

***DENSO***

**M18 / M30 Cylindrical type transceiver  
for 1732 series**

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**User's Manual**

DENSO WAVE INCORPORATED

# Federal Communication Commission Interference

**NOTICE:**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables must be used for connection to host computers and / or peripherals in order to meet FCC emission limits.

**FCC WARNING:**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**FCC CAUTION:**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## Declaration of Conformity (For European Union)

For European Union

[EN] English	Hereby, DENSO WAVE INCORPORATED declares that this equipment (M18/M30 Type Transceiver) is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
[BG] Bulgarian	С настоящето, DENSO WAVE INCORPORATED, декларира, че M18/M30 Type Transceiver е в съответствие със съществените изисквания и другите приложими разпоредби на Директива 1999/5/EC.
[HR] Croatian	Ovim DENSO WAVE INCORPORATED, izjavljuje da je M18/M30 Type Transceiver u skladu s bitnim zahtjevima i drugim relevantnim odredbama Direktive 1999/5/EC i Pravilnika o RiTT opremi (NN25/2012).
[CS] Czech	DENSO WAVE INCORPORATED tímto prohlašuje, že M18/M30 Type Transceiver splňuje základní požadavky a všechna příslušná ustanovení Směrnice 1999/5/ES.
[DA] Danish	Undertegnede DENSO WAVE INCORPORATED erklærer herved, at følgende udstyr M18/M30 Type Transceiver overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
[DE] German	Hiermit erkläre DENSO WAVE INCORPORATED, dass sich das Gerät M18/M30 Type Transceiver in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.
[ET] Estonian	Käesolevaga kinnitab DENSO WAVE INCORPORATED seadme M18/M30 Type Transceiver vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
[EL] Greek	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ Ο ΚΑΤΑΣΚΕΥΑΣΤΗΣ DENSO WAVE INCORPORATED ΔΗΛΩΝΕΙ ΟΤΙ Μ18/Μ30 Type Transceiver ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/EK
[ES] Spanish	Por la presente, DENSO WAVE INCORPORATED, declara que este M18/M30 Type Transceiver cumple con los requisitos esenciales y otras exigencias relevantes de la Directiva 1999/5/EC.
[FR] French	Par la présente, DENSO WAVE INCORPORATED déclare que l'appareil M18/M30 Type Transceiver est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.
[IT] Italian	Con la presente DENSO WAVE INCORPORATED dichiara che questo M18/M30 Type Transceiver è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
[LV] Latvian	Ar šo DENSO WAVE INCORPORATED deklarē, ka M18/M30 Type Transceiver atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
[LT] Lithuanian	Šiuo DENSO WAVE INCORPORATED deklaruoja, kad šis M18/M30 Type Transceiver atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas
[HU] Hungarian	A DENSO WAVE INCORPORATED ezzennel kijelenti, hogy a HIGH FREQUENCY 13.56MHz TRANSCEIVER típusú berendezés teljesíti az alapvető követelményeket és más 1999/5/EK irányelvben meghatározott vonatkozó rendelkezéseket.
[NL] Dutch	Hierbij verklaart DENSO WAVE INCORPORATED dat het toestel I HIGH FREQUENCY 13.56MHz TRANSCEIVER in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.
[PL] Polish	Niniejszym DENSO WAVE INCORPORATED deklaruje że HIGH FREQUENCY 13.56MHz TRANSCEIVER jest zgodny z zasadniczymi wymaganiami innymi właściwymi postanowieniami Dyrektywy 1999/5/EC.
[PT] Portuguese	Eu, DENSO WAVE INCORPORATED, declaro que o HIGH FREQUENCY 13.56MHz TRANSCEIVER cumpre os requisitos essenciais e outras provisões relevantes da Directiva 1999/5/EC.
[RO] Romanian	Prin prezenta, DENSO WAVE INCORPORATED, declară că aparatul HIGH FREQUENCY 13.56MHz TRANSCEIVER este în conformitate cu cerințele esențiale și cu alte prevederi pertinente ale Directivei 1999/5/CE.
[SK] Slovak	DENSO WAVE INCORPORATED týmto vyhlasuje, že HIGH FREQUENCY 13.56MHz TRANSCEIVER spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
[SL] Slovenian	DENSO WAVE INCORPORATED izjavlja, da je ta HIGH FREQUENCY 13.56MHz TRANSCEIVER v skladu z bistvenimi zahtevami in drugimi relevantnimi določili direktive 1999/5/ES.
[FI] Finish	DENSO WAVE INCORPORATED vakuuttaa täten että HIGH FREQUENCY 13.56MHz TRANSCEIVER tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
[SV] Swedish	Denna utrustning är i överensstämmelse med de väsentliga kraven och andra relevanta bestämmelser i direktiv 1999/5/EC.

NOTICE:

This M18/M30 Type Transceiver may be operated in below country:

AT	CZ	FR	HR	LT	PL	SI	IS	HR
BE	DK	DE	IE	LU	PT	ES	LI	MK
BG	EE	GR	IT	MT	RO	SE	NO	TR
CY	FI	HU	LV	NL	SK	GB	CH	LI

Properly shielded cables must be used for connection to host computers and / or peripherals in order to meet CE emission limits.

CE marking



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# Preface

Read this manual thoroughly before using the product to ensure the proper use of the product and its functions. Keep the manual in a convenient location for quick reference.

## Liability Limitations

- DENSO WAVE INCORPORATED does not assume any product liability (including damages for lost profits, interruption of operations, or the loss of business-related information) arising out of, or in connection with, the use of, or inability to use the product.
- DENSO WAVE INCORPORATED ("DENSO WAVE") takes appropriate precautions to ensure its products do not infringe upon any patents or other intellectual property rights of other(s). However, DENSO WAVE cannot be responsible for any patent or other intellectual property right infringement(s) or violation(s) arising from any of the following.
  - 1) The use of DENSO WAVE's products in connection or in combination with other components, products, devices, data processing systems or software not supplied by DENSO WAVE.
  - 2) The use of DENSO WAVE's products in a manner for which they were not intended nor designed.
  - 3) The modification of DENSO WAVE's products by parties other than DENSO WAVE.
- The warranty period is one (1) year from the date of delivery.

If it is determined by DENSO WAVE INCORPORATED that malfunction of the product is due to the product having been dropped or subjected to impact, repairs will be made at a reasonable charge even within the warranty period.

# Applicable Standards and Regulations

## Standards and Regulations in Other countries

	Standards	Applicability	Remarks
Radio Regulations	FCC (USA)	✓ *1	FCC Part 15 Subpart C M18 FCC ID : PZWAN22R01 M30 FCC ID : PZWAN23R01
	R&TTE (Europe)	✓ *1	EN 302 291-1, -2
	RSS-Gen RSS-210(Canada)	n/a	
EMC Regulations	EC/R&TTE Directive (Europe)	✓ *1	EN 301 489-1, -3
	ICES-003 (Canada)	n/a	
	EMC Framework (Australia)	n/a	C-Tick
Safety Regulations	UL (USA)	✓	UL508(Type4X Indoor Use Only) Product ID: 46XM INDUSTRIAL CONTROL EQUIPMENT
	c-UL (Canada)	✓	CSA C22.2 No.142
	R&TTE (Europe)	✓	EN 60950

✓: Applicable      n/a: Not applicable

**\*1 NOTICE:**

Properly shielded and grounded cables must be used for connection to host computer and / or peripherals in order to meet FCC/CE emission limits.

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# About this Manual

- The content of this manual may be subject to change for specification improvement without prior notice.
- The reproduction or duplication of the whole or part of this manual is strictly prohibited without prior consent.
- Every attempt has been made to ensure that the content of this manual is thorough and up to date, however, we kindly ask that any questionable content, mistakes, or omissions be reported to DENSO WAVE.
- The copyright for this User's Manual belongs to DENSO WAVE INCORPORATED.

## Manual Composition

This manual consists of the following 7 chapters.

### **Safety Precautions**

Explains the safety precautions for preventing accidents that could result in bodily injury and property damage.

### **Chapter 1      Outline**

Explains the hardware and system configuration.

### **Chapter 2      Basic Specifications**

Explains the basic specifications.

### **Chapter 3      Power Supply Specifications**

Explains the power supply specifications.

### **Chapter 4      Upper Communication Specifications**

Explains the interface specifications.

### **Chapter 5      Tag Communication Specifications**

Explains the RF interface specifications and communication distance.

### **Chapter 6      Installation**

Explains the environmental conditions and setups.

### **Chapter 7      Troubleshooting**

Explains possible causes and appropriate countermeasures of troubles.



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# SAFETY PRECAUTIONS

## Be sure to observe the safety precautions.

- Read through this manual carefully. It will enable you to use the product correctly.
- Always keep this manual in a handy place for easy reference.

Strict observance of these warnings and cautions is a MUST for preventing accidents that could result in bodily injury and property damage. Make sure you fully understand all definitions of these terms and symbols given below before you proceed to the text itself.



### **WARNING**

Indicates a potentially hazardous situation which could result in death or serious injury, if the instructions are not followed correctly.



### **CAUTION**

Indicates a potentially hazardous situation which may result in injury, if the instructions are not followed correctly.

## Meaning of Symbols



Indicates a warning of danger.  
The example indicates the warning for electrical shock.



Indicates what you are prohibited to do.  
The example indicates that you are not allowed to disassemble.



Indicates what you MUST do without fail.  
The example indicates that you MUST unplug the power cord.

---

## **WARNING**

### **Implantable Medical Devices**



- Avoid using the product near persons with implantable medical device, such as a cardiac pacemaker.  
A survey conducted on wireless card systems has reported the possibility of affecting or giving unfavorable impact on implantable medical devices.  
  
This is a general characteristic of those systems using radio waves, and not a unique feature of DENSO WAVE's products or this product itself.  
More information is available from the website by Ministry of Internal Affairs and Communications at: [http://www.soumu.go.jp/s-news/2003/030620\\_1.html](http://www.soumu.go.jp/s-news/2003/030620_1.html).

### **Radio Frequency Interference**



- Do not use the product in places where the use of radio frequency is restricted, such as in an airplane or hospital.  
Failure to comply could cause a malfunction in electronic or medical devices.

### **Operating Environments**



- Do not use the product in places where any inflammable gases may be emitted.  
Failure to comply could cause a fire.
- Do not use the product in places where an ambient temperature exceeds the specified operating temperature.  
Failure to comply could cause a fire.
- Do not use the product where it is subject to substantial vibration or shock.  
Failure to comply could cause a malfunction or a fire.
- Do not use the product where it is subject to oil or chemical contact.  
Failure to comply could cause a malfunction or a fire.

### **Precautions when Handling**





- Do not use a power supply and voltage other than the specified power supply and voltage.  
Failure to comply could cause a malfunction or a fire.
- Do not pull on the cable.  
A loose cable could cause a fire or electrical shock.
- Keep the product away from water or steam.  
If the connector gets wet, this could cause a fire, electrical shock, or a faulty connection.
- Do not damage, over bend, twist, pull, or heat the connection cable and device cable.  
Do not place heavy material on the cables or allow them to be damaged under heavy material.  
Failure to comply could cause the cables to break, and cause a fire or electrical shock.

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 **WARNING**

**Precautions when Handling**





	<ul style="list-style-type: none"><li>• Connect the cable to the connector firmly with a clamp. A loose cable could cause a fire or electrical shock.</li><li>• Replace the damaged cable to a new one, when a connection cable or a device cable are damaged (e.g., exposed or broken lead wires). Failure to comply could cause a fire or electrical shock.</li><li>• Wiring to the power supply and the upper device must be done correctly in accordance with this manual. Incorrect wiring could cause amalfunction, a fire, or electrical shock</li></ul>
	<ul style="list-style-type: none"><li>• If smoke, abnormal odors or noises come from the product, immediately turn the product off. Failure to comply could cause fire or electrical shock.</li><li>• If foreign material or water gets into the product, immediately disconnect the connection cable. Failure to comply could cause fire or electrical shock.</li><li>• If the product is dropped or damaged, immediately disconnect the connection cable. Failure to comply could cause fire or electrical shock.</li></ul>

 **CAUTION**

**Operating Environments**

	<ul style="list-style-type: none"> <li>• Never leave the product in places where there are excessively high temperatures, radiant heat, or in places exposed to direct sunlight. Failure to comply could affect the parts, and cause a fire.</li> <li>• Do not use the product in places where there are drastic temperature changes. Failure to comply could cause a malfunction, a fire or electrical shock.</li> </ul>
	<ul style="list-style-type: none"> <li>• Do not install the product near a motor, an inverter, or a switching power supply. Noise from these devices could interfere with the wireless communication between the product and the tag. Examine these noises carefully before the product is installed.</li> <li>• Keep the product or the connection cable away from high voltage and high current wiring. Failure to comply could cause a wireless communication error between the transceiver and tag, or between the transceiver and the upper device.</li> <li>• Keep the appropriate distance specified in this manual between the transceiver and tag to avoid any interference. Failure to comply could cause a wireless communication error between the transceiver and tag.</li> </ul>

**Precautions when Handling**

	<ul style="list-style-type: none"> <li>• Never touch the connector terminals. Failure to comply could damage the product by ESD.</li> <li>• Do not apply static electricity to the connector terminals and product itself when installing or wiring the product. Failure to comply could cause a fire or electrical shock.</li> <li>• Do not pull the connector cable. Failure to comply could disconnect the cable, damage the product inner part, burn the product, or cause a fire, or electrical shock.</li> <li>• Do not use chemicals or oil which may affect the material of the product. Failure to comply could damage the product.</li> </ul>
	<ul style="list-style-type: none"> <li>• Never disassemble or modify the product. Failure to comply could cause a fire or electrical shock.</li> </ul>
	<ul style="list-style-type: none"> <li>• When plugging/unplugging the connector, always turn the product off. Failure to comply could cause malfunction, electrical shock or breakdown.</li> <li>• Do not touch the product with bare hands when operating or right after operation. Failure to comply could cause a burn.</li> <li>• Install the product making sure it is not loose by tightening the screw within the torque specified in this manual. Failure to comply could cause a damage or malfunction.</li> </ul>
	<ul style="list-style-type: none"> <li>• If you are not using the product for a long time, be sure to unplug the connection cable for safety. Failure to comply could cause a fire.</li> <li>• When maintaining the product, unplug the connection cable for safety. Failure to comply could cause electrical shock.</li> </ul>

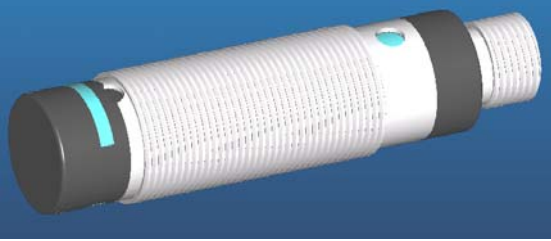
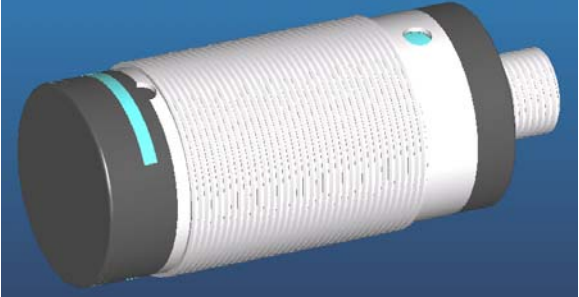
if used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

# Chapter 1 Outline

## 1.1 Hardware Configuration

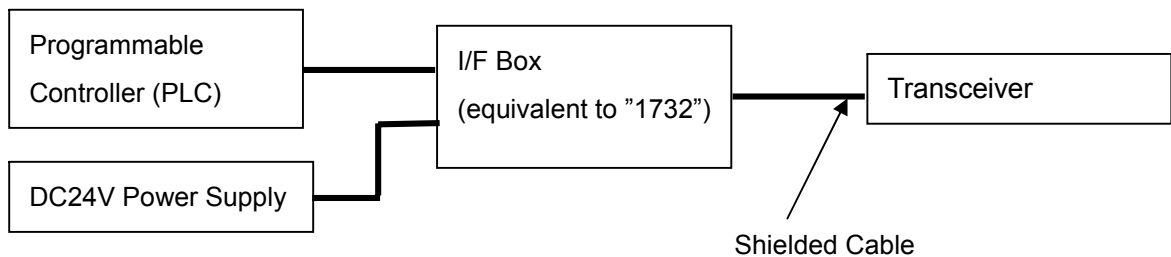
This product line (hereinafter referred to as the Transceiver) is developed for the Rockwell Automation "1732 series" products to read and write the HF (High Frequency) RFID tag.

As listed below, two versions of the transceivers are added.

type	model	appearance
M18 type transceiver	56RF-TR-M18	
M30 type transceiver	56RF-TR-M30	
Nut, Washer (Attachment)	-	T.B.D

## 1.2 System Configuration

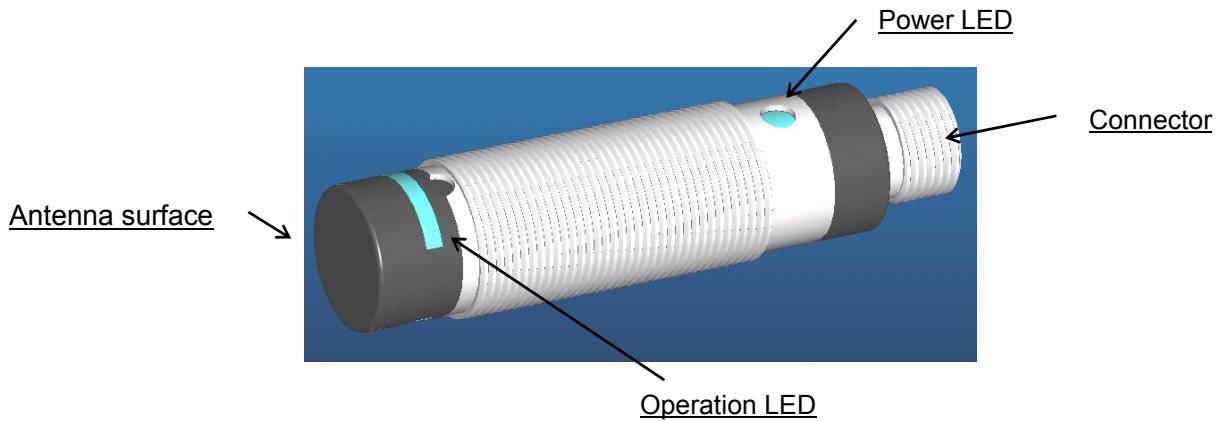
The transceiver is intended to operate in the following system configuration.



# Chapter 2 Hardware Specifications

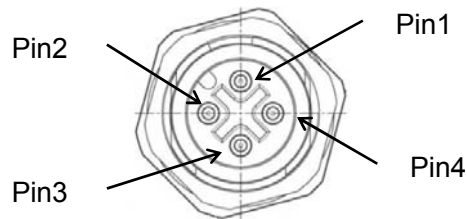
## 2.1 M18 Type Transceiver

### 2.1.1 Components and Functions



• Connector

Pin No.	Signal
Pin1	DC24V
Pin2	S +
Pin3	GND
Pin4	S -

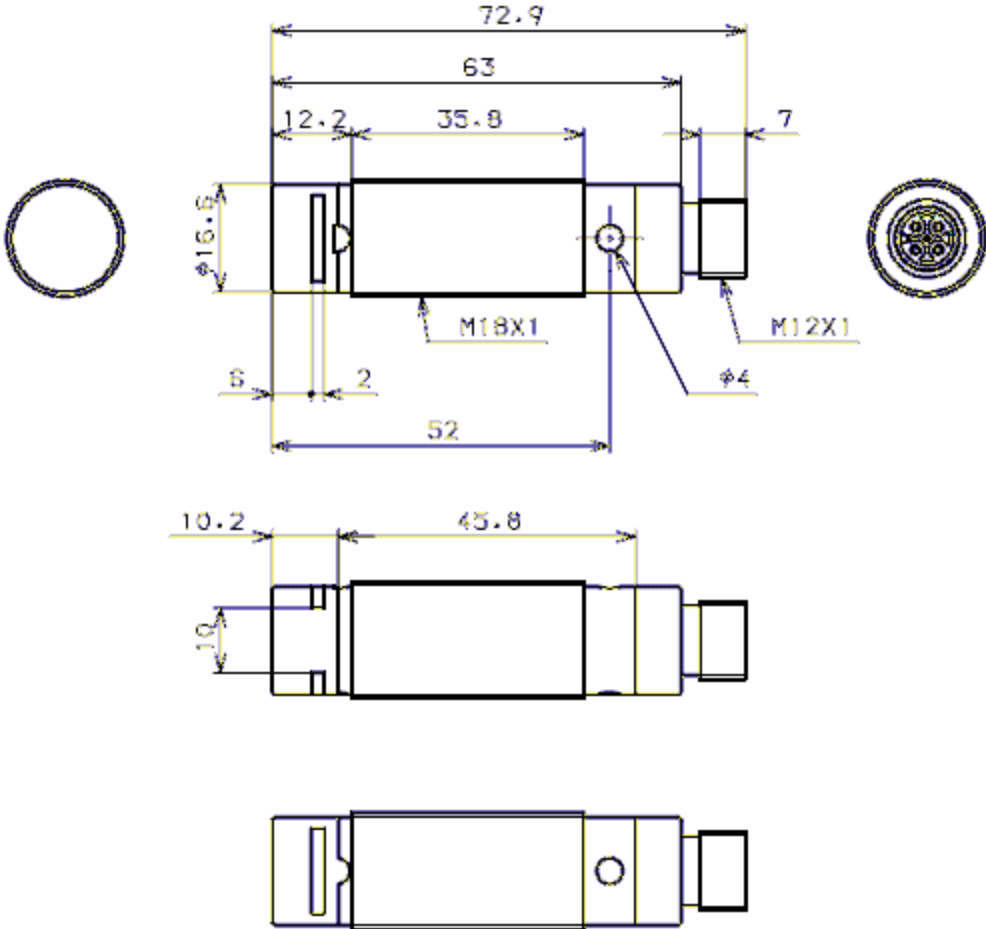


• LED light patterns

LED	Light	Explanation
Power LED	Solid Green	Power ON
	No light	Power OFF
Operation LED	Blinking Red (short intervals)	Nothing Communication
	Solid Green	Polling (No RFID tag)
	Solid Orange	Communication OK
	Solid Red	Communication Error / No RFID tag

2.1.2 External Dimensions

Unit: mm



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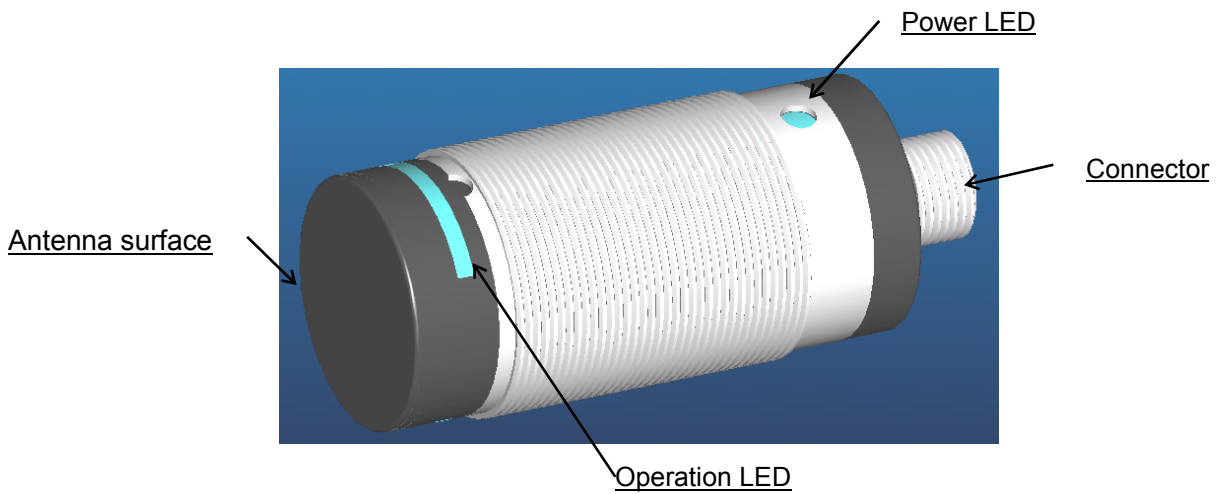
### 2.1.3 Environmental specifications

Item	Specification
Maximum surrounding air temperature rating	70°C
Minimum surrounding air temperature rating	-25°C (With no icing or condensation)
Operating Humidity	35 to 95%RH (With no icing or condensation)
Storage Temperature	-40°C to +85°C (With no icing or condensation)
Storage Humidity	25 to 85%RH (With no icing or condensation)
Insulation Resistance	20MΩ Min. (DC500V Mega) Between connector terminals and case
Vibration Resistance	10 to 500Hz, 1.5mm double amplitude, acceleration: 100m/s <sup>2</sup> , 10 sweeps in each of 3 axis directions (up/down, left/right, and forward/backward) for 11 minutes each
Shock Resistance	500 m/s <sup>2</sup> in 6 directions 3 times each (18 times in total)
Protective Structure	IP67 (Excluding connector area)
Altitude	Less than 2000m
Pollution degree	Level 2 (IEC61010-1)
Material	Plastic chassis: Grass fiber composite PBT (Black color) Metal chassis and M12 cable connector: Nickel Plated S45C
Weight	30g



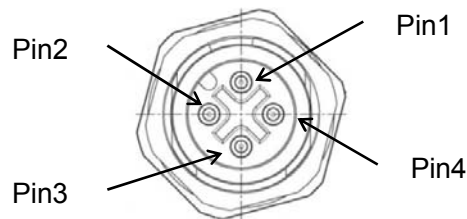
## 2.2 M30 Type Transceiver

### 2.2.1 Components and Functions



• Connector

Pin No.	Signal
Pin1	DC24V
Pin2	S +
Pin3	GND
Pin4	S -

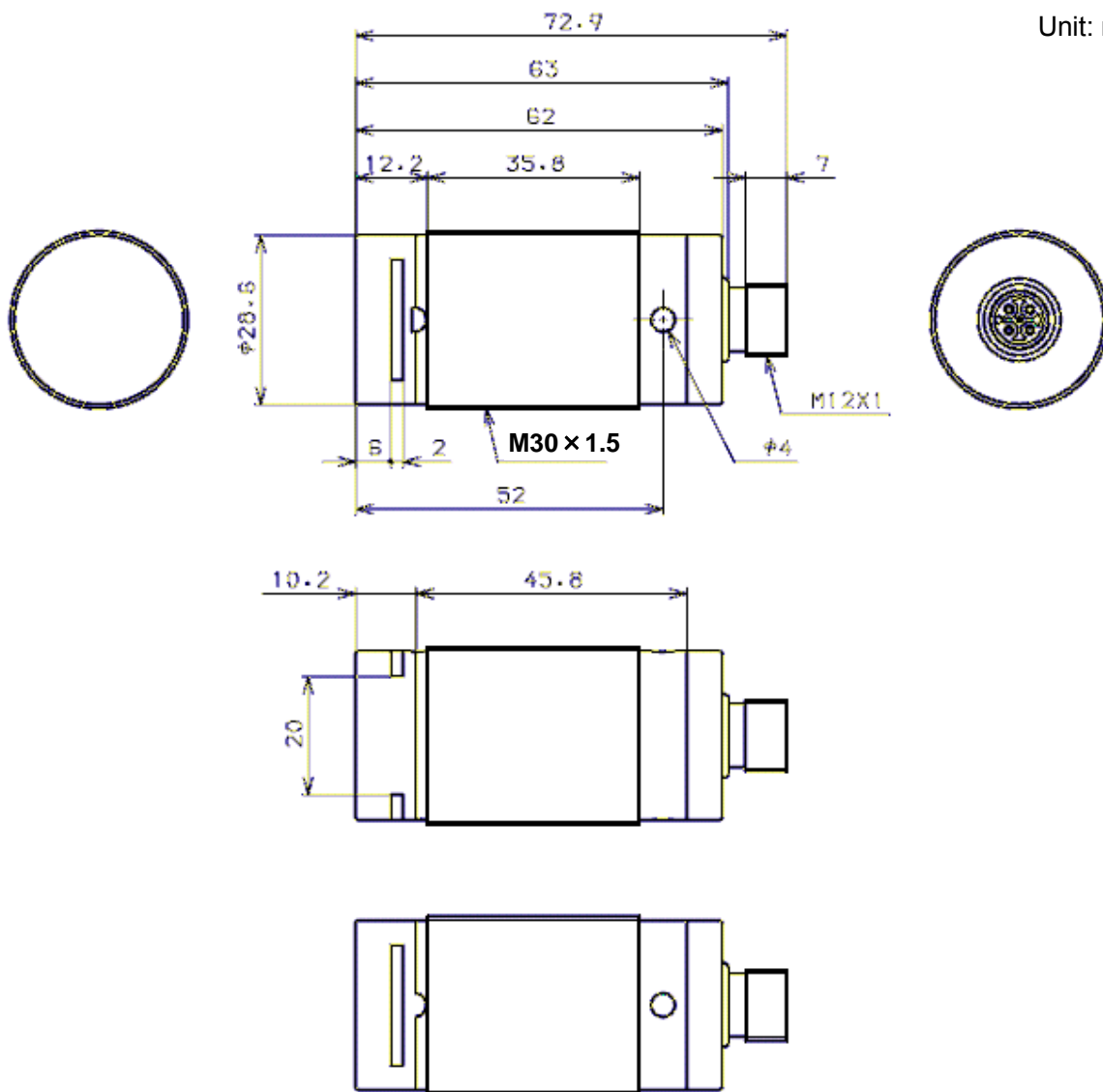


• LED light patterns

LED	Light	Explanation
Power LED	Solid Green	Power ON
	No light	Power OFF
Operation LED	Blinking Red (short intervals)	Nothing Communication
	Solid Green	Polling (No RFID tag)
	Solid Orange	Communication OK
	Solid Red	Communication Error / No RFID tag

## 2.2.2 External Dimensions

Unit: mm



---

### 2.2.3 Environmental specifications

Item	Specification
Maximum surrounding air temperature rating	70°C
Minimum surrounding air temperature rating	-25°C (With no icing or condensation)
Operating Humidity	35 to 95%RH (With no icing or condensation)
Storage Temperature	-40°C to +85°C (With no icing or condensation)
Storage Humidity	25 to 85%RH (With no icing or condensation)
Insulation Resistance	20MΩ Min. (DC500V Mega) Between connector terminals and case
Vibration Resistance	10 to 500Hz, 1.5mm double amplitude, acceleration: 100m/s <sup>2</sup> , 10 sweeps in each of 3 axis directions (up/down, left/right, and forward/backward) for 11 minutes each
Shock Resistance	500 m/s <sup>2</sup> in 6 directions 3 times each (18 times in total)
Protective Structure	IP67 (Excluding connector area)
Altitude	Less than 2000m
Pollution degree	Level 2 (IEC61010-1)
Material	Plastic chassis: Grass fiber composite PBT (Black color) Metal chassis and M12 cable connector: Nickel Plated S45C
Weight	55g

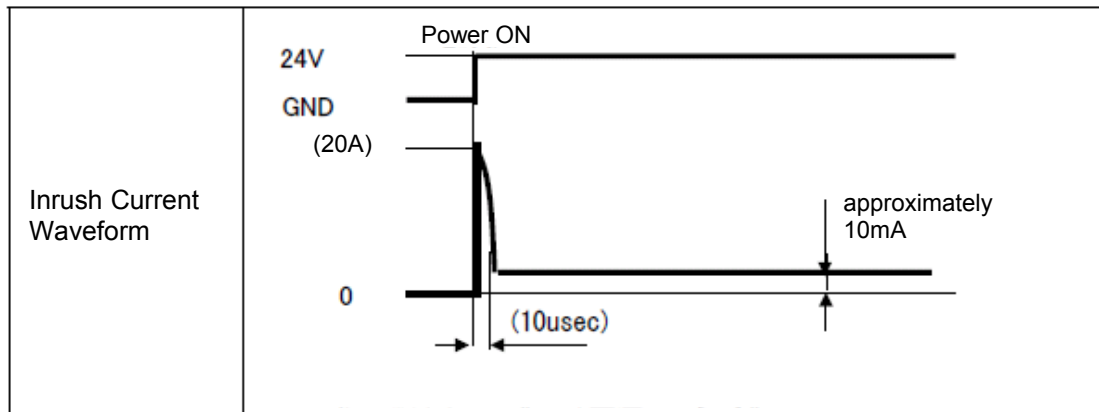
# Chapter 3 Power Supply Specifications

## 3.1 Supply Voltage and Current Consumption

Item	Specification		
Supply Voltage	DC24V (DC10 to 30V, Ripple is less than 1%)		
Current Consumption	Carrier off	10mA at DC24V (Excluding inrush)	
	Carrier on	M18 type	40mA (Max. 0.1A) at DC24V
		M30 type	40mA (Max. 0.1A) at DC24V

\* Power Supply : UL1310 Class2,  
IEC61010-1 Limited energy circuit

## 3.2 Inrush Current (reference value)



\*The waveform and values in the above figure are reference values at room temperature.

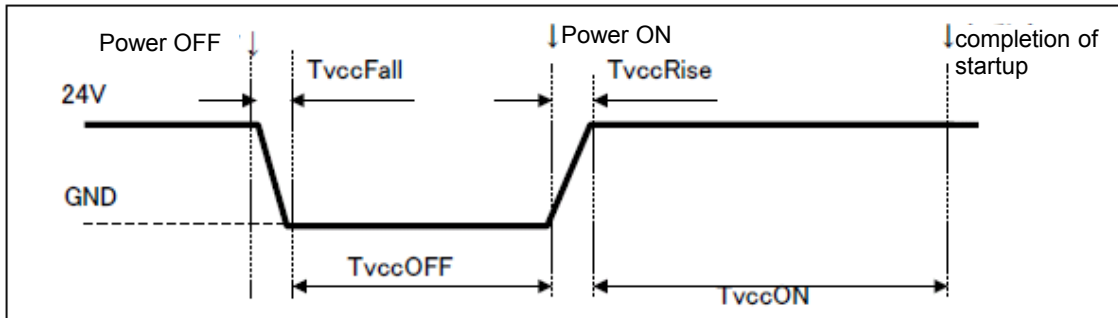
### 3.3 Power OFF Duration

OFF duration (referred to as “TvccOFF” in the figure) is required to re-power ON.

“TvccOFF” must be (1 second) or more.

ON duration (referred to as “TvccON” in the figure) is required before sending any command to the transceiver.

“TvccON” must be (0.5 second) or more.



Item	Description	Condition	Time
TvccOFF	Required OFF duration to re-power ON	TvccFall=0ms	(1 sec)
TvccON	Required ON duration to complete start up after completion of power-on (TvccRise).	TvccRise ≤ 10ms	(0.5sec)

### 3.4 Power Supply Protection Circuit

The transceiver does not have any power supply protection circuits. Add the following protection circuits to the host device as necessary.

- Over current protection circuit
- Over voltage protection circuit

Add appropriate countermeasures for noise as necessary.

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## Chapter 4 Upper Communication Specifications

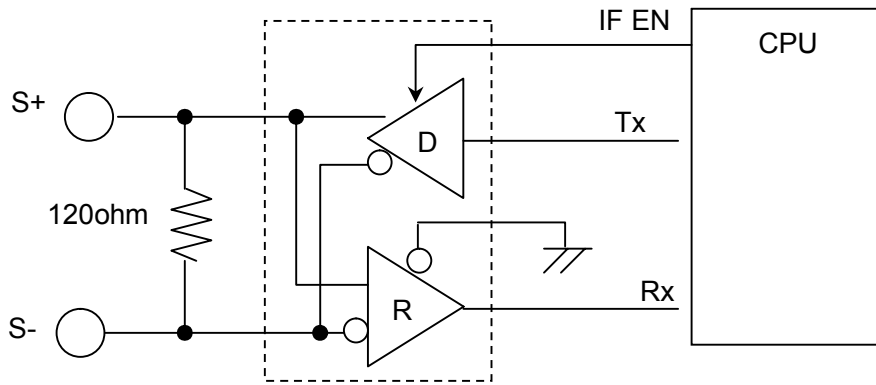
### 4.1 Specifications to communicate with the host device

Item	Specification
Connector	M12, 4-pin male connector
Communication System	Half Duplex (RS-485)
Baud Rates	9600/19200/38400/115200bps selectable (Default: 38400bps)
Data Length	8bit
Stop Bit Length	1bit
Error Detection	Parity bit even
Cable Length	Max. 100m (It varies in the cable)

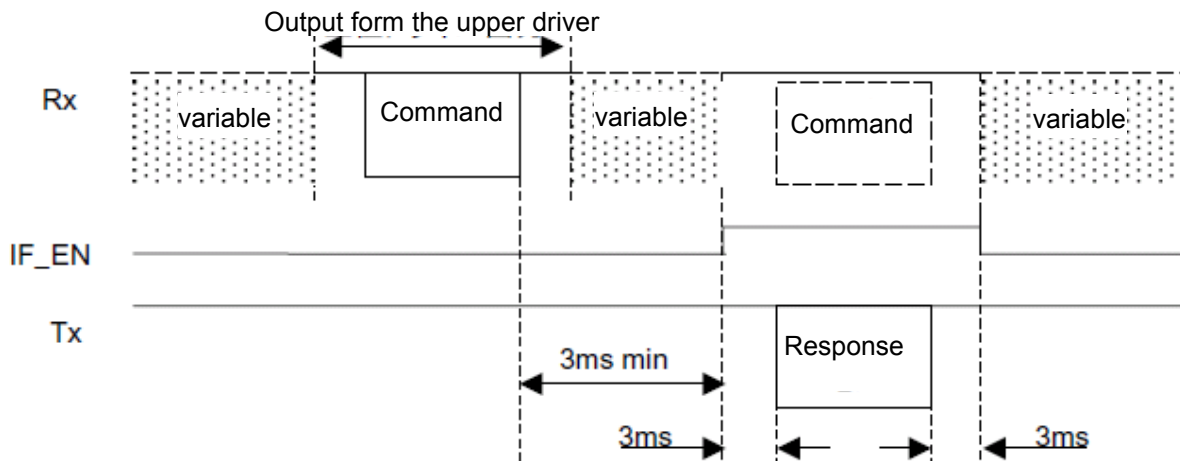
Note:

- RS485 Protocol: Switch the command-response mechanism to avoid signal conflict.
  - For more information, see the communication and interface specification.
  - For changing the transmission speed, see the programming manual.
- Important-
- (When Flash-ROM is rewritten,) Do not change the transmission speed more than 100 times.

## 4.2 I/F Circuit



## 4.3 Response Timing



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# Chapter 5 Tag Communication Specifications

## 5.1 Specifications to communicate with the RF tag

The following is the communication specifications between the transceiver and the RFID tag.

Item		Specification	
Tag Type		ISO/IEC 15693	
Communication System		Half Duplex	
Synchronization scheme		Bit Synchronization	
Transceiver ↓ Tag	Baud Rate	26.48kbit/s (Carrier:13.56MHz)	
	Modulation Scheme	ASK 10 to 30%	
Tag		Modulation code	1 out of 4
Tag ↓ Transceiver	Baud Rate	OOK 26.48kbit/s (Sub Carrier:424kHz)	
	Modulation Scheme	Load Modulation	
	Modulation code	OOK Manchester	

Note:

For details of the command and communication period, see the programming manual.

## 5.2 Communication Distance

Transceiver	communication distance (at room temperature)			
	φ50 tag (I-Code)	Φ30 tag (I-Code)	Φ20 tag (I-Code)	Φ16 tag (I-Code)
M18 type	30mm	-	-	-
M30 type	60mm	-	-	-

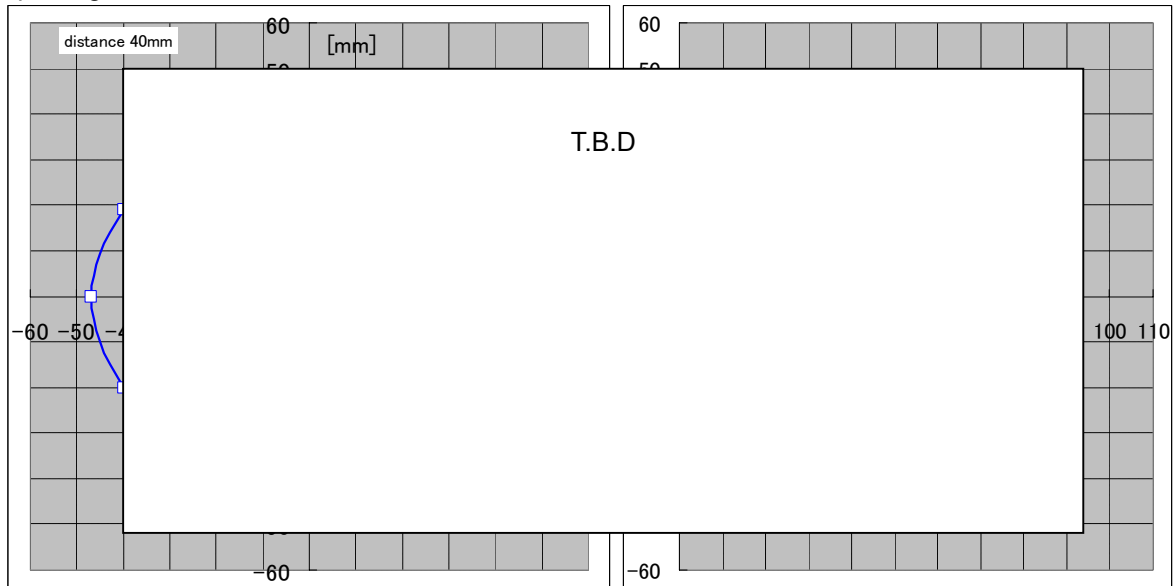
- Noise Interference, metals, and other transceivers are not allowed around the transceiver.
- Communication distance may be shorter than the above value due to the tag deviation.
- Must not be any slant between the transceiver and the antenna center of the tag.



## 5.3 Communication Area (reference)

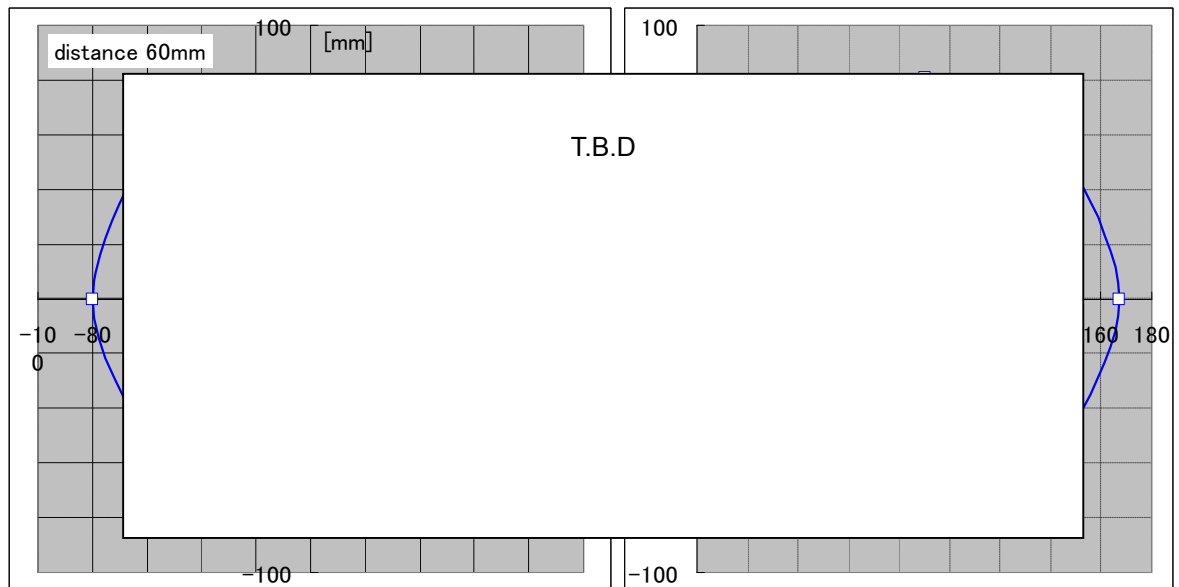
M18 Type

\*  $\phi 50$  tag



M30 Type

\*  $\phi 50$  tag



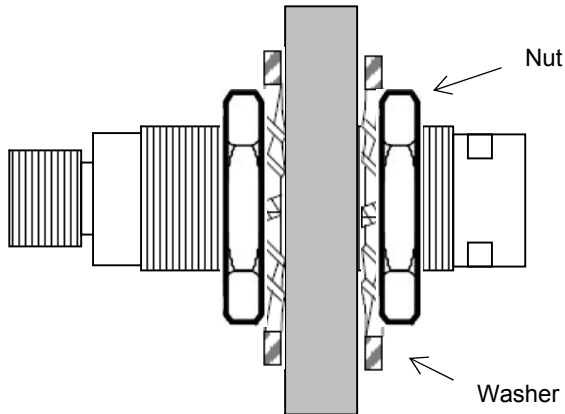
\* It isn't mentioned in the Side-Band-Area.

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# Chapter 6 Installation

## 6.1 Tightening Torque

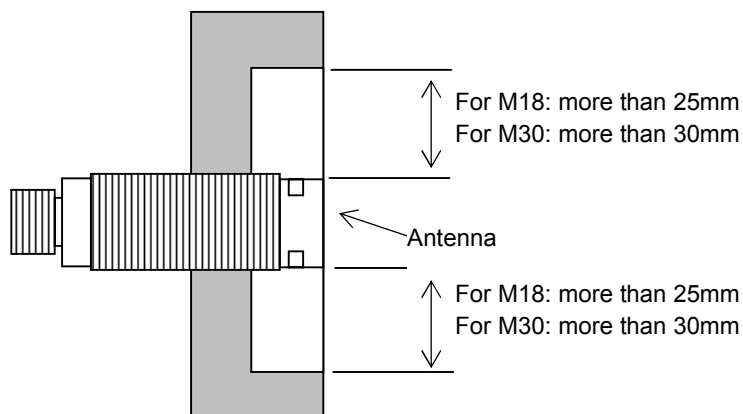
The tightening torque must be  $19.8\text{N}\cdot\text{m}$  for M18 nut, and  $33.9\text{N}\cdot\text{m}$  for M30 nut.



## 6.2 Surrounding Metal

M18 Type: Communication distance will drop significantly when the distance between the transceiver and any surrounding metal is less than 25mm.

M30 Type: Communication distance will drop significantly when the distance between the transceiver and any surrounding metal is less than 30mm.



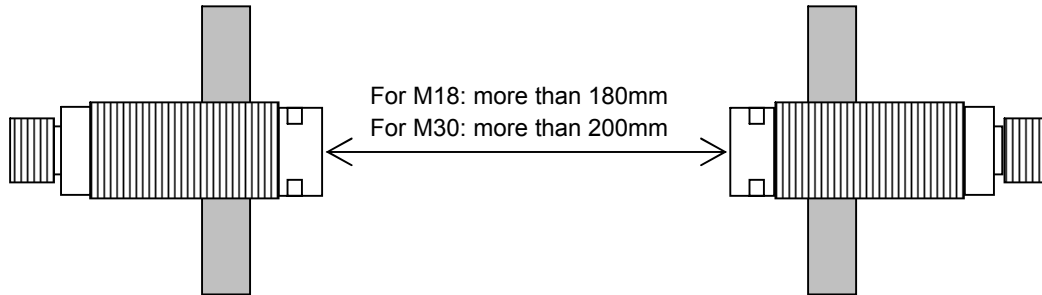
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### 6.3 Interference between the transceivers

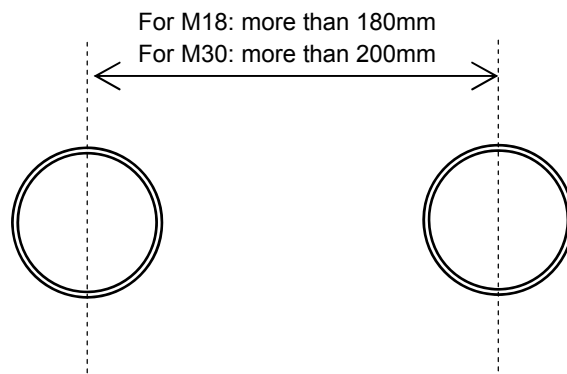
Installing more than one transceiver causes radio frequency interference and may result in the difficulty of the tag communication.

Keep a sufficient distance between the transceivers as shown in the figure below.

- face to face

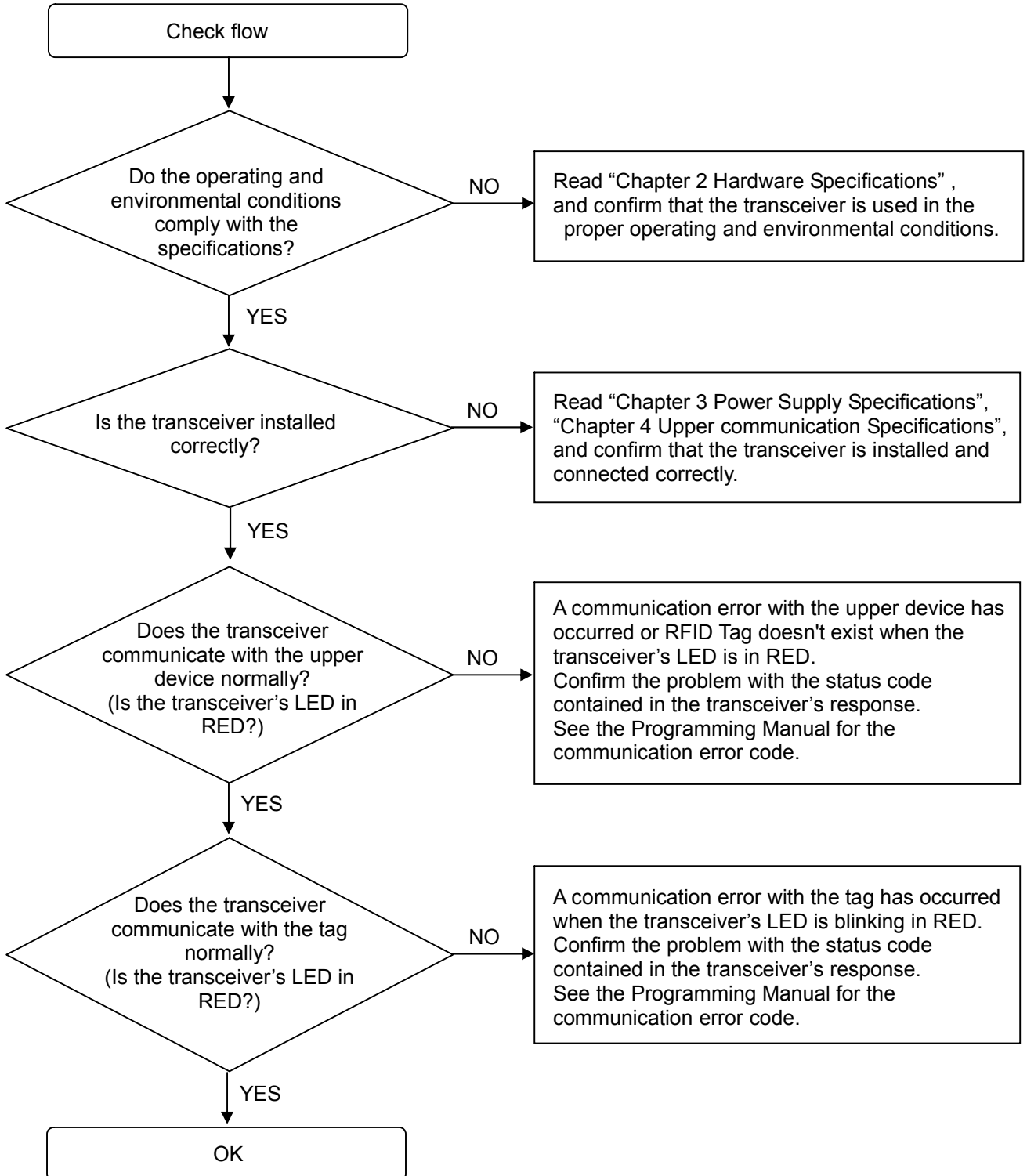


- side by side



# Chapter 7 Troubleshooting

Examine the cause of the problem by using the flowchart below and take appropriate countermeasures when any problems occur.



M18 type transceiver (56RF-TR-M18)  
M30 type transceiver (56RF-TR-M30)  
for 1732 series

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User's Manual

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