

# JRC FWA SYSTEM INSTRUCTION MANUAL

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*Japan Radio Co., Ltd.*



# Introduction

- Read this instruction manual carefully before use. Be sure you fully understand the instructions in this manual before using the equipment.
- After reading, save this instruction manual and refer to it as necessary. If you have any questions about or there is something wrong with the equipment, refer to this manual.






## Before use

### Warning Indications

This manual and the product use some icons to help you use the product properly and prevent any damage to you and other people or property. The following icons classify the potential damage if the indications are ignored or the product is used improperly. When reading the manual, keep these in mind.

	<b>Warning</b>	Wrong handling of this product may cause serious personal injury or death.
	<b>Caution</b>	Wrong handling of this product may cause personal injury or damage to properties.

### Examples of icons

	A triangle is an alert to call your attention including a warning or danger indication. The graphics within the triangle differs depending on the caution. (The figure on the left shows a caution for electrical shocks.)	
		⊘ icons indicate prohibition. A detailed prohibition description is given in the vicinity of the icon. (The figure on the left prohibits disassembly.)
Do not disassemble	General prohibitions	
		● icons require you to perform the item. A detailed instruction is given in the vicinity of the icon. (The figure on the left instruct to unplug the equipment.)
Unplug	General advice	

### Warning labels

Do not remove, damage or alter the warning labels.

## Precautions in Use



### Warning



Don't place containers having water, chemicals or cosmetics, such as vessels, flower pots and glasses, or small pieces of metals near or on top of this product. Liquids spilled over or into or small metal pieces getting into the product may cause fire, electrical shocks or failures.



Turn off the power and stop using the unit immediately if something abnormal such as fumes or smoke is detected, and contact our sales department, branch or sales office. Continuing to use the product as is may cause fire or electrical shock.

# Cautions



This manual describes important points to operate and maintain the equipment. Read the related sections when operating, maintaining and testing the unit. Do not try to carry out a test or maintenance not covered in this manual.



This equipment is a precision machine. A failure may occur if you do not observe the following:

- Do not jar or subject this equipment and the units to shocks.
- During operation, do not unplug the cable connected between the WT and WT adapter. Before unplugging this cable, first unplug the DC jack from the WT adapter and turn the power off.

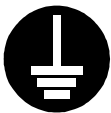
- Do not splash water on the WT adapter.
- Do not use this equipment in a place with excessive dirt or dust. Before touching a power-receiving terminal, turn the input power off to avoid electrical shocks.



Do not touch the rack of the WT during operation because it becomes hot.



When installing the Access Point (AP), connect the ground wire to the ground terminal. If the equipment is not grounded properly, you may get electrical shocks when the equipment becomes faulty or shorted.



When using a measuring instrument, connect the ground terminal of the measuring instrument to the ground terminal of this equipment. If the equipment is not grounded properly, you may get electrical shocks.



To avoid shock hazards, do not open and touch the inside or adjustment points except for maintenance or inspection. If you modify the equipment illegally, you may be punished according to the Radio Law.

# Cautions

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Don't use organic solvent for cleaning such as thinner and benzene because this may damage the coating. Just wipe the surface with a clean dry cloth.



Before plugging in or unplugging the coaxial cable between the AP-RFU and AP-IFU, turn the power off.



The DC -48V power supply voltage for AP-IFU shall be SELV or TNV-1 depending on the network environment (0 or 1) acc. to IEC62102.



The Equipment for connection to AP-IFU Ethernet-interface(RJ-45) shall be appropriate to connect to TNV-1 circuits.



The Equipment for connection to WT adapter PC-interface (RJ-45) shall be appropriate to connect to TNV-1 circuits.



For the connection WT adapter to WT and a cable suitable for outdoor use shall be installed.



For the connection Terminal Equipment to AP-IFU and a cables suitable for outdoor use shall be installed.





For the connection AP-IFU to AP-RFU and a coaxial cable suitable for outdoor use shall be installed.






## Avant usage

### Indications Préventives

Le manuel d'utilisation et le produit utilisent des icônes pour vous aider à utiliser correctement le produit et prévenir tout dommages sur vous, sur des tiers ou sur des biens. Les icônes qui suivent, indiquent le niveau des dommages éventuels si les précautions indiquées sont ignorées ou si le produit est mal utilisé. Quand vous lirez le manuel d'utilisation, faites attention à ces indications.

	<b>Danger</b>	Une mauvaise utilisation de ce produit peut causer de sérieux dommages corporels ou la mort.
	<b>Prudence</b>	Une mauvaise utilisation de ce produit peut causer des dommages corporels ou endommager des biens.

### Exemples d'icônes

	Danger électrique	Un triangle est une alerte pour attirer votre attention en cas de danger ou de conseil de prudence. Le signe à l'intérieur du triangle diffère selon le risque. (L'exemple de gauche signale un risque électrique.)
	Ne pas démonter	
	Interdiction générale	⊘ Les deux icônes de gauche indiquent une interdiction. Une description plus détaillée est donnée près de l'icône (la plus à gauche interdit le démontage.)
	Débranchez	● Ce type d'icône exige que vous exécutiez l'action. Une description plus détaillée est donnée près de l'icône (la plus à gauche exige de débrancher le matériel avant toute opération.)
	Conseil général	

### Attention

N'enlevez jamais, n'endommagez jamais et ne changez jamais les signalisations de danger.

(French)

## Précautions d'utilisations



### Attention



Ne placez pas de récipients contenant de l'eau, des produits chimiques ou des produits de beauté, tels que vaisselle, pots de fleur et verres, ou de petits morceaux de métal à côté ou sur ce produit. Les éclaboussures de liquides sur ou à l'intérieur du produit, ainsi que les petits morceaux de métal pénétrant le produit, peuvent provoquer le feu, des chocs électriques ou des pannes.



Coupez l'alimentation électrique et cessez immédiatement toute utilisation du produit si quelque chose d'anormal tel que vapeurs ou fumées sont détectées, et contactez notre service commercial. Continuer à utiliser le produit dans ces conditions, peut provoquer feu ou choc électrique.



# Attention



Ce manuel décrit les points importants pour l'utilisation et la maintenance du Matériel. Lisez les chapitres correspondants pour l'utilisation, la maintenance et le test du Matériel. N'essayez pas d'effectuer un test ou une maintenance qui ne soit pas décrit dans ce manuel.



Cet équipement est une machine de précision. Une panne peut se produire si vous ne vous conformez pas à ce qui suit :

- Ne cognez pas et ne soumettez pas ce matériel et ses éléments à des chocs.
- En cours d'utilisation, ne débranchez pas le câble reliant l'interface utilisateur du terminal sans fil et l'adaptateur WT. Avant de déconnecter ce câble, débranchez d'abord la prise jack DC de l'adaptateur WT et mettez hors-tension.
- N'éclaboussez pas l'adaptateur WT.
- N'utilisez pas ce matériel dans un endroit excessivement sale ou poussiéreux.

Avant de toucher à un terminal recevant l'alimentation, mettez hors-tension pour éviter des chocs électriques.



Ne touchez pas le rack du WT en cours d'utilisation parce qu'il devient chaud.



Lors de l'installation du Point d'accès, reliez le fil de terre à la masse du terminal. Si le matériel n'est mis correctement à la masse, vous pourriez provoquer des chocs électriques et le matériel deviendrait défectueux ou en court-circuit.



Lors de l'utilisation d'un instrument de mesure, reliez la masse de l'instrument de mesure à la prise de terre du matériel. Si les matériels ne sont pas correctement mis à la masse, vous pouvez provoquer des chocs électriques.



Pour éviter les risques de détérioration, n'ouvrez pas et ne touchez pas l'intérieur ou les points de réglage, excepté lors d'une maintenance ou d'une inspection. Si vous apportez des modifications au matériel illégalement, vous pouvez être poursuivi conformément aux lois en vigueur.

## Attention

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N'utilisez pas de solvant organique pour le nettoyage, tel que dissolvant et benzène parce que cela peut endommager le revêtement. Essuyez juste la surface avec un chiffon sec et propre.



Avant de brancher ou de débrancher le câble coaxial entre AP-RFU et AP-IFU, mettez hors-tension.



L'alimentation DC -48V pour AP-IFU peut être SELV ou TNV-1 en fonction du réseau (0 ou 1) conformément à la norme IEC62102.



Le matériel de connexion à AP-IFU par une interface Ethernet (RJ 45) devra être relié aux circuits TNV-1.



Le Matériel de connexion à l'adaptateur WT par l'interface PC (RJ 45) devra être relié aux circuits TNV-1.



Pour la connexion de l'adaptateur WT à WT, un câble adapté à l'utilisation en plein air sera utilisé.



Pour la connexion du Terminal à AP-IFU, un câble adapté à l'utilisation en plein air sera utilisé.





Pour la connexion de AP-IFU à AP-RFU un câble coaxial adapté à l'utilisation en plein air sera utilisé.

## Prima dell'utilizzo

### Seguire attentamente le avvertenze

Questo manuale ed il prodotto usano delle icone per aiutarLa a utilizzare propriamente il prodotto e prevengono eventuali danni a Lei o ad altre persone o beni materiale derivanti dal cattivo utilizzo di questo prodotto. Le icone seguenti classificano il pericolo ed il danno potenziale nel caso in cui le indicazioni fossero ignorate o nel caso in cui il prodotto fosse usato impropriamente. Seguire attentamente le avvertenze.

	<b>Pericolo</b>	Una cattiva utilizzazione di questo prodotto puo' provocare seri danni a persone mettendo i suddetti in pericolo di vita
	<b>Avvertenza</b>	Una cattiva utilizzazione di questo prodotto puo' provocare seri danni a persone o cose

### Esempi di icone

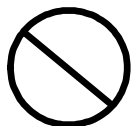


Tensioni pericolose

Un triangolo è un allarme per chiamare la Sua attenzione. Esso include un avvertimento o indicazione di pericolo. Le grafiche all'interno del triangolo differiscono dal grado di cautela. (La figura a sinistra mostra pericolo per shock elettrici.)

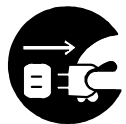


Non smonti



Proibizioni Generali

⊘ icone indicano proibizione. Una descrizione di proibizione particolareggiata è data accanto all'icona. (La figura sulla sinistra proibisce lo smontaggio del prodotto.)



Unplug



Consiglio Generale

! icone La invitano a compiere il gesto indicato. Una descrizione piu' dettagliata è data accanto all'icona. (La figura sulla sinistra richiede di scollegare il prodotto.)

### Segnali di avvertimento

Si prega di non rimuovere, alterare o danneggiare tali etichette

## Precauzioni d'uso



### Pericoli



Non metta contenitori d'acqua, prodotti chimici o cosmetici, come vasi, pentole ed occhiali o piccoli pezzi di metalli vicino o in cima a questo prodotto. Liquidi versati sopra o all'interno del prodotto, piccoli elementi metallici inseriti all'interno del prodotto possono provocare shock elettrici o malfunzionamenti.



Spenga immediatamente il prodotto se qualche anomalia come fumo o vapori sono emanati dal prodotto. e contatti immediatamente il nostro ufficio di vendite. Continuare ad usare il prodotto in tali condizioni può causare inizi di incendio o shock elettrici.

(Italian)



## Avvertenze



Questo manuale descrive importanti precauzioni punti per l'utilizzo e la manutenzione del prodotto. Legga le sezioni relative durante l'uso, in veglia o durante la prova dell'unità. Non tenti di eseguire prove o operazioni non descritte in questo manuale.



questa attrezzatura è una macchina di precisione. Possono verificarsi malfunzionamenti se non osserva le seguenti precauzioni:

- Non sottoponga questa attrezzatura a colpi o cadute
- Durante l'uso, non faccia scollegare il cavo connesso tra l'unità senza fili e l'adattatore di WT.

Prima di scollegare il dispositivo, rimuova il connettore dall'adattatore di WT e in seguito spenga il dispositivo.

- Non metta a contatto l'adattatore WT con acqua.
- Non usi questa attrezzatura in un luoghi polverosi o poco puliti. Prima di toccare un –terminale di potenza ricevente, spenga il dispositivo per evitare evitare shock elettrici.



Non tocchi l'intelaiatura del dispositivo WT poiché esso può produrre calore.



Quando installa il punto di accesso, connetta il filo di massa al terminale di terra. Se l'attrezzatura non è collegata a terra propriamente, Lei può ricevere shock elettrici quando l'attrezzatura diviene difettosa o in corto circuito.



Quando usa un strumento di misura, connetta il terminale di massa dello strumento di misura al terminale di massa di questa attrezzatura. Se l'attrezzatura non è collegata a terra propriamente, Lei può ricevere shock elettrici.



Per evitare pericoli di shock, non apra e non tocchi l'interno del dispositivo o i punti di rettifica eccetto durante manutenzione o ispezione. Se Lei modifica illegalmente l'attrezzatura, Lei può essere punito secondo la Legge Radio

(Italian)



## Cautele



Non usi solventi organici come diluente e benzene per pulire il dispositivo perché questo può danneggiarne il rivestimento. Asciugi la superficie con una stoffa asciutta e pulita.



Prima di collegare o scollegare il cavo coassiale tra l'AP-RFU ed AP-IFU, spenga il dispositivo.



La DC -48V tensione di alimentazione elettrica per AP-IFU sarà SELV o TNV-1 a seconda della rete elettrica utilizzata (0 o 1) con riferimento a IEC62102.



L'Attrezzatura per il collegamento ad AP-IFU Ethernet-interface(RJ-45) sarà adatto per connettere ai circuiti di TNV-1.



L'Attrezzatura per il collegamento all'adattatore di WT PC-interface(RJ-45) deve essere compatibile con una connessione ai circuiti di TNV-1



Per il collegamento tra adattatore WTe WT dovrà essere utilizzato un cavo appropriato per uso esterno.



Per il collegamento dell'attrezzatura completa al AP-IFU dovrà essere utilizzato un cavo adatto ad uso esterno





Per il collegamento tra AP-IFU e AP-RFU dovrà essere utilizzato un cavo coassiale appropriato per uso esterno.

(Italian)



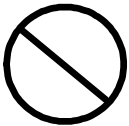


## Bitte beachten vor der Inbetriebnahme

### Warnhinweise und Kennzeichnungen

In diesem Handbuch und bei der Verwendung des Produktes werden Kennzeichen benutzt, die Ihnen helfen sollen das Produkt richtig einzusetzen und gleichzeitig verhindern sollen, dass Personenschäden entstehen. Bitte lesen Sie die folgenden Hinweise sorgfältig und beachten die Angaben beim Lesen des Handbuchs.

	<b>Warnung</b>	Falsche Handhabung dieses Produktes kann zu ernsthaften Personenschäden und sogar zum Tod führen.
	<b>Caution</b>	Falsche Handhabung dieses Produktes kann zu ernsthaften Personenschäden oder Schäden an anderen Gegenständen führen.

### Beispiele für Kennzeichen und ihre Bedeutung

	Gefährliche Hochspannung	Ein Dreieck dient als Alarmzeichen und Warnung, um ihre Aufmerksamkeit auf Gefahren zu lenken. Das Symbol im Dreieck unterscheidet die Art der Gefahren (Die Figur auf der Linke zeigt eine Warnung vor elektrischer Hochspannung)
	Nehmen Sie nicht auseinander	⊘ Kreisförmige Kennzeichen weisen auf ein Verbot hin. Eine Verbotsbeschreibung wird in der Unterschrift des Kennzeichens gegeben. (Die Figur links zum Beispiel verbietet eine Demontage)
	Allgemein Verbote	
	Stecken Sie	Gefüllte kreisförmige Kennzeichen weisen Sie auf eine beabsichtigtes Handlung hin. Sie werden aufgefordert die Handlung durchzuführen. Eine ausführliche Anweisungsbeschreibung wird in der Nähe des Kennzeichens gegeben. (In der Figur links werden Sie aufgefordert den Stecker aus der Steckdose zu entfernen)
	Allgemeiner Rat	

### Warnkennzeichnungen

Bitte entfernen, verändern oder beschädigen Sie die Kennzeichnung nicht.

(German)

## Vorkehrungen beim Gebrauch



### Warnung



Bitte stellen Sie keine Wasserbehälter, Chemikalien oder Kosmetika, wie zum Beispiel Gefäße, Blumenvasen, Gläser oder kleine Metallstücke auf oder in die Nähe des Produktes. Flüssigkeiten oder kleine Metallteile, die in das Gerät gelangen, könnten Brände, Kurzschlüsse oder Fehlfunktionen hervorrufen.



Schalten Sie das Gerät unbedingt aus, wenn Sie ungewöhnliche Rauch- oder Dampfentwicklung beobachten, und kontaktieren Sie unseren zentralen Vertrieb, eine Filiale oder ein Vertriebsbüro in Ihrer Nähe. In diesem Fall darf das Gerät nicht weiterverwendet werden. Eine weitere Benutzung kann zu Bränden und elektrischen Kurzschlüssen führen.

(German)





## Vorsicht



Dieses Handbuch enthält wichtige Informationen zur Bedienung und Wartung des Gerätes. Lesen Sie bitte die entsprechenden Abschnitte bevor Sie das Gerät in Betrieb bedienen, warten oder in anderer Weise testen. Bitte führen Sie keine Tests durch, die im Manual nicht beschrieben sind.



Dieses Gerät ist ein hochgenaues Instrument.

- Fehler können auftreten sollte das Gerät: Stößen oder starken Erschütterungen ausgesetzt wird.
- Während des Betriebes muss die Kabelverbindung zwischen dem Bedienelement des Funkterminal und dem WT-Adapter nicht gelöst werden.
- Um das Kabel zu entfernen, lösen Sie zuerst die DC-Versorgung Stecker des WT-Adapters und schalten das Gerät ab.
- Der WT-Adapter darf mit Wasser nicht in Berührung kommen.
- Vermeiden Sie den Betrieb des Gerätes in Umgebungen mit hoher Staub- und Schmutzbelastung.



Berühren Sie den Rahmen des WT's während des Betriebes auf keinen Fall, da dieser Teil sehr heiss wird.



Wenn Sie den Access Point installieren, verbinden Sie zuerst den Erdungsdraht mit dem Erdungsanschluss des Gerätes. Ungenügende Erdung des Gerätes, kann im Falle von Fehlfunktionen oder Kurzschlüssen zu Stromschlägen führen.



Wenn Sie ein weiteres Meßgerät einsetzen, verbinden Sie bitte den Erdungsanschluss des Messgerätes sorgfältig mit dem Erdungsanschluss des Gerätes. Ungenügende Erdung des Gerätes, kann zu Stromschlägen führen.



Bitte öffnen oder berühren Sie das Innenleben sowie die Einstellungsmittel des Gerätes nicht, ausser im Falle von Wartungsarbeiten oder Inspektionen. Wenn Sie unerlaubt Änderungen am Gerät vornehmen, zieht dies Massnahmen in Anwendung des „RADIO Gesetzes“ nach sich.

(German)



## Cautions

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Benutzen Sie kein organische Lösungsmittel, wie Verdüner und Benzole zur Reinigung, weil dies der Oberfläche des Gerätes beschädigen könnte. Reinigen Sie die Oberfläche nur mit einem sauberen trockenen Stofftuch.



Bitte schalten Sie das Gerät aus, bevor Sie das Koaxialkabel zwischen AP-RFU und AP-IFU anschliessen oder entfernen.



Nach IEC62102 sollte die 48V DC–Spannungsversorgung für den AP-IFU SELV oder TNV-1 in Abhängigkeit von der Netzwerkkumgebung ( 0 oder 1) sein.



Die Ausrüstung für Verbindung zu AP-IFU Ethernet-interface(RJ-45), wird geeignet sein, sich in Verbindung mit TNV-1-Schaltungen zu setzen.



Die die Verbindung des WT-Adapters zum WT sollte ein Kabel verwendet werden, dass für den Aussenbereich geeignet ist.



Für die Verbindung vom WT-Adapter zum WT sollte ein Kabel für Aussenanwendungen gewählt werden.



Für die Verbindung vom Terminal des Gerätes zum AP-IFU sollte ein Kabel für Aussenanwendungen gewählt werden.



Für die Verbindung AP-IFU zu AP-RFU sollte ein Koaxialkabel für den Aussenbereich installiert werden.

(German)

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# 1. OVERVIEW

JRC FWA SYSTEM is a broadband wireless point-to-multipoint communication system operating at 24-26 GHz that provides high-speed IP access. The 80Mbps/40Mbps wireless transmission rate is available on one frequency channel having the RF bandwidth of 26MHz. The wireless transmission rate depends upon the selected modulation system (16QAM/QPSK), which is controlled for each subscriber terminal to be adapted with the radio propagation path environment such as the distance from the access point and rainfall conditions. The maximum throughput (average data transmission rate of an Ethernet frame) received and transmitted by an access point is 46Mbps.

The data transmissions in radio channel are encrypted by different keys for each subscriber terminal to ensure sufficient security. The system can deal with the subscribers fairly in assigning the bandwidth, regardless of the distances of subscriber terminals from the base station.

## 1.1. FCC Notice

**FCCID: CKENTG335-EL0, CKENTG335-EL2, CKENTG337-EL0, CKENTG337-EL2  
CKENTG337-XL0, CKENT337-XL2**

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.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.



Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

Caution . Changes or modifications to this equipment could void the user's authority to operate the equipment.

## **1.2. CERTIFICATION NOTE FROM INDUSTRY CANADA**

**ICID: 768B-NTG335L0, 768B-NTG337L0, 768B-NTG335L2, 768B-NTG337L2**

While this equipment meets the technical requirements for its operation in its rated paired block arrangement, this block arrangement is different than the 40 + 40 MHz block arrangement prescribed in documents RSS-191 and SRSP-324.25. The operation of this equipment IS NOT permitted if the out-of-band and spurious emission limits are not met at the edge of any contiguous licensed spectrum. It should be noted that all current relevant spectrum policies, licensing procedures and technical requirements are still applicable. For additional information, please contact the local Industry Canada office.

### **Access Point**

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

### **Wireless Terminal**

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

## **1.3. System Configuration**

One Access Point (AP) has the capacity of linking with up to 239 subscriber terminals to configure a point-to-multipoint (P-MP) communications system. An omni-directional antenna (with horizontal directivity of 360°) mainly for a residential area of detached houses and a Sectoral-Horn-type antenna (90° × 10° directivity) mainly for multi-tenant building are available.

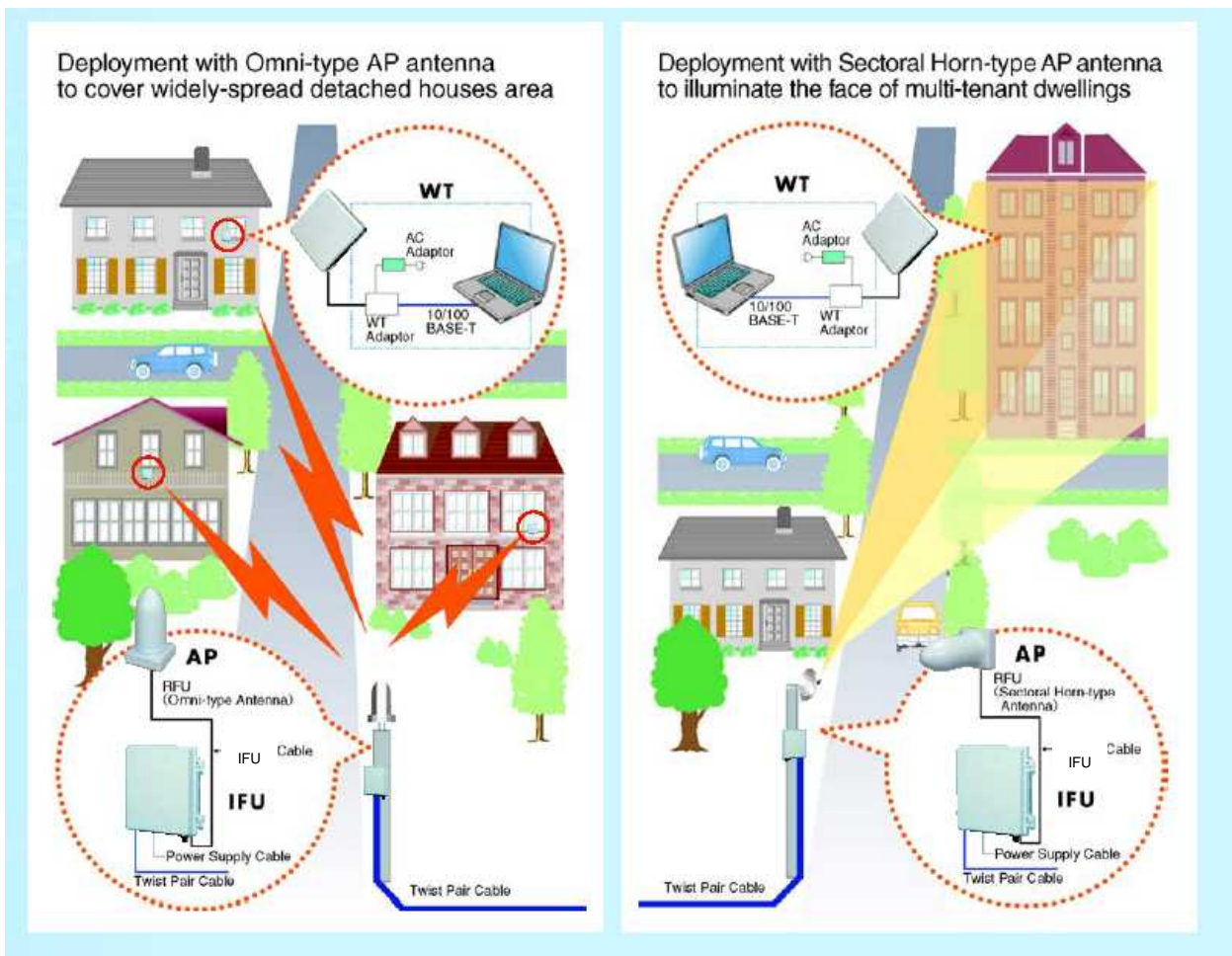
Wireless Terminal (WT), including the antenna and all the electric circuits, is designed compactly (19cm x 19cm x 7cm) and can easily be installed at any outside places of residential houses. WT is connected to a PC through one LAN cable and supplied with power through a tiny power supply adapter.

Second layer isolation of subscriber traffic is provided by 802.1Q VLAN-tag. Broadband Access Server (BAS) terminates access layer functions and relay user traffic to IP backbone network.

The Operation System (OpS) allowing the installation and registration of subscriber terminals and the supervision of its operational status is optionally available.

### 1.4. Deployment Schemes

Figure 1-1 is deployment schemes of JRC FWA systems.



AP: Access Point  
WT: Wireless Terminal  
RFU: Radio Frequency Unit  
IFU: Interface Unit

Figure 1-1 Deployment Schemes of JRC FWA Systems

## 1.5. Components

Table 1-1 Components

No.	Name	Model	Description
1	AP-RFU(Sectoral-Horn)	NTG-335<1><2><4>	The AP-RFU (Sectoral-Horn) is a radio unit that accommodates both the antenna and transceiver in the same housing. Connecting an AP-IFU to the AP-RFU constitutes an AP and allows connecting multiple WTs over radio links.
2	AP-RFU(Omni)	NTG-339<1><2><4>	The AP-RFU (Omni) is a radio unit that accommodates both the antenna and transceiver in the same housing. Connecting an AP-IFU to the AP-RFU constitutes an AP and allows connecting multiple WTs over radio links.
3	AP-IFU	NTJ-111<4>	The AP-IFU converts Ethernet frames into radio signals and vice versa. Connecting an AP-RFU to the AP-IFU constitutes an AP. It supports the 100BASE-TX electrical network interface to allow connecting a unit such as a router. Assigning an IP address for maintenance and monitoring allows transmission and reception of maintenance signals via SNMP through a network interface.
3.1	DC-48V connector (AP)	NRW-203-PF8-ULCSATUV	The DC -48V connector (AP) is for an external power cable. The connector is connected to the terminal for the AP-IFU power supply connector.
4	WT	NTG-337<1><3><4>	The WT is a radio unit that accommodates all the antenna, radio transceiver, signal processor and interface section in the same housing. It supports 10BASE-T and 100BASE-TX user interfaces to connect a personal computer and hub.
4.1	WT adapter	NQD-2049<4>	The WT adapter sends both Ethernet signals

			from the PC and 24 VDC from the AC adapter to the WT through an Ethernet cable. It also sends signals from the WT to the PC.
4.2	AC adapter (100V to 240V AC)	NBG-317<3> ----- NBG-399R	The AC adapter supplies 24 VDC to the WT. NBG-399R is latest.
4.3	AC adapter cable	H-7ZCCM0132 or H-7ZCCM0135	It use for NGB-399R. H-7ZCCM0132:Atype (USA) H-7ZCCM0135:Ctype (Europe)
4.4	WT mounting bracket	MPBX39464A ----- MPBX44142	The WT mounting bracket is used to mount the WT on a pole or similar object. MPBX44142 is latest.
4.4	CS Sleeve (WT aperture)	MPPK31288	The cold-shrinkable tube is mounted on the small window of the WT to make the WT waterproof and dustproof.
5	Antenna direction adjustment tool	NKK-163	There are antenna direction adjustment tools for the AP and WT.
6	JRC Local management tool CD-ROM	H-7YZCM5074B	AP Local management tool、WT Local management tool、AP Local management tool instruction manual and WT Local management tool instruction manual are included in this CD-ROM.
6.1	AP Local management tool	H-7YZCM5053A	Connecting a computer with this software installed to the AP-IFU allows you to execute the maintenance and management functions for the AP. Use the AP local management cable to connect between the PC and AP-IFU.
6.2	WT Local management tool	H-7YZCM5052A	Connecting a computer with this software installed to the WT allows you to execute the maintenance and management functions for the WT. Use an Ethernet cable to connect between the PC and WT.
6.3	AP Local management tool instruction manual	H-7YZCM5061	instruction manual of AP Local management tool

6.4	WT Local management tool instruction manual	H-7YZCM5060	instruction manual of WT Local management tool
7	AP local management cable	H-7ZCCM5040A H-7ZCCM0121A	Use this cable to connect a PC with the AP local management tool installed to the AP-IFU. H-7ZCCM0121A is latest.
8	PMP-OpS (CD-ROM)	H-7YZCM5076C	The PMP-OpS is included in this CD-ROM.
8.1	PMP-OpS	H-7YZCM5056A	The PMP-OpS (Point-to-Multipoint Operation System) is an SNMP manager dedicated to a JRC FWA system with a point-to-multipoint configuration.
8.2	PMP-OpS INSTRUCTION MANUAL	H-7YZCM5062	The PMP-OpS INSTRUCTION MANUAL
9	PP-OpS (CD-ROM)	H-7YZCM5077B	The PP-OpS is included in this CD-ROM.
9.1	PP-OpS	H-7YZCM5055A	The PP-OpS (Point-to-Point Operation System) is an SNMP manager dedicated to a JRC FWA system with a point-to-point configuration.
9.2	PP-OpS INSTRUCTION MANUAL	H-7YZCM5063	The PP-OpS INSTRUCTION MANUAL
10	JRC FWA SYSTEM INSTRUCTION MANUAL (CD-ROM)	H-7YZCM0102C	INSTRUCTION MANUAL is included in this CD-ROM.
10.1	JRC FWA SYSTEM INSTRUCTION MANUAL	H-7YZCM0101B	INSTRUCTION MANUAL.

Subject to change without notice.

<1> Frequency Type

L0 : 24.050 ~ 24.549GHz

L1 : 24.549 ~ 24.997GHz

L2 : 24.997 ~ 25.445GHz

H1 : 25.557 ~ 26.005GHz

H2 : 26.005 ~ 26.453GHz

X0 : 24.050 ~ 24.549GHz (External Antenna)

X2 : 24.997 ~ 25.445GHz (External Antenna)

<2> Antenna Type

H : Horizontal Polarization

V : Vertical Polarization

<3> AC Power Cable Plug Type

E : Europe

U : USA

<4> RoHS

Blank : non RoHS

R : RoHS

## 2. Specifications

### 2.1. General

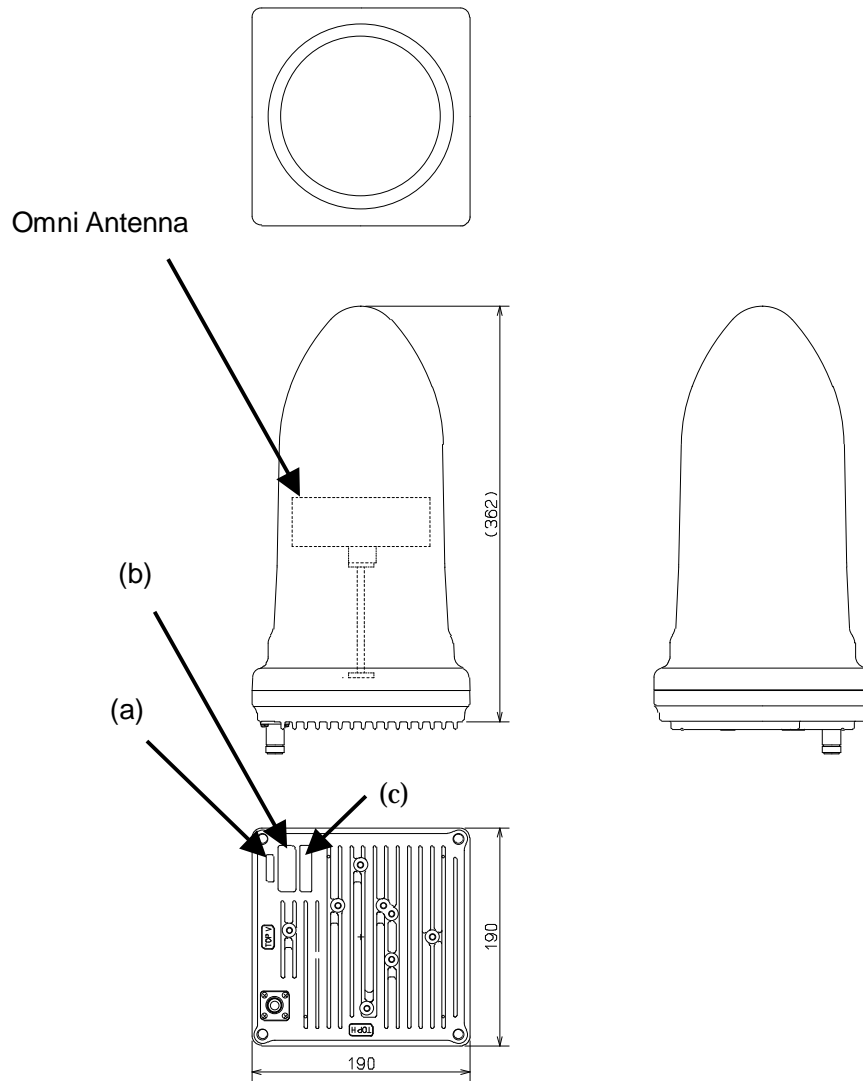
Table 2-1 JRC FWA SYSTEM Specifications

Item	Point to Multipoint System			Point to Point System	
	AP		WT		
Frequency Band [GHz]	EL0 24.050-24.549	EL1 24.549-24.997	EL2 24.997-25.445	EH1 25.557-26.005	EH2 26.005-26.453
Duplex/multiple access	TDD/TDMA			TDD	
Modulation system	QPSK/16QAM				
Symbol rate	20M symbol/s				
Radio Transmission rate (Data throughput)	QPSK:40Mbps (Max.23Mbps)		16QAM:80Mbps (Max.46Mbps)	QPSK:40Mbps (Max.16Mbps)	16QAM:80Mbps (Max.32Mbps)
Occupied bandwidth	26MHz (QPSK/16QAM)				
Channel spacing	28MHz				
Transmit output power	QPSK:+14dBm		QPSK (ATPC): -6 to +14dBm 16QAM (ATPC): -8.5 to +11.5dBm	QPSK: -6 to +14dBm 16QAM: -8.5 to +11.5dBm	
Frequency Stability	±10ppm				
Transmitter spurious emission	-30dB/MHz or less				
RF spectrum mask	QPSK:ETSI Type A 16QAM:ETSI Type B				
Minimum receiving level (BER=10 <sup>-6</sup> ) After an error correction	QPSK: -79dBm or less    16QAM: -69dBm or less				
Antenna type and gain (typ)	Omni: 6.5dBi 90°X10°Sectoral Horn:15.5dBi		High-gain flat antenna: 31dBi External Antenna: 35.7dBi(30cm) / 41.1dBi(60cm) / 44.6dBi(90cm) / 46.9dBi(120cm)		
Max number of WTs	239 WTs per AP			-	
Interface	100BASE-TX		10BASE-T/100BASE-TX		
MAC processing	VLAN (IEEE802.1Q) User data are distributed by using VLAN-TAG to each WT			-	
MAC address filtering	enable			disable	
SNMP (agent)	Remote operation is possible by OpS (option).				
	SNMP V2, Private MIB, VLAN TAG (IEEE802.1q)				
	AP setup/control WT setup/control Test Alarm log WT Operating Status List Remote downloading Bandwidth Table			Parameter setup/Control (Master) Alarm Log (Master) Traffic information (Master) Network configuration (Master)	
Local management	Local management is possible by Local management tool (option).				
	AP: Serial interface(Exclusive cable use) WT: Ether interface			Master/Slave: Ether interface	
	Setup (AP,WT) Control (AP,WT) Radio link monitor (WT) Log (AP,WT) Tool Setup (AP,WT)			Setup Control Radio link monitor Log Tool Setup (AP,WT)	

Power	-48 V DC 35W (MAX)	100 to 240 V AC 35VA (MAX)
Physical	RFU:Dimensions W190XH190XD362(mm) Weight 3kg  IFU:Dimensions W275XH325XD165(mm) Weight 8kg	RF Unit (Internal Antenna):Dimensions W190XH190XD61(mm) Weight about 2kg RF Unit (External Antenna):Dimensions W220 XH220XD53(mm) Weight about 3kg WT Adapter:Dimensions W45XH95XD40(mm) Weight about 100g AC Adapter:Dimensions W60XH38XD120(mm) (NBG-317) W52XH30XD108(mm) (NBG-399R) Weight about 330g
Temperature	-33degree Celsius - +50degree Celsius cold start at minimum -10degree Celsius ambient	RF Unit: -33degree Celsius - +50degree Celsius cold start at minimum -10degree Celsius ambient WT Adapter: -20degree Celsius - +50degree Celsius AC Adapter: 0degree Celsius - +40degree Celsius
Humidity	20% - 80% non-condensing	

## 2.2. External Views of the Units

### 2.2.1.AP-RFU (Omni Antenna)



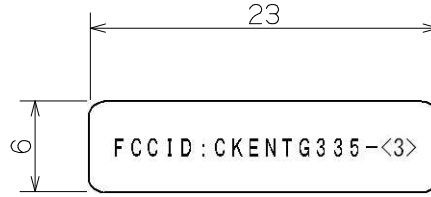
(in mm)

Figure 2-1 External View of the AP-RFU (Omni Antenna)

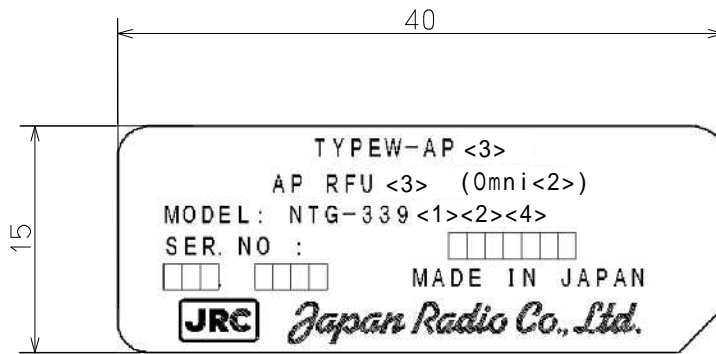


### 2.2.1.1. AP-RFU (Omni Antenna) Nameplate

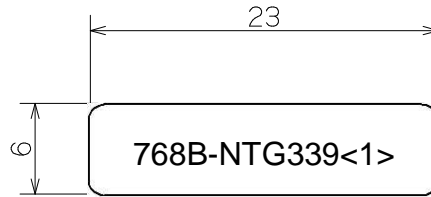
Nameplate(a)



Nameplate(b)



Nameplate(c)



<1>

L0 : 24.050 ~ 24.549GHz

L1 : 24.549 ~ 24.997GHz

L2 : 24.997 ~ 25.445GHz

H1 : 25.557 ~ 26.005GHz

H2 : 26.005 ~ 26.453GHz

<4>

Blank : non RoHS

R : RoHS

<2>

H : Horizontal Polarization

V : Vertical Polarization

<3>

EL0 : 24.050 ~ 24.549GHz

EL1 : 24.549 ~ 24.997GHz

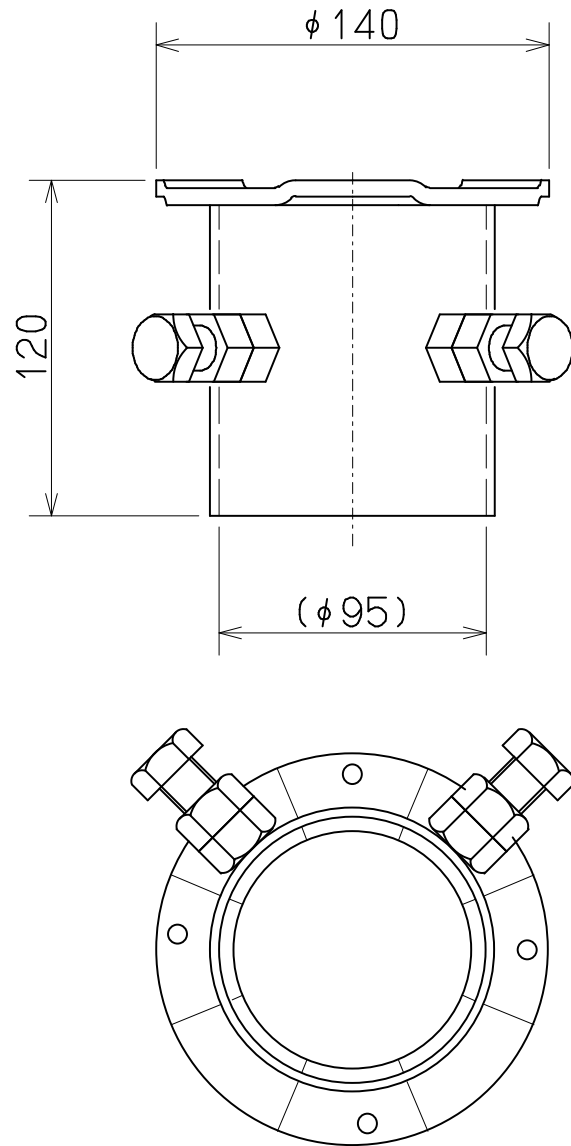
EL2 : 24.997 ~ 25.445GHz

EH1 : 25.557 ~ 26.005GHz

EH2 : 26.005 ~ 26.453GHz

Figure 2-2 Nameplate

### 2.2.1.2. AP-RFU (Omni Antenna) Mounting Bracket



(in mm)

Figure 2-3 Mounting Bracket

### 2.2.2.AP-RFU (Sectoral-Horn Antenna)

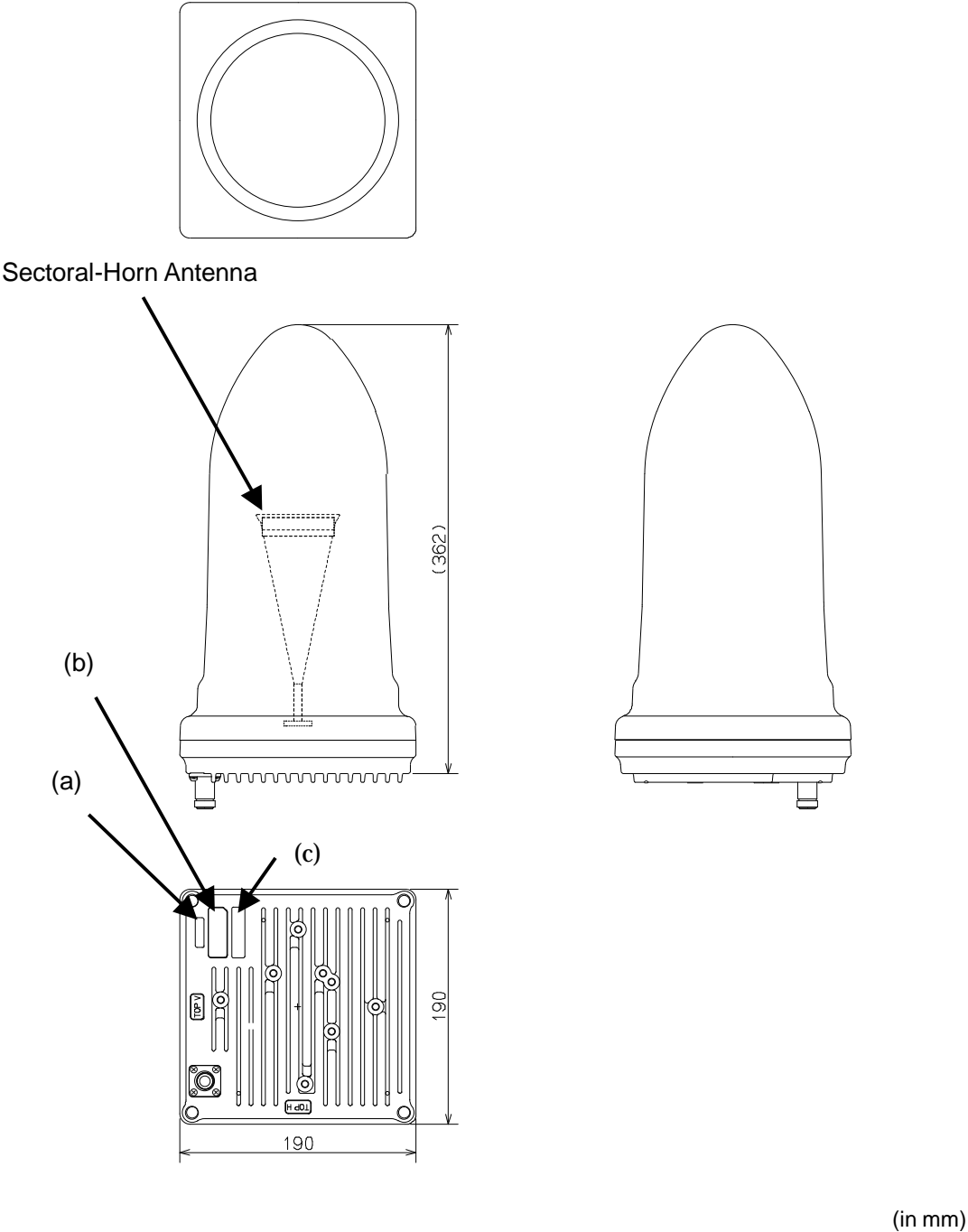
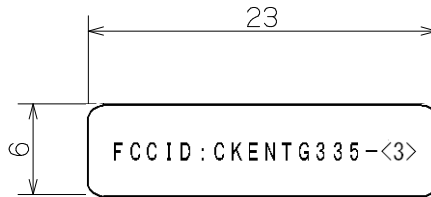


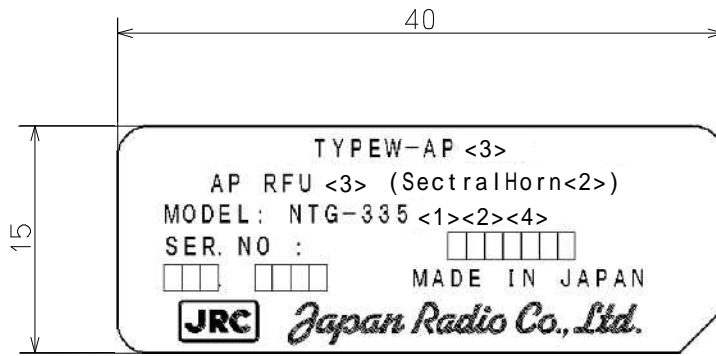
Figure 2-4 External View of the AP-RFU (Sectoral-Horn Antenna)

### 2.2.2.1. AP-RFU (Sectoral-Horn Antenna) Nameplate

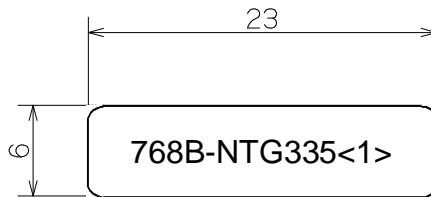
Nameplate(a)



Nameplate(b)



Nameplate(c)



<1>

L0 : 24.050 ~ 24.549GHz

L1 : 24.549 ~ 24.997GHz

L2 : 24.997 ~ 25.445GHz

H1 : 25.557 ~ 26.005GHz

H2 : 26.005 ~ 26.453GHz

<4>

Blank : non RoHS

R : RoHS

<2>

H : Horizontal Polarization

V : Vertical Polarization

<3>

EL0 : 24.050 ~ 24.549GHz

EL1 : 24.549 ~ 24.997GHz

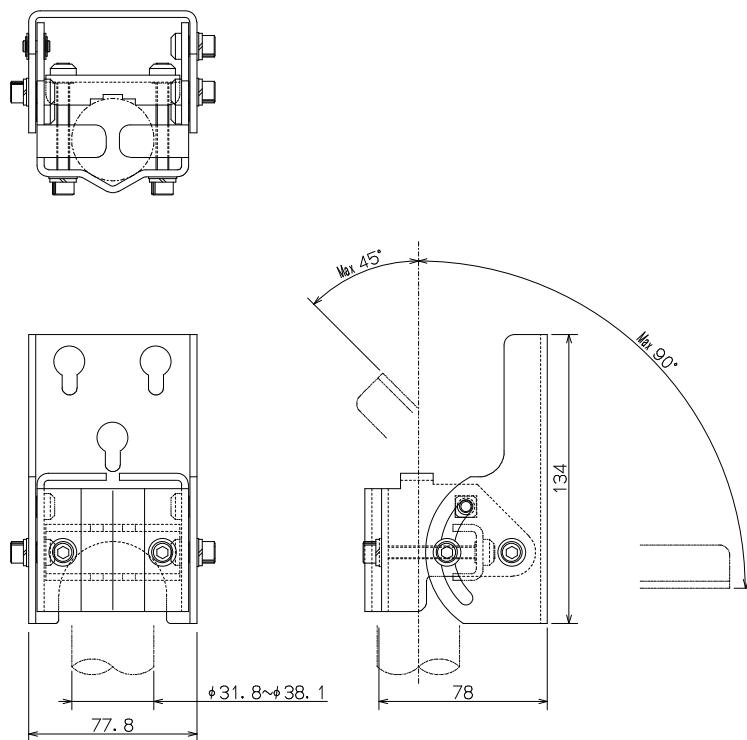
EL2 : 24.997 ~ 25.445GHz

EH1 : 25.557 ~ 26.005GHz

EH2 : 26.005 ~ 26.453GHz

Figure 2-5 Nameplate

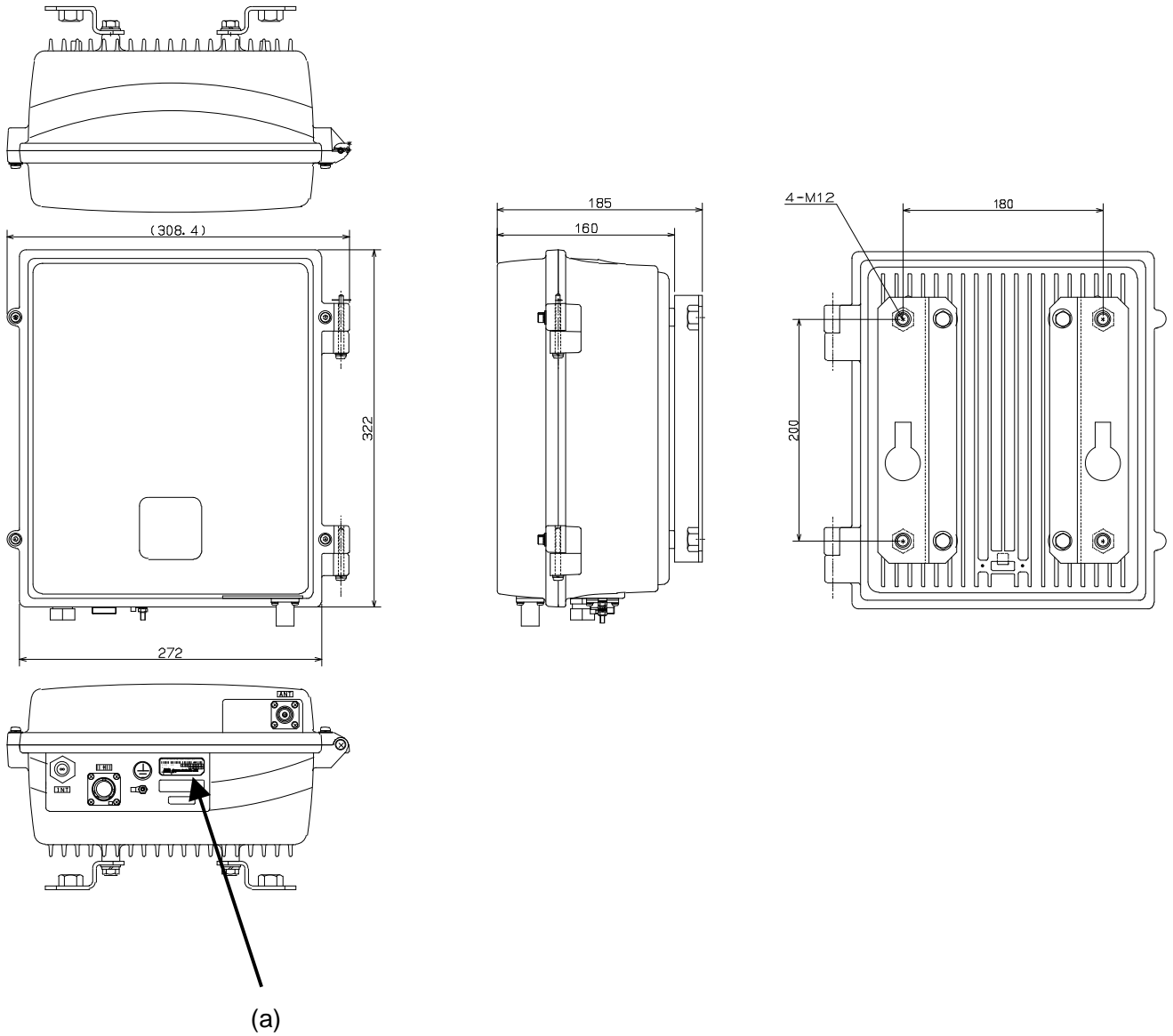
### 2.2.2.2. AP-RFU (Sectoral-Horn Antenna) Mounting Bracket



(in mm)

Figure 2-6 Mounting Bracket

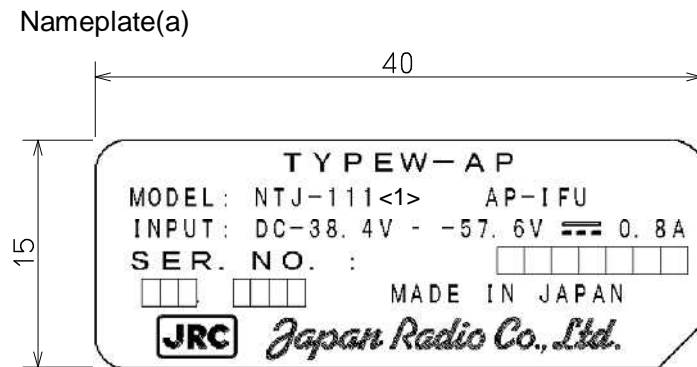
### 2.2.3.AP-IFU



(in mm)

Figure 2-7 External View of the AP-IFU

### 2.2.3.1. AP-IFU Nameplate



(in mm)

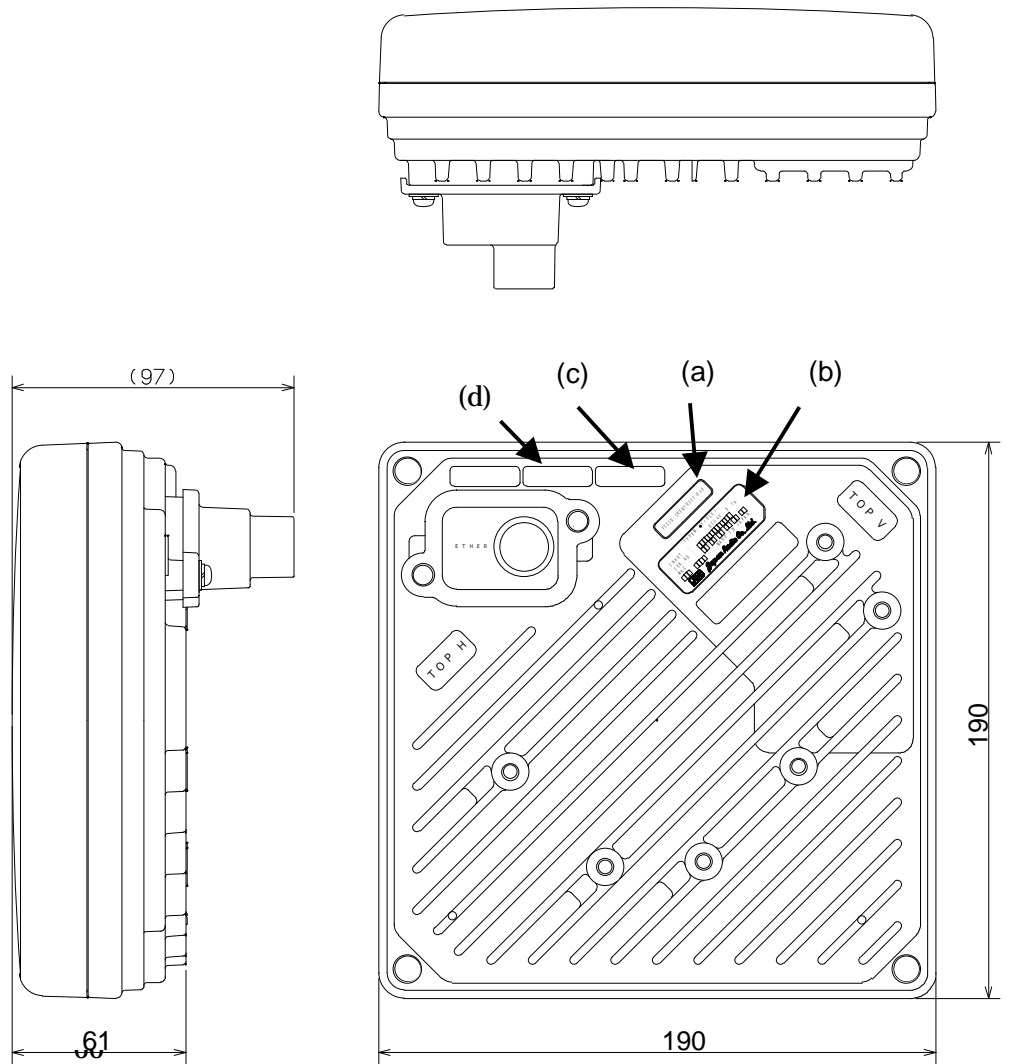
<1>

Blank : non RoHS

R : RoHS

Figure 2-8 Nameplate

## 2.2.4.WT



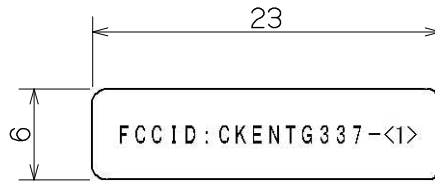
(in mm)

Figure 2-9 External View of the WT

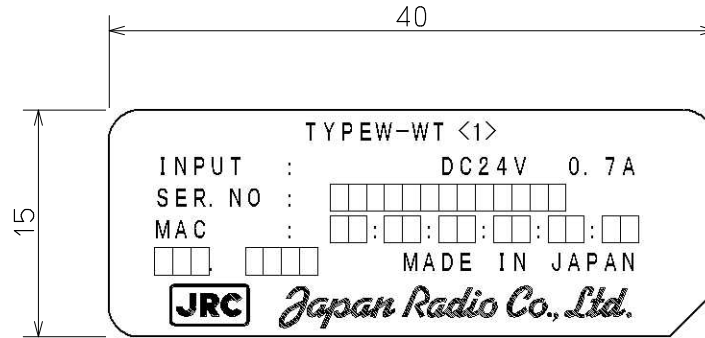


### 2.2.4.1. WT Nameplate

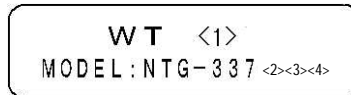
Nameplate(a)



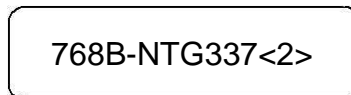
Nameplate(b)



Nameplate(c)



Nameplate(d)



<1>

EL0 : 24.050 ~ 24.549GHz  
 EL1 : 24.549 ~ 24.997GHz  
 EL2 : 24.997 ~ 25.445GHz  
 EH1 : 25.557 ~ 26.005GHz  
 EH2 : 26.005 ~ 26.453GHz

<2>

L0 : 24.050 ~ 24.549GHz  
 L1 : 24.549 ~ 24.997GHz  
 L2 : 24.997 ~ 25.445GHz  
 H1 : 25.557 ~ 26.005GHz  
 H2 : 26.005 ~ 26.453GHz

<3>

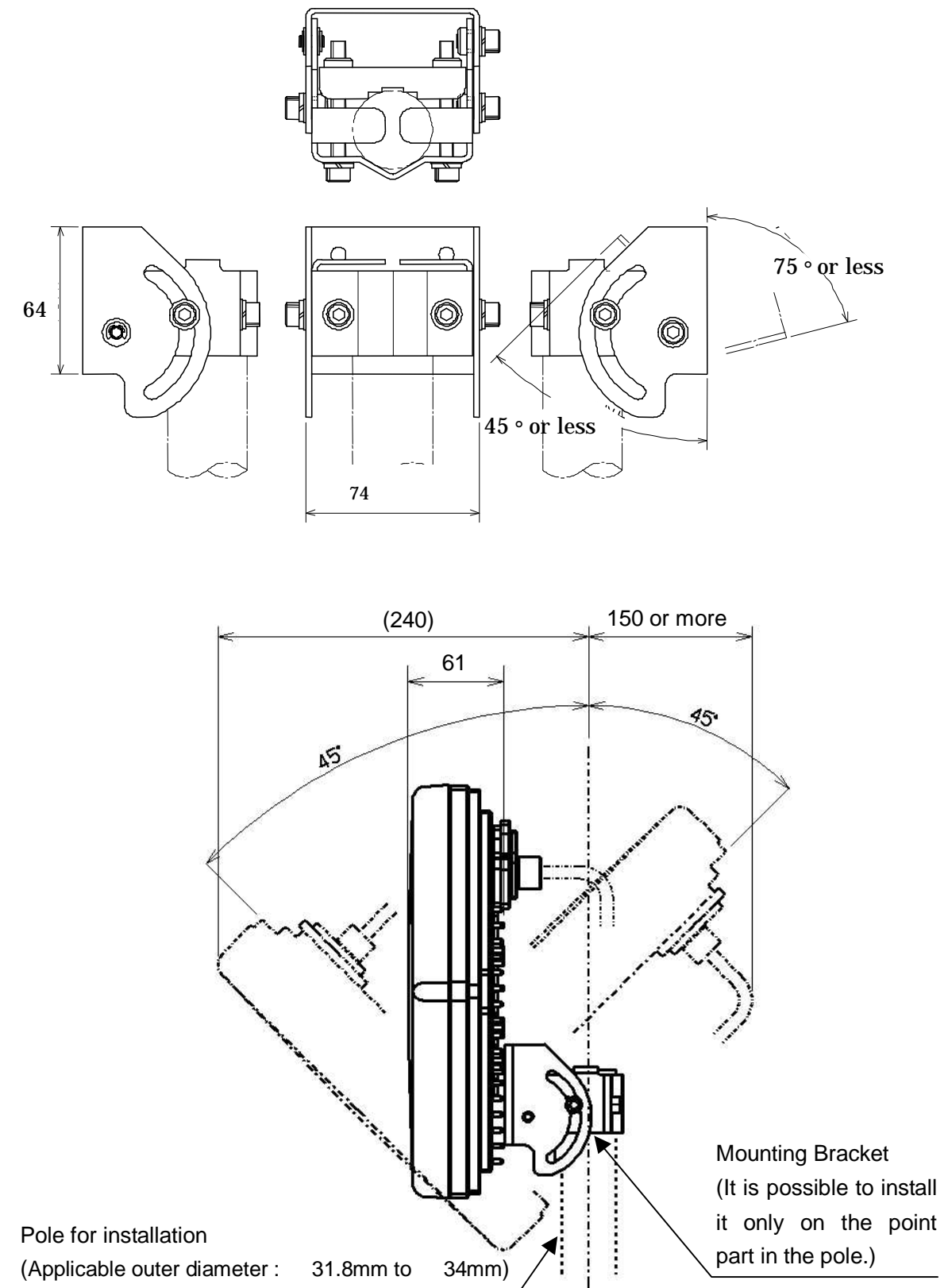
U : USA Type AC Plug  
 E : European Type AC Plug

<4>

Blank : non RoHS  
 R : RoHS

Figure 2-10 Nameplate

### 2.2.4.2. WT Mounting Bracket



(in mm)

Figure 2-11 External View of the Outdoor Mounting Brackets for the WT

## 2.2.5.WT (External Antenna)

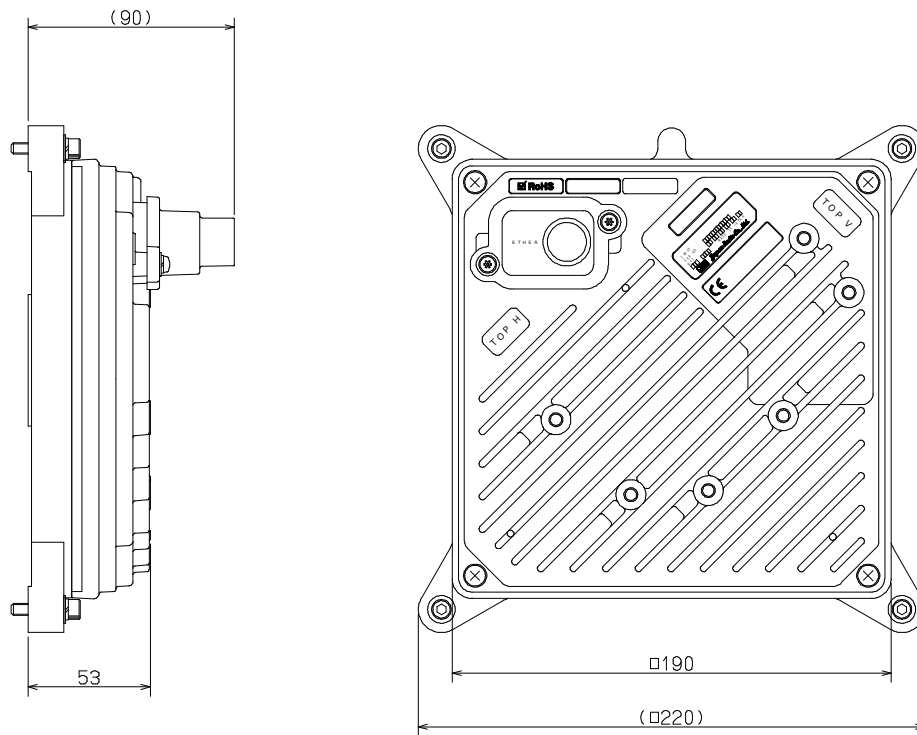
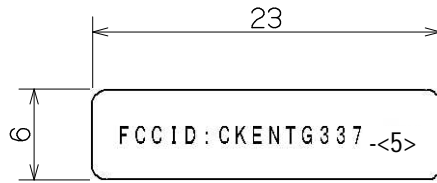


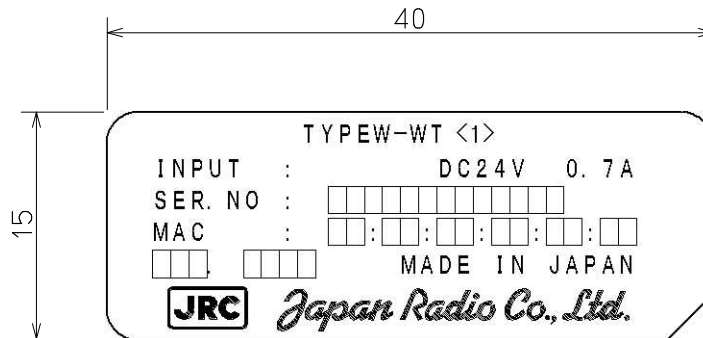
Figure 2-12 External View of the WT (External Antenna)

### 2.2.5.1. WT (External Antenna) Nameplate

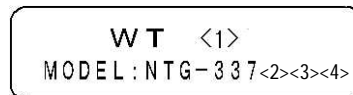
Nameplate(a)



Nameplate(b)



Nameplate(c)



<1>

EL0 : 24.050 ~ 24.549GHz

EL2 : 24.997 ~ 25.445GHz

<2>

X0 : 24.050 ~ 24.549GHz

X2 : 24.997 ~ 25.445GHz

<3>

U : USA Type AC Plug

E : European Type AC Plug

<4>

Blank : non RoHS

R : RoHS

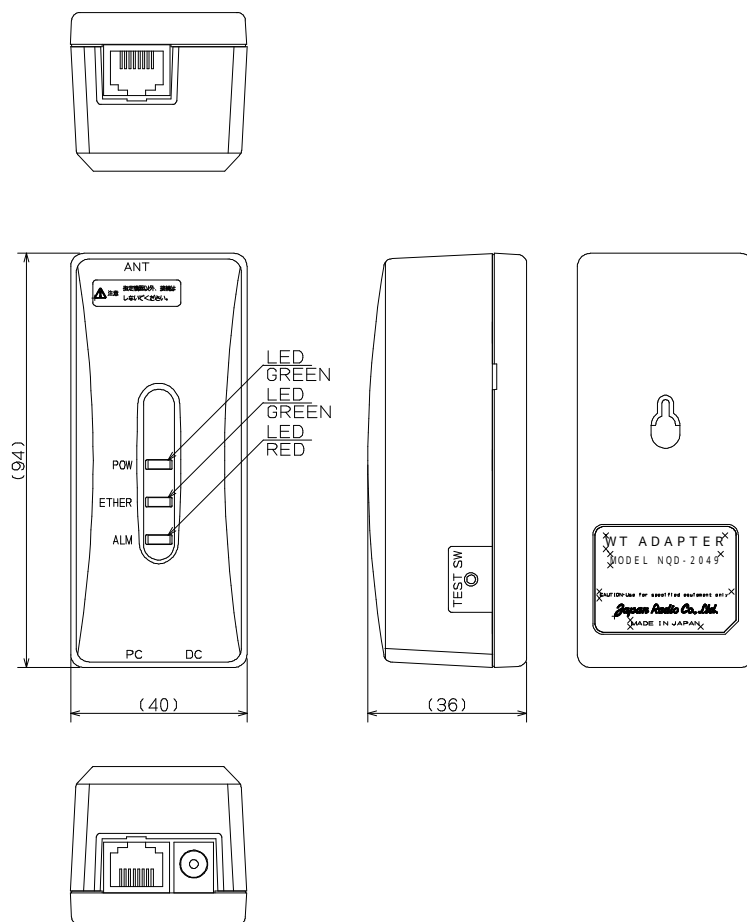
<5>

XL0 : 24.050 ~ 24.549GHz

XL2 : 24.997 ~ 25.445GHz

Figure 2-13 Nameplate

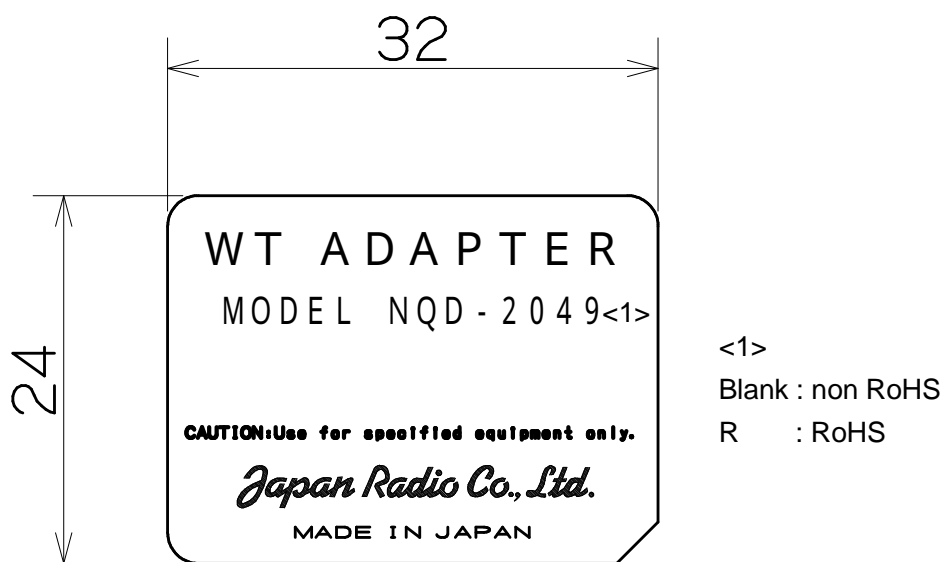
## 2.2.6.WT Adapter



(in mm)

Figure 2-14 External View of the WT Adapter

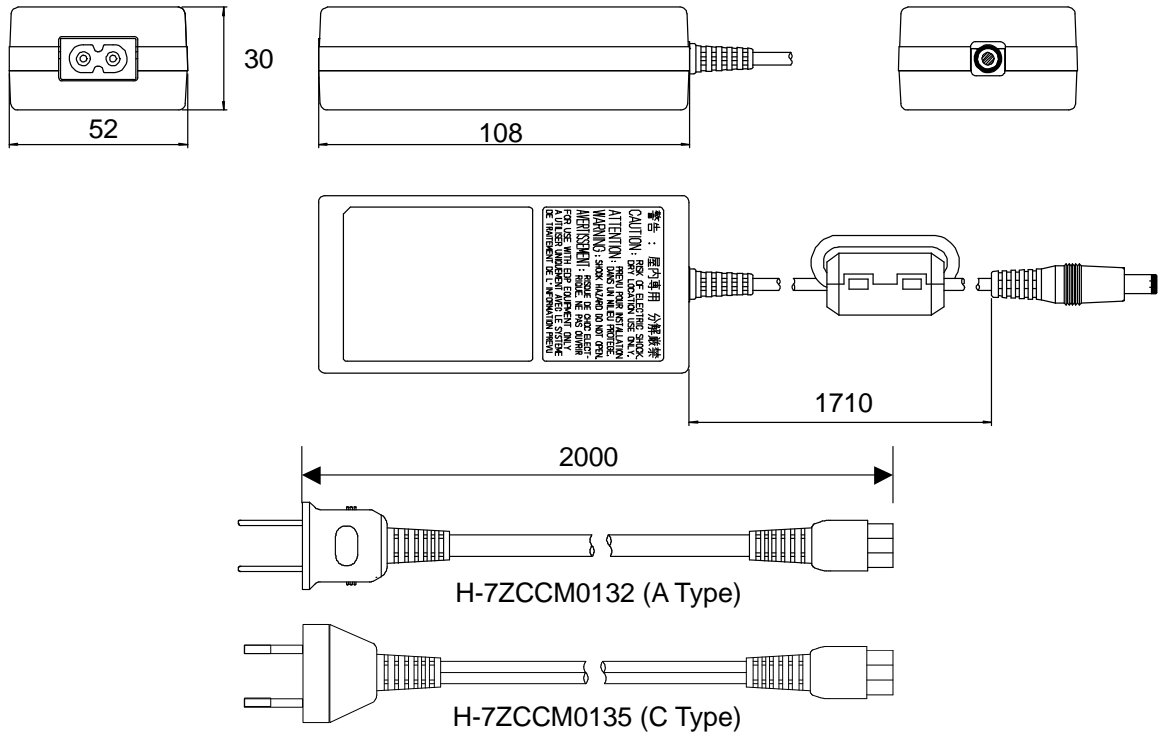
### 2.2.6.1. WT Adapter Nameplate



(in mm)

Figure 2-15 Nameplate

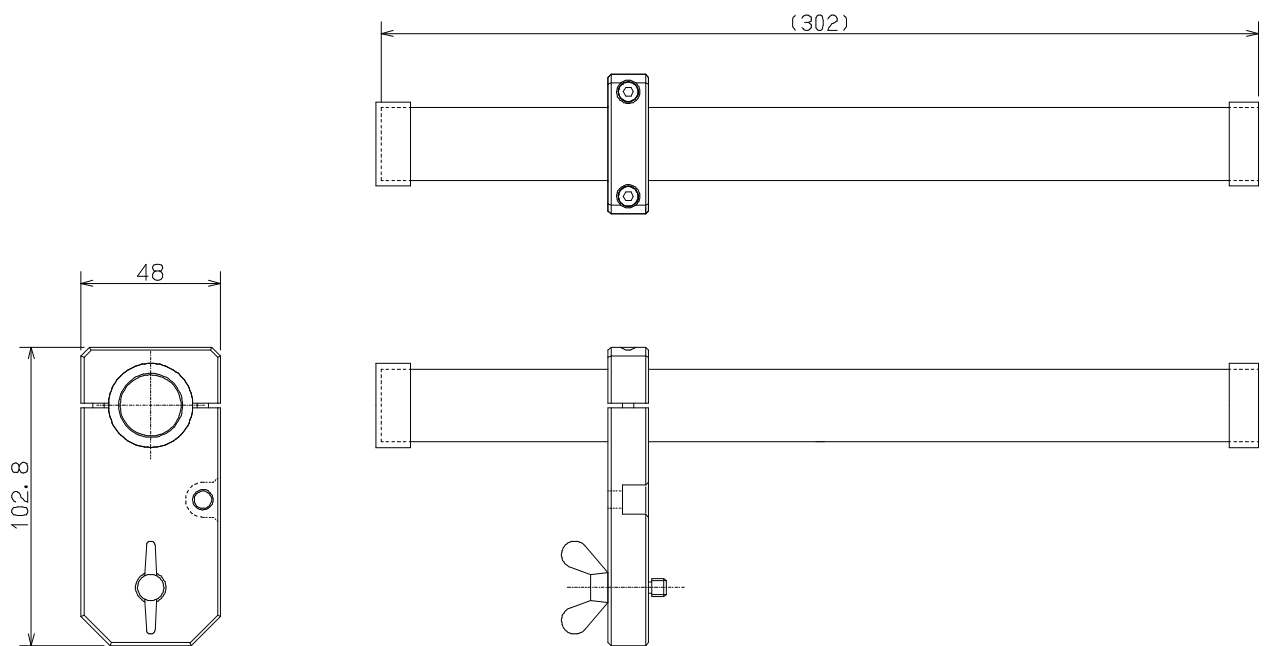
## 2.2.7.WT AC Adapter



(in mm)

Figure 2-16 External View of the WT AC Adapter

## 2.2.8. Antenna direction adjustment tool



(in mm)

Shape of the scope is subject to change without notice.

Figure 2-17 Antenna direction adjustment tool

## **3. AP**

### **3.1. AP-RFU**

#### **3.1.1.Overview**

The AP-RFU consists of three blocks: Antenna section, RF section and IF section.

#### **3.1.2.Antenna section**

The omni-directional antenna (with horizontal directivity of 360°) and the Sectoral-Horn-type antenna (90° × 10° directivity) look the same.

#### **3.1.3.RF section**

In the RF section, the transmission IF signals are up-converted into 24-26 GHz-band RF signals using the local signal, which is generated by multiplying the 2.4 GHz synthesized oscillator. The next-stage BPF eliminates unwanted sideband components. The up-converted 24-26 GHz-band RF signals are amplified up to the desired level then fed to the antenna via the TDD-Switch and the Waveguide Filter.

The received 24-26 GHz-band RF signals by the antenna are fed in to the LNA via the Waveguide Filter and the TDD-Switch. The output signals of the LNA are down-converted into IF signals using the local signal, which is generated by multiplying the 2.4 GHz synthesized oscillator. The BPF is employed to eliminate the image components (interference).

The TDD Switch selects the transmitting or receiving function. Detection of the transmitting burst at the IF section turns the switch to the transmitting side.

#### **3.1.4.IF section**

In the receiving IF section, the output level to the AP-IFU is adjusted by the automatic gain control (AGC) function, so that the input level of the AP-IFU does not saturate for the reception of the WT signal which gives highest receiving level. The SAW filter eliminates the adjacent channel interference.

In the transmitting IF section, the detection of the transmitting burst signal controls the TDD-Switch in the RF section to turn it to the transmitting side. The SAW filter provides the signal delay for the period of the burst detection and the TDD-Switch turning time, as well as the elimination of the non-desired signal component.

The IF section also has the compensation functionality for cable losses between the AP-RFU and AP-IFU.



The CPU in the IF section performs the AGC, the cable loss compensation, and the monitoring and control functionalities.

Figure 3-1 is a block diagram of the AP-RFU.

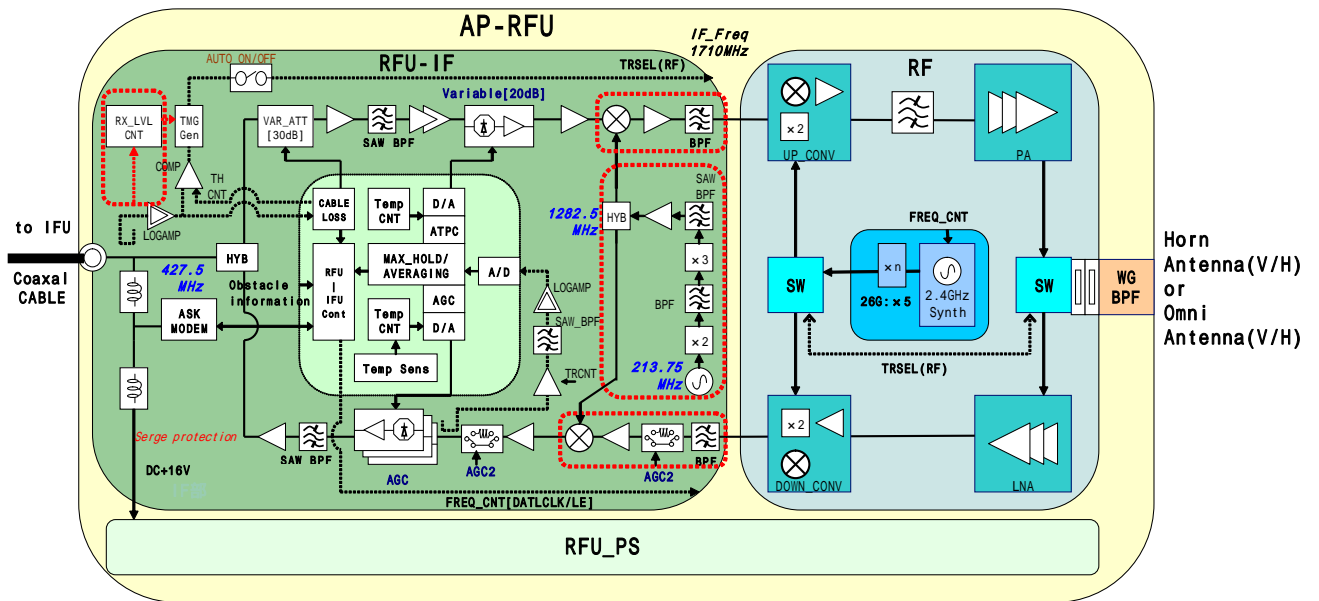


Figure 3-1 AP-RFU Block Diagram

### 3.1.5. Operations and Indications

The AP-RFU does not have any operation or indication panels.

#### 3.1.5.1. Indications

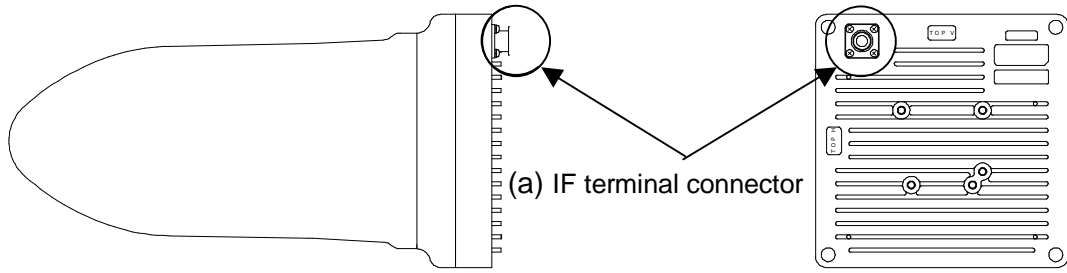
The AP-RFU does not have any LEDs or other status indicators.

#### 3.1.5.2. Switches

The AP-RFU does not have any switches.

### 3.1.6. Terminals

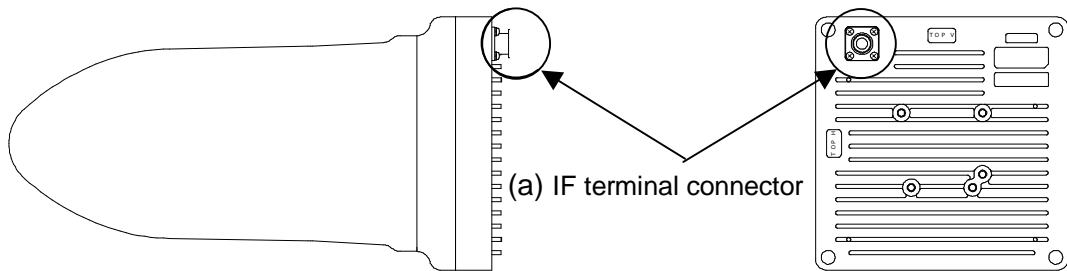
#### 3.1.6.1. Omni Antenna



(a) IF terminal connector	
Contents	Connect the AP-IFU with the coaxial cable.
Shape	N-Type Jack for Coaxial
Applicable Connector	N-Type Plug for Coaxial

Figure 3-2 Connecting Section of the AP-RFU (Omni Antenna)

#### 3.1.6.2. Sectoral-Horn Antenna



(a) IF terminal connector	
Contents	Connect the AP-IFU with the coaxial cable.
Shape	N-Type Jack for Coaxial
Applicable Connector	N-Type Plug for Coaxial

Figure 3-3 Connecting Section of the AP-RFU (Sectoral-Horn Antenna)

## 3.2. AP-IFU

### 3.2.1. Overview

AP-IFU consists of three blocks: IF section, digital section and interface section.

### 3.2.2. IF section

The transmission IF section performs quadrature modulation of 427.5MHz IF frequency according to the transmission output from the digital modem installed in the WT-ASIC.

In the receiving IF section, the received burst signal level is adjusted by the automatic gain control (AGC) function of the digital modem. The quadrature demodulator downconverts the received IF signal into the baseband signal.

The digital section consists of a digital modem, TDD/TDMA framer, wireless MAC processor, and system controller. These functionalities are equipped in the WT-ASIC.

The digital modem performs modulation and demodulation of transmitting and receiving burst signals.

The interface section has an interface between the AP and the upper unit (100BASE-TX).

The digital section consists of the wireless MAC processor, TDD/TDMA controller, modem and system controller. The wireless MAC processor converts between the Ethernet frames that the interface section handles and wireless MAC frames. It also schedules the dynamic slot assignment. The TDD/TDMA controller performs scrambling, encryption, error correction and other processing. The system controller performs operating parameter setting, state monitoring, control and testing for the modem, TDD/TDMA processor, wireless MAC processor and network interface. It also sends and receives maintenance signals via SNMP. It performs delay control, authentication and other procedures, operating parameter setting, state monitoring, control and testing for the subordinate WTs over a DMF channel.

The transmission IF section in the IF section performs quadrature modulation for the transmission baseband signals at 427.5MHz LOC frequency for upconversion to IF signals. It also controls the output level to the desired level based on the control from the ASIC. The receive IF section equalizes the level of the reception waves arriving in a wide level range using the automatic gain control (AGC) from the ASIC, and then downconverts them into baseband signals.

Figure 3-4 is a block diagram of the AP-IFU.

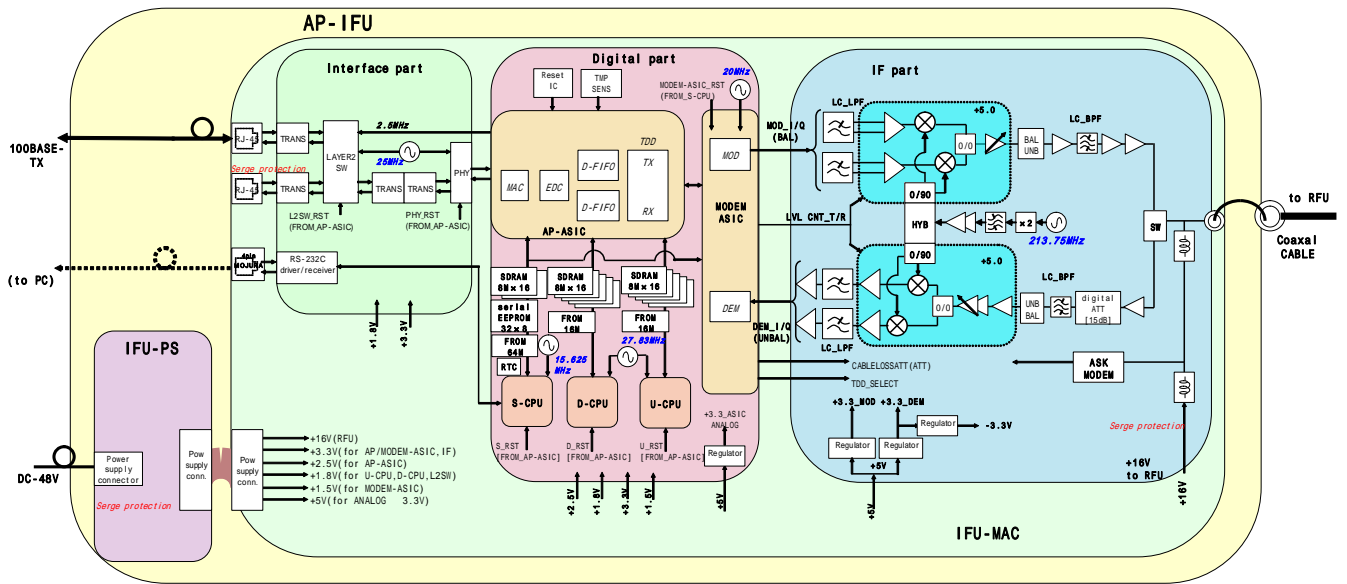


Figure 3-4 AP-IFU Block Diagram

### 3.2.3. Operations and Indications

#### 3.2.3.1. Indications

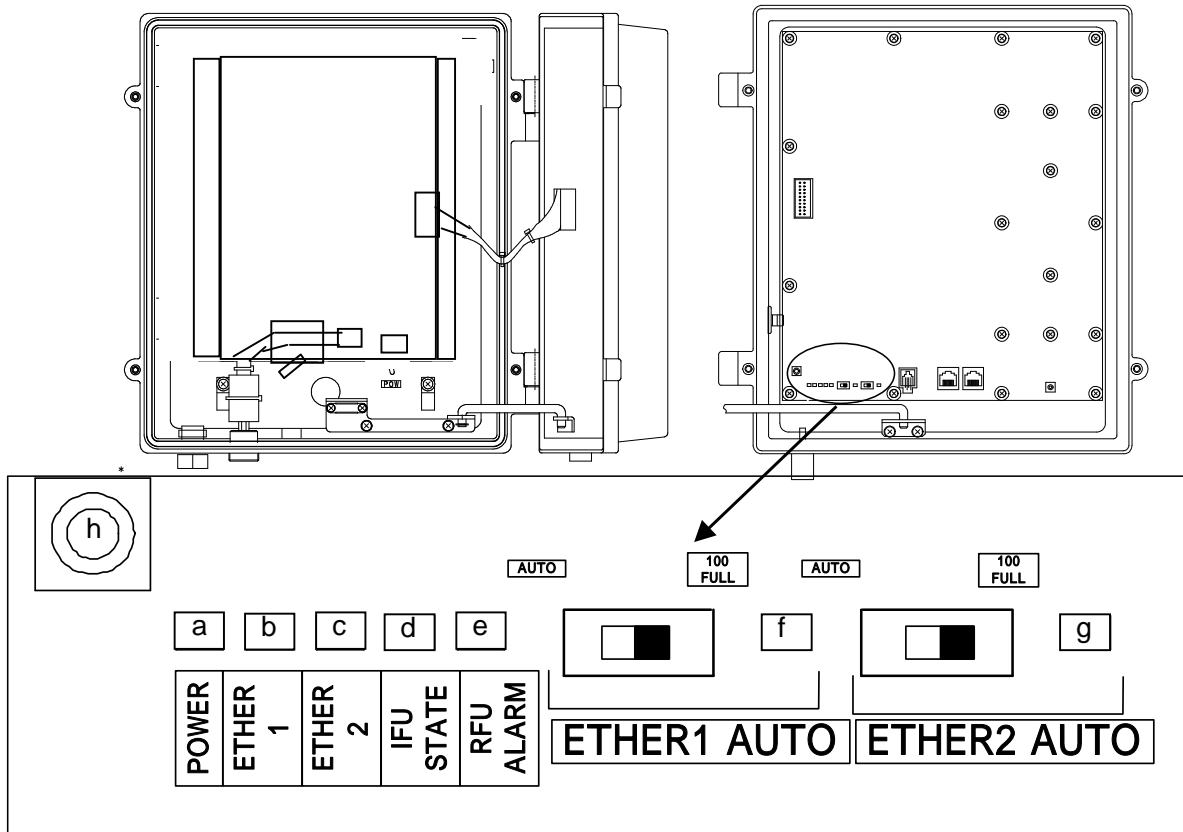


Figure 3-5 AP-IFU Operation and Indication Panel

Table 3-1 AP-IFU Indications

	LED	State indication
a	POWER	Lit green: Power on Extinguished: Power off
b	ETHER 1	Lit green: ETHER link established Flashing green: ETHER signal sent or received Extinguished: ETHER link down (See Table 3-3, 4)
c	ETHER 2	Lit green: ETHER link established Flashing green: ETHER signal sent or received Extinguished: ETHER link down (See Table 3-3, 5)
d	IFU STATE	Lit red: IFU alarm (See Table 3-3, 2) Flashing green: Normal (CPU running) Flashing orange: During initialization
e	RFU ALARM	Lit red: RFU alarm (Cause: RFU failure (See Table 3-3, 1) or communication error between the IFU and RFU (See Table 3-3, 3)) Extinguished: RFU alarm cleared
f	ETHER1 AUTO	Lit green: AUTO (ETHER1 AUTO switch set to AUTO) Extinguished: 100BASE full duplex
g	ETHER2 AUTO	Lit green: AUTO Extinguished: 100BASE full duplex
h	RST	Unit reset switch

Table 3-2 AP-IFU Controls

	Switch	Description
1	ETHER1 AUTO	Sets the ETHER1 interface (100BASE full duplex/AUTO). After changing the switch setting, you have to reboot the unit (power off and back on) to enable the new setting. AUTO: AUTO 100FULL: 100BASE full duplex (factory setting)
2	ETHER2 AUTO	Sets the ETHER2 interface (100BASE full duplex/AUTO). After changing the switch setting, you have to reboot the unit (power off and back on) to enable the new setting. AUTO: AUTO 100FULL: 100BASE full duplex (factory setting)

Table 3-3 Alarm Issuance and Clear Conditions

	Item	Initial state	Issued when:	Cleared when:
1	RFU failure	Cleared	The RFU-CPU detects LOCALM or TRSELALM three times each for more than 10msec.	The RFU-CPU detects no LOCALM or TRSELALM three times each for more than 10msec.
			LOCALM (local oscillator alarm) occurs if the local oscillator lost synchronization.	Synchronization is recovered.
			TRSELALM (transmission/reception switchover SW failure) occurs if the transmission state continues for more than 1sec.	Only by a reset.
			IFU-CPU detects a RFU-IFU communication error (monitoring response).	IFU-CPU is cleared by a single RFU-IFU communication (monitoring response).
2	IFU failure	Cleared	Communication error among the S-CPU, D-CPU and U-CPU. No response to polling for 3sec	Cleared by a single response.
			L2SW setting failure If setting failed four times (once for transmission and 3 times for retransmission)	No recovery
3	Communication error between RFU and IFU	Cleared	The S-CPU detects a S-RFU-CPU communication error. No response to polling four times (once for transmission and 3 times for retransmission)	Cleared by a single response.
4	ETHER 1 link down	Issued	PHY link down 3 times each for 100msec.	Recovered from PHY link down 3 times each for 100msec.
5	ETHER 2 link down	Issued	PHY link down 3 times each for 100msec.	Recovered from PHY link down 3 times each for 100msec.

### 3.2.3.2. Switches

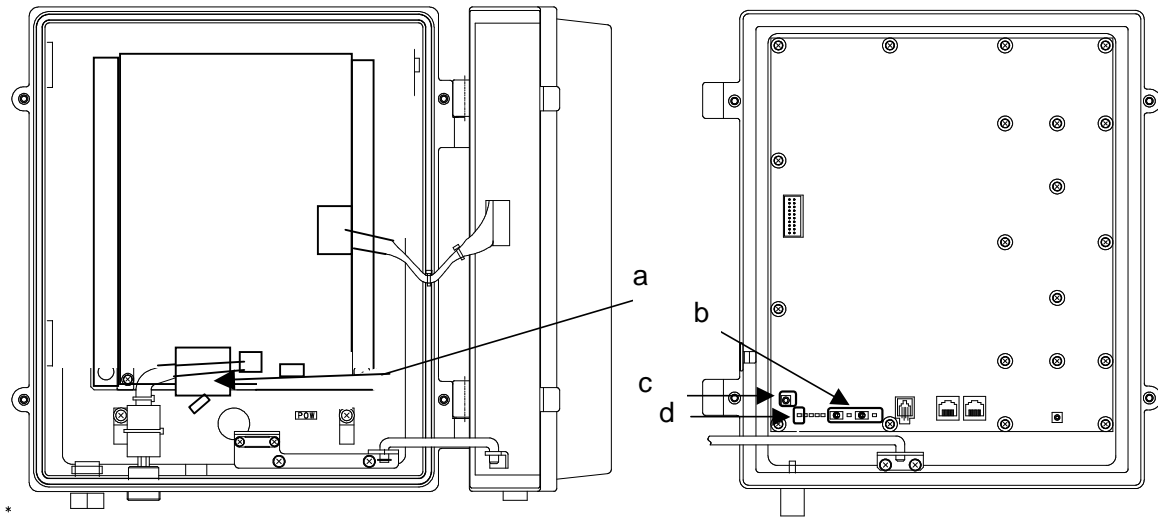
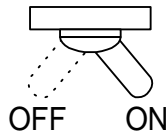


Figure 3-6 Switches on the AP-IFU

(a) Power switch

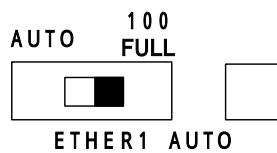
This is the switch to supply power to the AP-IFU and AP-RFU.



(b) ETHER1/ETHER2 switch

This is the switch to set AUTO or 100FULL.

(The shape of the switch may be changed.)



ETHER AUTO LED  
 AUTO: Lit green  
 100FULL: Extinguished

Factory setting: 100FULL

(c) RST switch

This is the switch to reset the unit.

(d) POWER LED

When on : Lit green

When off: Extinguished



- After changing the switch setting, you have to reboot the unit (power off and back on) to enable the new setting.

### 3.2.3.3. Terminals

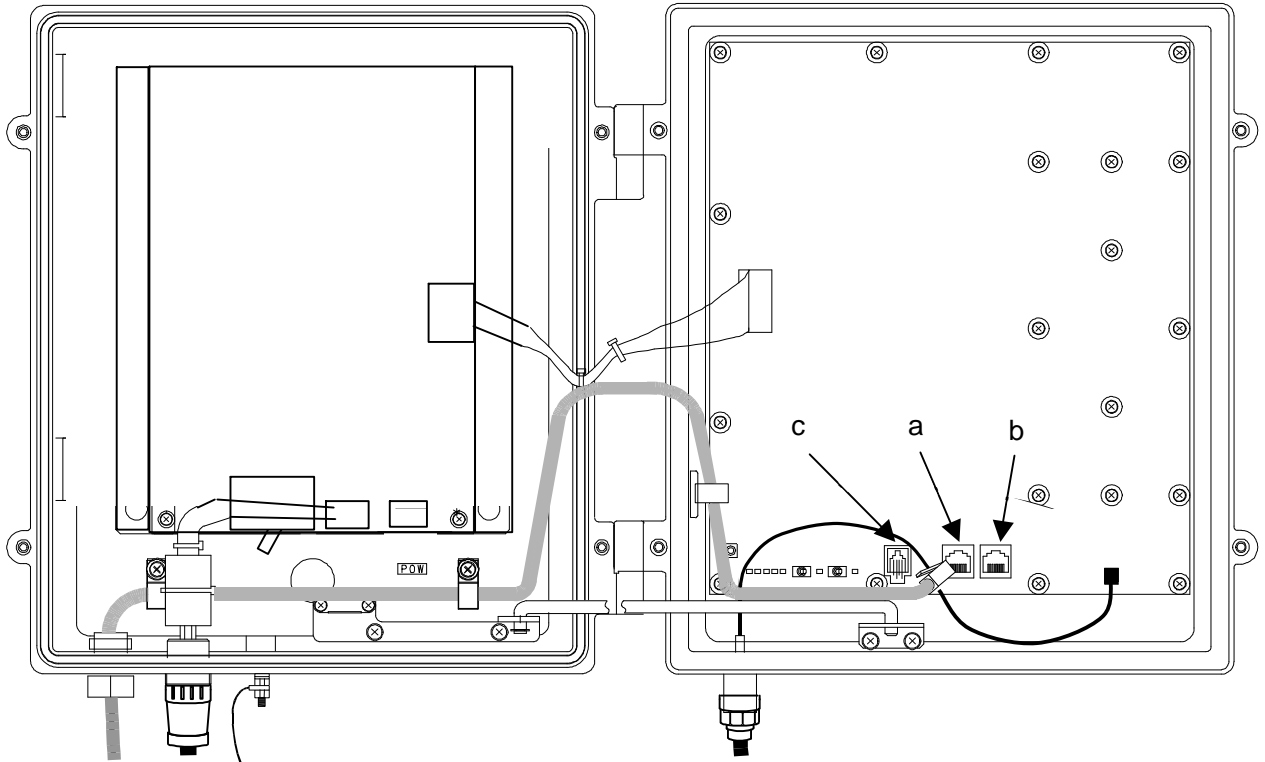


Figure 3-7 Connecting Section of the AP-IFU (Open View)

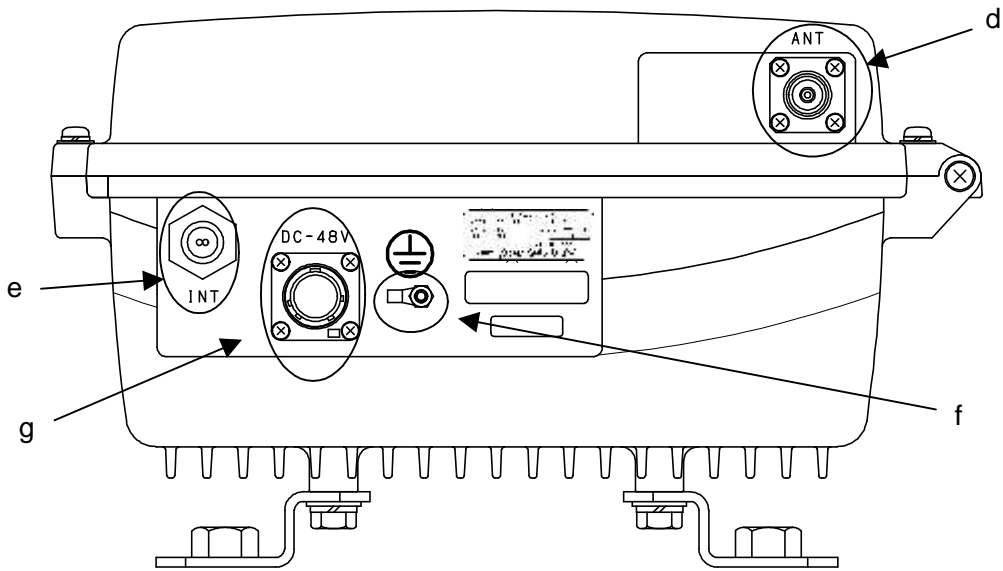
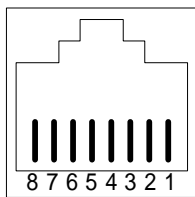
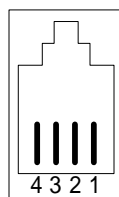


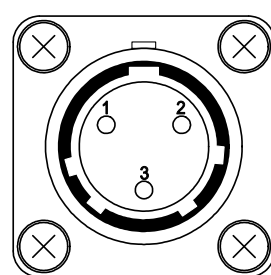
Figure 3-8 Connecting Section of the AP-IFU (Bottom View)



1	TXD+
2	TXD-
3	RXD+
4	NU
5	NU
6	RXD-
7	NU
8	GND



1	TXD
2	RXD
3	NU
4	GND



1	GND
2	DC-48V
3	NU

Figure 3-9 (a),(b) Ethernet connector

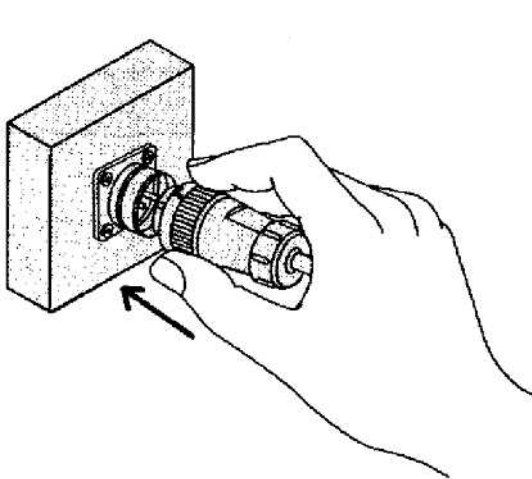
Figure 3-10 (c) MNT connector

Figure 3-11 (f) Power cable connector

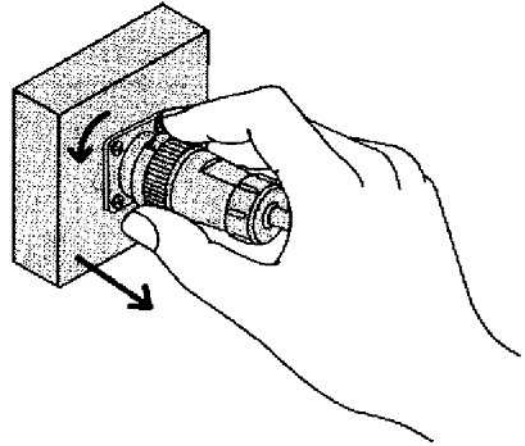


(a) ETHER1 connector	
Contents	Connect the outside network
	The user signal distributed by internal SW-HUB, and output to ETHER1 and ETHER2. ETHER1 is used usually.
Interface	100BASE-Tx
Connector shape	RJ-45
Pin assign	See Figure 3-9
(b) ETHER2 connector	
Contents	Connect the outside network
	The user signal distributed by internal SW-HUB, and output to ETHER1 and ETHER2. ETHER1 is used usually.
Interface	100BASE-Tx
Shape	RJ-45
Pin assign	See Figure 3-9
(c) MNT(maintenance) connector	
Contents	Connect the Local management tool
Interface	Serial
Shape	RJ-22
Pin assign	See Figure 3-10
(d) ANT terminal connector	
Contents	Connect the AP-IFU with the coaxial cable.
Shape	N-Type Jack for Coaxial
Applicable Connector	N-Type Plug for Coaxial
(e) Ethernet cable inlet	
Contents	Insert the Ethernet cable into the rubber bushing.
Applicable outer diameter	Φ5.5mm or less
(f) FG terminal	
Contents	Connect the ground wire.
Applicable Cable	Ground wire more than 1.5□mm
Applicable terminal	FG terminal M4nut.
(g) Power cable connector	
Contents	Connect the power cable.
Pin assign	See Figure 3-11
Name	NRW-203-RM-ULCSATUV (Nanaboshi Electric MFG Co.,LTD.)
Applicable Connector name	NRW-203-PF8-ULCSAUV (Nanaboshi Electric MFG Co.,LTD.) (This connector is supplied with AP-IFU.)

How to install and remove the power cable connector



To install:  
Align the plug and receptacle guides,  
and push in the connector straight.



To remove:  
Turn the connector counterclockwise 45  
degrees and pull it out straight.



- Power cable terminal (g): The DC -48V power supply voltage for AP-IFU shall be SELV or TNV-1 depending on the network environment (0 or 1) acc. to IEC62102.
- Ethernet cable inlet (e): The Equipment for connection to AP-IFU Ethernet-interface (RJ-45) shall be appropriate to connect to TNV-1 circuits.

## **4. WT**

### **4.1. WT**

#### **4.1.1.Overview**

The WT consists of the antenna section, RF section, IF section, digital section, interface section and power supply.

#### **4.1.2.Antenna section**

Uses a Triplate planar antennas to make the antenna compact and to provide a high gain. When you use an option, you can install a external antenna.

#### **4.1.3.RF section**

In the RF section, the transmission IF signals are up-converted into 24-26 GHz-band RF signals using the local signal, which is generated by multiplying the 2.4 GHz synthesized oscillator. The next-stage BPF eliminates unwanted sideband components. The up-converted 24-26 GHz-band RF signals are amplified up to the desired level then fed to the antenna via the TDD-Switch and the Waveguide Filter.

The received 24-26 GHz-band RF signals by the antenna are fed in to the LNA via the Waveguide Filter and the TDD-Switch. The output signals of the LNA are down-converted into IF signals using the local signal, which is generated by multiplying the 2.4 GHz synthesized oscillator. The BPF is employed to eliminate the image components (interference).

The TDD Switch selects the transmitting or receiving function under the control of TDD/TDMA framer installed in the WT-ASIC.

#### **4.1.4.IF section**

The transmission IF section performs quadrature modulation of 427.5MHz IF frequency according to the transmission output from the digital modem installed in the WT-ASIC. The SAW filter in the next stage eliminates undesired out-of-band signals. The output level of the transmission IF section is adjusted by the automatic transmission gain control (ATPC) function of the digital modem.

In the receiving IF section, the SAW filter eliminates the adjacent channel interference. The received burst signal level is adjusted by the automatic gain control (AGC) function of the digital modem. The quadrature demodulator downconverts the received IF signal into the baseband signal.

### **4.1.5.Digital section**

The digital section consists of a digital modem, TDD/TDMA framer, wireless MAC processor, and system controller. These functionalities are equipped in the WT-ASIC.

The digital modem performs modulation and demodulation of transmitting and receiving burst signals.

The TDD/TDMA framer constructs and deconstructs radio burst frames. It also performs scrambling, encryption, and error correction functionalities.

The wireless MAC processor converts between the Ethernet frames and the wireless MAC frames in the radio channel.

The system controller performs operating parameter setting, state monitoring, control and testing for the entire unit. It also communicates with the AP processor via the DMF channel.

### **4.1.6.Interface section**

The interface section provides the physical interfaces of Ethernet for user interface and serial interface for the receiving level measurement terminal. It has a lightning surge protector to protect the unit against external surges.

### **4.1.7.Power supply**

The power supply section generates various voltages used within the unit from +24V input power.

Figure 4-1 is a block diagram of the WT.

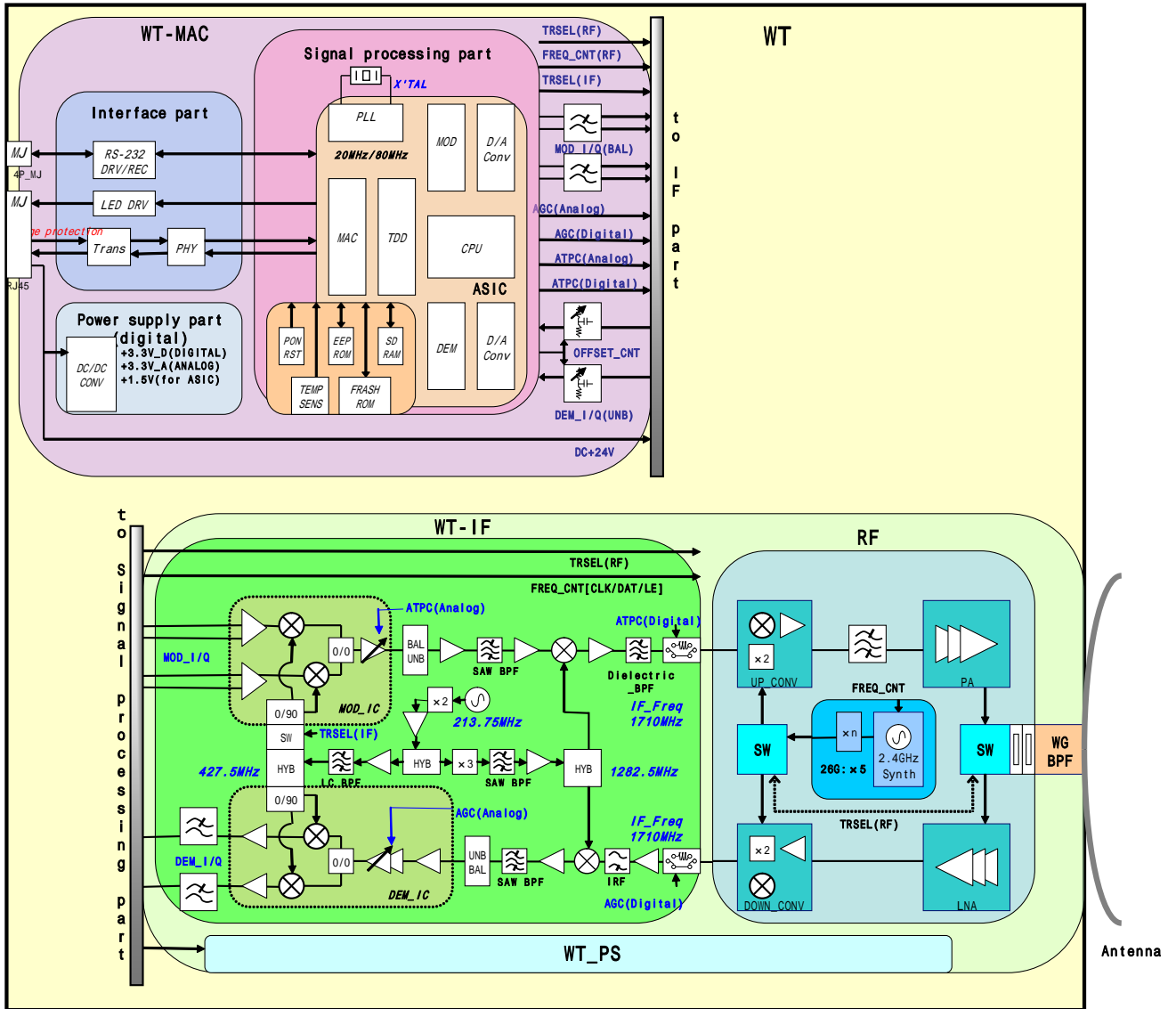


Figure 4-1 WT Block Diagram

## 4.1.8. Operations and Indications

### 4.1.8.1. Indications

(1) Indications

The indications on the WT adapter allows you to check the state of the WT.

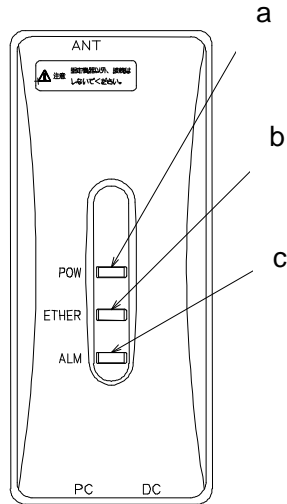


Figure 4-2 Indications on the WT Adapter

Table 4-1 Indications on the WT Adapter

	LED	Indication (Point to Multipoint System)	Indication (Point to Point System)
a	POW	-Lit green: Power on. -Extinguished: Power off.	-Lit green: Power on. -Extinguished: Power off.
b	ETHER	-Lit green: ETHER link established. -Flashing green: Transmission or reception on the ETHER port. -Extinguished: ETHER link down.	-Lit green: ETHER link established. -Flashing green: Transmission or reception on the ETHER port. -Extinguished: ETHER link down.
c	ALM	-Lit red: Wireless synchronization lost. -Flashing red: /Flashing red for 500msec: Wireless synchronization established (during authentication). /Flashing red for 1 sec: VID use halted -Extinguished: Wireless synchronization established (after authentication)	-Lit red: Wireless synchronization lost. -Flashing red: Flashing red for 500msec: Wireless synchronization established (during authentication). -Extinguished: Wireless synchronization established (after authentication)

(2) State transition

The table below shows how each LED changes its state after the power is turned on until the unit becomes operable.

Table 4-2 LED State Transition when the Power is Turned On (Point to Multipoint system)

		Immediately after the power is turned on	Several seconds after the power is turned on	Radio synchronization lost	Authenticating after radio synchronization is reestablished	Operating after authentication is finished	Remarks
a	POW	Lit	Lit	Lit	Lit	Lit	
b	ETHER	Extinguished (Extinguished)	Lit (Lit)	Extinguished (Lit/Flashing)	Extinguished (Lit/Flashing)	Extinguished (Lit/Flashing)	The state within parentheses is that when a PC is connected.
c	ALM	Extinguished	Lit	Lit	Flashing*	Extinguished	

\*Flashing for 500msec. (On for 500msec. and off for 500msec.)

(3) Lighting conditions

The table below shows when the ALM LED lights.

Table 4-3 Lighting Conditions of the ALM LED in the Out-of-Service State (Point to Multipoint system)

Operation state	Out-of-service state	
	Out of service	Cleared
During authentication	ALM LED=Extinguished	ALM LED=Extinguished
During operation	ALM LED=Flashing*	ALM LED=Extinguished
Carrier off	ALM LED=Extinguished	ALM LED=Extinguished

\*Flashing for one second (On for one second and off for one second)

### 4.1.8.2. Switches

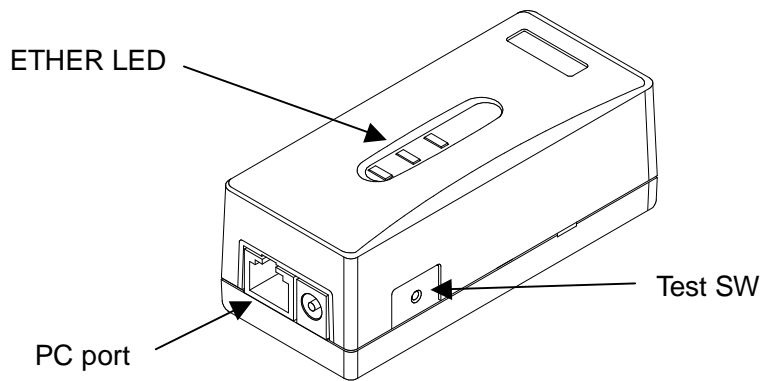


Figure 4-3 Switches on the WT Adapter

(a) [TEST SW] switch

This is the switch to check for any disconnection on the Ethernet cable connecting the WT and WT adapter.

The connection of the ETHER signal line (4) in the Ethernet cable (8) can be confirmed. If you turn on this switch, the Ethernet signal is looped back to the WT and not output to the PC port.

How to check for a disconnection:

- connected to cable between WT and WT adapter, and turns on the power supply with the AC adapter.
- Unplug the cable from the PC port of the WT adapter.
- Make sure that the ETHER LED lights.
- Hold down the TEST SW switch.
- (The Ethernet signal from the WT is looped backed to the WT via the WT adapter.)
- The connection is normal if the ETHER LED lights green.
- The four Ethernet signal lines have a disconnection or wrong wiring if the ETHER LED remains extinguished.



- The TEST SW cannot identify a wrong connection for the straight/cross cable. When connecting a connector, make the correct connection for the straight or cross cable. If you turn on this switch by mistake, the Ethernet signal is looped back to the WT and not output to the PC port.



### 4.1.8.3. Terminals

#### 4.1.8.3.1. WT

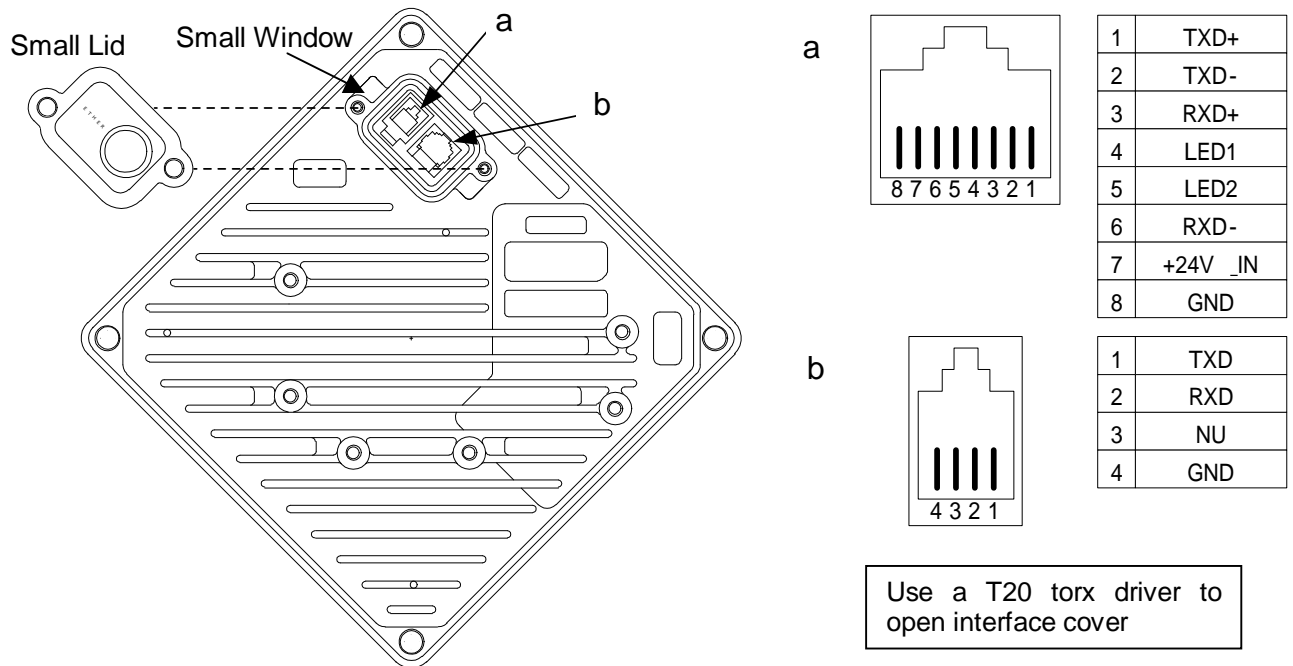


Figure 4-4 Connecting Section of the WT

(a) ETHER port


This is the port to connect the WT to the WT adapter. Use a straight cable between the WT and WT adapter.

Connected cable between WT and WT adapte	
Cable type	Ethernet cable for outdoor, straight
Range of applicable outer diameter	φ5.0 mm ~ 5.7mm
Cable length	50m(max)
Connector	
Shape	RJ-45
Pin assign	<ul style="list-style-type: none"> <li>• Ethernet signal (MDI specification)</li> <li>• An Ethernet cable has eight signal lines. Four lines are used to carry Ethernet signals. The remaining four lines are used as power lines and LED control lines.</li> </ul>

(b) Industrial port

This is the industrial port.

Shape: RJ-22

-  The cable connecting between the WT and WT adapter carries 24 VDC for the WT in addition to Ethernet signals. Before unplugging the cable connecting between the WT and WT adapter, make sure to unplug the DC jack of the WT adapter to turn the power off. Otherwise, the unit may be damaged.
- The cable connecting the WT and WT adapter is a straight cable. Wrong connection may damage the unit.
- When closing the small window, make sure that the rubber packing of the small window is free from any foreign matter.

### 4.1.8.3.2. WT Adapter

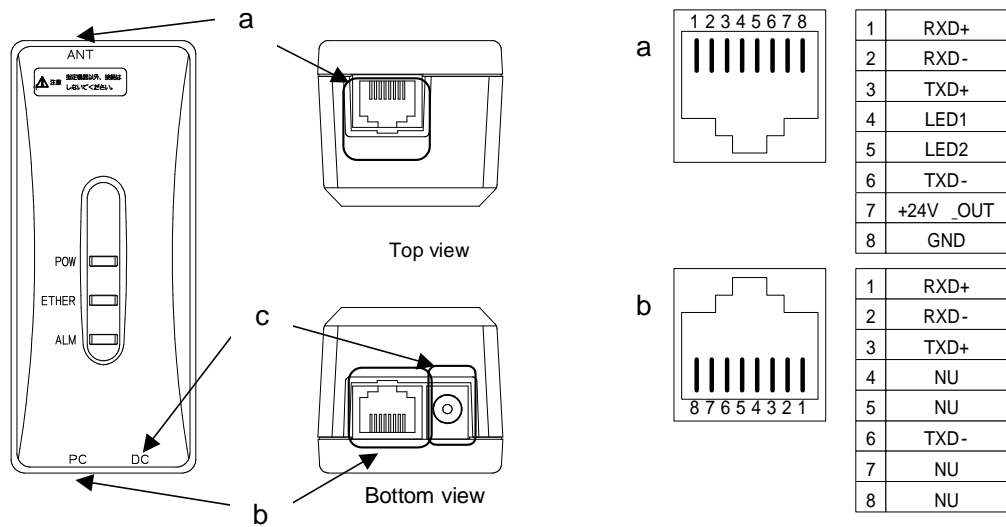


Figure 4-5 Connecting Section of the WT Adapter

(a) ANT port: (Connector type: RJ-45)

This is the port to connect the WT to the WT adapter. Use a straight cable between the WT and WT adapter.

Connected cable between WT and WT adapte	
Cable type	Ethernet cable for outdoor, straight
Range of applicable outer diameter	φ5.0 mm ~ 5.7mm
Cable length	50m(max)
Connector	
Shape	RJ-45
Pin assign	<ul style="list-style-type: none"> <li>• Ethernet signal (MDI X specification)</li> <li>• An Ethernet cable has eight signal lines. Four lines are used to carry Ethernet signals. The remaining four lines are used as power lines and LED control lines.</li> </ul>



(b) PC port: (Connector type: RJ-45)

This is the port to connect the communication terminal.

Interface	
Interface	10BASE-T / 100BASE-TX
Connector	
Shape	RJ-45
Pin assign	Ethernet signal ( MDI-X )

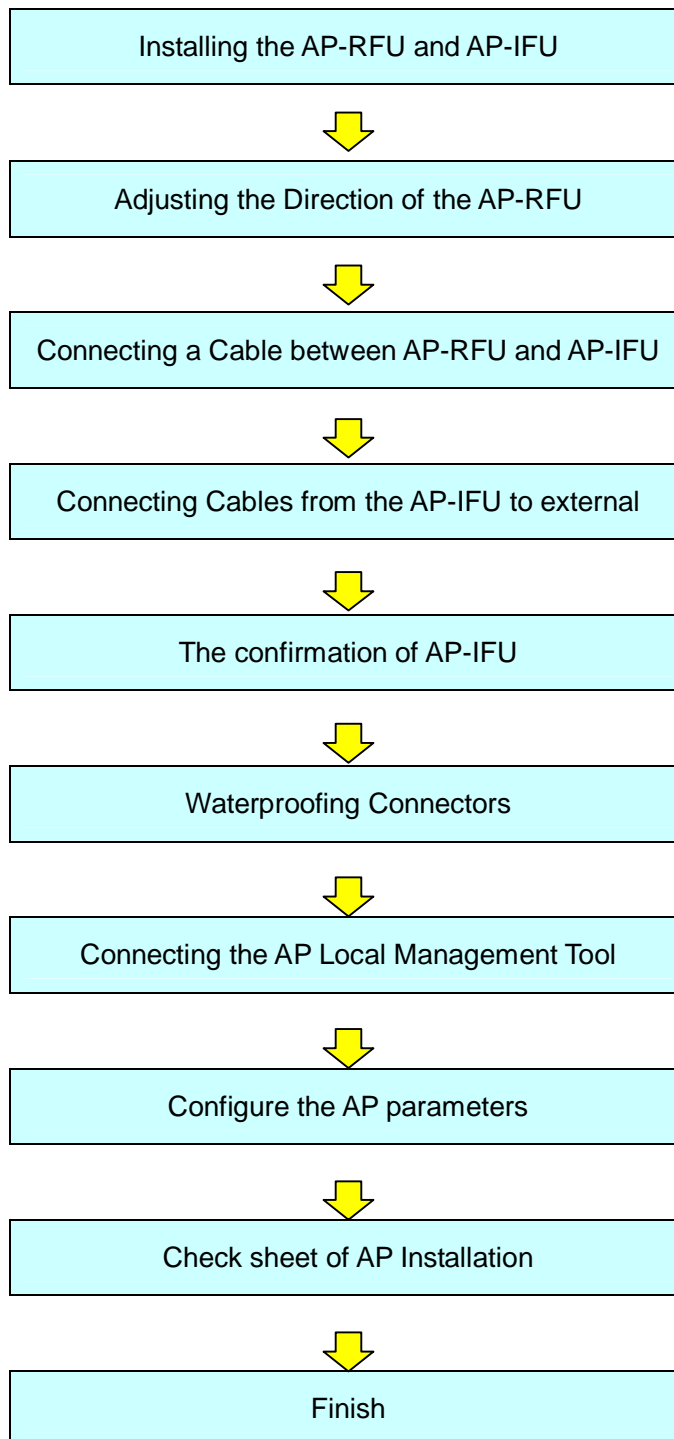
(c) DC jack: (+24VDC power supply)

Connect the AC adapter that comes with the WT.

-  • Never connect a communication terminal to the ANT port of the WT adapter. Doing so may damage your personal computer.
-  • The cable connecting between the WT and WT adapter carries 24 VDC for the WT in addition to Ethernet signals. Before unplugging the cable connecting between the WT and WT adapter, make sure to unplug the DC jack of the WT adapter to turn the power off. Otherwise, the unit may be damaged.
- The cable connecting the WT and WT adapter is a straight cable. Wrong connection may damage the unit.
- PC port: (Connector type: RJ-45 (b))The Equipment for connection to WT adapter PC-interface(RJ-45) shall be appropriate to connect to TNV-1 circuits.

## 5. CONSTRUCTING A POINT-TO-MULTIPOINT SYSTEM (AP)

### 5.1. Overview



## 5.2. Installing the AP-RFU and AP-IFU

### 5.2.1. Installing the AP-RFU (Omni Antenna)

Secure the AP-RFU (omni antenna) to a pole using the bolts (a), as shown in Figure 5-1.

- (1) As shown in Figure 5-1, install the AP mounting bracket on the AP-RFU and tighten the bolts (a).

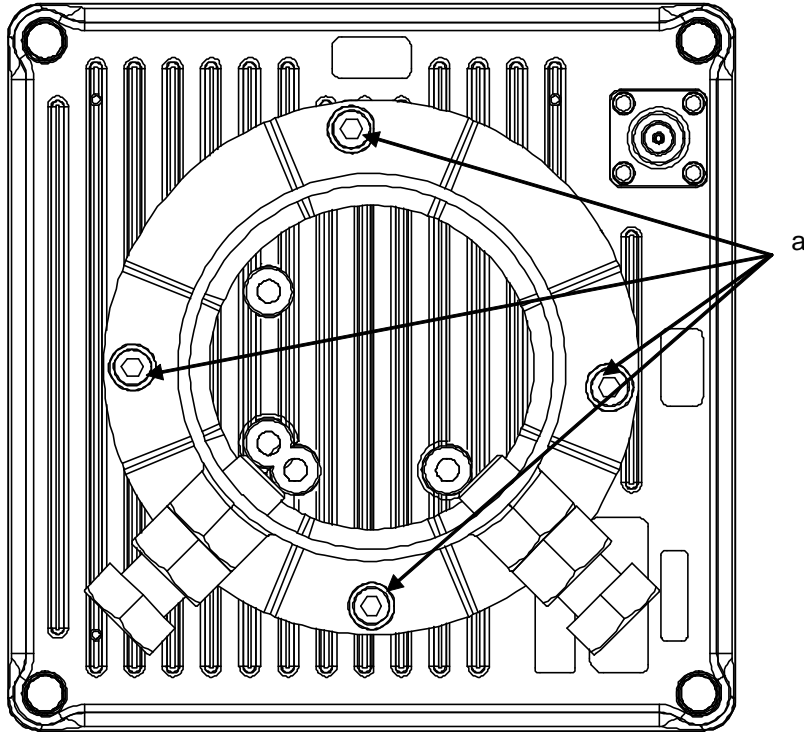


Figure 5-1 Installing the Mounting Bracket on the AP-RFU (Omni Antenna)

- (2) As shown in Figure 5-2, loosen the bolts and nuts (b) and (c) for the AP mounting bracket and install the bracket on the pole. Next, tighten the bolts (b) and tighten the nuts (c) while making sure that the bolts (b) stay in place.

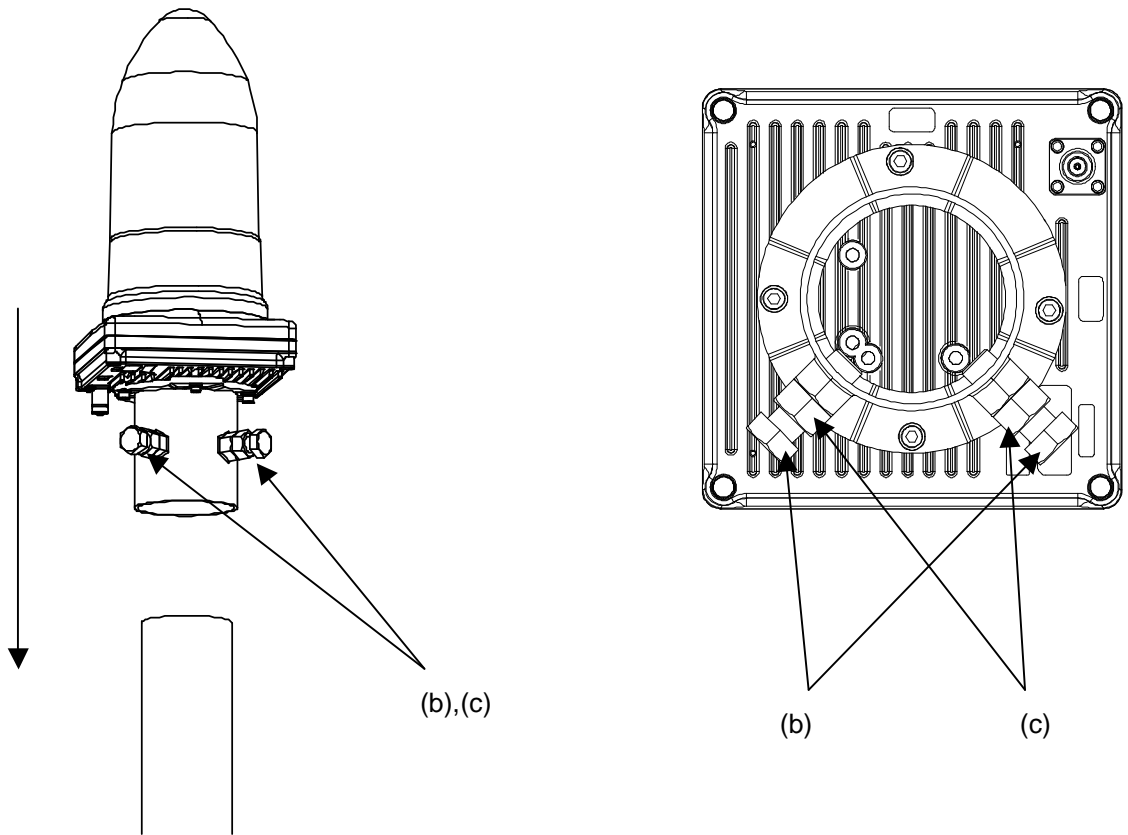


Figure 5-2 Installing the AP-RFU (Omni Antenna)

## 5.2.2. Installing the AP-RFU (Sectoral-Horn Antenna)

The mounting bracket are attached AP-RFU.

- (1) As shown in Figure 5-3, loosen the bolts (a), (b), and (c) and install the AP-RFU mounting bracket on the pole. Next, tighten the bolts (a), (b), and (c). (Recommended tightening torque: 8.5 N-m)

**!** Applicable pole diameter: From 31.8mm to 38.1mm

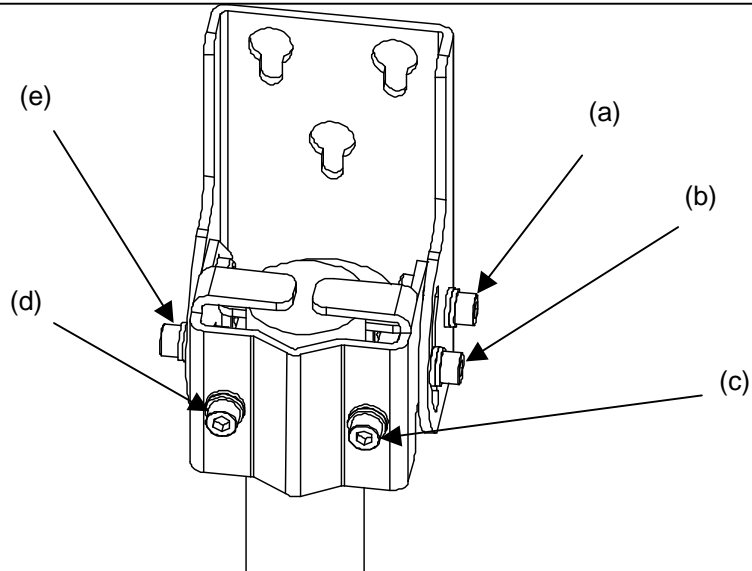


Figure 5-3 Installing the AP-RFU Mounting Bracket on the Pole

- (2) As shown in Figure 5-4, finger-tighten the bolts (f) in the threaded holes on the rear of the AP-RFU.

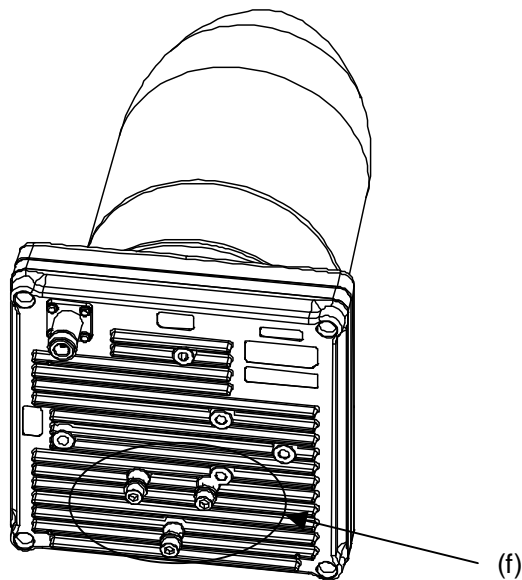


Figure 5-4 Finger-tightening the Mounting Bolts to the AP-RFU

- (3) As shown in Figure 5-5, align the AP-RFU with the openings in the AP-RFU mounting bracket and tighten the bolts (f). (Recommended tightening torque: 8.5N-m)

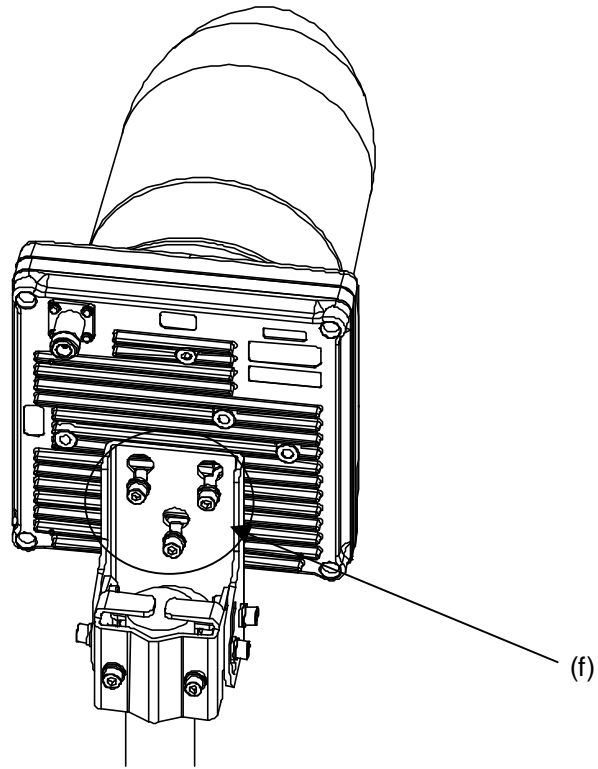


Figure 5-5 Installing the AP-RFU on the Mounting Bracket



A builder prepares a steel pipe by the installation place (a wall, a pole or etc.), and it install.  
The required space of installation is shown below.

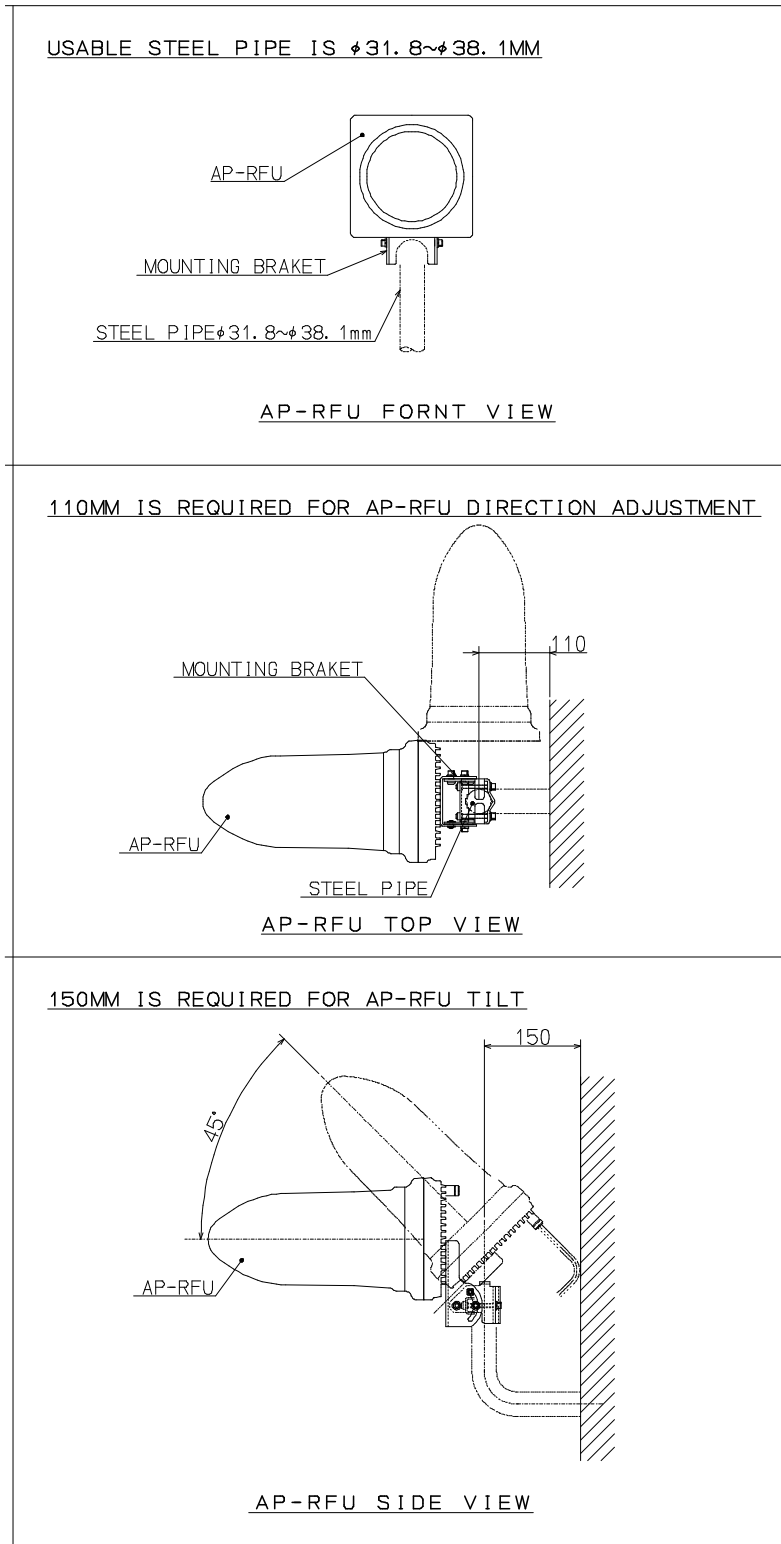


Figure 5-6 the required space of installation

### 5.2.3. Setting AP-RFU(Sectoral-Horn Antenna)for Vertical or Horizontal Polarization

#### (1) NTG-335<1><2>V

The NTG-335<1><2>V device is used only for the vertical polarization plane. Install it with the **TOP V** marking at the top.

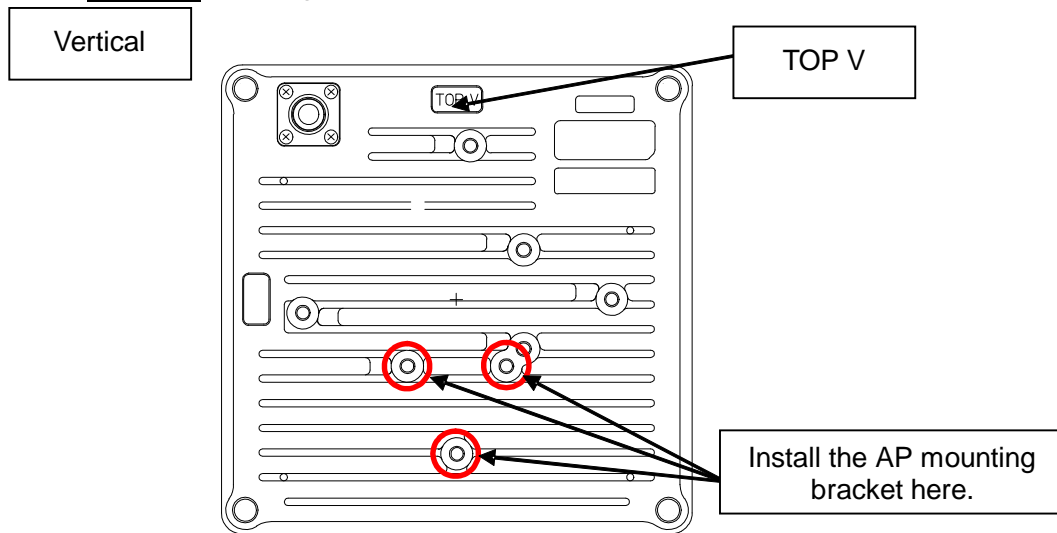


Figure 5-7 Vertical Polarization

#### (2) NTG-335<1><2>H

The NTG-335<1><2>H device is used only for the horizontal polarization plane. Install it with the **TOP H** marking at the top.

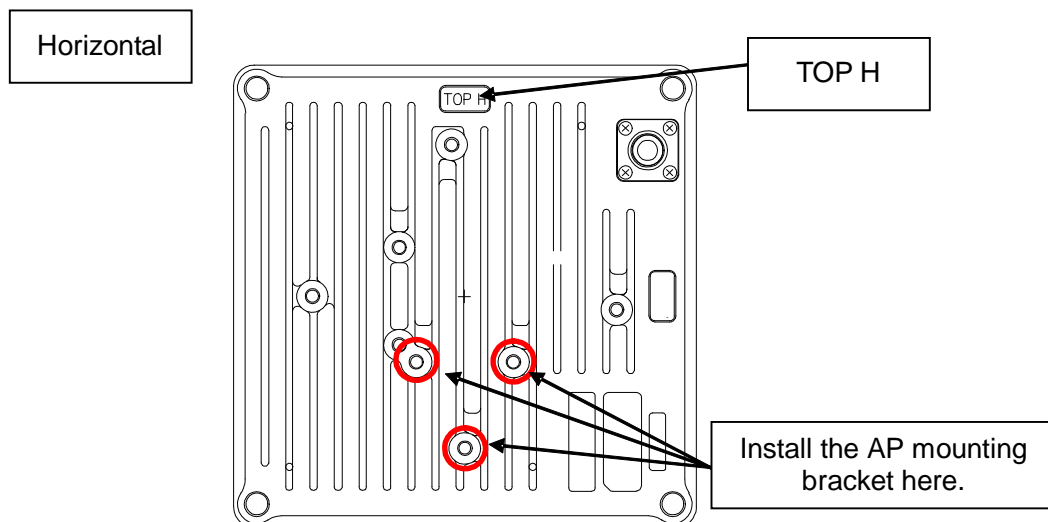


Figure 5-8 Horizontal Polarization

## 5.2.4. installing the AP-IFU

### 5.2.4.1. Installing the AP-IFU

The mounting braket are attached AP-IFU.

A builder prepares a fixing braket by the installation place (a wall, a pole or etc.), and it install.

The required space of installation is shown below.

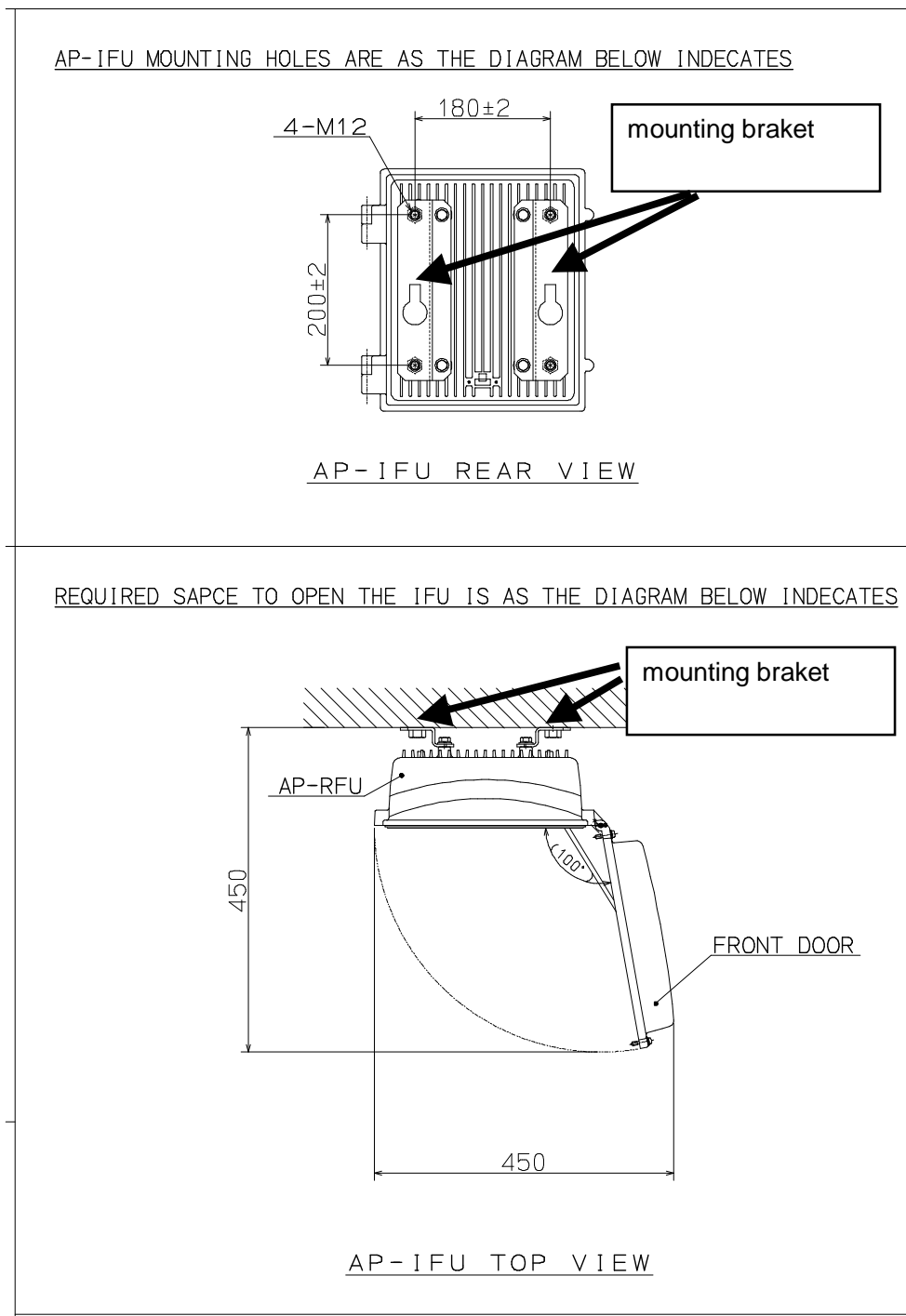


Figure 5-9 The required space of installation

### 5.2.4.2. Example of Installing the AP-IFU

(1) On a Utility Pole

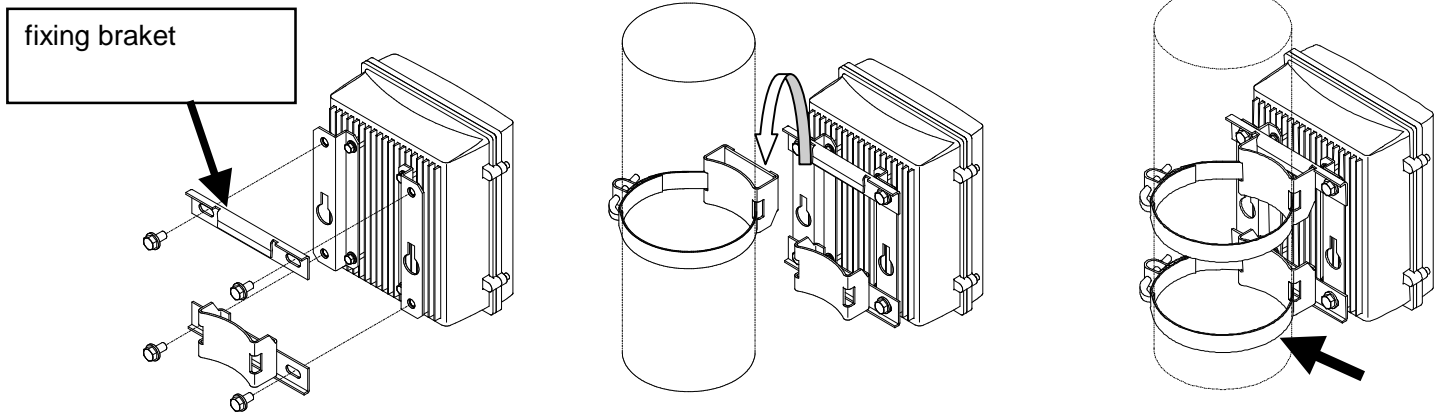


Figure 5-10 Installing the AP-IFU on a Utility Pole

(2) Indoor Installation

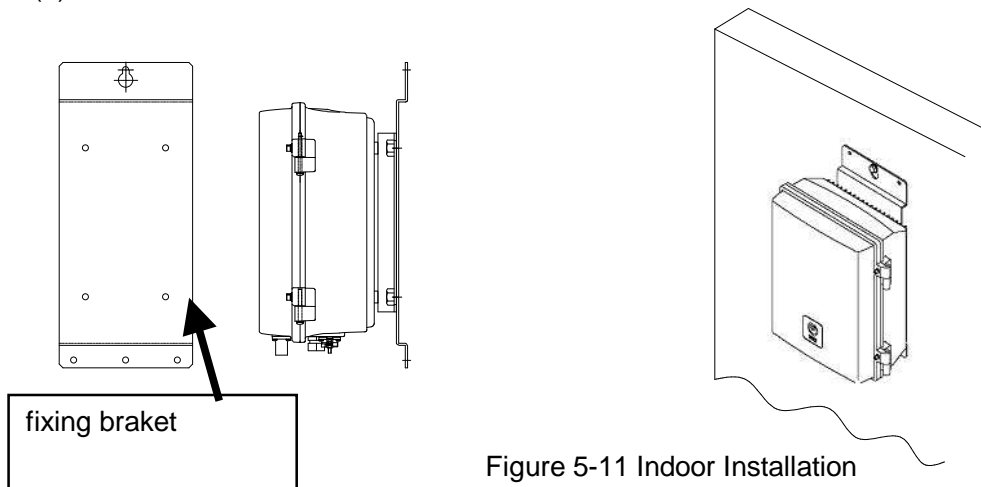


Figure 5-11 Indoor Installation

(3) 19-inch Rack

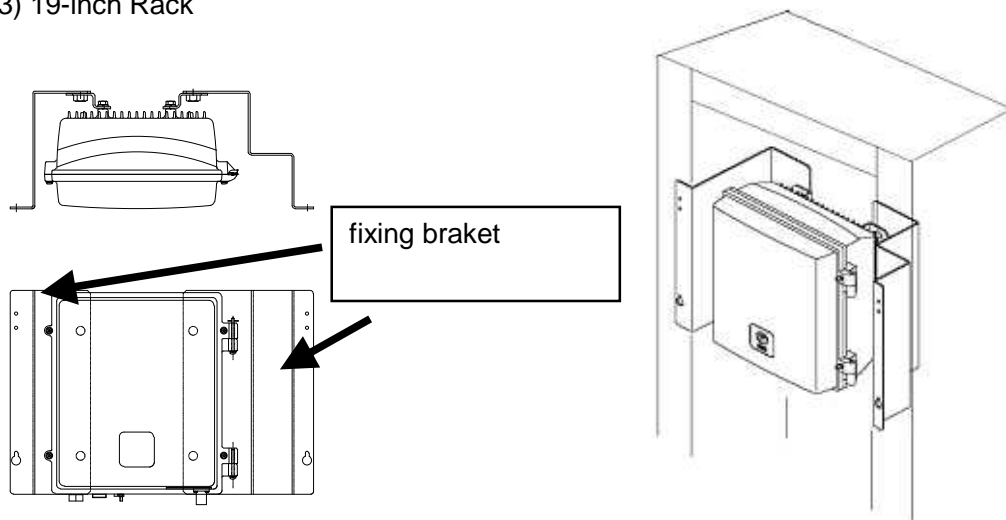


Figure 5-12 Installing the AP-IFU on a 19-inch Rack

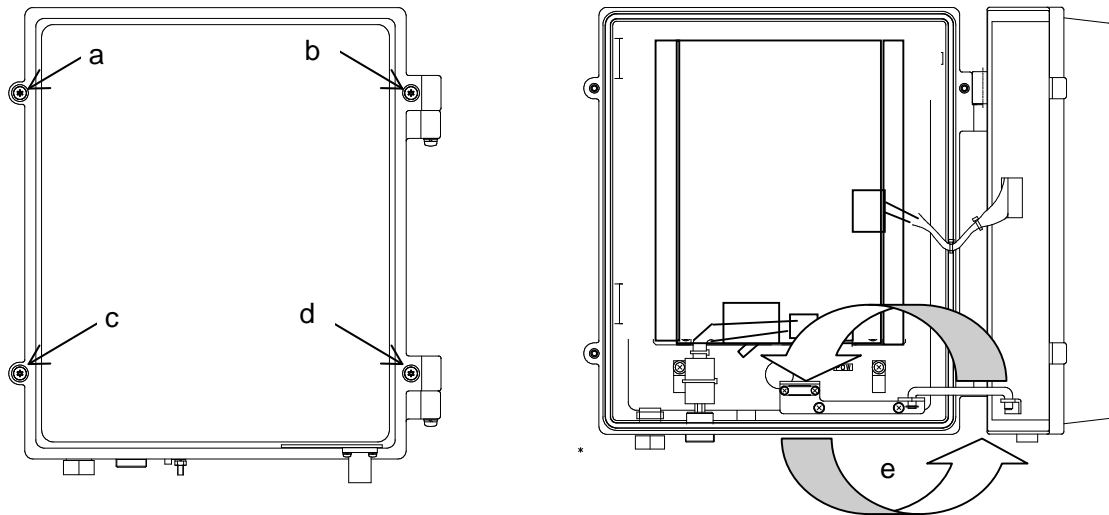
### 5.2.4.3. Opening and Closing the AP-IFU Cover

To open the cover:

- (1) Loosen the special screws (a) to (d) to open the cover as shown in Figure 5-13.
- (2) Keep the cover stay open using the stopper (e) as shown in Figure 5-13.

To close the cover:

- (1) Replace the stopper (e) on the main unit as shown in Figure 5-13
- (2) Close the cover and tighten the special screws (a) to (d) as shown in Figure 5-13.



Use a T25 torx driver to open the AP-IFU cover.

Figure 5-13 Opening and Closing the AP-IFU Cover



- When opening the AP-IFU cover, make sure that the four special screws are loosened completely. Forcing open the cover may damage it.
- After you opened the AP-IFU cover, make sure to secure it using the stopper. Otherwise, you may get hurt. To close the cover, be sure to return the stopper to the original position.
- If it is difficult to tighten the four special screws of the AP-IFU cover, adjust the locations of the screw holes (support the cover and align the top of the cover to that of the chassis) and tighten the screws. Forced tightening of the screws may damage the cover and screws.
- When closing the cover, be careful not to nick cables.

## **5.3. Adjusting the Direction of the AP-RFU**

### **5.3.1. Adjusting the Direction of the AP-RFU (Omni Antenna)**

The AP-RFU (omni antenna) eliminates the need for adjusting the antenna direction.

### **5.3.2. Adjusting the Direction of the AP-RFU (Sectoral-Horn Antenna)**

This section explains how to adjust the antenna direction for the AP-RFU (sectoral-horn antenna). To adjust the antenna direction for the AP-RFU (sectoral-horn antenna), use the Antenna direction adjustment tool and the following procedure.

Step1 Before adjusting

- Install the Antenna direction adjustment tool.

Step2 Direction adjustment of the antenna

- Adjust the horizontal direction
- Adjust the vertical direction
- Tighten the antenna with the appropriate torque.

Step3 After adjusting

- Remove the Antenna direction adjustment tool.

### 5.3.3.Direction adjustment of the antenna

Step1 Adjust the horizontal direction

- As shown in Figure 5-14, use the wing bolt (a) to attach the Antenna direction adjustment tool.
- As shown in Figure 5-15, loosen the hexagonal socket head bolts (b) and (c) securing the mounting bracket, swing the antenna left or right, and adjust the horizontal direction.
- Finally, tighten the bolts (b) and (c). ( Recommended tightening torque: 8.5 N-m )

In figure is an example when the antenna type is the horizontal polarization.

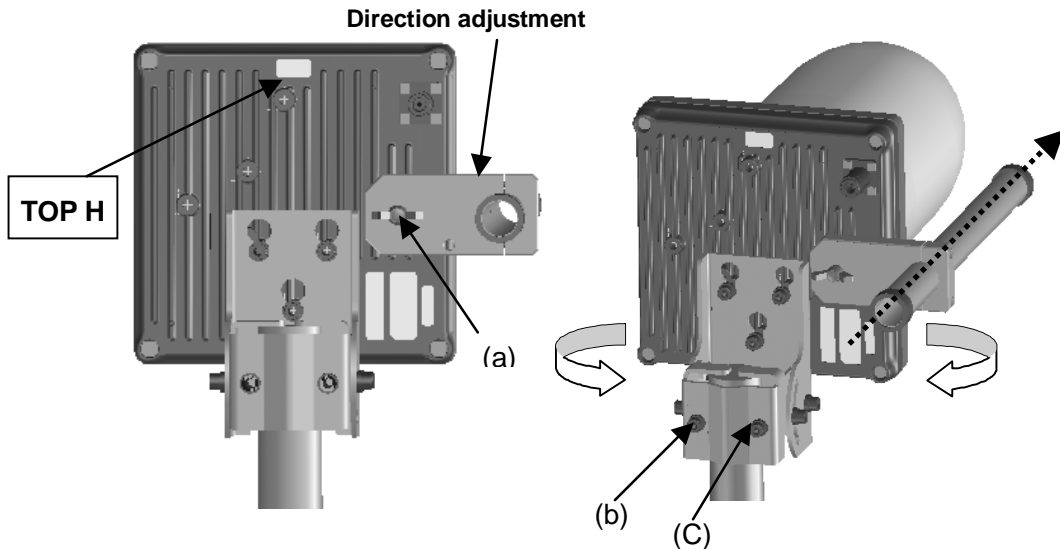


Figure 5-14 Attaching the Direction Adjustment tool      Figure 5-15 Adjusting the Horizontal Direction

Step2 Adjust the vertical direction

- As shown in Figure 5-16, loosen the hexagonal socket head bolts (d), (e), and (f) securing the mounting bracket, and tilt the antenna up or down to adjust the vertical direction.
- Tighten the bolts (d), (e) and (f). ( Recommended tightening torque: 8.5 N-m )
- Finally, loosen the wing bolt (a) and remove the Antenna direction adjustment tool.

In figure is an example when the antenna type is the horizontal polarization.

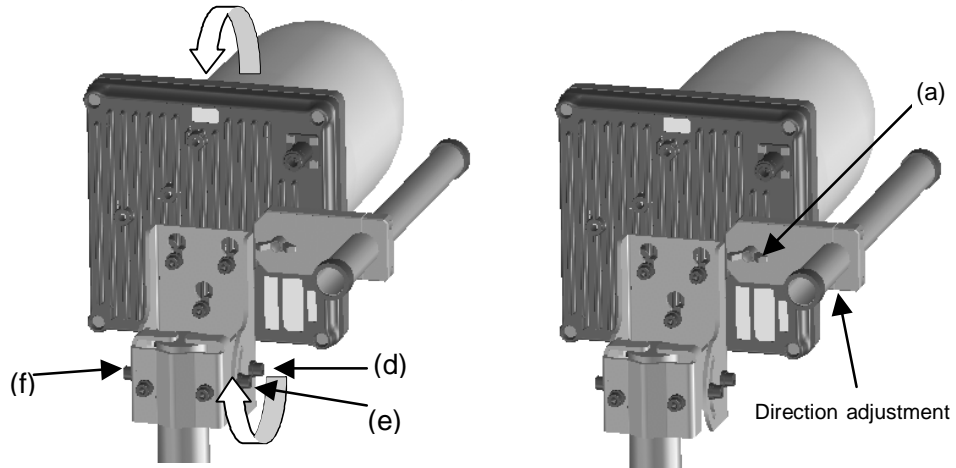


Figure 5-16 Adjusting the Vertical Direction

## 5.4. Connecting a Cable between AP-RFU and AP-IFU

### 5.4.1. AP-RFU (Omni Antenna)

Step1 Use the coaxial cable to connect the AP-RFU and the AP-IFU. (Figure 5-17)

Step2 Waterproof the connection with self-bonding tape or cold-shrinkable tube.

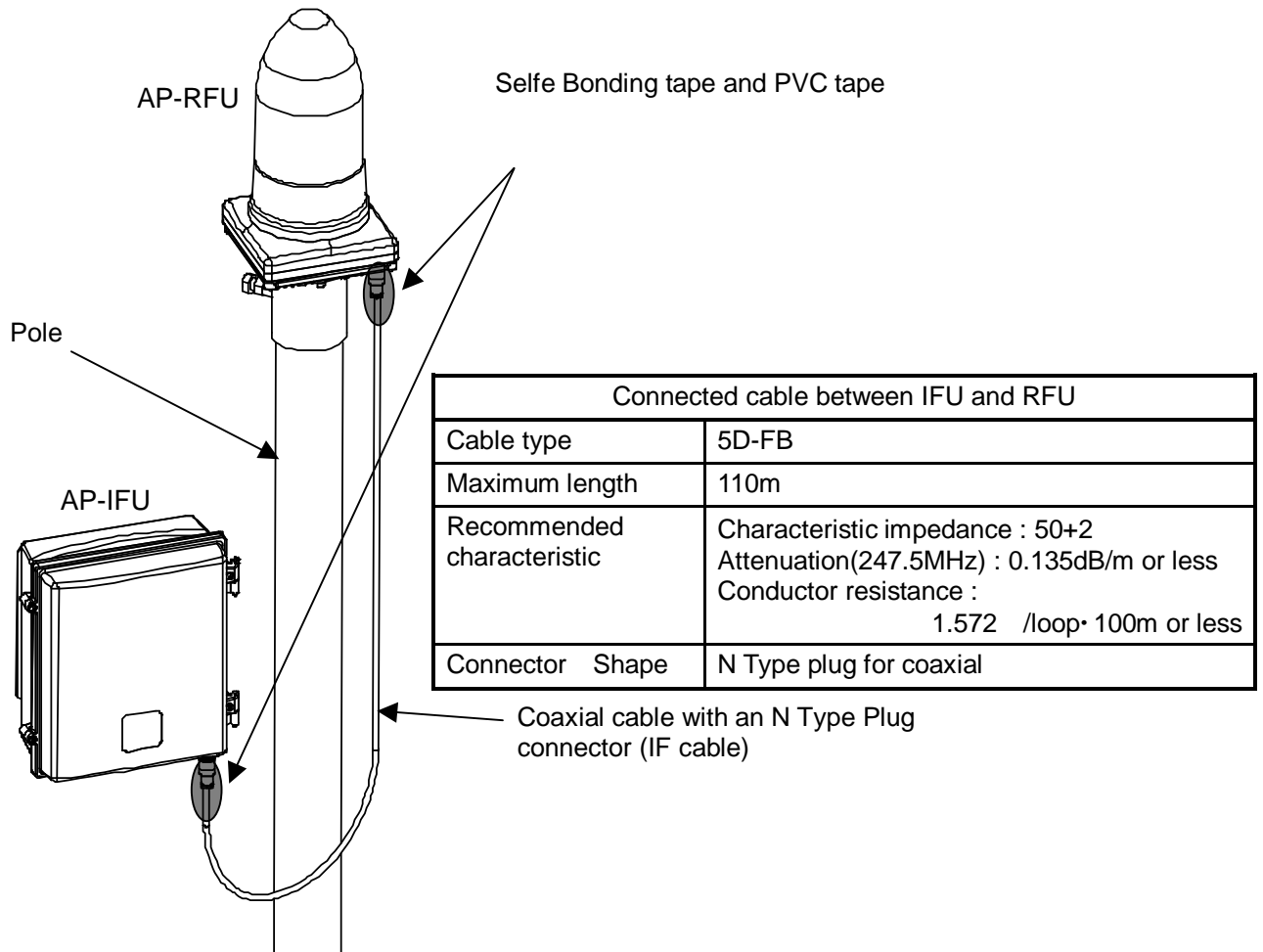


Figure 5-17 Connecting the Cable to the AP-RFU (Omni Antenna)



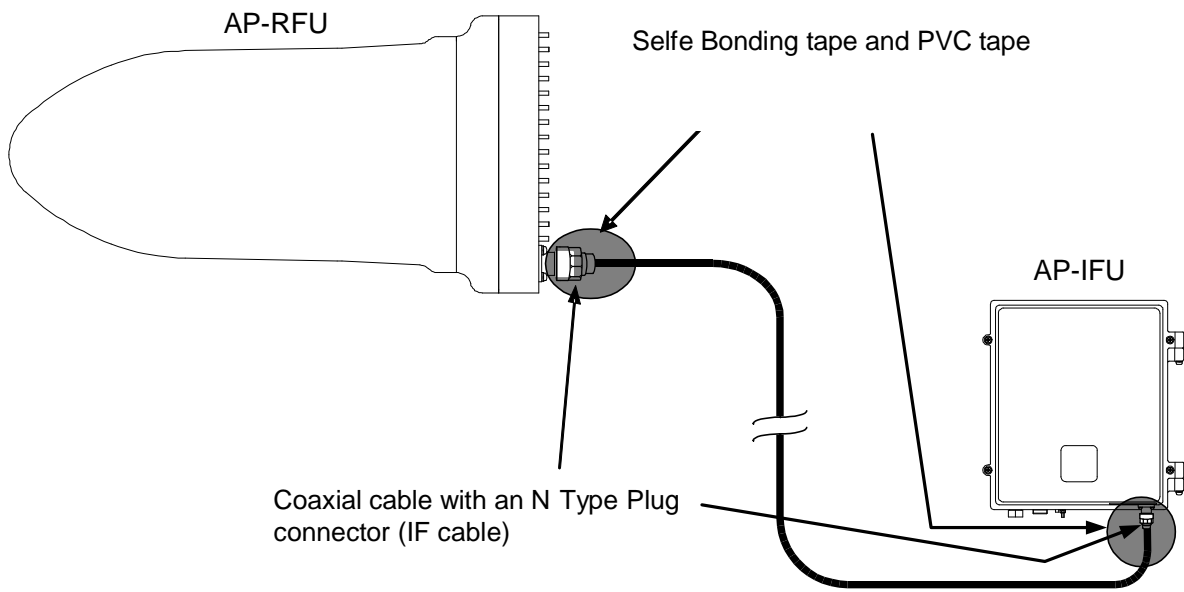
- +16VDC to be supplied to the AP-RFU is superimposed on the signals in the IF cable. Turn off the power to the AP-IFU when installing or removing the IF cable. Otherwise, the unit may be damaged.
- Cover the cable connection with a cold-shrinkable sleeve to make it waterproof. Otherwise, water may get in the connection.
- The curvature radius of the connection cable between the RFU and IFU should be 6 times or more the outer diameter of the cable.
- When securing the connection cable between the RFU and IFU, be careful so the cable is not deformed.



## 5.4.2.AP-RFU (Sectoral-Horn Antenna)

Step1 Use the coaxial cable to connect the AP-RFU and the AP-IFU. (Figure 5-18)

Step2 Waterproof the connection with self-bonding tape and PVC tape.



Connected cable between IFU and RFU	
Cable type	5D-FB
Maximum length	110m
Recommended characteristic	Characteristic impedance : 50+2 Attenuation(247.5MHz) : 0.135dB/m or less Conductor resistance :1.572 /loop· 100m or less
Connector Shape	N Type plug for coaxial

Figure 5-18 Connecting a Cable to the AP-RFU (Sectoral-Horn Antenna)



- +16VDC to be supplied to the AP-RFU is superimposed on the signals in the IF cable. Turn off the power to the AP-IFU when installing or removing the IF cable. Otherwise, the unit may be damaged.
- Cover the cable connection with a cold-shrinkable sleeve to make it waterproof. Otherwise, water may get in the connection.
- The curvature radius of the connection cable between the RFU and IFU should be 6 times or more the outer diameter of the cable.
- When securing the connection cable between the RFU and IFU, be careful so the cable is not deformed.

## 5.5. Connecting Cables from the AP-IFU to external

Step1 Connect four cables to the AP-IFU: a coaxial cable (with an N-type plug), Ethernet cable, outdoor power supply cable, and ground wire.

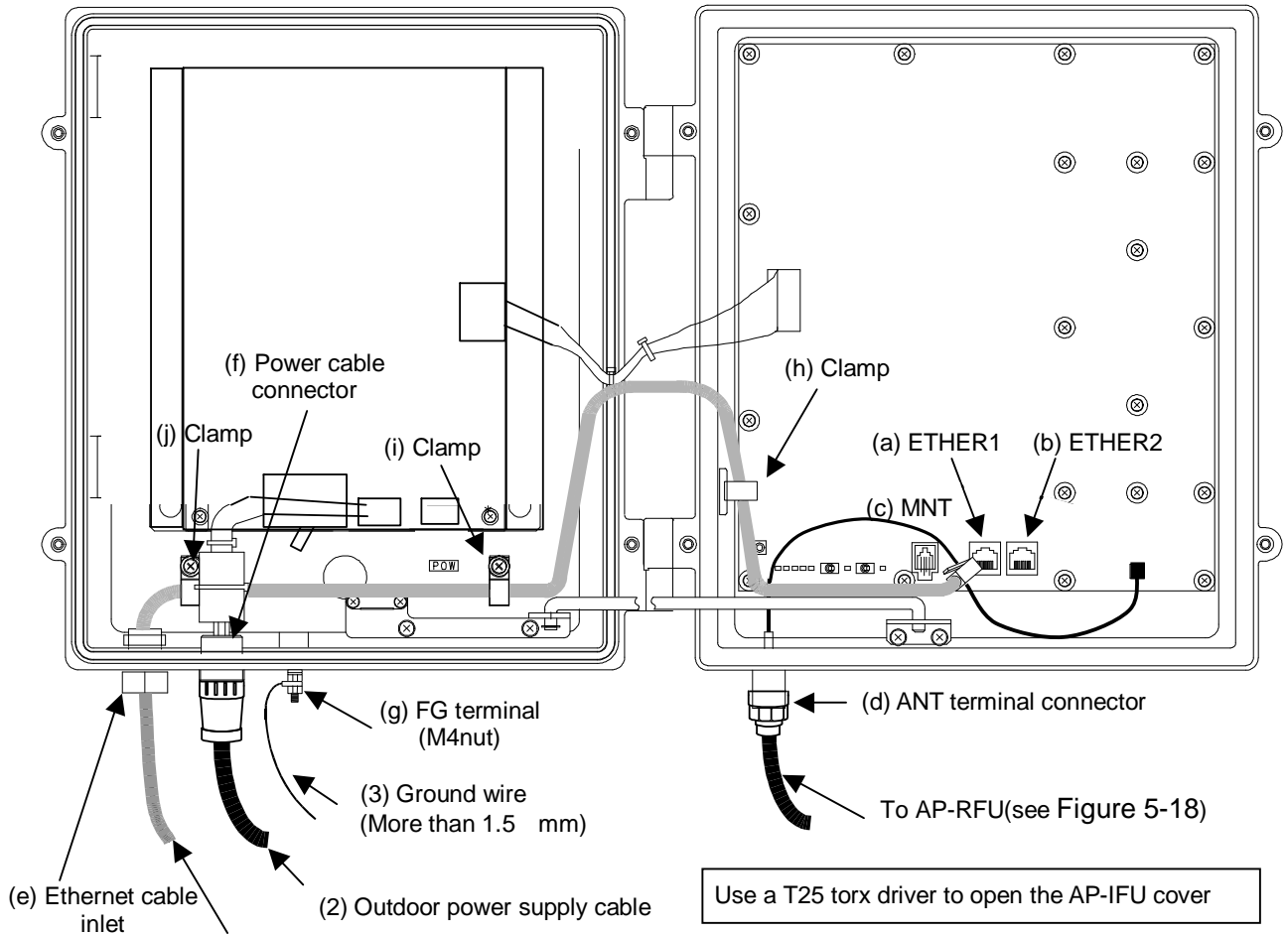


Figure 5-19 Connecting Cables to the AP-IFU

(1) Ethernet Cable	
Cable contents	Connect the (a)ETHER1 connector. Fix the cable by using (h), (i), (j) clamp in the AP-IFU. Connect the external network through the (e)Ethernet cable inlet.
Interface	100BASE-Tx
Connector shape	RJ-45
Pin assign	ETHER signal ( MDI )
Cable type	Ethernet cable for outdoor
Range of applicable outer diameter	Φ5.5mm or less

(2) Power cable	
Contents	Connect the power cable connector.
Equipment specification of power	DC-48V,35W(Max)
Range of applicable outer diameter	7.0mm – 8.5mm
Connector name	NRW-203-RM-ULCSATUV (Nanaboshi Electric MFG Co.,LTD.)
Applicable Connector	NRW-203-PF8-ULCSAUV (Nanaboshi Electric MFG Co.,LTD.) (This connector is supplied with AP-IFU.)
(3) Ground wire	
Contents	Connect the ground wire.
Applicable Cable	Ground wire more than 1.5□
Applicable terminal	FG terminal M4nut.
Method of processing connector	See Subsection 5.5.1

(1) Ethernet cable



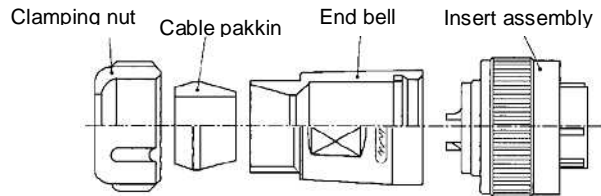
- Ground wire more than 1.5□mm
- FG terminal M4nut.
- The DC -48V power supply voltage for AP-IFU shall be SELV or TNV-1 depending on the network environment (0 or 1) acc. to IEC62102.
- The Equipment for connection to AP-IFU Ethernet-interface(RJ-45) shall be appropriate to connect to TNV-1 circuits.
- For the connection Terminal Equipment to AP-IFU and a cables suitable for outdoor use shall be installed.
- When opening the AP-IFU cover, make sure that the four special screws are loosened completely. Forcing open the cover may damage it.
- +16VDC to be supplied to the AP-RFU is superimposed on the signals in the IF cable. Turn off the power to the AP-IFU when installing or removing the IF cable. Otherwise, the unit may be damaged.
- Cover the cable connection with a cold-shrinkable sleeve to make it waterproof. Otherwise, water may get in the connection.
- After you opened the AP-IFU cover, make sure to secure it using the stopper. Otherwise, you may get hurt. To close the cover, be sure to return the stopper to the original position.
- For the connection AP-IFU to AP-RFU and a coaxial cable suitable for outdoor use shall be installed.

## 5.5.1. Connecting the Power cable connector

The connector manufacturer (Nanaboshi Electric MFG Co., Ltd.) recommends the following method of cable connection.

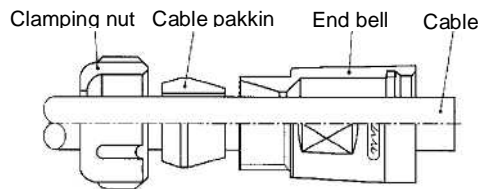
(1) Disassemble the connector, as shown here.

- (a) Remove the insert assembly from the end bell by turning the assembly counterclockwise.
- (b) Loosen the clamping nut to remove the cable packing.

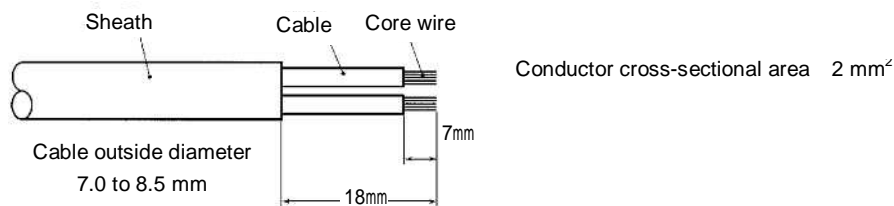


(2) Pass the cable through the disassembled parts in the sequence shown here.

Note: Be sure that all the parts are placed in the specified sequence and in the correct direction.



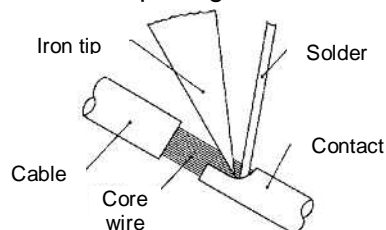
(3) Peel the cable sheath and wires according to the dimensions specified here.



(4) Process the ends of the cable's core wires and pretin them.

Note: Do not pretin the cable sheath.

Note: When the cable core is pretinned, it should be uniform everywhere and smaller than the diameter of the opening in the contact.



(5) Soldering

- (a) Insert the pretinned core wires into the contact's solder pot.
- (b) Using a soldering iron, heat the contact and the core wires.
- (c) Let solder flow into the gap between the contact and the core wires until the gap is filled.

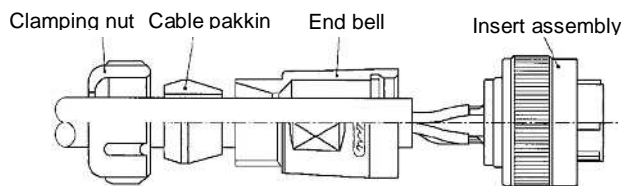
Soldering iron wattage [W]	Conductor cross-sectional area [mm <sup>2</sup> ]	Iron tip temperature [ ]
30	2	350 to 370

(6) Assemble the connector.

- (a) Clamp the insert assembly and tighten the end bell with the specified torque.
- (b) Push the cable packing into the end bell, clamp the end bell, and tighten the clamping nut with the specified torque.
- (c) Move the cable back and forth until it moves easily (as shown). Once again, tighten the parts with the specified torque.

Where to tighten	Shell size: 20
End bell	1.0 to 1.5
Clamping nut	1.5 to 2.0

[Unit: N-m]



## 5.6. The confirmation of AP-IFU

Turn on the AP-IFU and check the state of the LEDs on the AP-IFU.

Table 5-1 LED State Indications

AP-IFU LED	State
POWER LED	Lit green
IFU STATE LED	Flashing green
IFU ALM LED	Off
ETHER1 LED	Lit green or flashing
ETHER2 LED	Off *1
ETHER1 AUTO LED	Off *2
ETHER2 AUTO LED	Off *3

\*1 The LED lights if an Ethernet cable is connected to ETHER2.

\*2 The LED lights if the ETHER1 switch is set at AUTO.

\*3 The LED lights if the ETHER2 switch is set at AUTO.

## 5.7. Waterproofing Connectors

### 5.7.1. Self Bonding tape

Figure 5-20 shows how to waterproof the connection using self-bonding tape.

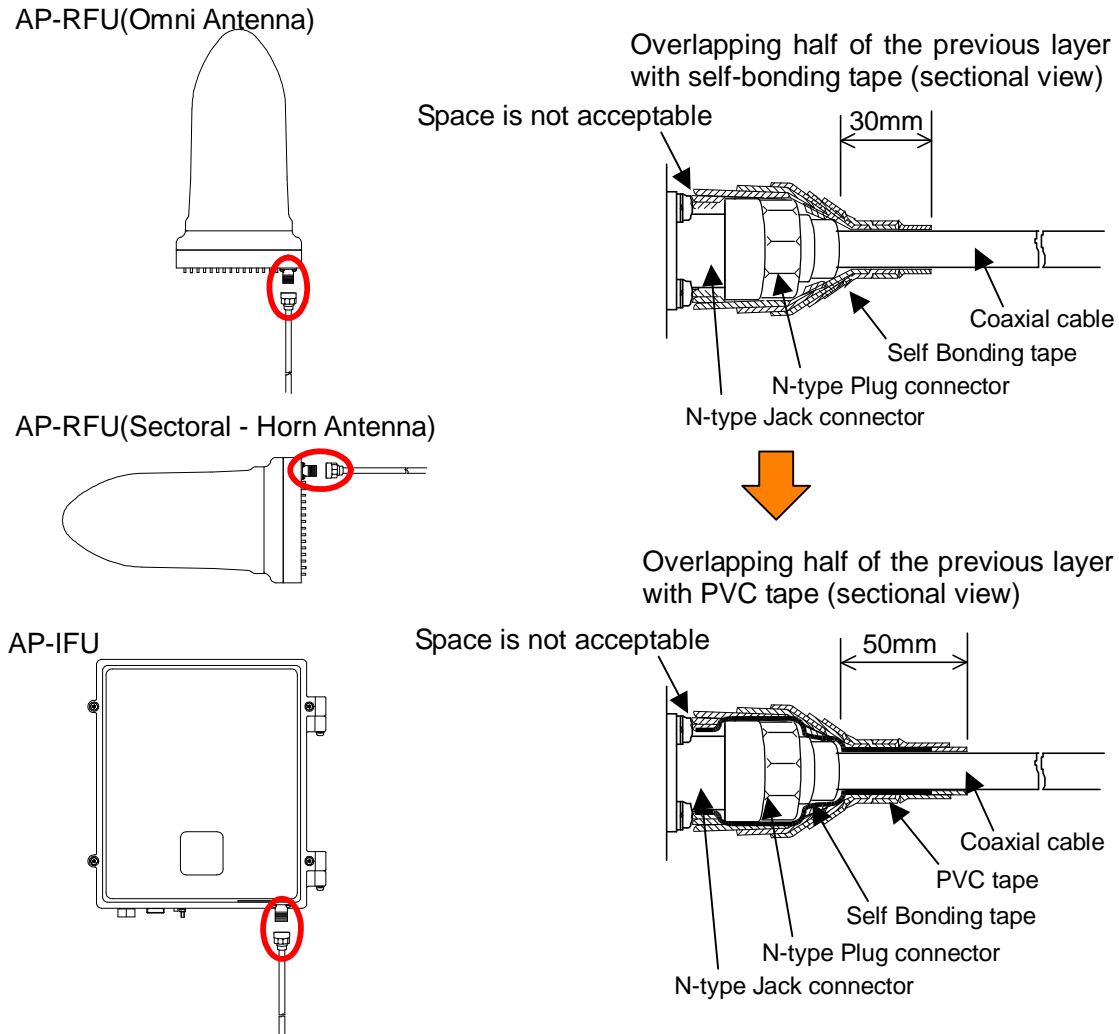


Figure 5-20 Waterproofing a Connector Using Self-Bonding Tape

#### Waterproofing procedure

- Step1 Wrap the self-bonding tape around the base of the N-type jack connector on the unit side one complete turn. After one turn, wrap around the coaxial cable by about 30 millimeters, overlapping one-half of the previous turn. Reverse the wrapping direction back to the base of the N-type jack connector on the unit side.
- Step2 Wrap the PVC tape for class 2 protection around the coaxial cable starting from the base of the N-type jack connector on the unit side by about 50 millimeters,

overlapping one-half of the previous turn so that the self-bonding tape is completely hidden. Reverse the wrapping direction back to the base of the N-type jack connector on the unit side.



- For the stretching margin of self-bonding tape, see the instruction manual for the product.
- Press evenly along the entire length of tape to remove air pockets.
- Make sure that there are no air pockets between layers of the self-bonding tape. Air pockets will degrade the waterproofing effect.



## 5.8. Connecting the AP Local Management Tool

Open the cover of the AP-IFU.

Connect the AP local management tool terminal to the MNT port of the AP-IFU using the AP local management cable as shown in Figure 5-21

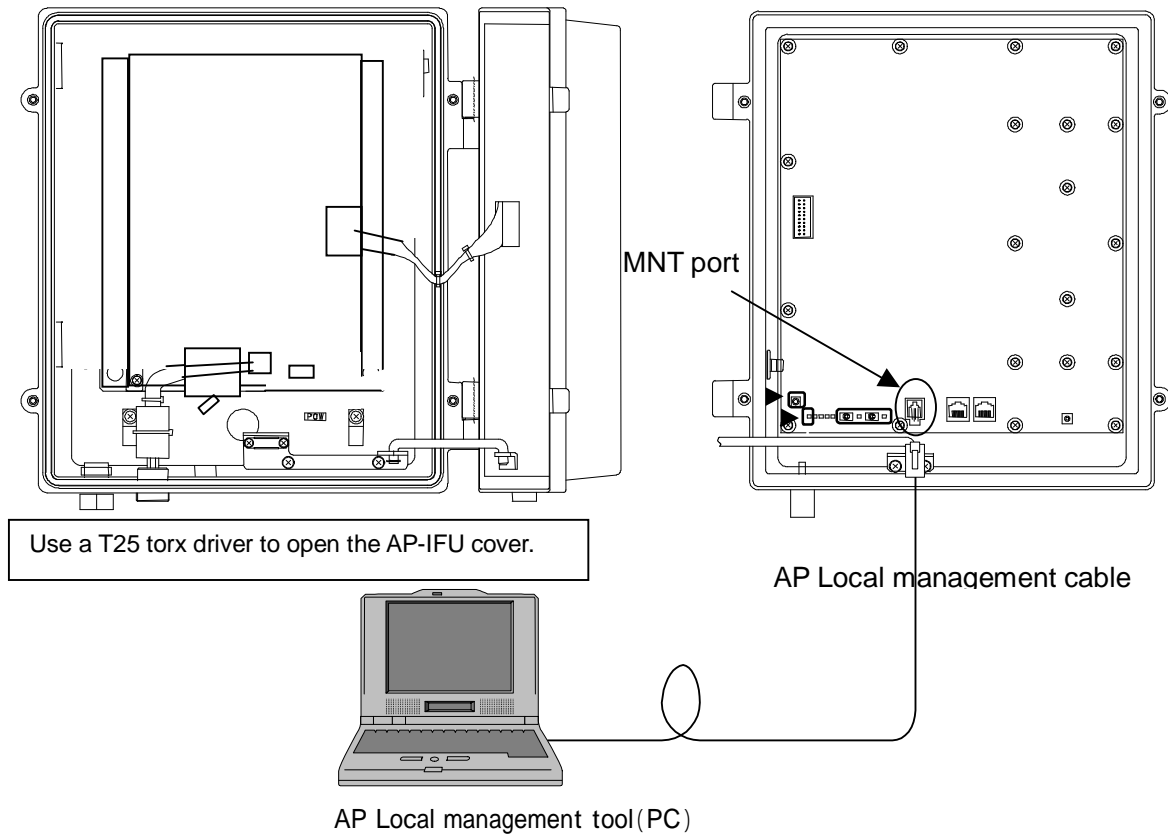


Figure 5-21 Connection

- When opening the AP-IFU cover, make sure that the four special screws are loosened completely. Forcing to open the cover may damage it.
- After you opened the AP-IFU cover, make sure to secure it using the stopper. Otherwise, you may get hurt. To close the cover, be sure to return the stopper to the original position.
- If it is difficult to tighten the four special screws of the AP-IFU cover, adjust the locations of the screw holes (support the cover and align the top of the cover to that of the chassis) and tighten the screws. Forced tightening of the screws may damage the cover and screws.
- When closing the cover, be careful not to nick cables.

## 5.9. Configure the AP parameters

### 5.9.1. AP Local management tool

#### 5.9.1.1. Configure the AP network parameters

Use the AP Local Management Tool to set the network parameters.

These settings enable the OpS to connect to the AP.

Perform the following setup procedure from the AP setup screen on the AP Local Management Tool.

- Step 1: OpS Frame Priority: Set the OpS frame priority.
- Step 2: User Frame Priority: Set the user frame priority.
- Step 3: OpS Frame VLAN-ID: Set the OpS frame Vlan-ID.
- Step 4: Radio frequency: Set the radio frequency.
- Step 5: AP IP Address: Set the AP IP address.
- Step 6: Subnet mask: Set the subnet mask.
- Step 7: Default gateway: Set the default gateway.
- Step 8: Trap Des, IP Add. 1: Set the "Reg./Not" and trap destination IP address 1. Set "Reg." or "Not" and set an IP address for trap destination IP address 1. If necessary, you can also set Trap Des, IP Add. 2 and Trap Des, IP Add. 3.
- Step 9: Ether-IF 1: Set whether to use Ether-IF 1. If necessary, you can also set Ether-IF 2.
- Step 10: Click the **Setup** button.

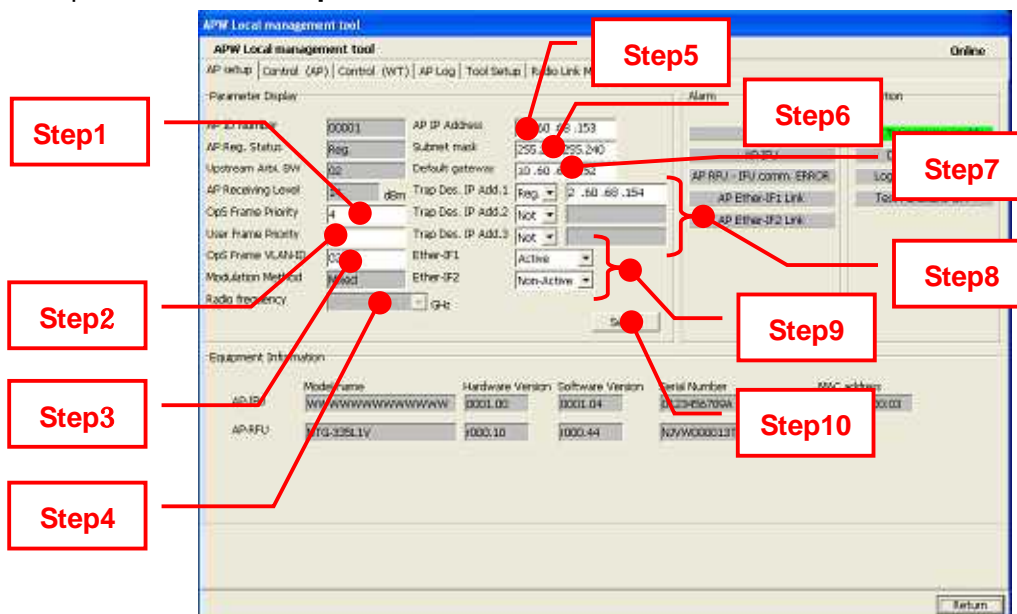


Figure 5-22 Configure the AP network

Step 11: when you click the button, a range check is performed. If the range check does not detect any error, the Confirmation dialog box appears. Click the Yes (Y) button.

If a range error is detected, a message saying that a setting value is outside the range appears.

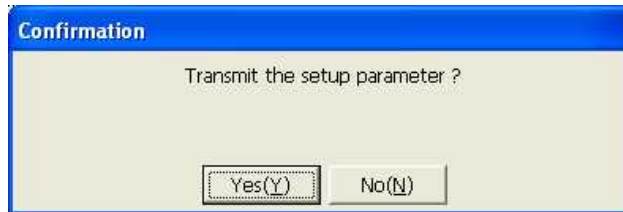


Figure 5-23 Confirmation Dialog Box

### 5.9.1.2. Reset the AP

Resetting the AP-IFU enables the AP network parameter settings.

To reset the AP-RFU, on the Control (AP) screen in the AL Local Management Tool, click the **Execute** button. A confirmation dialog box appears. Clicking the **Yes (Y)** button executes a reset.

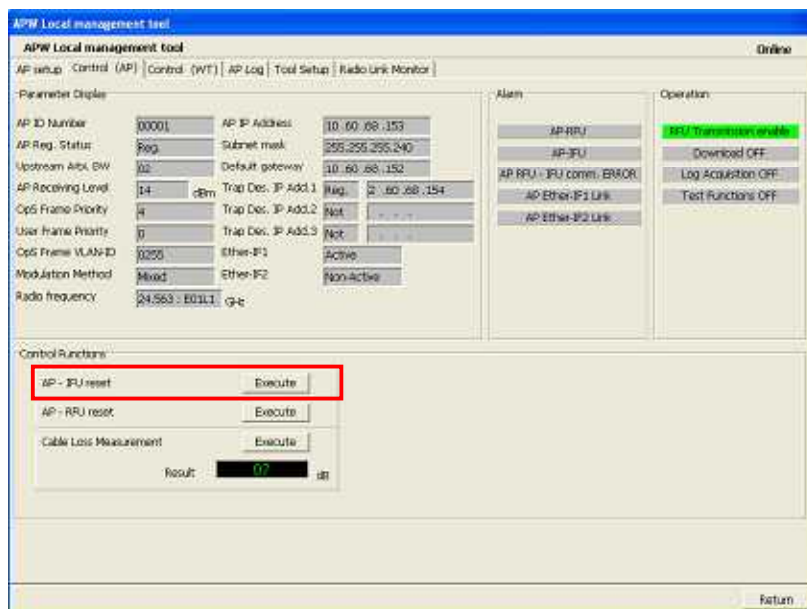


Figure 5-24 Reset the AP

### 5.9.1.3. Measure the cable loss

Check that the cable between the AP-IFU and the AP-RFU is connected correctly, and start cable loss measurement.

When the measurement of cable loss between the AP-IFU and the AP-RFU is completed, the value is automatically compensated for.

The cable loss compensation value is stored in the memory in the AP-RFU.

Step 1: Select the Control (AP) screen in the AP Local Management Tool.

Step 2: In the Cable Loss Measurement field, click the Execute button.

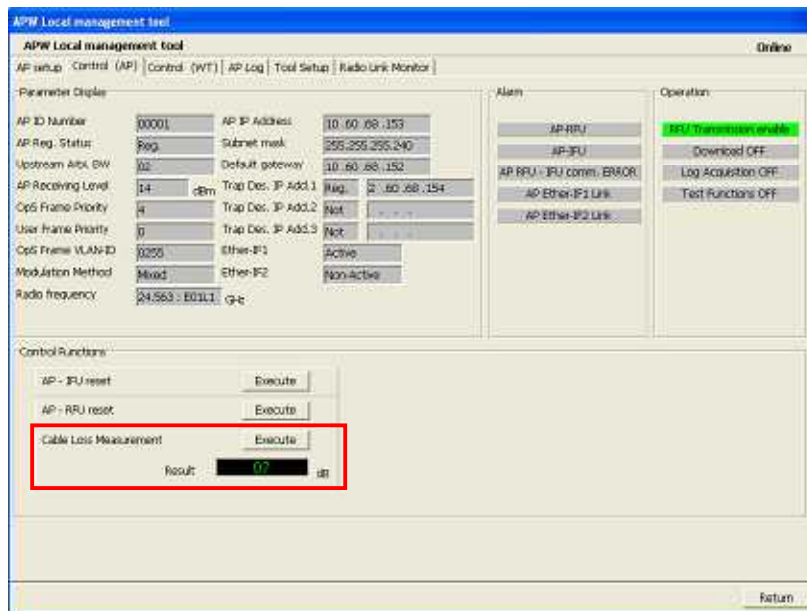


Figure 5-25 Measure the cable loss

Step 3: The Confirmation dialog box appears. Clicking the Yes (Y) button executes the measurement.

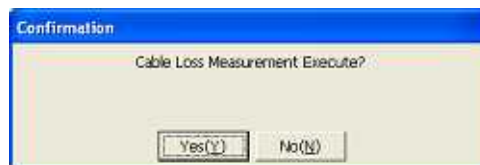


Figure 5-26 Confirmation Dialog Box

Step 4: If measurement ends normally, the Result dialog box appears. Click the OK button to end the measurement process.

You can compensate for a cable loss of 0 to 15 dB

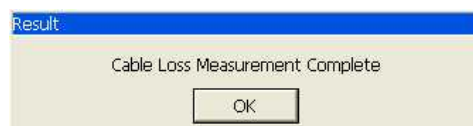


Figure 5-27 Cable Loss Measurement Complete

Step 5: If the procedure ends abnormally, the Under Control dialog box appears.

Check if the cable between the IFU and RFU is too long and there is a contact failure at the connector section.

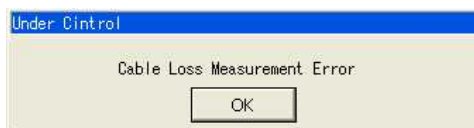


Figure 5-28 Cable Loss Measurement Error

Step 6: If the procedure ends normally, the Under Control dialog box appears.

Check if the cable between the IFU and RFU is connected correctly.

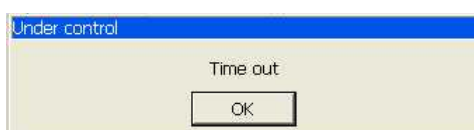


Figure 5-29 Time out

## 5.9.2. Register the AP ID number to OpS

Connect the OpS to the target AP and specify the setup parameters.

### Procedure

Step 1: In the OpS, select the AP Parameter Setup/Control screen.

Step 2: AP ID Number: Set the AP ID number and click the Set button.

Step 3: Upstream Arbi. BW: Set the upstream arbitration bandwidth.

Step 4: AP trans. Level: Set the AP transmission level (You can set only +14dBm) and click the Set button.

Step 5: AP Reg. Status: Set the AP registration status to Registered and click the Set button.

Step 6: RFU transmission: Set the RFU transmission to Enable and click the Set button.

Step 7: Modulation Method: Set the modulation method to QPSK, 16QAM or Mixed, and click the Set button.

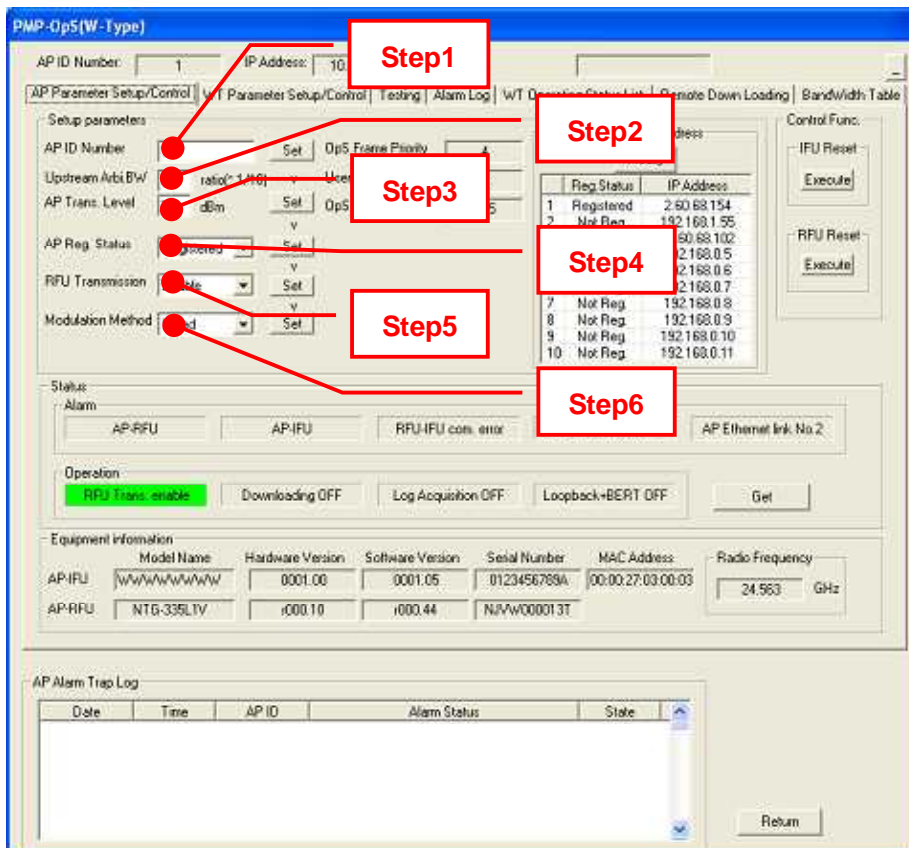


Figure 5-30 Register the AP to OpS

## 5.10. Check sheet of AP Installation

You can use the check sheet below to check the operation of the AP.

Procedure

(A) LED operation test

- Turn off the AP-IFU and confirm that the "POWER" LED goes out.
- Turn on the AP-IFU and check the states of all the LED.

(B) Alarm operation test

- Turn on the AP-IFU and cause the "AP power recovery" trap to occur. Confirm that the message "AP power recovery: Clear" appears in the list of OpS alarms.

(C) Control operation test

- Run the RFU Reset command from the OpS and cause the "AP RFU-IFU communication error" trap to occur. Confirm that the message "AP RFU-IFU communication error: Clear" appears in the list of OpS alarms.

Table 5-2 Check sheet

AP	Serial number	Test date	
Test type	Test condition	Check item	Pass/fail
LED operation test	When power is off	Confirm that the POWER LED is off.	
	When power is on	Confirm that the POWER LED lights green.	
		Confirm that the IFU STATE LED flashes green.	
		Confirm that the IFU ALM LED is off.	
		Confirm that the ETHER1 LED lights green or flashes.	
		Confirm that the ETHER2 LED is off. *1	
		Confirm that the ETHER1 AUTO LED is off. *2	
Confirm that the ETHER2 AUTO LED is off. *3			
Alarm operation test	OpS	Confirm that the message "AP power recovery: Clear" appears in the list of OpS alarms.	
Control operation test	Running RFU Reset from OpS	Confirm that the message "AP RFU-IFU communication error: Clear" appears in the list of OpS alarms.	

\*1 The LED lights if an Ethernet cable is connected to ETHER2.

\*2 The LED lights if the ETHER1 switch is set at AUTO.

\*3 The LED lights if the ETHER2 switch is set at AUTO.