	0...25	-	0...40	-	0...40	-	0...50	-	0...55	-	-	-	0...52	-	0...33	-
IPC02-50P	0...30	-	0...40	-	0...40	-	0...58	-	0...70	-	0...65	-	0...70	-	0...43	-
IPC02-C1	0...30	-	0...40	-	0...40	-	0...45	-	0...55	-	0...65	-	0...60	-	0...40	-
IPC11-12	0...9	0...8	0...12	0...10	0...12	0...10	0...24	0...18	0...15	0...13	-	-	0...12	0...10		
IPC11-30	0...25	0...18	0...30	0...20	0...30	0...20	0...40	0...35	0...35	0...25	-	-	0...30	0...20		
IPC11-50	0...35	0...35	0...45	0...40	0...45	0...40	0...50	0...45	0...60	0...70	0...80	0...70	0...55	0...50		
IPC11-50CD	0...35	0...35	0...43	0...38	0...43	0...38	0...45	0...40	0...55	0...70	0...80	0...70	0...55	0...50		
IPC03-20P	0...15	0...10	0...20	0...15	0...20	0...15	0...30	0...20	0...45	0...35	-	-	0...30	0...20		
IPC03-30P	0...25	0...20	0...30	0...25	0...30	0...25	0...40	0...30	0...50	0...40	-	-	0...40	0...30		
IPC03-50P	0...35	0...35	0...55	0...50	0...55	0...50	0...65	0...55	0...75	0...65	0...85	0...75	0...65	0...55		
IPC03-C1	0...30	0...30	0...45	0...40	0...45	0...40	0...48	0...40	0...65	0...55	0...65	0...55	0...50	0...40		

Legend: - Combination not recommended

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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Read/write ranges, directly on steel with 10 mm spacing (250 kHz read/write tag at 25 °C, in mm)

Read/write head	ISH-18GM-V1		ISH-F61-V1		ISH-FP-V1	
	reading	writing	reading	writing	reading	writing
IDC-50-1K	8...37	0...19	10...45	10...34	10...75	7...58
IDC-50F-1K	8...37	0...19	10...45	10...34	10...75	7...58

Legend: - Combination not recommended

Read/write ranges, directly on steel with 10 mm spacing (13,56 MHz read/write tag at 25 °C, in mm)

Read/write head ISO 15693 Read only / Read/write tag	IQH1-18GM-V1		IQH1-F61-V1		IQH1-FP-V1		IQH1-F15-V1	
	reading	writing	reading	writing	reading	writing	reading	writing
IQC21-16	0...23	0...23	0...30	0...30	5...40	5...40	-	-
IQC21-30P	0...17	0...17	0...33	0...33	5...42	5...42	-	-
IQC21-50P	0...25	0...25	0...36	0...36	0...50	0...50	25...90	25...90
IQC21-58	0...34	0...34	0...50	0...50	0...70	0...70	10...100	10...100
IQC21-50F-T10	0...20	0...20	0...32	0...32	0...45	0...45	20...60	20...60
IQC21-85-T13	0...22	0...22	0...40	0...40	0...53	0...53	5...90	5...90
IQC21-F125	0...17	0...17	0...24	0...24	0...33	0...33	-	-
IQC22-22-T9	0...25	0...25	0...35	0...35	5...42	5...42	-	-
IQC22-C1	0...22	0...22	0...35	0...35	2...36	2...36	20...90	20...90
IQC22-C4	0...28	0...28	0...40	0...40	0...45	0...45	15...80	15...80
IQC24-27-T12	0...25	0...25	0...32	0...32	0...44	0...44	20...45	20...45
IQC33-16	0...25	0...25	0...30	0...30	5...22	5...22	-	-
IQC33-20	0...20	0...20	0...23	0...23	0...35	0...35	-	-
IQC33-30	0...26	0...26	0...30	0...30	5...35	5...35	-	-

Legend: - Combination not recommended

Read/write ranges

Read/write head	IQH1-18GM-V1		IQH1-F61-V1		IQH1-FP-V1		IQH1-F15-V1	
ISO 15693	reading	writing	reading	writing	reading	writing	reading	writing
Read only / Read/write tag								
IQC33-50	0...20	0...20	0...30	0...30	5...45	5...45	30...55	30...55
IQC33-50F-T10	0...25	0...25	0...37	0...37	3...50	3...50	20...60	20...60

Legend: - Combination not recommended

Read/write head	IQH2-18GM-V1		IQH2-F61-V1		IQH2-L2-V1		IQH2-FP-V1	
ISO 14443	reading	writing	reading	writing	reading	writing	reading	writing
Read only / Read/write tag								
IQC43-30P	0... 14 mm	0... 14 mm	0... 15 mm	0... 15 mm	0...21 mm	0...21 mm	0...23 mm	0...23 mm
IQC43-50P	-	-	0... 18 mm	0... 18 mm	0...23 mm	0...23 mm	0...29 mm	0...29 mm
IQC42-C1	-	-	0...6 mm	0...6 mm	0... 15 mm	0... 15 mm	0...19 mm	0...19 mm

Legend: - Combination not recommended

Read/write ranges -Read/write heads (at 25 °C, in mm)

Read/write head Read only / Read/write tag	ISH-30GM105-EXD		IPH-30GM105-EXD		IQH1-30GM105-EXD	
	reading	writing	reading	writing	reading	writing
IDC-12-1K	0...4	0...3				
IDC-30GK-EXIA-1K	0...10	0...8				
IPC02-34-EXIA			0...8	-		
IPC02-16			0...6	-		
IPC02-26-T6			0...8	-		
IPC02-30P			0...10	-		
IPC02-50P			0...8	-		
IPC03-16GK-1K			0...4	0...3		
IPC03-20P			0...10	0...8		
IPC03-30GK			0...8	0...6		
IPC03-30P			0...11	0...9		
IPC03-50P			0...12	0...10		
IPC03-58			0...10	0...8		

Legend: - Combination not recommended

Read/write head Read only / Read/write tag	ISH-30GM105-EXD		IPH-30GM105-EXD		IQH1-30GM105-EXD	
	reading	writing	reading	writing	reading	writing
IQC21-34-EXIA					0...8	0...8
IQC21-16					0...10	0...10
IQC22-22-T9					0...10	0...10
IQC21-30P					0...11	0...11
IQC33-16					0...10	0...10
IQC33-20					0...6	0...6
IQC33-30					0...8	0...8

Legend: - - Combination not recommended

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