

WIPAS2  
**INSTRUCTION MANUAL**

(Point to Point)

Rev. 1.3  
20/Apr./2012



*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

	Dangerous voltages	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.)
	General prohibitions	
	Do not disassemble	⊘ icons indicate prohibition. A detailed prohibition description is given in the vicinity of the icon. (The figure on the left prohibits disassembly.)
	Unplug	● 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.)
	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.
- 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 WT, 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

---



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.





For the connection PoE PSE to WT and a 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

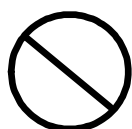


Danger électrique

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



Conseil général

● 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.)

### 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 pas à ce qui suit :

- Ne cognez pas et ne soumettez pas ce matériel et ses éléments à des chocs.
- 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.

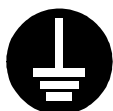


Ne touchez pas le rack du WT en cours d'utilisation parce qu'il devient chaud.

Lors de l'installation du WT, 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 modification au matériel illégalement, vous pouvez être poursuivi conformément aux lois en vigueur.





## Attention

---



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





Pour la connexion PoE PSE à WT, un câble 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

(Italian)

## 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
- 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 poiche esso puo' produrre calore.



Quando installa il WT, connetta il filo di massa al terminale di terra. Se l'attrezzatura non è collegata a terra propriamente, Lei puo' 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 puo' 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.





Per il collegamento PoE PSE a WT dovrà essere utilizzato un cavo appropriato per uso esterno.






## 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 beabsichtigte 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.
- 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 WT 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 Einstellungs mittel 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

---



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.



Für die Verbindung PoE PSE zum WT sollte ein Kabel für Aussenanwendungen gewählt werden.

# CONTENTS

Introduction .....	I
Before use .....	II
Precautions in Use .....	III
Avant usage .....	VI
Précautions d'utilisations .....	VII
Prima dell'utilizzo .....	X
Precauzioni d'uso .....	XI
Bitte beachten vor der Inbetriebnahme .....	XIV
Vorkehrungen beim Gebrauch .....	XV
CONTENTS .....	1-1
1. OVERVIEW .....	1-4
1.1. FCC Notice .....	1-5
1.2. CERTIFICATION NOTE FROM INDUSTRY CANADA .....	1-5
1.3. Required by RSS-191, clause 5.1(a) .....	1-6
1.4. For Europe (R&TTE) .....	1-6
1.5. Declaration of Conformity (DoC) .....	1-6
1.6. System Configuration .....	1-7
1.7. Installation examples .....	1-8
1.8. Components .....	1-9
2. Specifications .....	2-10
2.1. General .....	2-10
2.2. External Views of the Units .....	2-12
2.2.1. WT .....	2-12
2.2.1.1. WT Nameplate .....	2-13
2.2.1.2. WT Mounting Bracket .....	2-14
2.2.2. WT (External Antenna Type) .....	2-17
2.2.2.1. WT (External Antenna Type) Nameplate .....	2-18
2.2.3. Antenna direction adjustment tool .....	2-19
3. WT .....	3-20
3.1. WT .....	3-20
3.1.1. Overview .....	3-20
3.1.2. Antenna section .....	3-20
3.1.3. RF section .....	3-20
3.1.4. Digital section .....	3-20
3.1.5. Interface section .....	3-21

3.1.6.	Power supply .....	3-21
3.1.7.	Terminals.....	3-22
3.1.7.1.	WT .....	3-22
4.	Management Tool (MT).....	4-24
4.1.1.1.	MT system requirements.....	4-25
5.	INSTALLING A POINT-TO-POINT SYSTEM.....	5-26
5.1.	Overview and installation flow.....	5-26
5.2.	Start the Maintenance Tool.....	5-28
5.3.	Configure the WT (master).....	5-29
5.4.	Configure the WT (slave) .....	5-33
5.5.	Installing the WT.....	5-35
5.5.1.	Installing the WT (master/slave).....	5-35
5.5.2.	Setting the WT for Vertical or Horizontal Polarization .....	5-37
5.6.	Installing the WT (External Antenna Type).....	5-38
5.6.1.	Installing $\Phi$ 30cm Antenna in WT (External Antenna Type) .....	5-38
5.6.2.	Installing $\Phi$ 60cm Antenna in WT (External Antenna Type) .....	5-43
5.7.	Adjusting the antenna Direction of the WT .....	5-48
5.7.1.	Adjusting the Antenna Direction of the WT .....	5-48
5.7.1.1.	Measuring the receive level.....	5-49
5.7.1.2.	Roughly Adjusting the Direction .....	5-53
5.7.1.3.	Roughly Adjusting the Direction (Using the Antenna direction adjustment tool) .....	5-54
5.7.1.4.	Finely Adjusting the Direction .....	5-55
5.7.2.	The receive level and the distance .....	5-57
5.8.	Installing the PoE PSE (master/slave) .....	5-63
5.9.	Connecting Cables to the WT (master/slave).....	5-64
5.10.	Waterproofing WT Small lid.....	5-66
5.11.	When you use the cable with the LAP sheath for outdoor.....	5-69
5.12.	Testing .....	5-72
5.12.1.	Ping test.....	5-72
5.12.2.	Measure the Received Blocks Discarded Rate.....	5-73
5.13.	Check sheet.....	5-74
6.	Standard Tools for installation.....	6-75
7.	INITIAL VALUES.....	7-76
7.1.1.	Initial values for WT(Master) parameters (Point to point System) .....	7-76
7.1.2.	Initial values for WT (Slave) parameters (Point to point System) .....	7-81
8.	Revision History.....	8-82

9. Others ..... 9-82

# 1. OVERVIEW

WIPAS (Wireless IP Access System) is a broadband wireless communication system that provides high-speed IP access up to 180Mbps \* transmission rate at frequency band from 24GHz to 26.5GHz

WIPAS is suitable for last-mile solution for the variety of Networks and Short Haul Mobile Backhaul as well.

## Future

- 28/56MHz RF channel spacing of ETSI and FCC compliant
- Adaptive modulation (QPSK to 64QAM) and QoS support for maximizing spectrum utilization and radio link availability
- 180Mbps data throughput (aggregated downlink and uplink)
- Flexible Downlink and Uplink ratio
- Full QoS support for triple play services
- Encryption by Camellia (128bit)
- Zero-footprint and small size
- Management Tool for fault, configuration, performance, and security
- High reliability – Field MTBF of previous model is better than 1 million hours

## 1.1. FCC Notice

**FCCID: CKENTG525-USL, CKENTG525-EUL**

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

**IC: 768B-NTG525UL, 768B-NTG525EL**

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.

REMARQUE D'HOMOLOGATION D'INDUSTRIE CANADA : Bien que ce matériel respecte les exigences techniques pour son fonctionnement selon l'arrangement spécifique de paires de blocs, cet arrangement de bloc est différent de l'arrangement de bloc 40 + 40 MHz prescrit dans le CNR-191 et PNRH-324,25. Le fonctionnement de cet équipement N'EST PAS permis si les limites de rayonnement hors-bande et non essentiel ne sont pas respectées à l'extrémité de tout spectre licencié contigu. Il est à noter que toutes les politiques, procédures de délivrance de permis et exigences techniques demeurent applicables. Pour plus de renseignements, veuillez contacter le bureau local d'Industrie Canada.

### **1.3. Required by RSS-191, clause 5.1(a)**

For RSS-191: The minimum guard band sizes are 1MHz for 20MHz symbol rate carriers and 2MHz for 40MHz symbol rate carriers. The equipment operates with a single carrier.

(English)

Pour CNR-191: La largeur minimale des bandes de garde est de 1MHz pour un débit de symboles de 20MHz et de 2MHz pour un débit de symboles de 40MHz. L'appareil fonctionne avec une seule porteuse. (French)

### **1.4. For Europe (R&TTE)**

This equipment may be operated in all EU and EFTA countries. The use of this equipment requires a license.

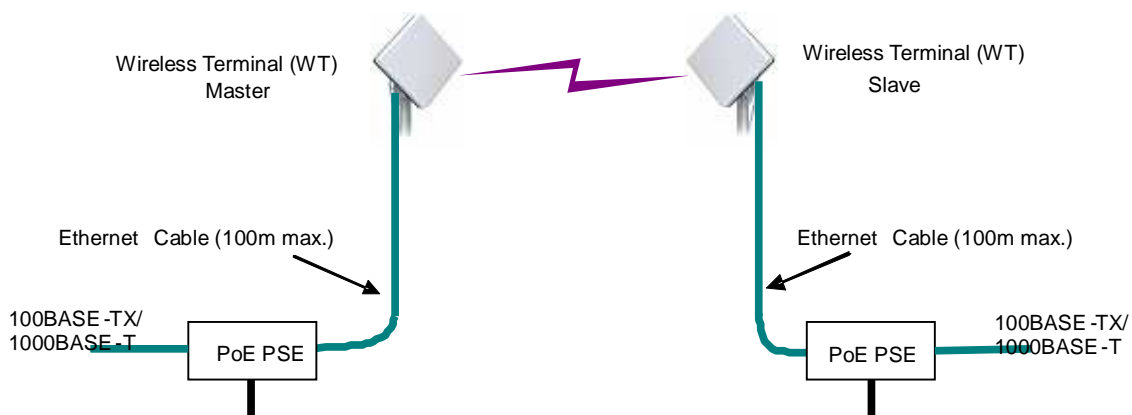
### **1.5. Declaration of Conformity (DoC)**

Hereby, Japan Radio Co., Ltd. declares that this NTG-525EUL is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be obtained at the following address:

1-1, Shimorenjaku 5-chome, Mitaka-shi, Tokyo 181-8510, Japan



## 1.6. System Configuration



The operation mode of the WT can choose Slave mode and Master mode.  
Point to Point line uses in combination Master and Slave.

WT is supplied a power supply by PoE PSE (Power over Ethernet Power Sourcing Equipment)

The setting items such as modulation method, the radio frequency channel set it to Master.  
These setting items are transmitted into Slave through a radio link.

The user data is transmitted between Master and Slave transparently.  
Master implements an SNMP agent function and can communicate with an SNMP manager.

## 1.7. Installation examples

Figure 1-1 is Installation examples of The WT.



Figure 1-1 Installation examples of the WT

## 1.8. Components

Table 1-1 Components List

No.	Name	Model	Description
1	WT (Wireless Terminal)	-NTG-525USL: 24.250-24.450GHz (FCC [Lch])  -NTG-525EUL: 24.549-25.445GHz (ETSI [Lch] and FCC [Hch]):  -NTG-525EUH:25.557-26.453GHz (ETSI [Hch])	The WT is a radio unit that accommodates all the antenna, radio transceiver, signal processor and interface section in the same housing. It supports 100BASE-TX and 1000BASE-T user interfaces to connect a personal computer and hub.
1.1	WT mounting bracket	MPBX46819	The WT mounting bracket is used to mount the WT at a pole.  Including in WT
2	Antenna direction adjustment tool	NKK-163	This is the antenna direction adjustment tools for the WT.
3	WIPAS2 INSTRUCTION MANUAL (CD-ROM)	H-7YZCM5106	INSTRUCTION MANUAL is included in this CD-ROM
3.1	WIPAS2 INSTRUCTION MANUAL	H-7YZCM5107	INSTRUCTION MANUAL

Subject to change without notice.

A customer prepares for PoE PSE, Ethernet Cable, and Ground wire.

## 2. Specifications

### 2.1. General

Table 2-1 Specifications

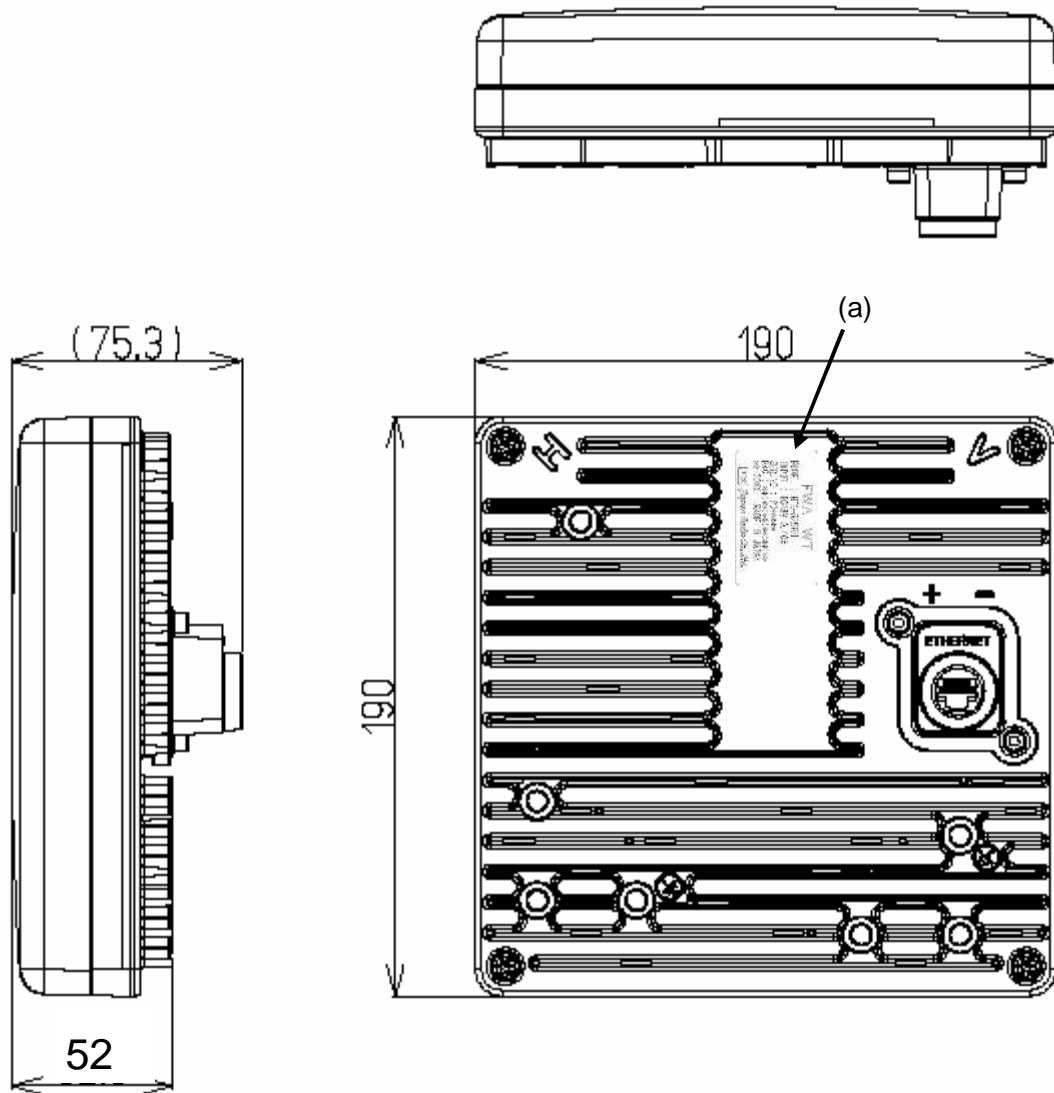
Item	WIPAS2 Point to Point System		
WT Model Name	NTG-525USL	NTG-525EUL	NTG-525EUH
Frequency Band	24.250-24.450GHz FCC Band	24.549-25.445GHz ETSI and FCC Band	25.557-26.453GHz ETSI Band
Duplex/multiple access	TDD ( Flexible DL / UL Ratio )		
Modulation system	QPSK/16QAM/64QAM ( Adaptive Modulation or Fixed )		
Channel spacing	28MHz	56MHz	
Occupied bandwidth	26MHz	52MHz	
Symbol rate (Selectable)	20M symbol/s,	40M symbol/s	
Radio Transmission rate	QPSK: 40 Mbps 16QAM: 80 Mbps 64QAM: 120Mbps	QPSK: 80 Mbps 16QAM: 160 Mbps 64QAM: 240Mbps	
Data throughput	QPSK: 30 Mbps 16QAM: 60 Mbps 64QAM: 90bps	QPSK: 60 Mbps 16QAM: 120 Mbps 64QAM: 180Mbps	
Transmit output power	QPSK: -6 to +14dBm 16QAM: -8.6 to +11.4dBm 64QAM:-9.7 to 10.3dBm		
Frequency Stability	±10ppm		
Minimum receiving level (BER=10 <sup>-6</sup> ) After an error correction	QPSK: -80.5dBm or less 16QAM: -73.5dBm or less 64QAM: -65.5dBm or less	QPSK: -77.5dBm or less 16QAM: -70.5dBm or less 64QAM: -62.5dBm or less	
Antenna type and gain (typ)	High-gain flat antenna: 31dBi External Antenna*1: HPCPE-26 35.7 dBi (30cm)*1 HP2-26 41.1 dBi (60cm)*1		
Interface	10BASE-T/100BASE-TX/1000BASE-T		
QoS	<ul style="list-style-type: none"> <li>- Service class: 8 class</li> <li>- Priority control: Strict Priority Queuing (SPQ)</li> <li>- Band late control: Policer, Shaper</li> <li>- Transmitted Buffer size: total 1Mbytes, Each buffer size is configurable</li> <li>- Service identifier: With VLAN Tag :VLAN COS field With out VLAN Tag :IPv4 TOS field, IPv6 Traffic Class field, Ether Type (15 types)</li> </ul>		
MAC address filtering	disable		
SNMP (agent)	SNMP V2,V3, Private MIB		
Maintenance Tool	Local & Remote maintenance is possible by Management Tool by Web browser supported OS: Windows7 , Windows XP		
	<ul style="list-style-type: none"> <li>- Main Monitor:</li> <li>- Monitoring: Event Log / Radio Performance / Link Utilization / Traffic Counter / NE State Information</li> <li>- QoS and Traffic Control:</li> <li>- Installation: Antenna Alignment / Packet Transmission Test</li> <li>- Configuration: Radio / Network / Boot Sector Selection and Initializations / Date and Time / Configuration Backup / Software Downloading / User Class Password / Frequency Table</li> </ul>		
Power	20VA (MAX)		
Power supply method	IEEE802.3at Type2 WT is supplied power by PoE PSE		
Physical	WT Unit (Internal Antenna):Dimensions W190XH190XD52(mm) (not include protuberance) Weight about 2kg		

	WT Unit (External Antenna):Dimensions W220 XH220XD45(mm) (not include protuberance) Weight about 3kg
Operating Temperature	-33degree Celsius - +50degree Celsius
Operating Humidity	20% - 95% non-condensing
waterproofing	IP55
storage environment	-33degree Celsius - +60degree Celsius 20% - 95% non-condensing
survival wind speed	90m/s non-destructive 40m/s communicatable

Remark\* 1 : JRC doesn't offer External Antenna. Please buy External Antenna directly from Radio Wave which is antenna bender.

## 2.2. External Views of the Units

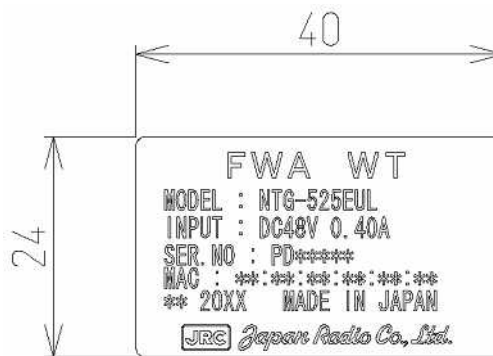
### 2.2.1.WT



(in mm)

Figure 2-1 External View of the WT

### 2.2.1.1. WT Nameplate



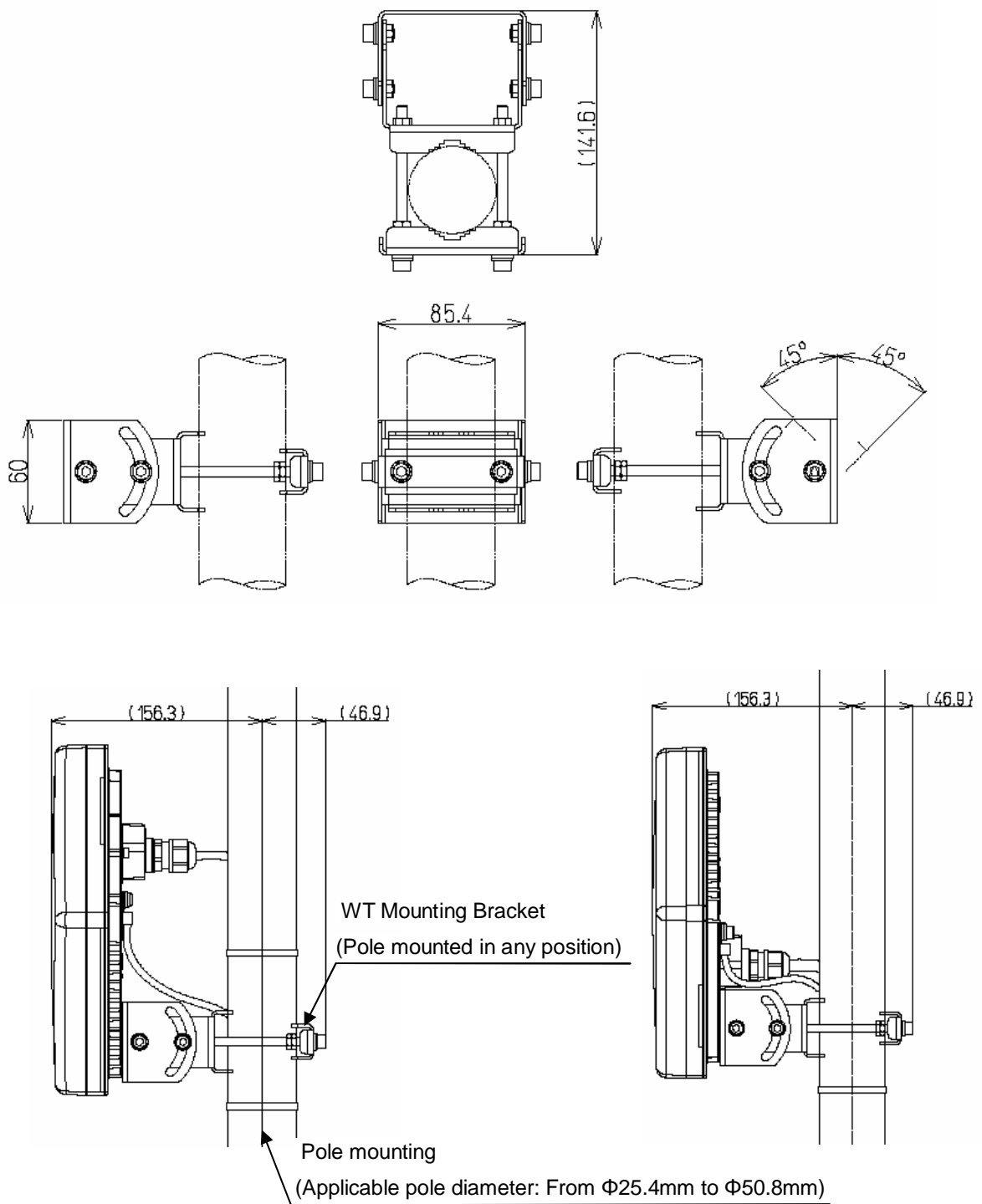
Nameplate(a)



Nameplate(b)

Figure 2-2 Nameplate

### 2.2.1.2. WT Mounting Bracket

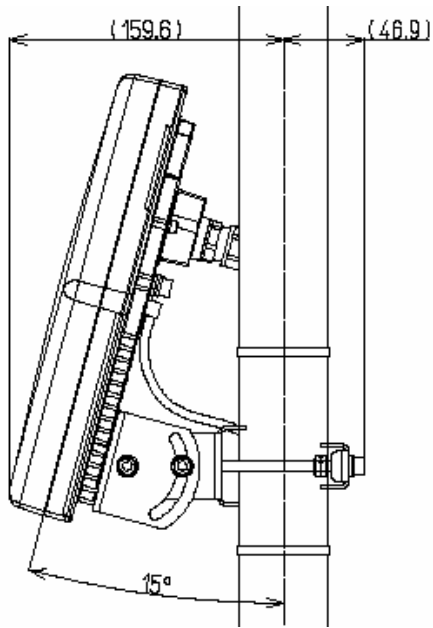


- Vertical polarization  
(Pole diameter is  $\Phi 50.8\text{mm}$ )

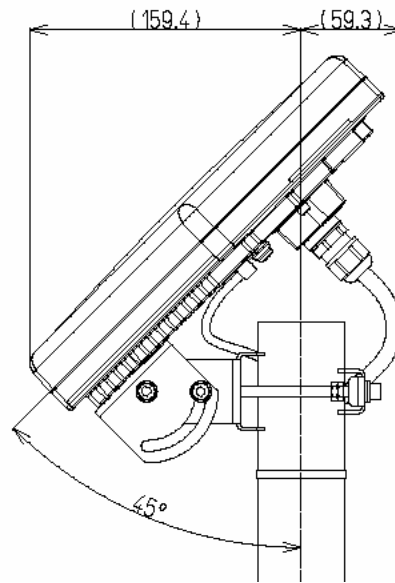
- Horizontal polarization  
(Pole diameter is  $\Phi 50.8\text{mm}$ )

Figure 2-3 External View of the Outdoor Mounting Brackets for the WT

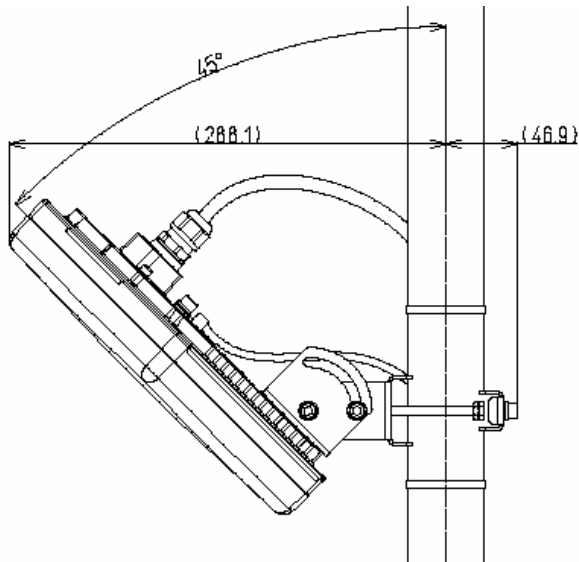




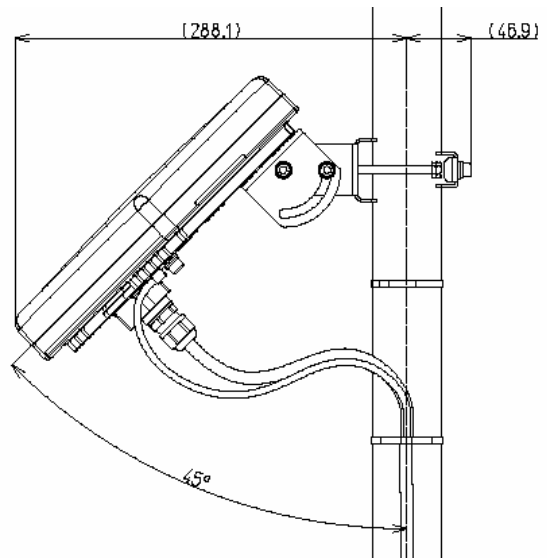
Angle of elevation 15degree



Angle of elevation 45degree on the pole top



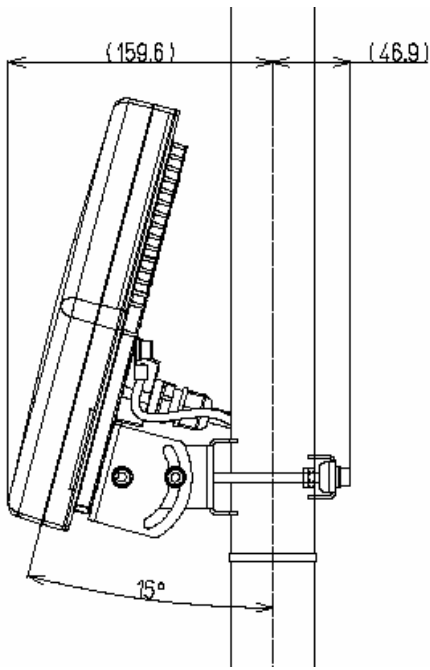
Dip 45degree



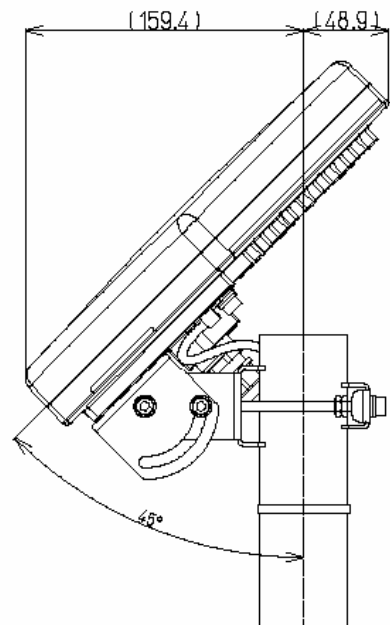
Angle of elevation 45degree in middle of the pole

(in mm)

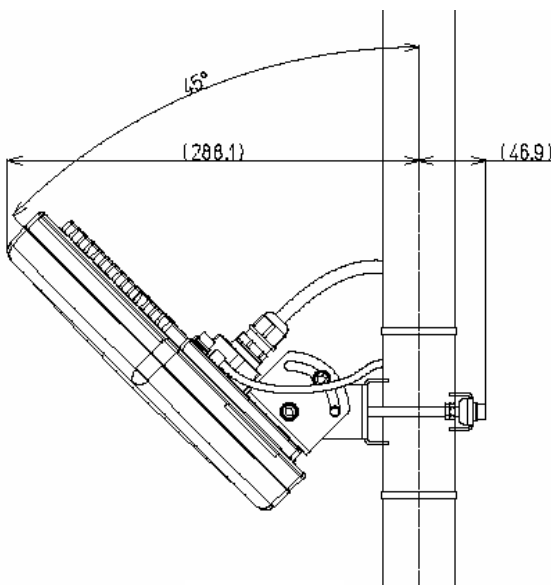
Figure 2-4 Installation example for Vertical polarization(Pole diameter is  $\Phi 50.8\text{mm}$ )



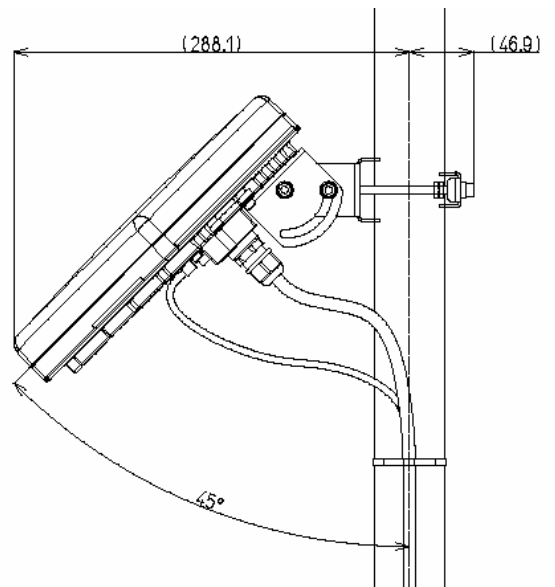
Angle of elevation 15degree



Angle of elevation 45degree on the pole top



Dip 45degree



Angle of elevation 45degree in middle of the pole

Figure 2-5 Installation example for Horizontal polarization(Pole diameter is  $\Phi 50.8\text{mm}$ )

### 2.2.2.WT (External Antenna Type)

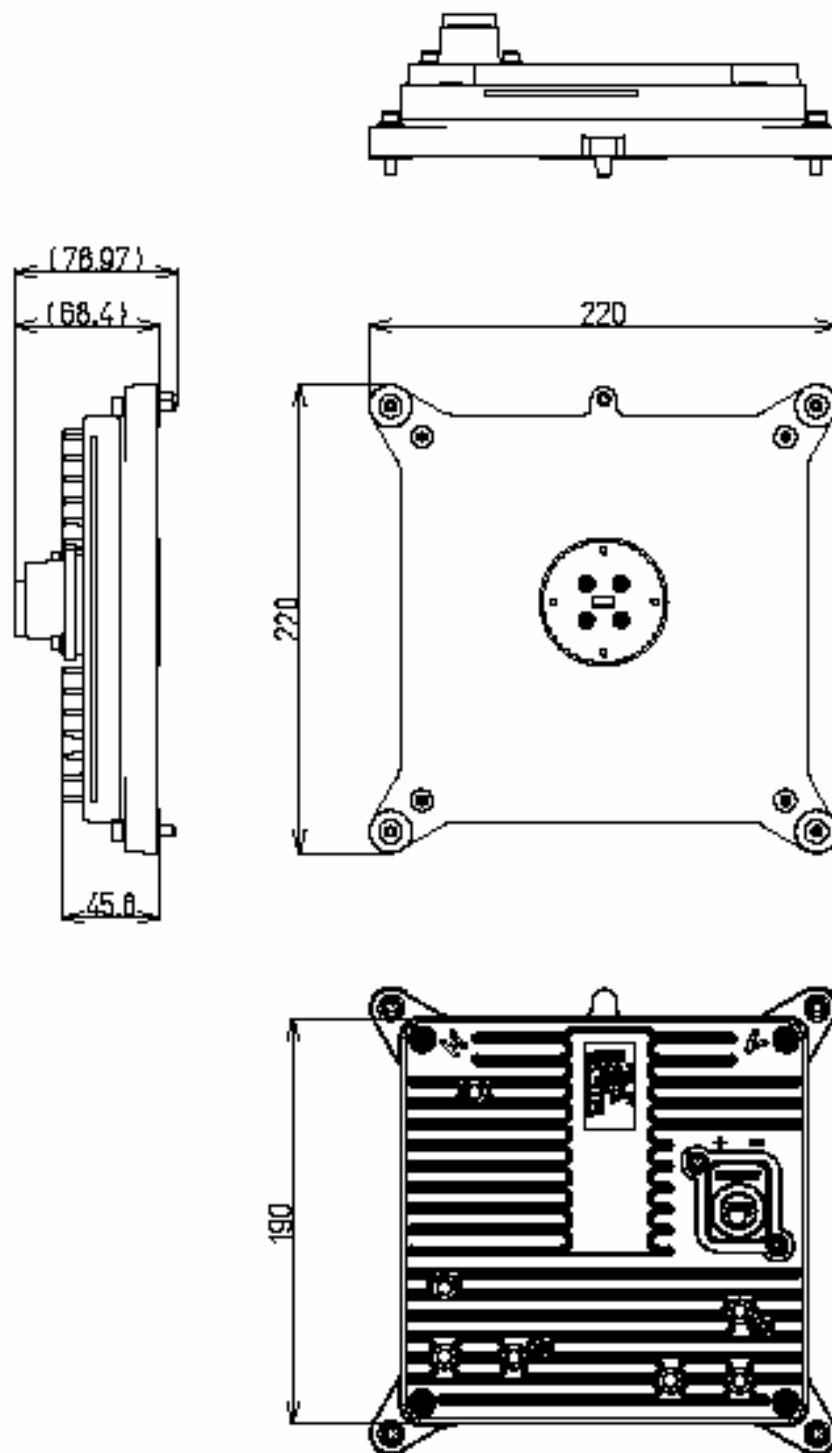


Figure 2-6 External View of the WT (External Antenna Type)

### 2.2.2.1. WT (External Antenna Type) Nameplate

Nameplate (a)

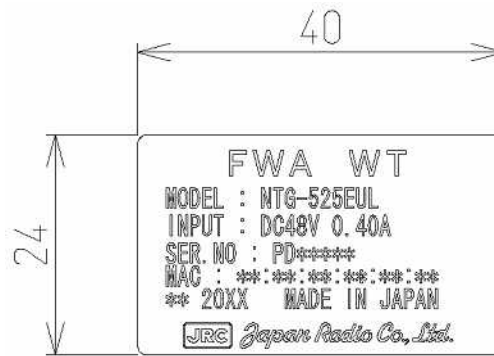
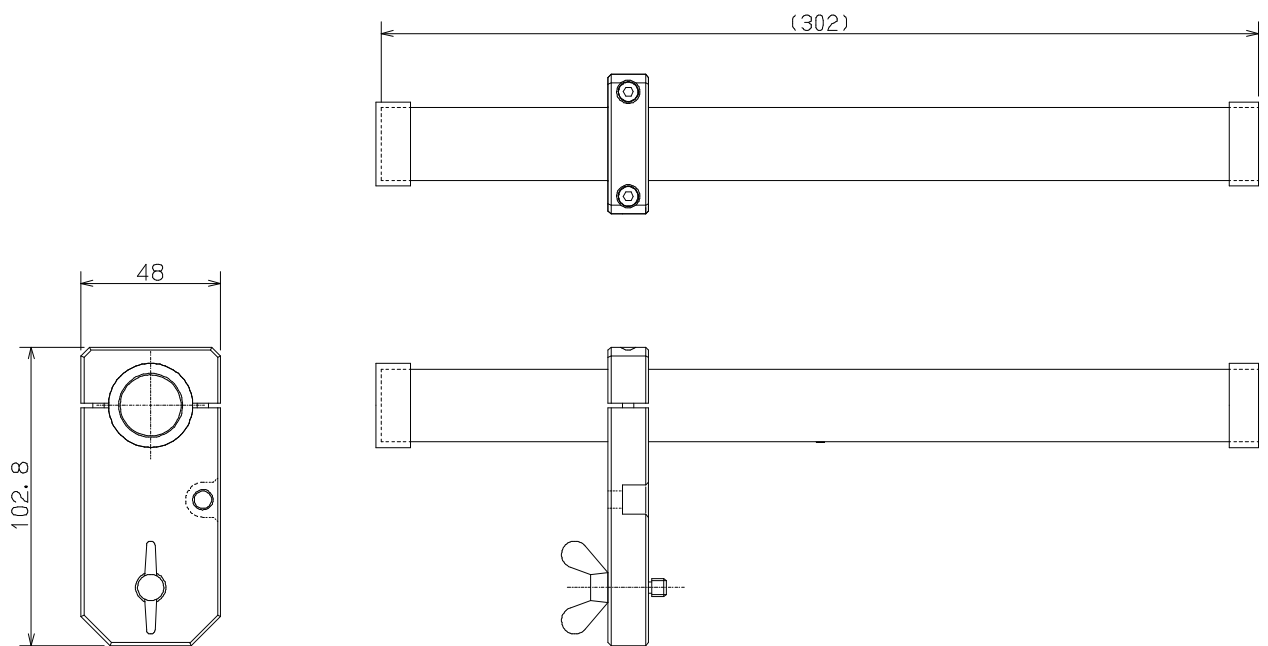


Figure 2-7 Nameplate

### 2.2.3. Antenna direction adjustment tool



(in mm)

Shape of the scope is subject to change without notice.

Figure 2-8 Antenna direction adjustment tool

## **3. WT**

### **3.1. WT**

#### **3.1.1.Overview**

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

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

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

#### **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 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 synthesized oscillator.

#### **3.1.4.Digital section**

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

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

The TDD framer constructs and deconstructs radio 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. It also communicates with the opposite WT processor via the radio link.

### 3.1.5. Interface section

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

### 3.1.6. Power supply

The power supply section generates various voltages used within the unit from input power of PoE PSE.

Figure 3-1 is a block diagram of the WT.

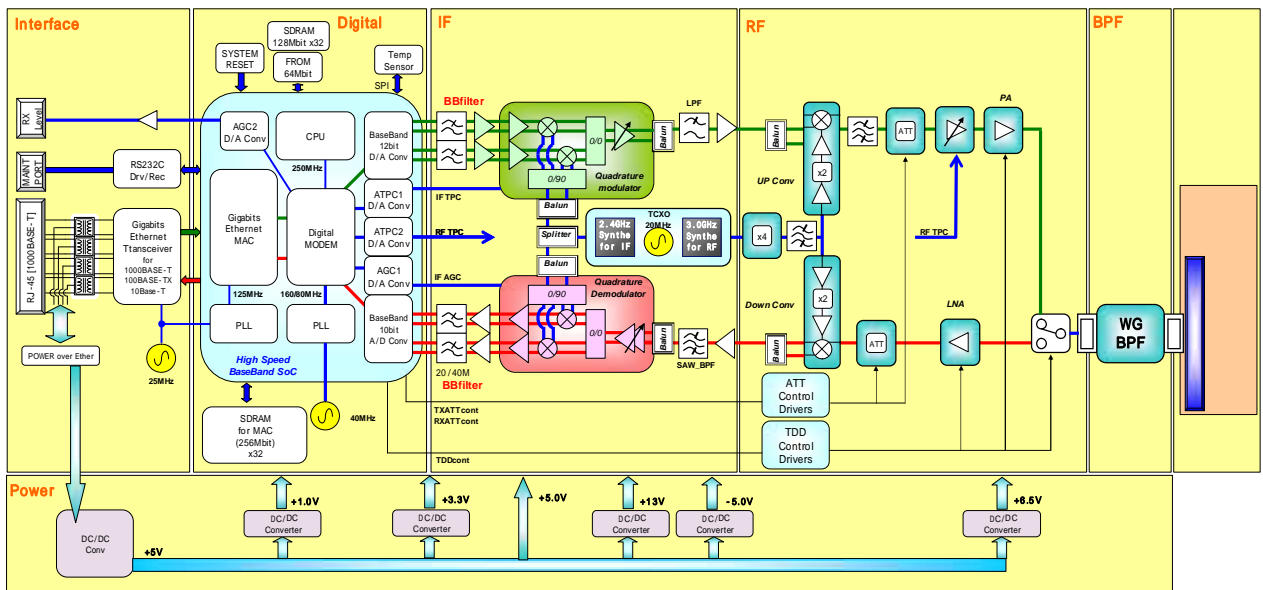
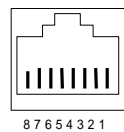
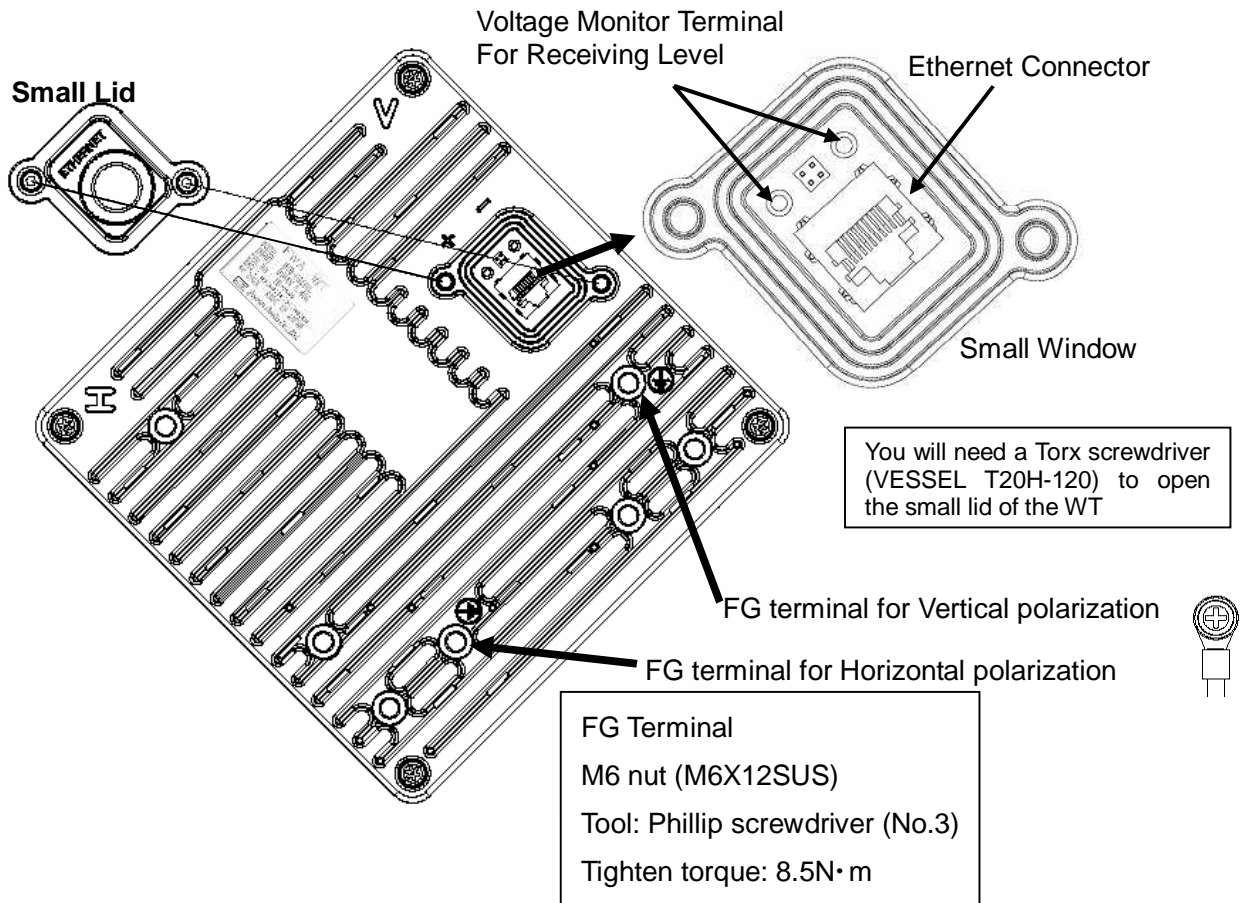


Figure 3-1 WT Block Diagram

### 3.1.7. Terminals

#### 3.1.7.1. WT



Ethernet Connector Pin Assign

Pin Assign	DATA	PoE
1	TRD+(0)	48V
2	TRD-(0)	48V
3	TRD+(1)	48V ( Return )
4	TRD+(2)	48V
5	TRD-(2)	48V
6	TRD-(1)	48V ( Return )
7	TRD+(3)	48V ( Return )
8	TRD-(3)	48V ( Return )

Figure 3-2 Connecting Section of the WT



(1) Ethernet Connector	
Contents	Connect the user network via. PoE PSE
Interface	1000BASE-T, 100BASE-TX, 10BASE-T
Cable length	Maximum 100m. In case of PoE HUB use : 100m is from the WT to PoE HUB In case of PoE injector use: 100m is from the WT via PoE injector to HUB. (Because, there is no function of terminate PHY in the PoE injector)
Connector shape	RJ-45
Pin assign	- ETHER signal: MDI-X - POWER: IEEE802.3at Type2
Cable type	Ethernet cable for outdoor, STP(Shield Twisted Pair)
Range of applicable outer	diameter $\phi$ 4.0 mm - 7.0mm

(2) FG Terminal	
Contents	Connect the ground wire.
Applicable Cable	Ground wire 1.6 $\square$ (AWG#14)
Applicable terminal	FG terminal M6 nut.
Note	ground resistance is 100 $\Omega$ or less

(3) Voltage Monitor Terminal For Receiving Level	
Contents	It is a terminal monitoring a receiving level by using voltage circuit tester.



- When closing the Small lid, make sure that the rubber packing of the Small lid is free from any foreign matter.

## 4. Management Tool (MT)

The Management Tool (MT) is the Web server function that WT had built-in. The MT performs setting and the monitoring of the WT. The table below lists the function summary of the MT.

Table 4-1 MT function lists

Items 1	Items 2	Contents
Main Monitor		Shows the radio performance, Ethernet counter, Packet rate in real time
Monitoring	Event Log	Shows the alarm log, modulation log.
	Radio Performance	Shows the radio performance data of past 2-day. The data are statistics of every 15 minutes.
	Link Utilization	Shows the Ethernet counter data of past 2-day. The data are statistics of every 15 minutes.
	Traffic Counter	Shows the traffic counter. It is a statistic counter that is period from "Counter Clear" button to "Get Counter" button
	NE State Information	Shows all configuration of the network element (WT).
QoS and Traffic Control		Sets the buffer size, TDD control, QoS configuration, policing, shaping.
Installation	Antenna Alignment	Carries out the antenna alignment mode
	Packet Transmission Test	Carries out the packet transmission test
Configuration	Radio	Sets the radio configuration
	Network	Sets the IP address and SNMP
	Boot Sector Selection and Initializations	Carries out the reset, the changing the boot sector, and initializing
	Date and Time	Sets the date and time
	Configuration Backup	Carries out saving and loading the configuration file.
	Software Downloading	Carries out downloading of the software.
	User Class Password	Sets the password per user class
	Frequency Table	Sets the frequency.
Logout		Logout MT

#### 4.1.1.1.

#### MT system requirements

Table 4-2 MT system requirements

Web browser	OS	Note
Internet Explorer 8	Windows 7 Windows XP	Screen resolution : higher than 1024x768 pixels

## 5. INSTALLING A POINT-TO-POINT SYSTEM

### 5.1. Overview and installation flow

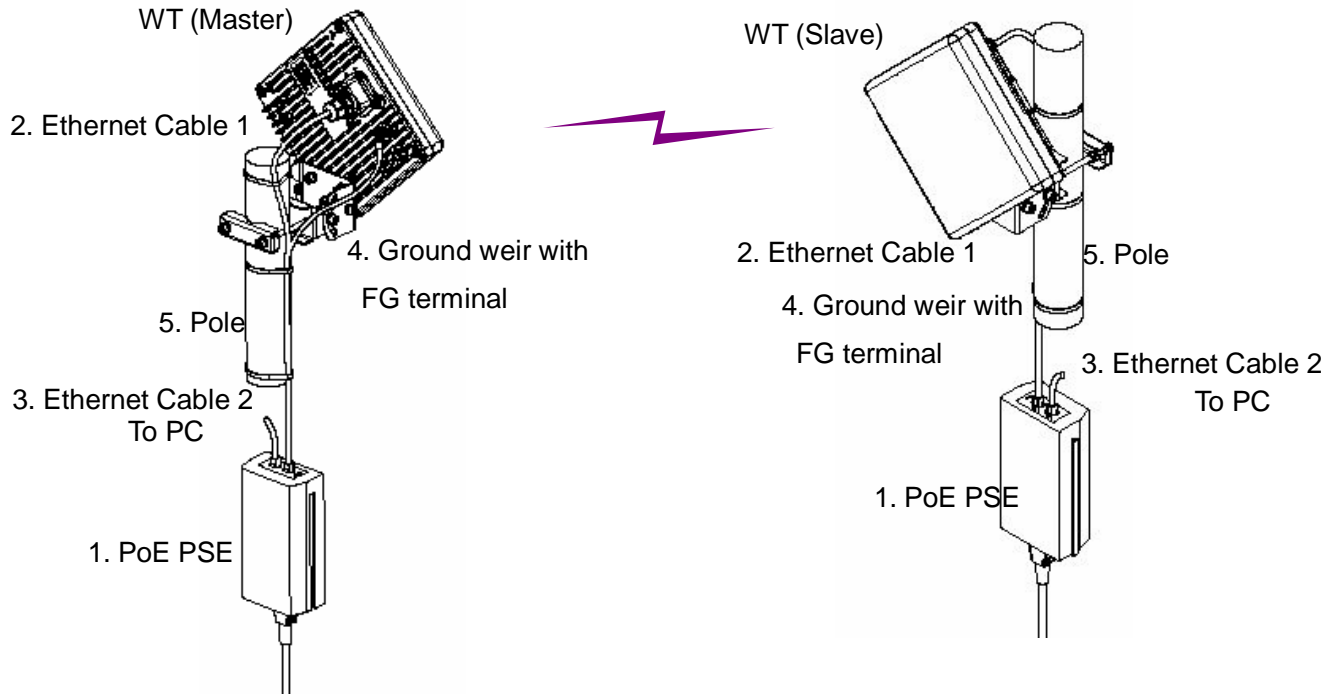
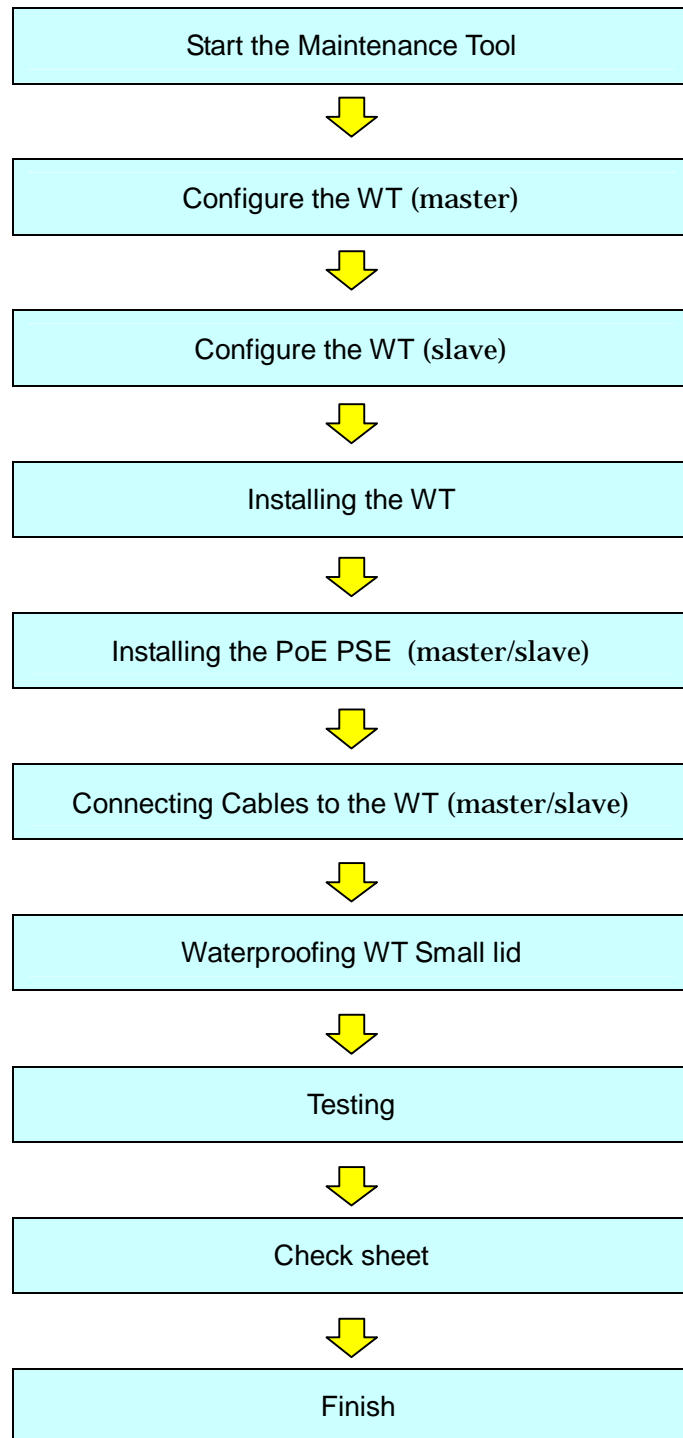


Figure 5-1 installation Configuration

Table 5-1 Installation components preparing by customer

No	components	Quantity per WT	contents
1	PoE PSE (Power over Ethernet Power Sourcing Equipment)	1	- IEEE-802.3at TYPE2 - PoE Injector or PoE HUB - Surge protection type is recommended for the purpose of surge protection for the user devise. (WT has the surge protection circuit inside)
2	Ethernet Cable 1 (WT to PoE PSE)	1	- CAT-5e cable is recommended - Straight cable
3	Ethernet Cable 2 (PoE PSE to PC)	1	- CAT-5e cable is recommended
4	Ground weir with FG terminal	1	- Ground resistance is 100 or less
5	Pole	1	- Applicable pole diameter: From $\Phi 25.4\text{mm}$ to $\Phi 50.8\text{mm}$

Figure 5-2 P to P installation flow



## 5.2. Start the Maintenance Tool

Connect WT to PC. (Figure 5-3)

Start WEB browser and input “http://192.168.1.100” (initial) into an address column and push the ETNER key.

A login screen of the Management Tool (MT) is displayed on WEB browser.

After select a login class, input a password to start MT. (Login class: admin or installation)

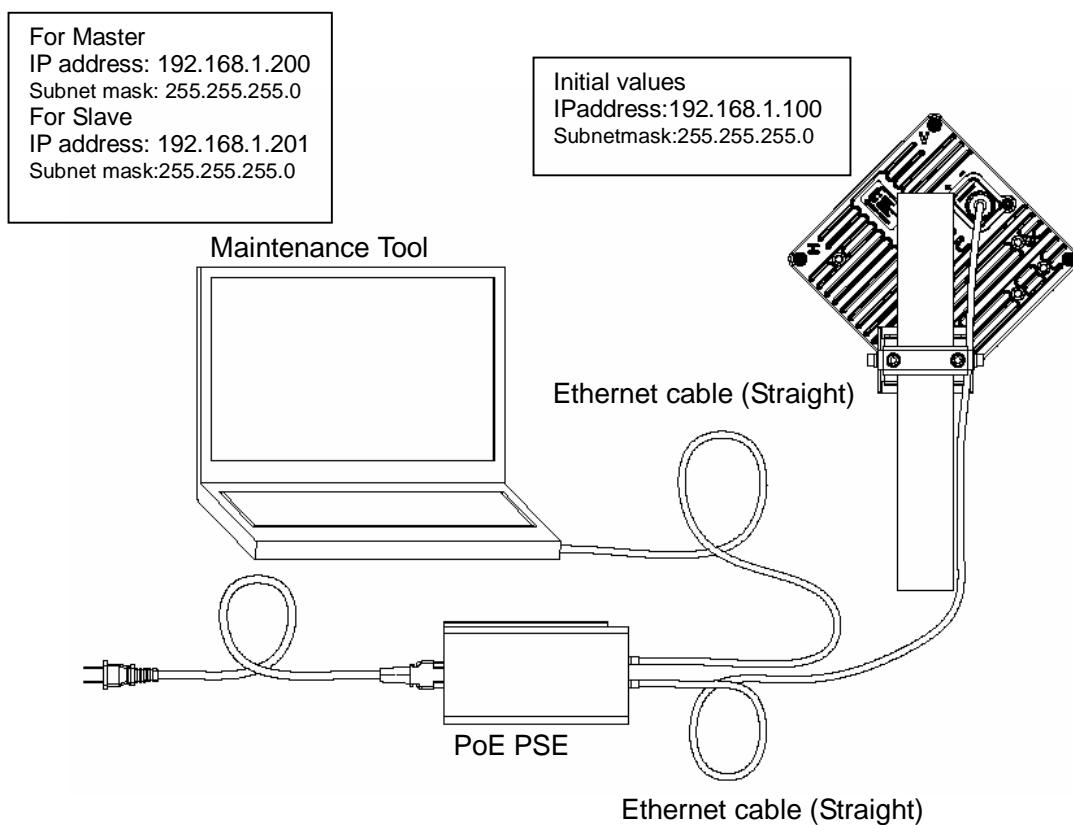


Figure 5-3 Connection



- When changing the IP address of the unit, please input the IP address that was changed
- When changing the IP address of the unit, restart the power of the hub if the unit is connected to the management tool via a hub (because MAC address learning may fail and the connection may be dropped).

### 5.3. Configure the WT (master)

Set the Master configurations with the Maintenance Tool.

Step1 Select the Configuration > Radio configuration tab

- Operating Mode : Set the P-P(Master)
- Symbol Rate : Set 40MHz or 20MHz
- Frame ID : Set the Frame ID same as a Slave ( 1 ~ 65535 )
- Encryption Parameter : Set the Encryption Parameter same as a Slave  
(0-22 half width alphabet or digit character)
- Click the **Setup** button. "Setup" makes configuration changes. These changes are reflected after Reset.
  
- Network Element Name : Set Network Element Name. (0-20 full width or half width alphabet)
- FREQUENCY-CH: Set Frequency CH.  
You should register the Frequency CH beforehand on "Frequency Setting" screen.  
Configuration> "Frequency Setting" screen.
- Modulation: Set adaptive modulation or fixed modulation. If set adaptive modulation, set highest modulation (down/ up link). If set fixed modulation, set modulation (down/up link) .
- ATPC: Set Enable (ATPC: automatic transmit power control) or Disable (MTPC: manual transmit power control). If disabled (MTPC), set MTPC Level (-6 - +14dBm).  
Slave MTPC is configured in Slave.
- RF Transmission: Set Enable or Disable (Master and Slave).
- Click the **Setup** button.

### Radio Configuration

Operating Mode	P-P(Master) ▼
Symbol Rate	40.0MHz ▼
Frame ID Number [ 1 ~ 65535 ]	1
Encryption Parameter (0-22 halfwidth alphabet or digit character)	1234567890
Maximum Service Distance	<input type="radio"/> 3km <input checked="" type="radio"/> 7km <input type="radio"/> 14km <input type="radio"/> 28km

**Setup** "Setup" automatically make System Reset.

<b>Network Element Name</b> (0-20 fullwidth or halfwidth alphabet)	
<b>FREQUENCY-CH</b>	CH4:25810
<b>Modulation</b>	<input checked="" type="radio"/> Adaptive DL Highest modulation: 64QAM (240Mbps) UL Highest modulation: 64QAM (240Mbps) <input type="radio"/> Fixed DL Modulation: QPSK (80Mbps) UL Modulation: QPSK (80Mbps)
<b>ATPC [ -6 to +14dBm ]</b>	<input checked="" type="radio"/> Enable ATPC Maximum Transmitted Level: +5.0dBm
<b>MTPC [ -6 to +14dBm ]</b>	<input type="radio"/> Disable MTPC Level: 5.0 dBm <small>Note: Slave MTPC Level is configured in Slave.</small>
<b>RF Transmission</b>	Master <input type="radio"/> Disable <input checked="" type="radio"/> Enable Slave <input type="radio"/> Disable <input checked="" type="radio"/> Enable
<input type="button" value="Setup"/>	

Figure 5-4 Radio configuration tab (master)

Step2 Select the Configuration > Network Configuration tab.

- IPv4 : Set IP address, subnet mask and default gateway
- IPv6 : Set Disable or Enable. If enabled, set IP address, default gateway
- Click the **Setup** button. "Setup" makes configuration changes. These changes are reflected after Reset.
  
- ETHERNET Configuration : Set the interface class 1000BASE-T(AUTO), 1000BASE-T(Fixed), 1000BASE-T(AUTO), 100BASE-TX/FULL(FIXED), 100BASE-TX(AUTO) or 100BASE-TX/HAFE(Fixed)
- Management VLAN TAG: Set Enable or Disable. If enabled, set VID, COS
- OpS1-3: Set Enable or Disable. If enabled , set IP address (IPv4 or IPv6)
  
- Community name (SNMP v2)1-3: Set the GET / SET community name for each OpS1-3.
- User name (SNMP v3) 1-3: Set user name, authentication protocol, authentication password, encryption protocol, encryption password and access control for each OpS1-3.
- Trap destination 1-2: Set Enable or Disable. If enabled, set IP address (IPv4 or IPv6) and SNMP Version (v2 or v3).
- Click the **Setup** button.

The basic configuration of the WT (Master) is completed by the above and works.



# Network Configuration

<b>IPv4</b>	IP Address	192	168	1	100
	Subnet Mask	255	255	255	0
	Default Gateway				
<b>IPv6</b>	<input checked="" type="radio"/> Disable <input type="radio"/> Enable				
	IP Address	<input type="text"/>			
	Default Gateway	<input type="text"/>			

**Setup** Apply the setup values after reset

<b>Ethernet configuration</b>	1000BASE-T(AUTO)
<b>Management VLAN TAG</b> [MD 1 - 4094] [COS 0 - 7]	No.1 : <input type="radio"/> Enable <input checked="" type="radio"/> Disable VID <input type="text"/> COS <input type="text"/>
	No.2 : <input type="radio"/> Enable <input checked="" type="radio"/> Disable VID <input type="text"/> COS <input type="text"/>
	No.3 : <input type="radio"/> Enable <input checked="" type="radio"/> Disable VID <input type="text"/> COS <input type="text"/>
<b>OpS1</b>	<input checked="" type="radio"/> Disable <input type="radio"/> Enable IP: <input checked="" type="radio"/> IPv4 <input type="radio"/> IPv6 IP Address: <input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>
	<b>OpS2</b>
<b>OpS3</b>	<input checked="" type="radio"/> Disable <input type="radio"/> Enable IP: <input checked="" type="radio"/> IPv4 <input type="radio"/> IPv6 IP Address: <input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>

<b>Community Name (SNMP v2)</b> (Up to 60 characters)	Get Community Name 1	public
	Set Community Name 1	public
	Get Community Name 2	public2
	Set Community Name 2	public2
	Get Community Name 3	public3
	Set Community Name 3	public3

<b>User Name (SNMP v3)</b> <b>User Name Authentication Password / Encryption Password (8 - 15 characters)</b>	User Name	User 1	User 2	User 3
		username	username2	username3
	Authentication protocol	MD5	MD5	MD5
	Authentication Password	●●●●●●●●	●●●●●●●●	●●●●●●●●
	Re-enter Authentication Password	●●●●●●●●	●●●●●●●●	●●●●●●●●
	Encryption protocol	AES	AES	AES
	Encryption Password	●●●●●●●●	●●●●●●●●	●●●●●●●●
	Re-enter Encryption Password	●●●●●●●●	●●●●●●●●	●●●●●●●●
Access Control	<input checked="" type="radio"/> Read Only <input type="radio"/> Read/Write	<input checked="" type="radio"/> Read Only <input type="radio"/> Read/Write	<input checked="" type="radio"/> Read Only <input type="radio"/> Read/Write	

Trap destination 1	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
	IP Address <input checked="" type="radio"/> IPv4 0 0 0 0 <input type="radio"/> IPv6
Community Name (under 60 characters)	SNMP Version
	<input checked="" type="radio"/> SNMPv2
User Name (1-15 characters)	Community Name: public
	<input type="radio"/> SNMPv3
Authentication Password / Encryption Password (8-15 characters)	User Name: username
	Authentication protocol: MD5 Encryption protocol: AES
	Authentication Password: ..... Encryption Password: .....
	Re-enter Authentication Password: ..... Re-enter Encryption Password: .....
Trap destination 2 (Up to 60 characters)	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
	IP Address <input checked="" type="radio"/> IPv4 0 0 0 0 <input type="radio"/> IPv6
Community Name (under 60 characters)	SNMP Version
	<input checked="" type="radio"/> SNMPv2
User Name (1-15 characters)	Community Name: public2
	<input type="radio"/> SNMPv3
Authentication Password / Encryption Password (8-15 characters)	User Name: username2
	Authentication protocol: MD5 Encryption protocol: AES
	Authentication Password: ..... Encryption Password: .....
	Re-enter Authentication Password: ..... Re-enter Encryption Password: .....
<input type="button" value="Setup"/>	

Figure 5-5 Network Configuration tab (master)

if necessary, set the following setting.

Step3: Select the QoS and Traffic control tab

- Set Buffer size, COS assignment for Management Communication between Master and Slave, QoS Priority Class, TDD control, Slave QoS Priority Mapping, Policing Rate, and Shaping Rate

Step4: Select the Configuration> Date and Time tab

- Set Date and time

## 5.4. Configure the WT (slave)

Set the Slave configurations with the Maintenance Tool.

Step1 Select the Configuration > Radio configuration tab

- Operating Mode : Set the P-P(Slave)
- Symbol Rate : Set 40MHz or 20MHz
- Frame ID : Set the Frame ID same as a Master ( 1 ~ 65535 )
- Encryption Parameter : Set the Encryption Parameter same as a Master  
(0-22 half width alphabet or digit character)
- Click the **Setup** button. "Setup" makes configuration changes. These changes are reflected after Reset.
  
- Network Element Name : Set Network Element Name. (0-20 full width or half width alphabet)
- FREQUENCY-CH: Set Fixed or SEARCH. If fixed, set Frequency CH. If SEARCH, set start CH and end CH.  
You should register the Frequency CH beforehand on "Frequency Setting" screen.  
Configuration> "Frequency Setting" screen.
- MTPC: Set MTPC (manual transmit power control) Level (-6 - +14dBm).  
If Master is selected ATPC, Slave is automatically configured as ATPC Mode.
- Click the **Setup** button.

### Radio Configuration

<b>Operating Mode</b>	P-P(Slave) ▾
<b>Symbol Rate</b>	40.0MHz ▾
<b>Frame ID Number</b> [ 1 ~ 65535 ]	1
<b>Encryption Parameter</b> (0-22 halfwidth alphabet or digit character)	1234567890
<input type="button" value="Setup"/> "Setup" makes configuration changes. These changes are reflected after Reset.	

<b>Network Element Name</b> (0-20 fullwidth or halfwidth alphabet)	
<b>FREQUENCY-CH</b>	<input checked="" type="radio"/> FIXED FREQUENCY-CH CH4:25810 ▾
	<input type="radio"/> SEARCH START CH4:25810 ▾
	END CH4:26190 ▾
<b>MTPC</b>	5.0 ▾ dBm
	<small>If Master select ATPC, Slave is automatically configured as ATPC Mode.</small>
<input type="button" value="Setup"/>	

Figure 5-6 Radio configuration tab (Slave)

Step2 Select the Configuration > Network Configuration tab.

- IPv4 : Set IP address, subnet mask and default gateway
- IPv6 : Set Disable or Enable. If enabled, set IP address, default gateway
- Click the **Setup** button. "Setup" makes configuration changes. These changes are reflected after Reset.
  
- ETHERNET Configuration : Set the interface class 1000BASE-T(AUTO), 1000BASE-T(Fixed), 1000BASE-T(AUTO), 100BASE-TX/FULL(FIXED), 100BASE-TX(AUTO) or 100BASE-TX/HAFE(Fixed)
- Management VLAN TAG: Set Enable or Disable. If enabled, set VID, COS
- Click the **Setup** button.

The basic configuration of the WT (Slave) is completed by the above and works.

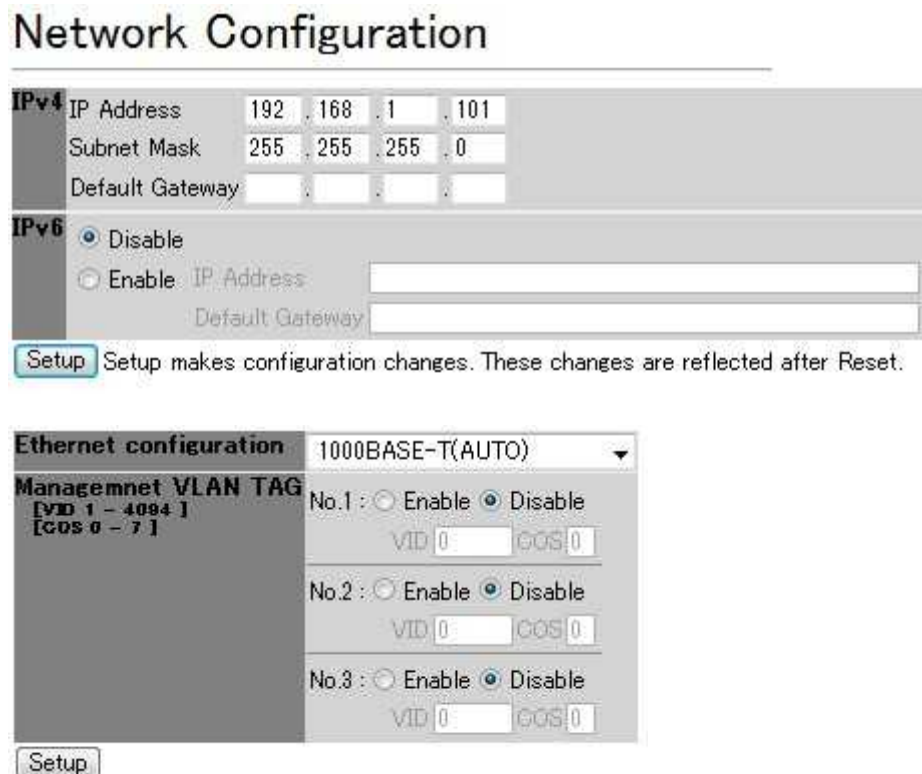


Figure 5-7 Network Configuration tab (Slave)

if necessary, set the following setting.

Step3: Select the QoS and Traffic control tab

- COS assignment for Management Communication from Slave to Master.

## 5.5. Installing the WT

### 5.5.1. Installing the WT (master/slave)

Step1 Attach the WT mounting bracket to the WT using the bolts (a), (b) and (c).

You can install the WT either for vertical or horizontal polarization.

Step2 Secure the WT mounting bracket to the pole using the bolts.

Due to prevent a fall, Bolt (d) removes it. Bolt (e) does not remove it.

Applicable pole diameter: From  $\Phi 25.4\text{mm}$  to  $\Phi 50.8\text{mm}$

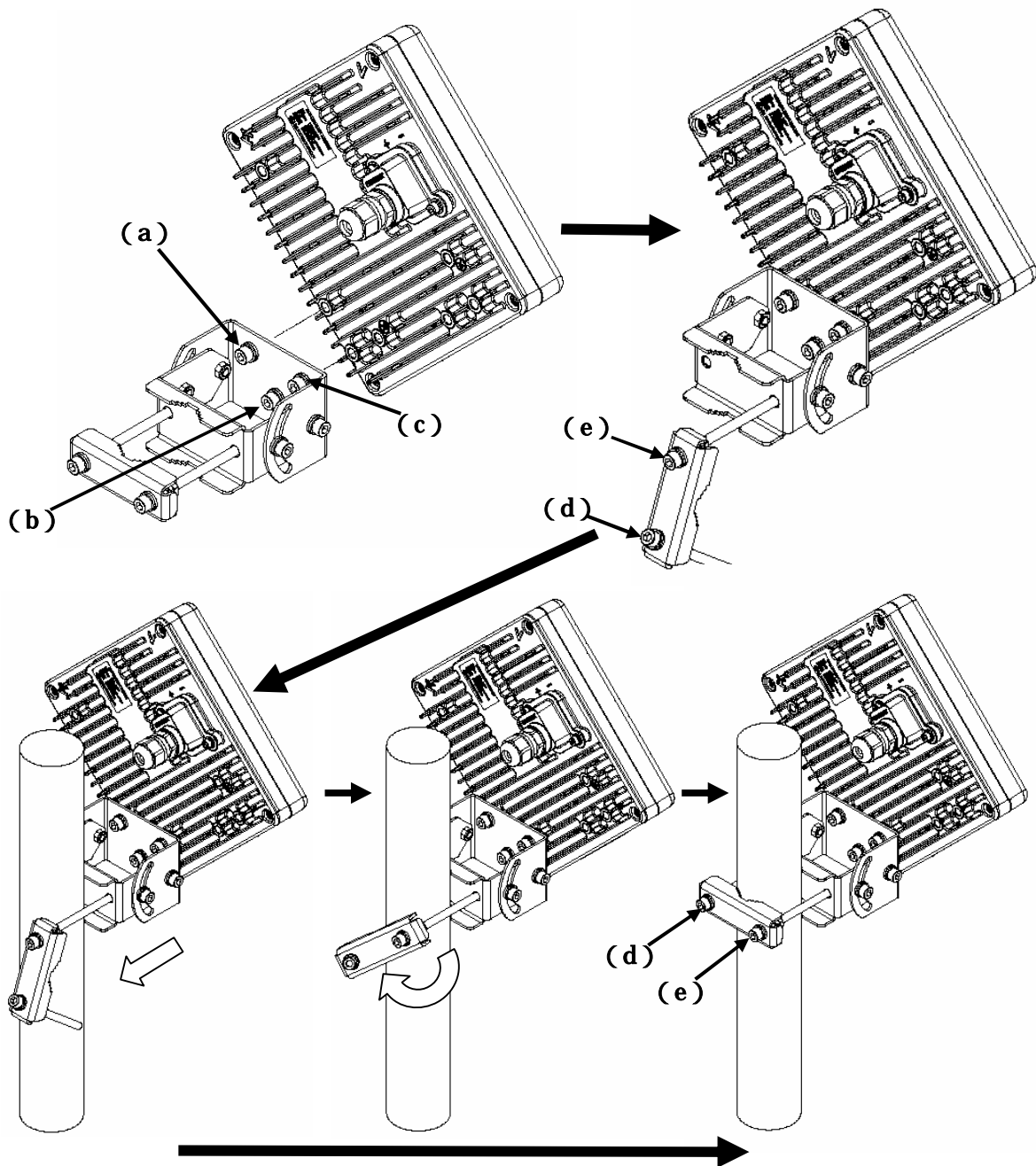
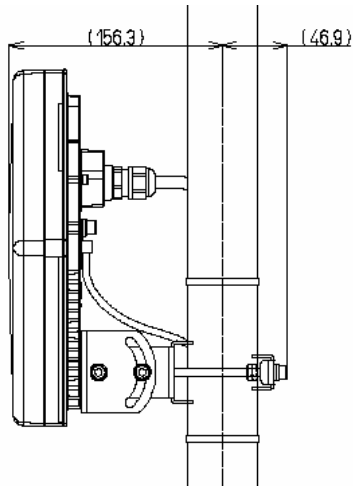
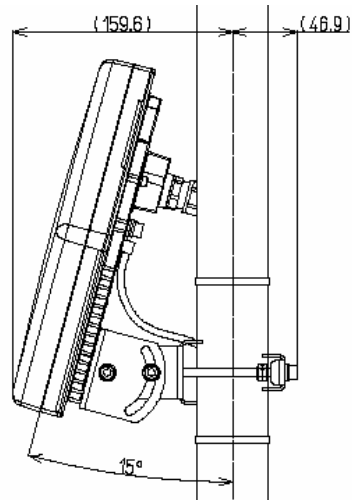


Figure 5-8 Installing the WT

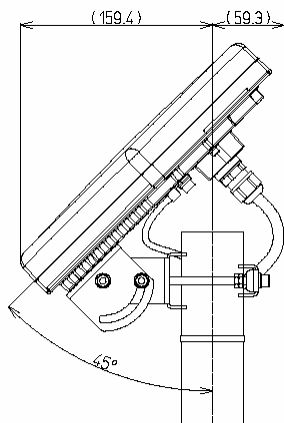
A builder prepares a steel pipe by the installation place (a wall, a pole or etc.), and it install. Installation example is shown below.



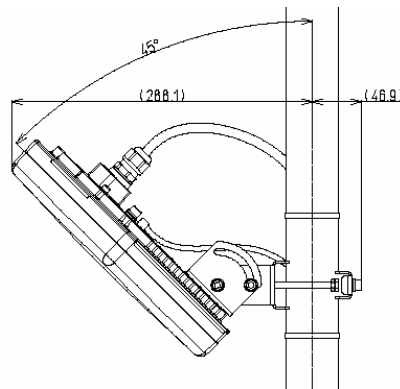
Horizontal



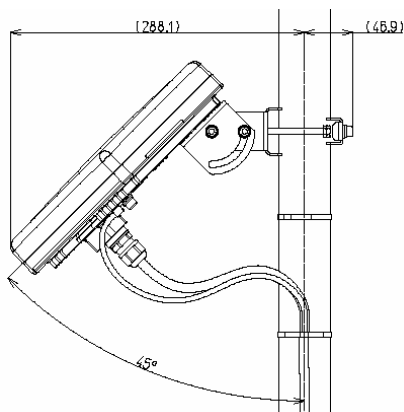
Angle of elevation 15degree



Angle of elevation 45degree on the pole top



Dip 45degree



Angle of elevation 45degree in middle of the pole

Figure 5-9 Installation example for vertical polarization (pole diameter is  $\Phi 50.8\text{mm}$ )

## 5.5.2. Setting the WT for Vertical or Horizontal Polarization

Rotate the antenna ninety degrees to choose between vertical or horizontal polarization

For vertical polarization, position **V** at the top.

For horizontal polarization, position **H** at the top.

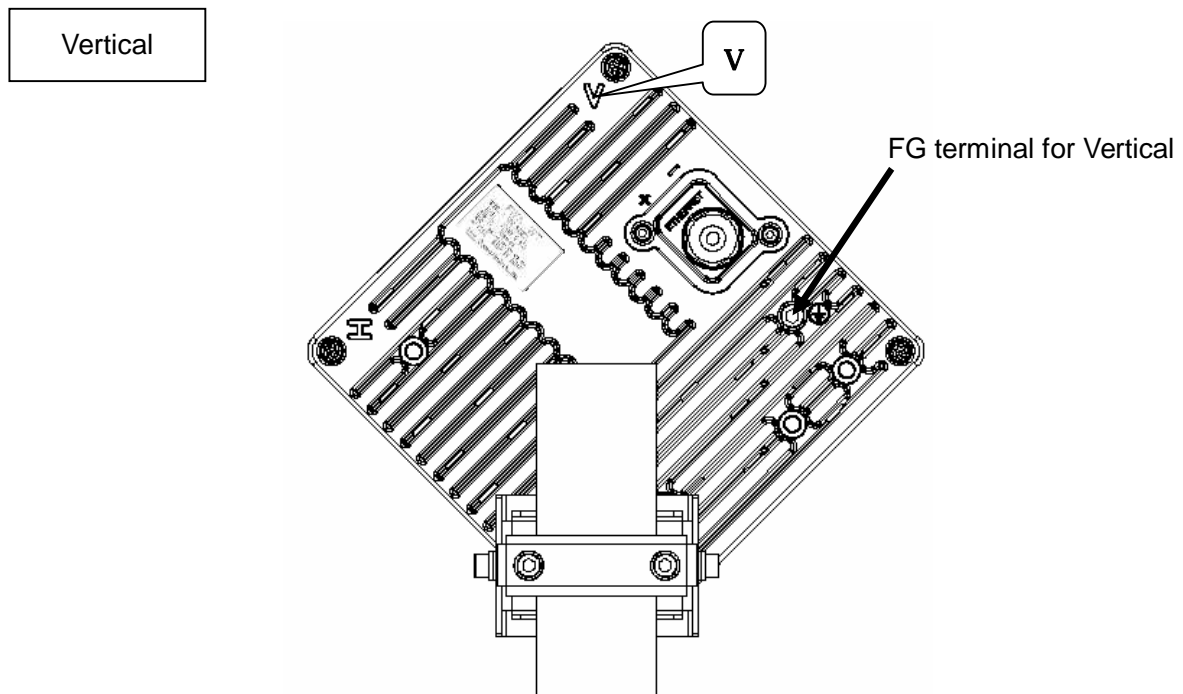


Figure 5-10 Vertical Polarization

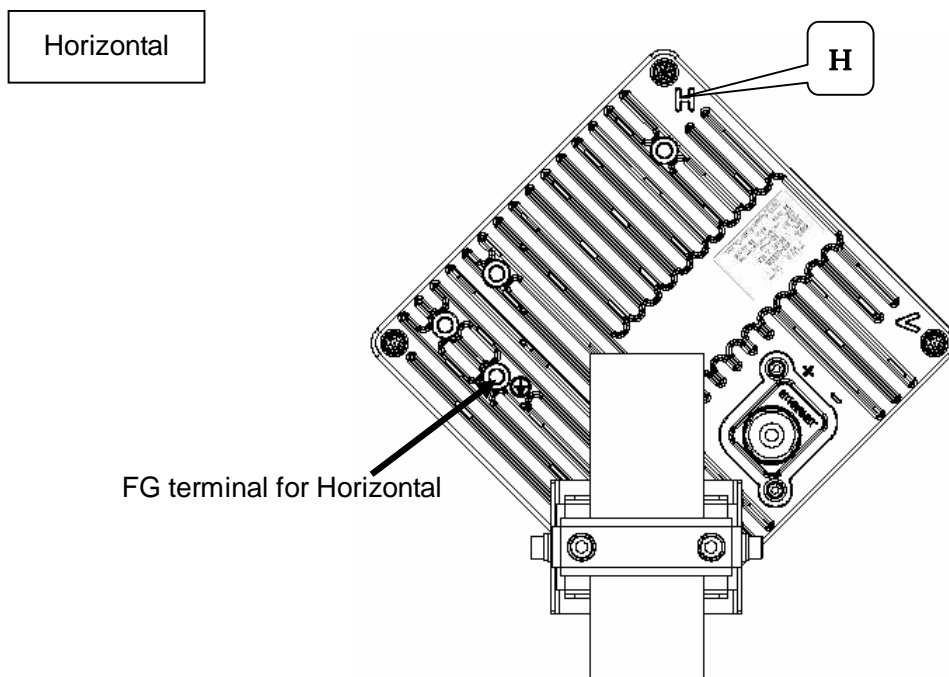


Figure 5-11 Horizontal Polarization

## 5.6. Installing the WT (External Antenna Type)

### 5.6.1. Installing 30cm Antenna in WT (External Antenna Type)

#### 1. Φ30cm antenna (HPCPE-26J : RADIO WAVE, INC ) installation procedure

1) According to the antenna manual of RADIO WAVES, INC., set it up on the pole.

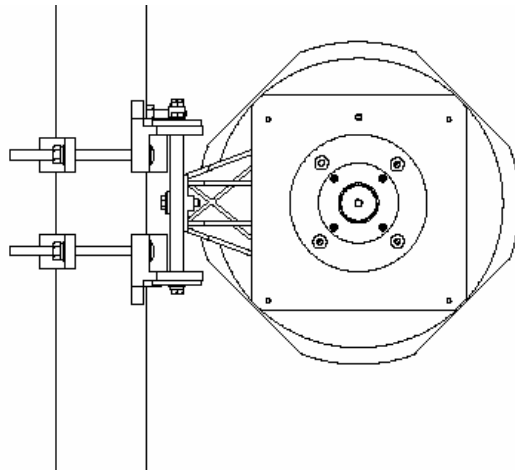


Figure 5-12 Φ30cm antenna of RADIO WAVES, INC.

2) Spread specified grease on the O-ring.

The spreading method depends on the manual of RADIO WAVES, INC..

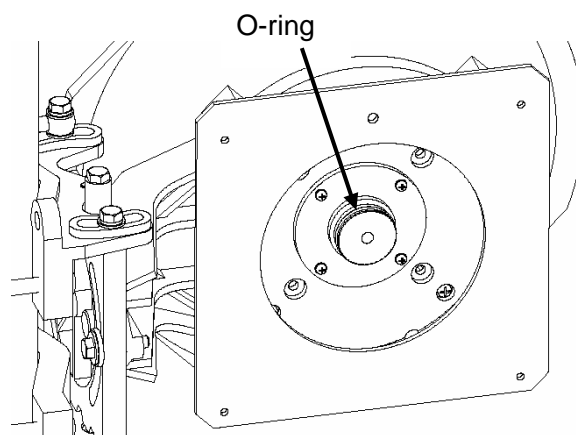


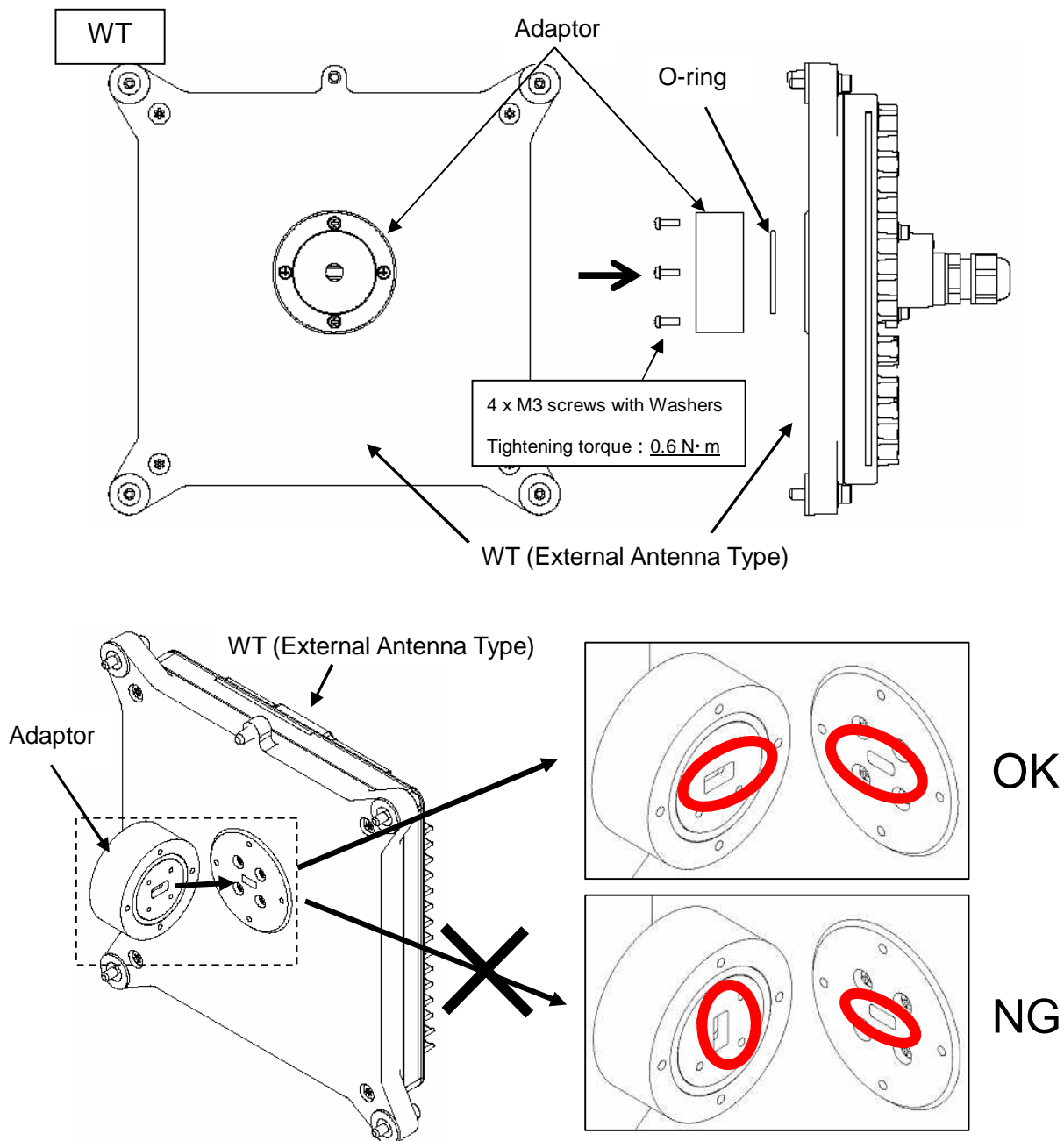
Figure 5-13



## 2. WT installation procedure

Attach the antenna adaptor to the WT with the O-ring using four M3 screws. (Figure 6-12 & Figure 6-13)

These (adaptor, the O-ring, M3 screws with Washers x 4 pieces) are attached articles of the antennas of RADIO WAVES, INC. Tightening torque : 0.6 N·cm



- When you attach the antenna adaptor to the WT, it should take the matched shape of each other.
- If it takes the unmatched shape of each other, the radio can not work normally.

Figure 5-15

### **3. Installed WT to an antenna for choosing vertical or horizontal polarization**

Rotate the WT ninety degrees to choose between vertical or horizontal polarization.

#### 1) Vertical polarization

When using the V (Vertical) polarization, the guide pin of the WT should be turned to right above and inserted into the V guide hole of the plate.

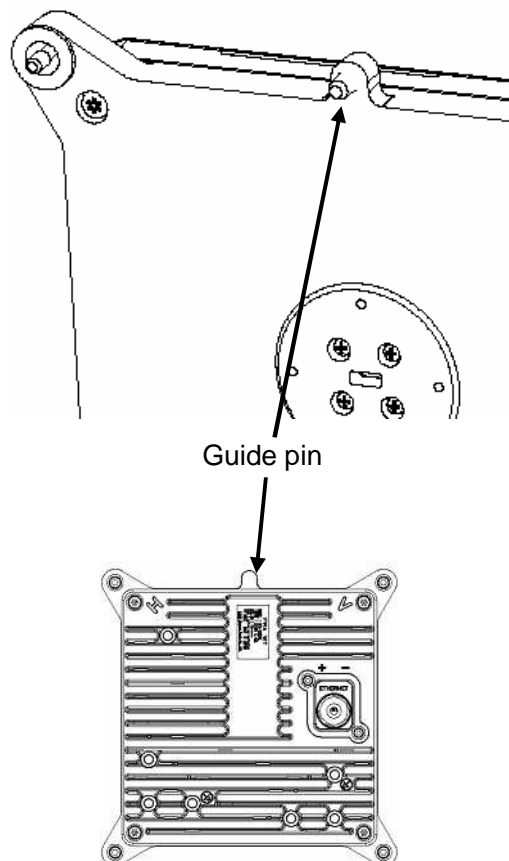


Figure 5-17

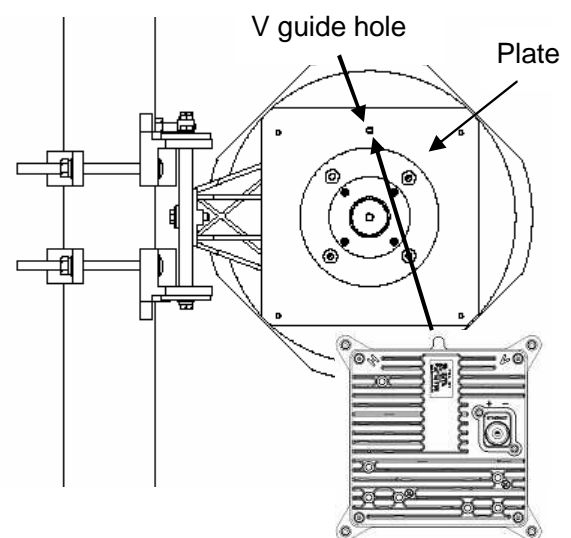


Figure 5-16 Vertical polarization

After inserting the guide pin of the WT into the guide hole, presses the WT to the plate.  
 While you are pressing the WT, you must be tightening the four M5 screws which included in WT.  
 Tightening torque : 2.7 N·cm

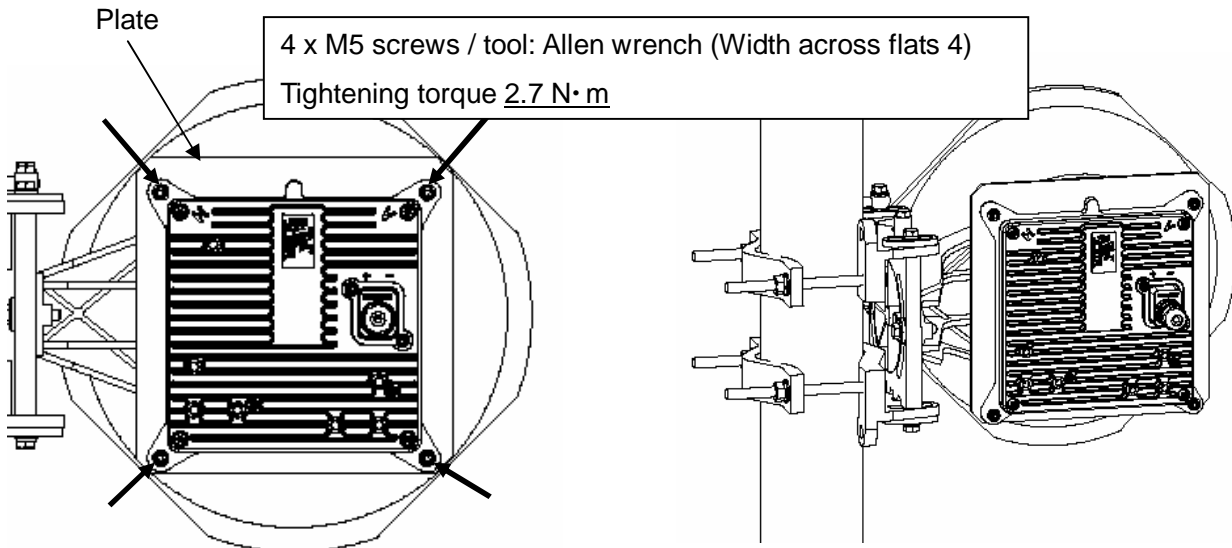


Figure 5-18 Installed WT to an antenna for vertical polarization

2) Horizontal polarization

When using H (Horizontal) polarization, the guide pin of the WT should be rotated to the right and inserted into the H guide hole of the plate.

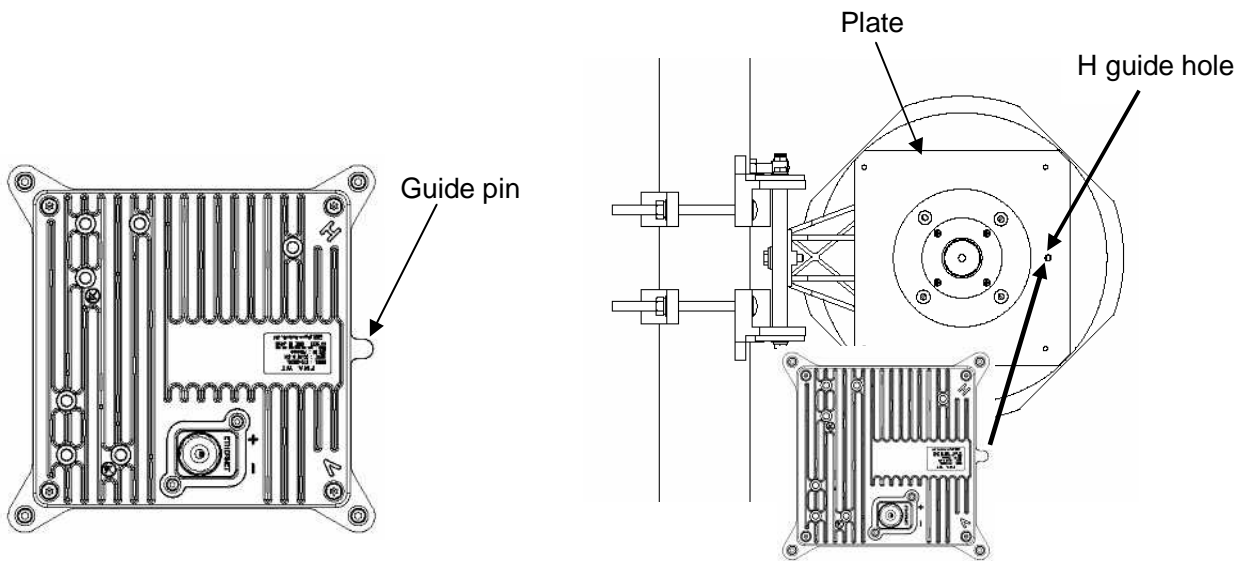


Figure 5-19

Figure 5-20 Horizontal polarization

After inserting the guide pin of the WT into the guide hole, presses the WT to the plate.  
While you are pressing the WT, you must be tightening the four M5 screws which included in WT.  
Tightening torque : 2.7 N·cm

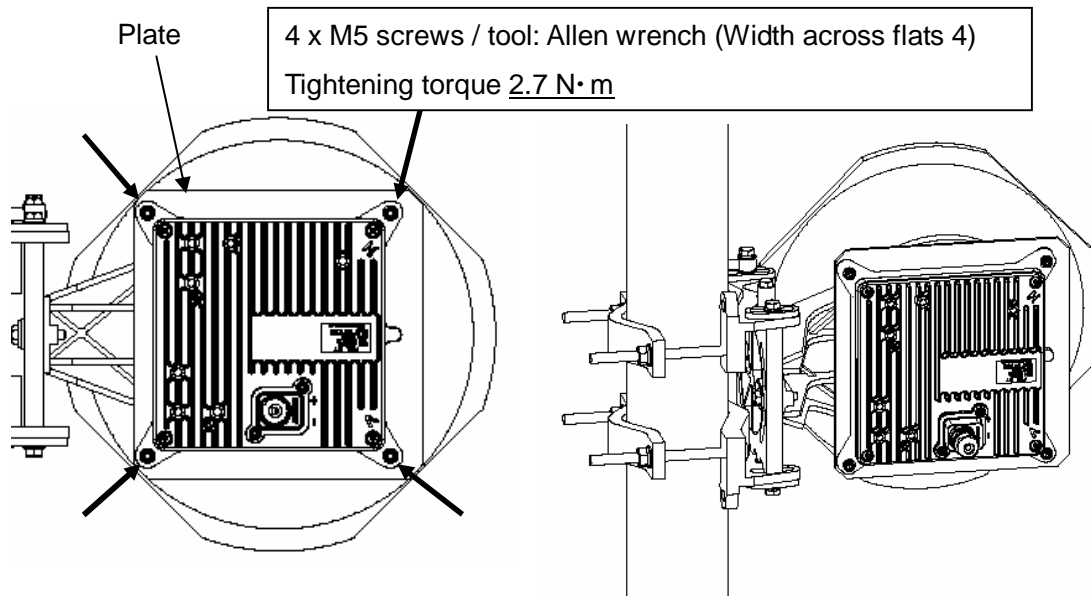


Figure 5-21 Installed WT to an antenna for horizontal polarization

## 5.6.2. Installing 60cm Antenna in WT (External Antenna Type)

### 1. Φ60cm antenna (HP2-26J : RADIO WAVE, INC ) installation procedure

1) According to the antenna manual of RADIO WAVES, INC., set it up on the pole.

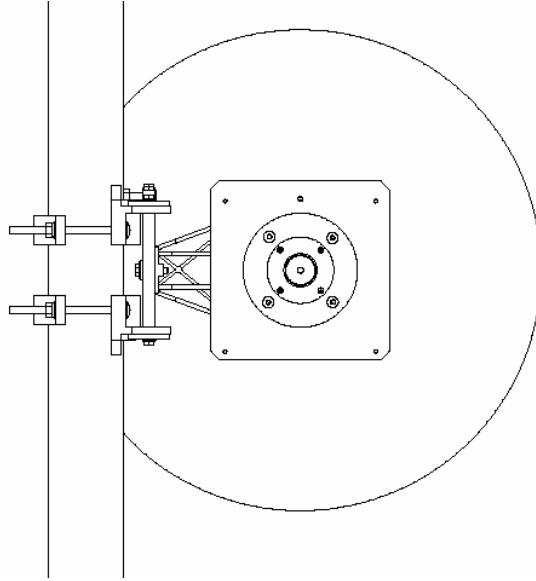


Figure 5-22 Φ60cm antenna of RADIO WAVES, INC.

2) Spread specified grease on the O-ring.

The spreading method depends on the manual of RADIO WAVES, INC..

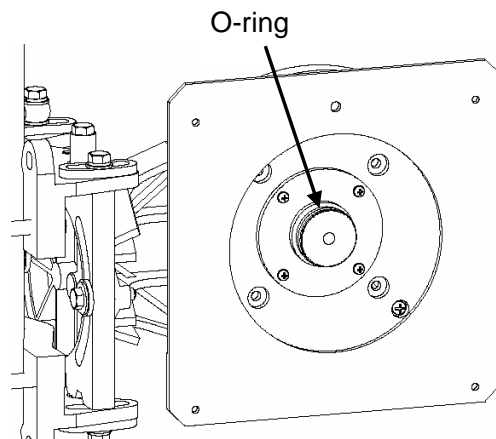


Figure 5-23

## 2. WT installation procedure

Attach the antenna adaptor to the WT with the O-ring using four M3 screws. (Figure 6-22 & Figure 6-23)

These (adaptor, the O-ring, M3 screws with Washers x 4 pieces) are attached articles of the antennas of RADIO WAVES, INC. Tightening torque :  $0.6 \text{ N}\cdot\text{cm}$

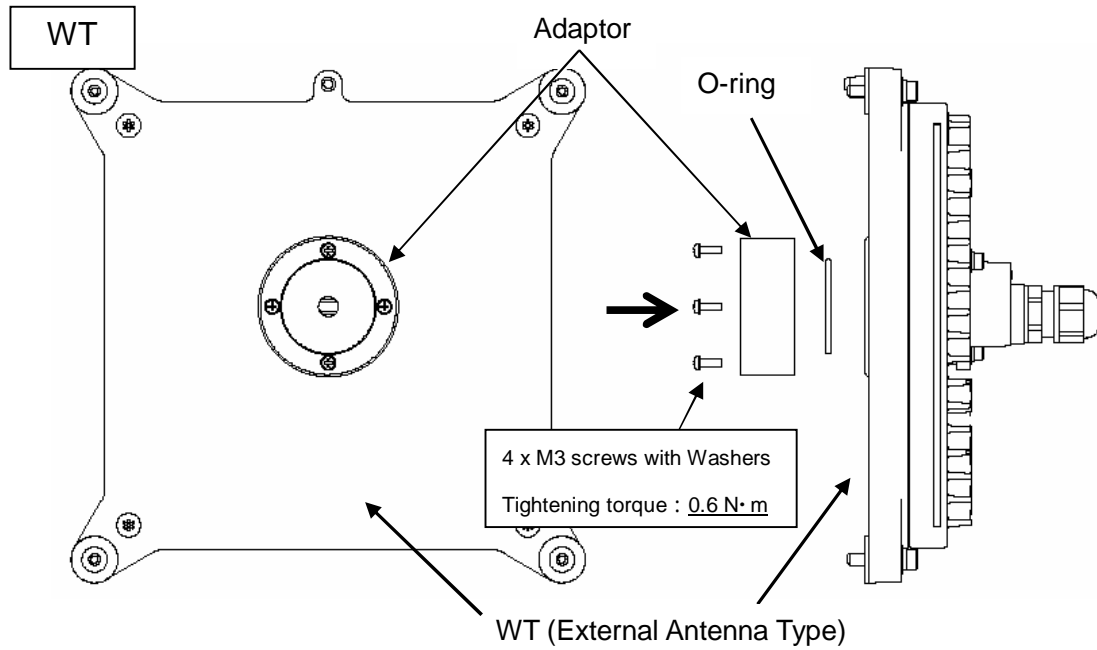
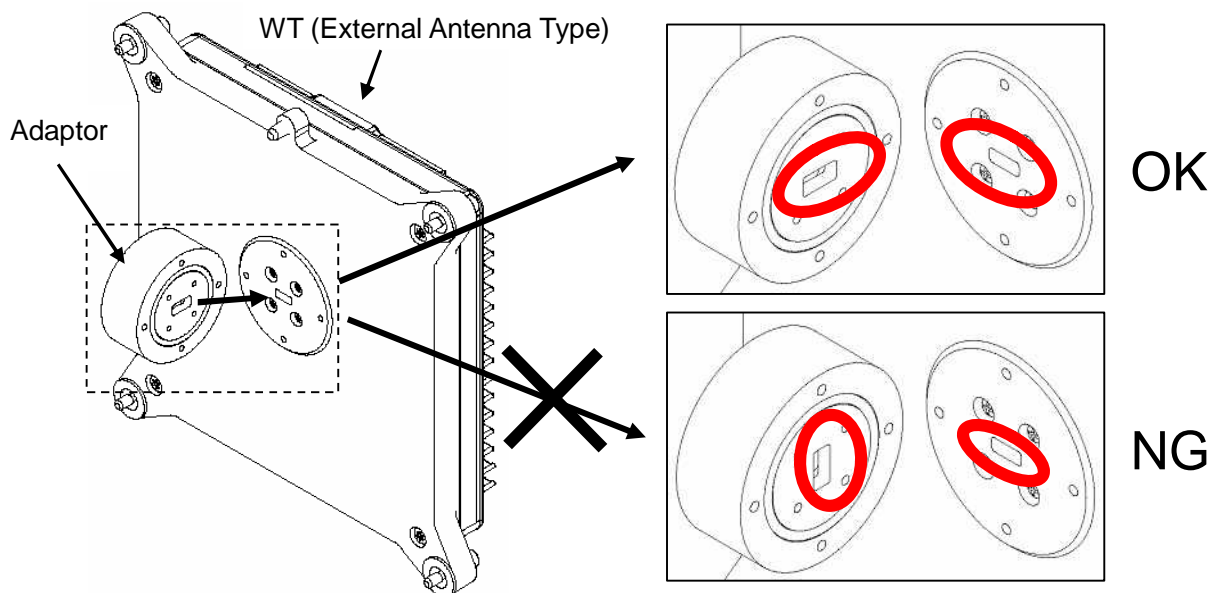


Figure 5-24



- ❗ • When you attach the antenna adaptor to the WT, it should take the matched shape of each other.
- If it takes the unmatched shape of each other, the radio can not work normally.

Figure 5-25

### **3. Installed WT to an antenna for choosing vertical or horizontal polarization**

Rotate the WT ninety degrees to choose between vertical or horizontal polarization.

#### 1) Vertical polarization

When using the V (Vertical) polarization, the guide pin of the WT should be turned to right above and inserted into the V guide hole of the plate.

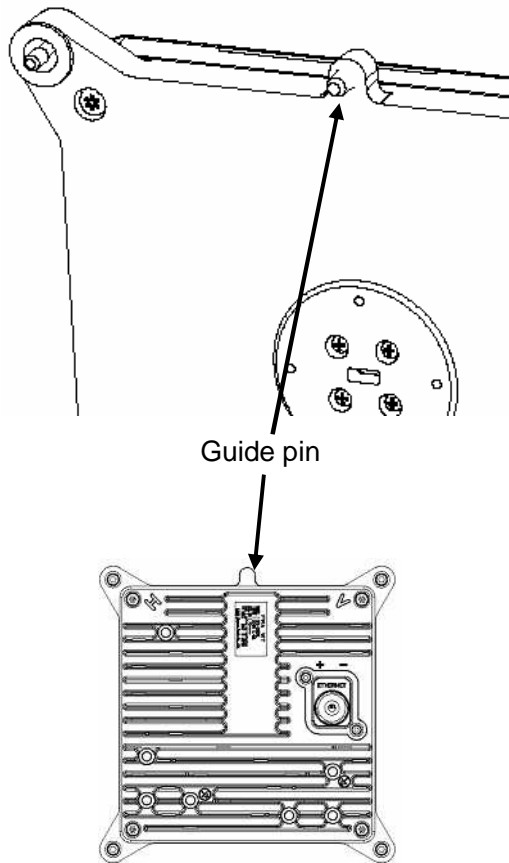


Figure 5-27

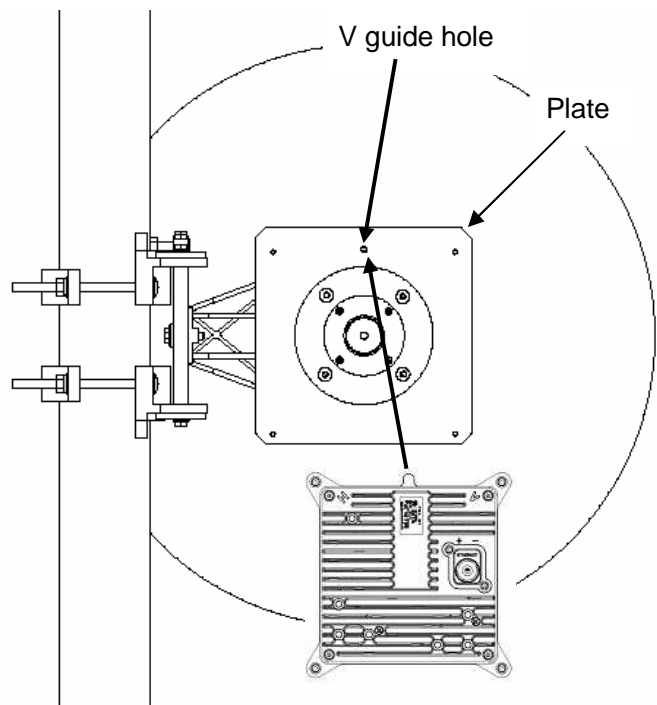


Figure 5-26 Vertical polarization

After inserting the guide pin of the WT into the guide hole, presses the WT to the plate.  
 While you are pressing the WT, you must be tightening the four M5 screws which included in WT.  
 Tightening torque : 2.7 N·cm

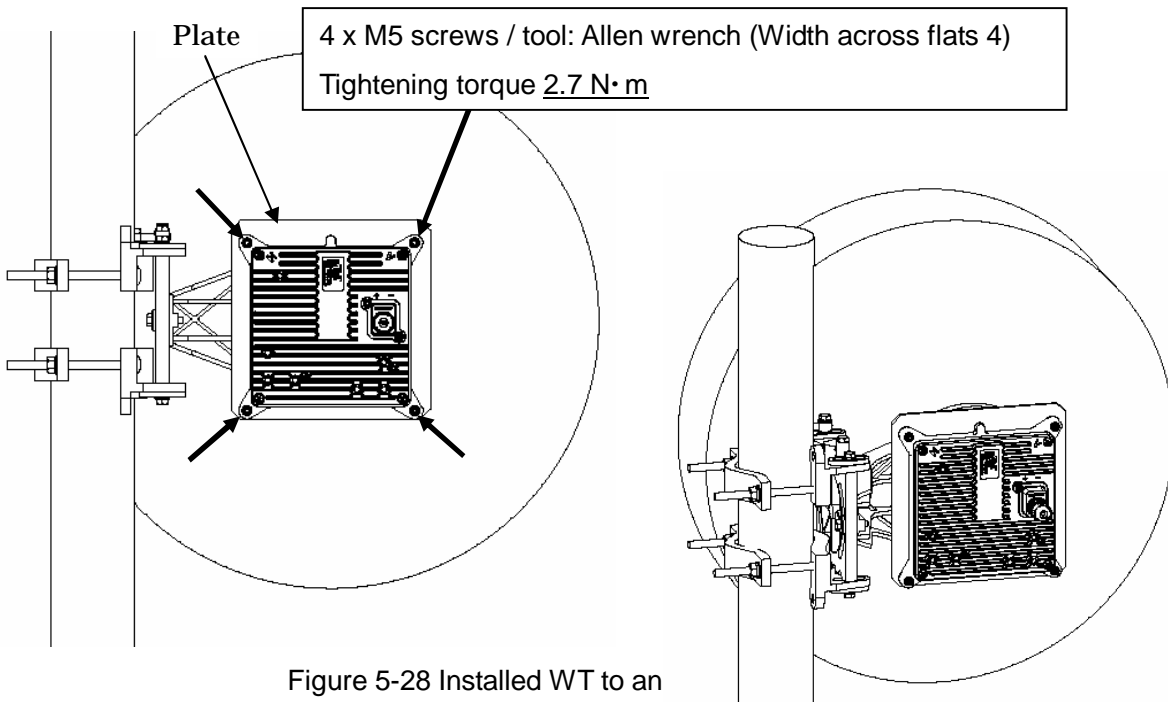


Figure 5-28 Installed WT to an

## 2) Horizontal polarization

When using H (Horizontal) polarization, the guide pin of the WT should be rotated to the right and inserted into the H guide hole of the plate.

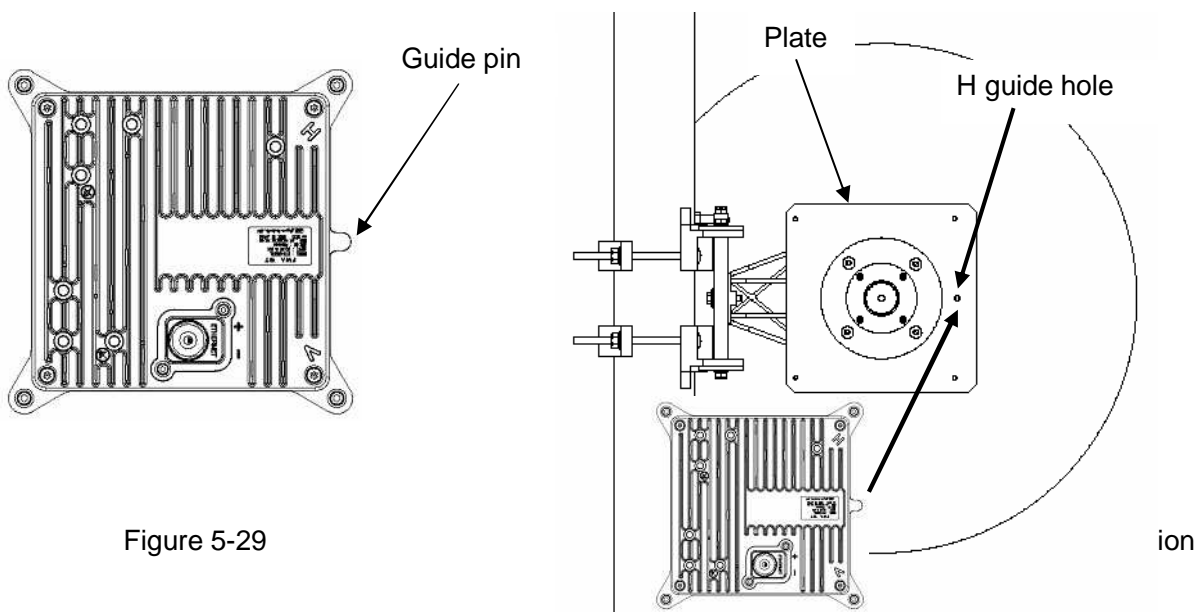


Figure 5-29



After inserting the guide pin of the WT into the guide hole, presses the WT to the plate.  
While you are pressing the WT, you must be tightening the four M5 screws which included in WT.  
Tightening torque : 2.7 N·cm

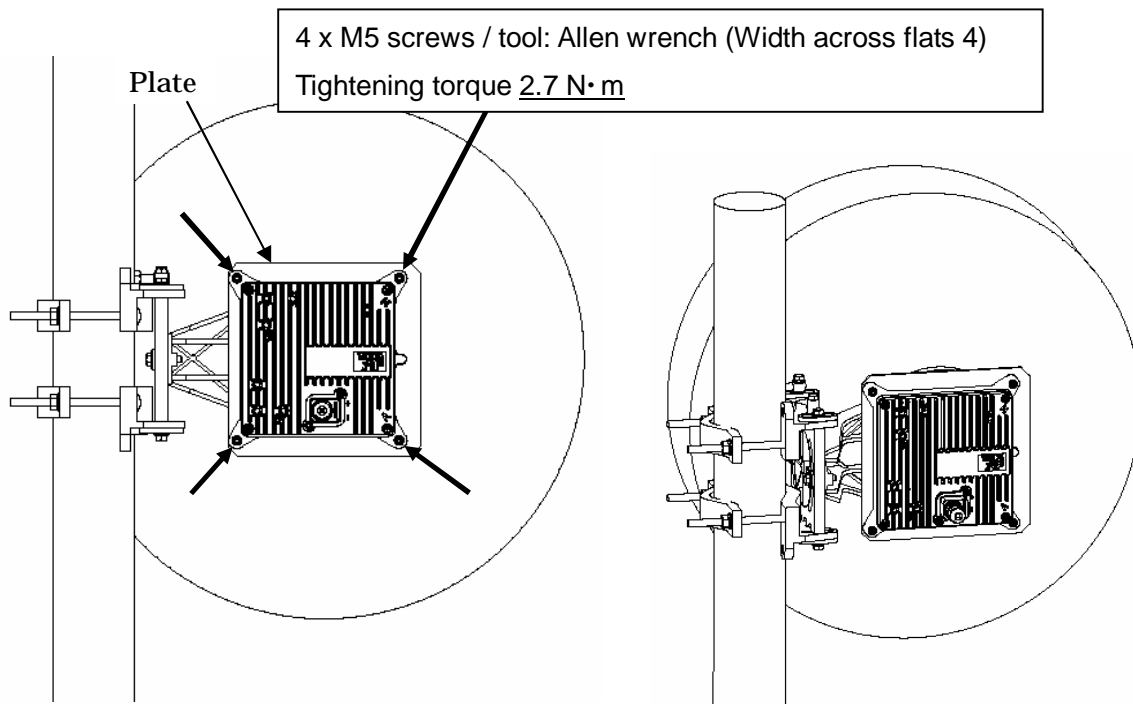


Figure 5-31 Installed WT to an antenna for horizontal polarization

## 5.7. Adjusting the antenna Direction of the WT

### 5.7.1. Adjusting the Antenna Direction of the WT

This section describes the procedure for adjusting the antenna direction.

When adjusting the direction of the WT antenna, use the “Antenna direction adjustment tool” together with Maintenance Tool.

Step 1: Connection between WT (master/slave) and Management Tool and display the Receiving Level.

See Subsection 5.7.1.1

- In case of near-distance installation (When receive level become more than -30dBm), Enable the setting of the short distance mode.

Step 2: Rough adjustment for the WT (Master)

- Install the Antenna direction adjustment tool.
- See Subsection 5.7.1.2
- Remove the Antenna direction adjustment tool.
- When using the Antenna direction adjustment tool, See Subsection 5.7.1.3.

Step 3: Rough adjustment for the WT (Slave)

- Install the Antenna direction adjustment tool.
- See Subsection 5.7.1.2
- Remove the Antenna direction adjustment tool.
- When using the Antenna direction adjustment tool, See Subsection 5.7.1.3.

Step 4: Fine adjustment for the WT (Slave)

- See Subsection 5.7.1.4

Step 5: Fine adjustment for the WT (Master)

- See Subsection 5.7.1.4

Step 6: Verification

- After fine adjustment, use the Management Tool to final check the receive level.  
If the receive level value is within the standard range, the procedure for adjusting the antenna direction has been completed.  
If the receive level value is lower than a standard value, you need to perform Steps 4 and 5 again.

Step 7: Exit the Maintenance Tool

### 5.7.1.1. Measuring the receive level

(1) As shown in Figure 5-32, connect the Management Tool (PC) to the WT. ( login class: admin or installation )

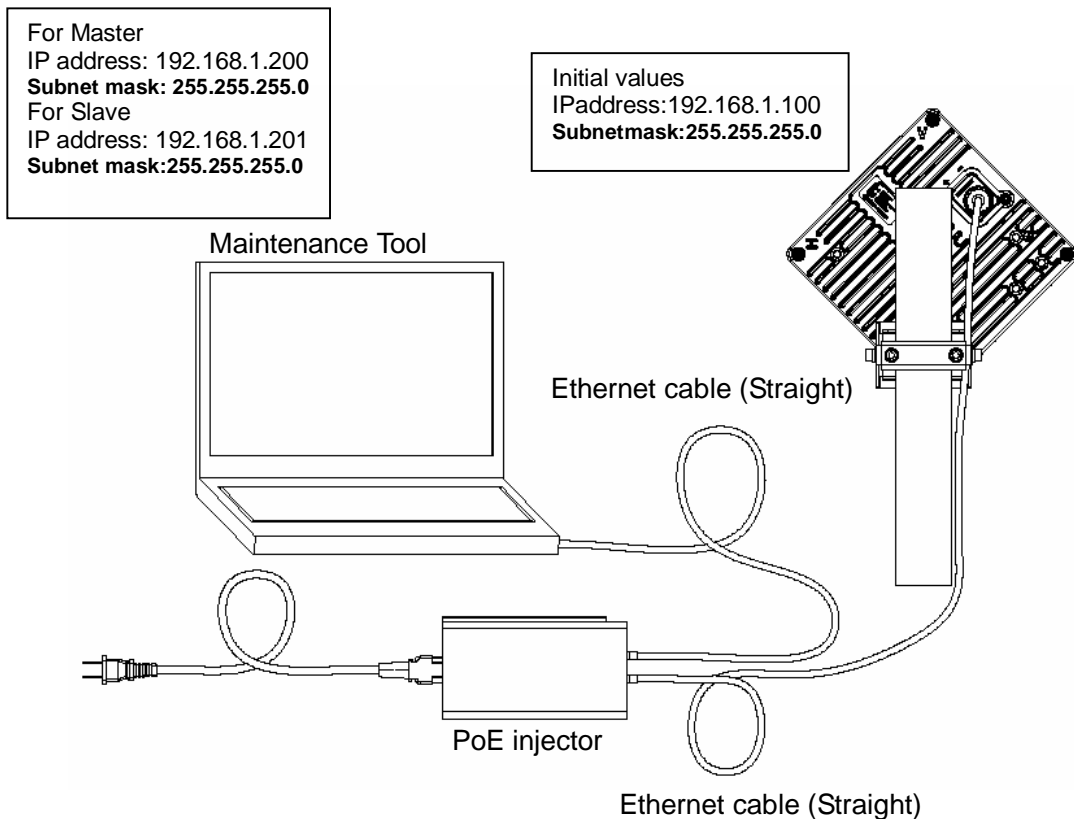


Figure 5-32 Connecting the Maintenance Tool

(2) Measuring the receive level the WT (Master / Slave)

Step1 Select the Installation > Antenna Alignment tab

Step2 Click the Enter button to change the Antenna Alignment mode

When distance is a short (approximately less than 100m), change the short distance mode into Enable (add -20dB attenuation for transmitted level)

Only for Slave, set the Frequency CH same as Master frequency CH.

Step3 The initial value of the modulation scheme is QPSK in the direction adjustment mode. Usually use QPSK in Antenna Alignment mode

If you need, you can set the Modulation scheme (down link / up link).

QPSK、16QAM、64QAM

Click the **Setup** button to change the modulation scheme.

The modulation scheme of Down link and Up link usually set it in the same value.

Step4 Measure the "Receiving Level"

The Receiving level aims for a direction adjustment mode level of the graph (ATPC OFF) about "5.7.2 The receive level and the distance"..

In addition, it becomes a normal operation mode when you finish a direction adjustment mode. The receiving level is optimized by ATPC function.

Therefore, the MT display level of the receiving level becomes the normal operative value of the graph (ATPC ON) about "5.7.2 The receive level and the distance".

You can confirm the change of the Receiving Level in high (Receiving Level is high) / low (Receiving Level is low) of the sound when you turn on "sound on" button. The correspondence OS is Windows XP. This function does not work in Winodws7.Sound function works on WINDOWS XP.

- Step5 After Antenna Alignment, measure the Received Blocks Discarded Rate.  
Select the downlink modulation scheme and the uplink modulation scheme (Only Master)  
QPSK, 16QAM, 64QAM  
Usually set the downlink and the uplink for the same modulation scheme.
- Step6 Check the Received Blocks Discarded Rate  
Push the Clear button to reset a counter and start the measurement. Update the measurements automatically.
- Step7 END the Antenna Alignment,  
Click the "End and Reset" button to finish the Antenna Alignment mode  
The "Reset ok" dialog appears. Clicking the OK button executes the reset. After 20 seconds, reset is completed.

# Antenna Alignment

**Enter Antenna Alignment Mode**

Start

Exit and Reset

**Short distance mode**

ON

**State**

-

**Transmitted Level [dBm]**

-

**Receiving Level**

-99
-10(dBm)

**-55.1** dBm

**-26.6** dBm

Clear Max-Hold

Instantaneous
Maximum-Hold

Sound on

**Receive CNR**

**29.5** dB

**Link Distance**

**Modulation Selection**

DL Modulation Scheme

QPSK

16QAM

64QAM

UL Modulation Scheme

QPSK

16QAM

64QAM

**Radio Link Status**

	Discarded Received Blocks	Number of Received Blocks	Received Blocks Discarded Rate
QPSK	-	-	-
16QAM	-	-	-
64QAM	-	-	-

Figure 5-33 Measuring the Receive Level (Master)

# Antenna Alignment

<b>Start Antenna Alignment Mode</b>	<input type="button" value="Enter"/> <input type="button" value="Exit and Reset"/>		
<b>Short distance mode</b>	<input type="button" value="Enable"/>		
<b>Frequency</b>	Not Set	<input type="button" value="Setup"/>	
<b>State</b>	-		
<b>Transmitted Level [dBm]</b>	-		
<b>Receiving Level</b>	<div style="display: flex; justify-content: space-between;"> <span>-99</span> <span>-10(dBm)</span> </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <span style="font-size: 24pt; color: green;"><b>-55.1</b></span> dBm  <b>Instantaneous</b> </div> <div style="text-align: center;"> <span style="font-size: 24pt; color: yellow;"><b>-54.7</b></span> dBm  <b>Maximum-Hold</b> </div> <div style="text-align: right;"> <input type="button" value="Clear Max-Hold"/> </div> </div> <input checked="" type="checkbox"/> Sound on		
<b>Receive CNR</b>	<div style="font-size: 24pt; color: green; background-color: black; padding: 5px; display: inline-block;"><b>30.0</b></div> dB		
<b>Modulation Scheme</b>	DL Modulation Scheme	UL Modulation Scheme	
	QPSK	QPSK	
	16QAM	16QAM	
	64QAM	64QAM	
<b>Radio Link Status</b>	<input type="button" value="Clear"/>		
		Discarded Received Blocks	Number of Received Blocks
			Received Blocks Discarded Rate
	QPSK	-	-
	16QAM	-	-
	64QAM		

Figure 5-34 Measuring the Receive Level (Slave)

### 5.7.1.2. Roughly Adjusting the Direction

Step1 As shown in Figure 5-39, loosen the hexagonal socket head bolts (a) and (b) securing the mounting bracket and swing the antenna left or right. Adjust the antenna approximately for the WT direction and finger-tighten the bolts (a) and (b).

Step2 As shown in Figure 5-40, loosen the bolts (c), (d), (e) and (f) and tilt the antenna up or down. Perform vertical-direction adjustment so that the WT of the opposite station can be seen and finger-tighten the bolts (c), (d), (e) and (f).

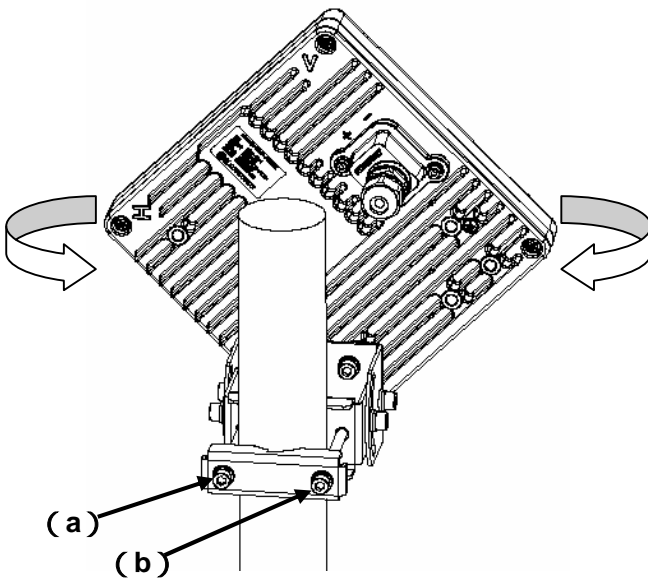


Figure 5-35 Rough-adjusting Horizontal Direction

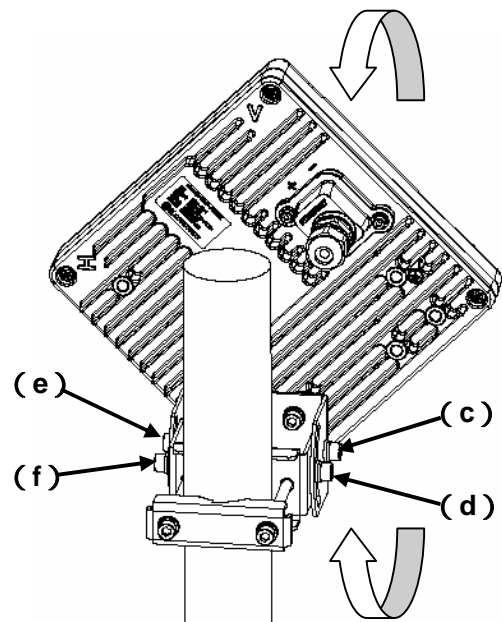


Figure 5-36 Rough-Adjusting the Vertical Direction

### 5.7.1.3. Roughly Adjusting the Direction (Using the Antenna direction adjustment tool)

- Step1 As shown in Figure and Figure5-38, use the wing bolt (a) to attach the Antenna direction adjustment tool.
- Step2 As shown in Figure 5-39, loosen the hexagonal socket head bolts (b) and (c) securing the mounting bracket and swing the antenna left or right. Adjust the antenna approximately for the WT direction and finger-tighten the bolts (b) and (c).
- Step3 As shown in Figure 5-40, loosen the bolts (d), (e), (f) and (g) and tilt the antenna up or down. Perform vertical-direction adjustment so that the WT of the opposite station can be seen through the scope of the Antenna direction adjustment tool.

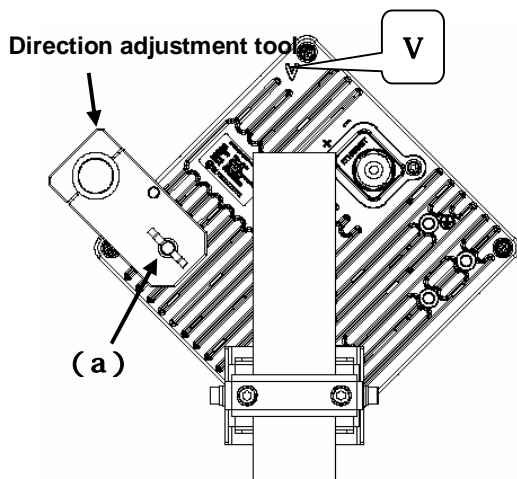


Figure 5-37 How to Install Direction Adjustment tool when the antenna type is the horizontal polarization

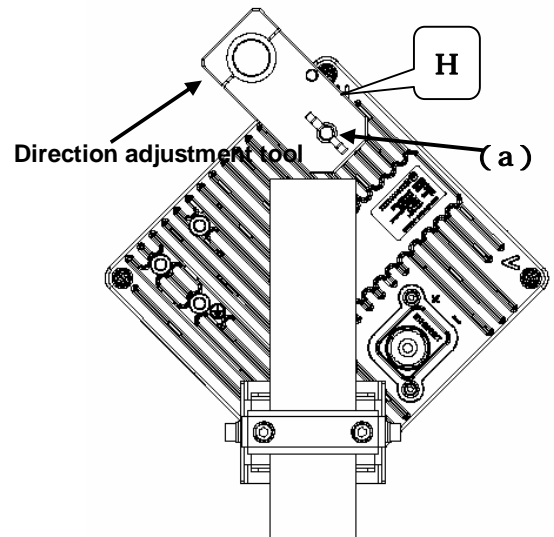


Figure 5-38 How to Install Direction Adjustment tool when the antenna type is the vertical polarization

In Figure 5-39 and Figure 5-40 is an example when the antenna type is the horizontal polarization.

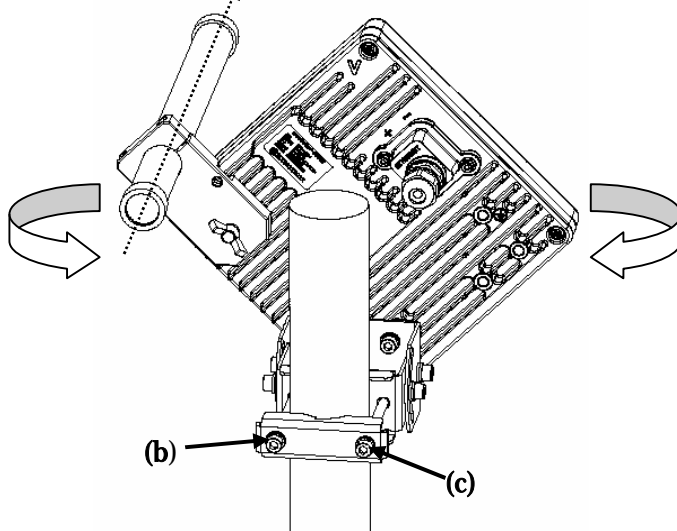


Figure 5-39 Rough-adjusting Horizontal Direction

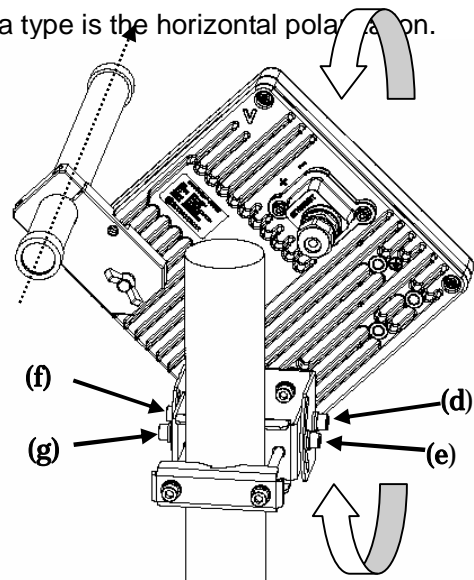


Figure 5-40 Rough-Adjusting the Vertical Direction

**!** • Never look at the sun directly. Doing so may seriously damage the eyes.



#### 5.7.1.4. Finely Adjusting the Direction

##### Step 1: Horizontal direction

As shown in Figure 5-41, loosen the hexagonal socket head bolts (a) and (b) securing the mounting bracket and swing the antenna left or right. Adjust the antenna direction so that the receive level indicates the maximum value, and finger-tighten the bolts (a) and (b).

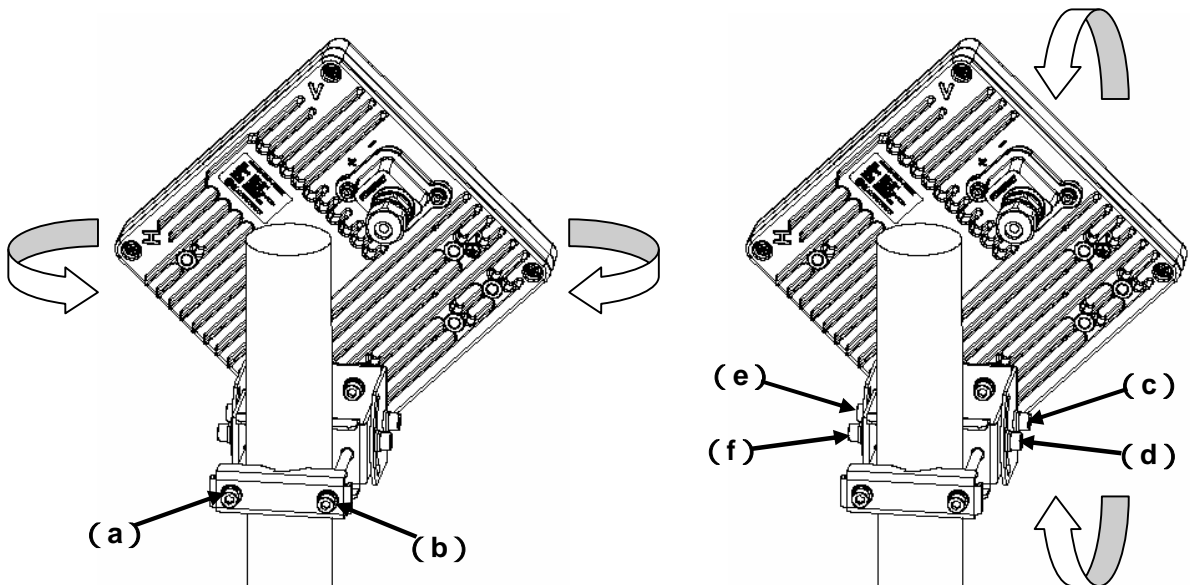
##### Step 2: Vertical direction

As shown in Figure 5-42, loosen the hexagonal socket head bolts (c), (d), (e) and (f) securing the mounting bracket and tilt the antenna up or down. Adjust the antenna direction so that the receive level indicates the maximum value. Tighten the bolts at a point showing the maximum receive level (tightening torque: 8.5N•m).

Tighten the bolts in order of (f), (d), (e) and (c) and make sure that the point showing the maximum receive level is maintained. This concludes the procedure for vertical-direction adjustment.

##### Step 3: Horizontal direction

Finely adjust the horizontal direction by slightly loosening the bolts (a) and (b) again. Once again, locate the point where the receiving level reaches the maximum value and hold that point. Finally, tighten the bolts (a) and (b) (tightening torque: 8.5N•m) while making sure that the point showing the maximum receiving level is maintained. This concludes the procedure for horizontal-direction adjustment.



The figures show examples of horizontal polarization setup.

Figure 5-41 Finely Adjusting the Horizontal Direction

Figure 5-42 Finely Adjusting the Vertical Direction

Note : When adjusting the antenna direction, you might mistakenly take the antenna's side lobe as the maximum receive level. For fine adjustment, therefore, you should move the antenna some more after the receiving level has reached the maximum value to make sure that you have not caught a side lobe.

### 5.7.2.The receive level and the distance

In a point-to-point system, the receiving level at clear sky and the distance are related as shown as bellows

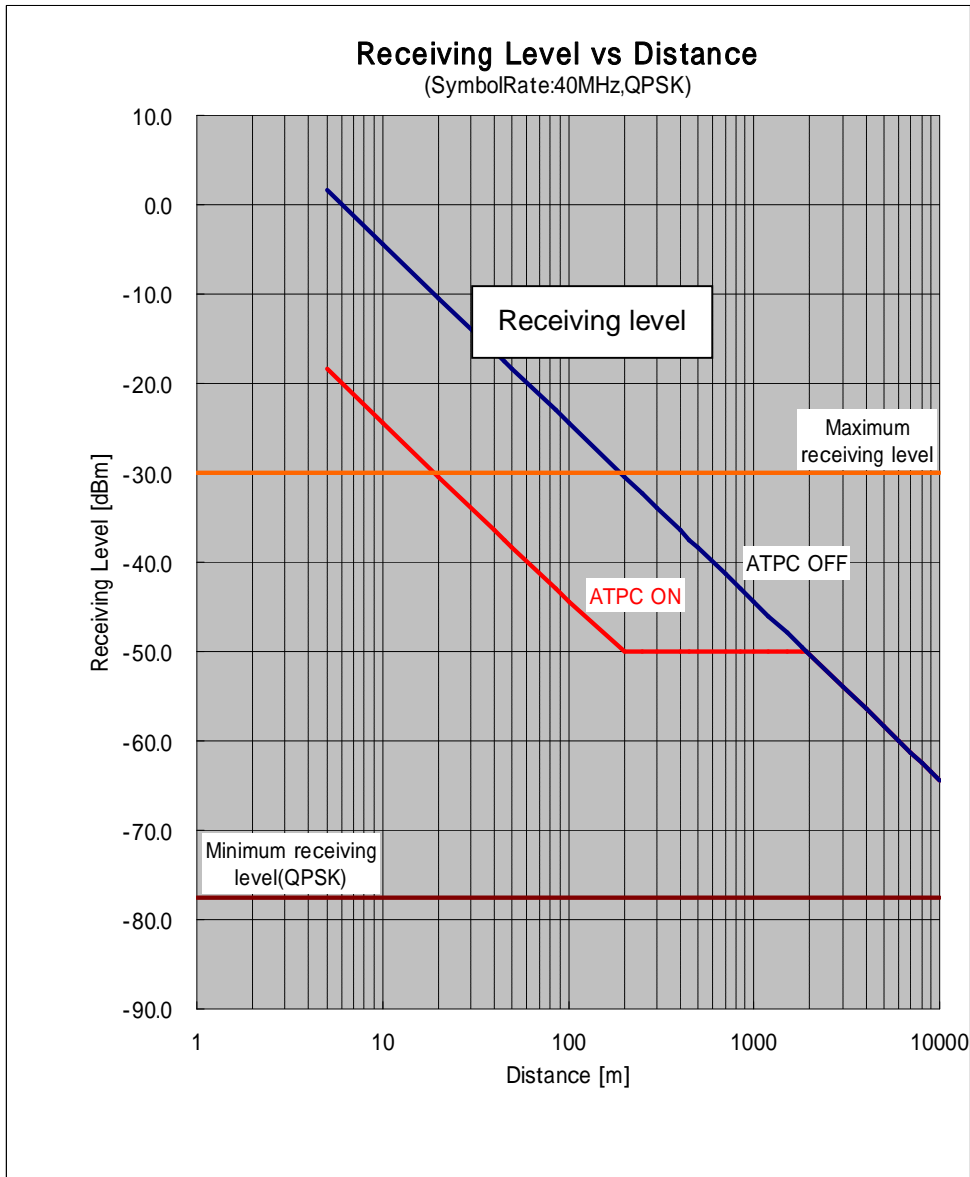


Figure 5-43 Receiving Level and Distance (SymbolRate:40MHz,QPSK)

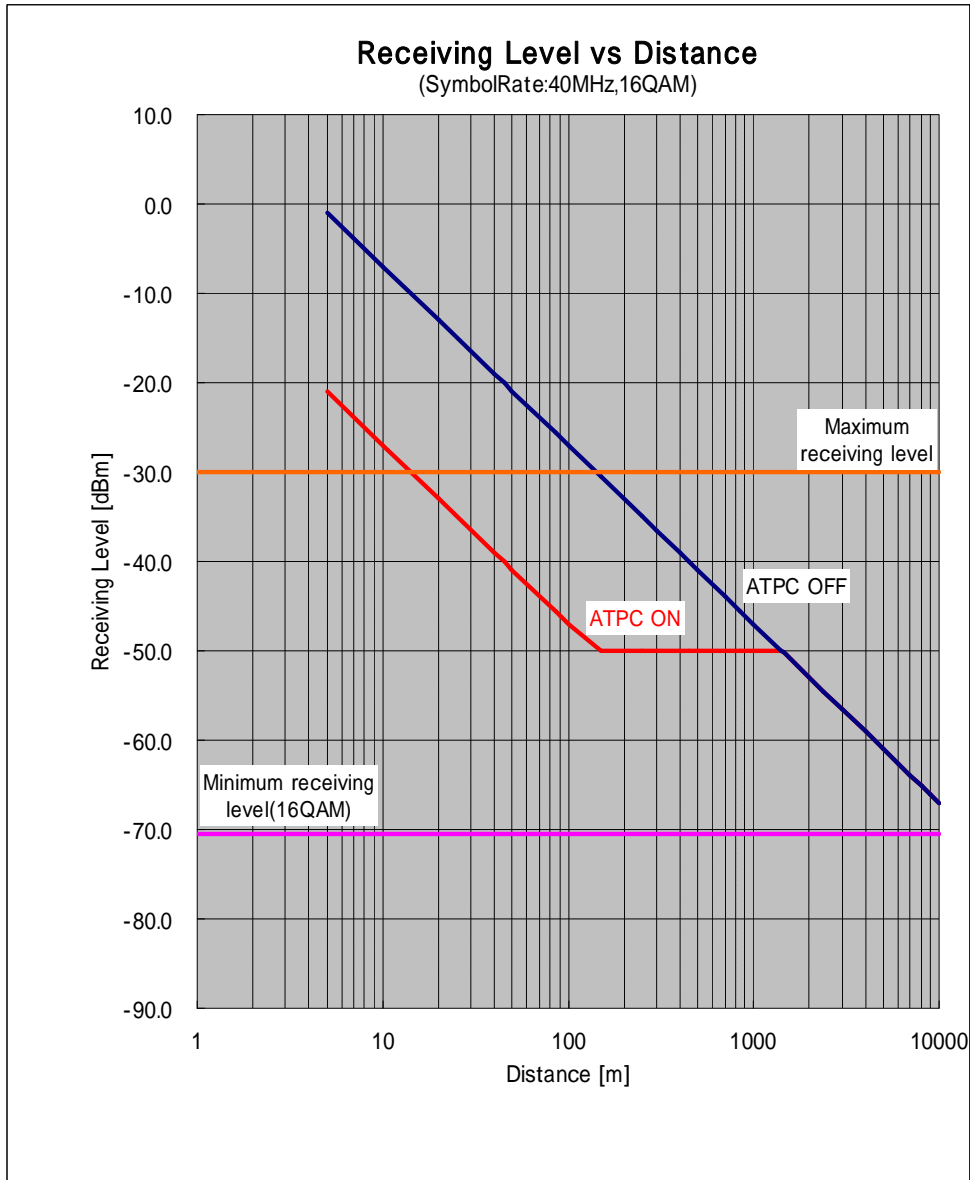


Figure 5-44 Receiving Level and Distance (SymbolRate:40MHz,16QAM)

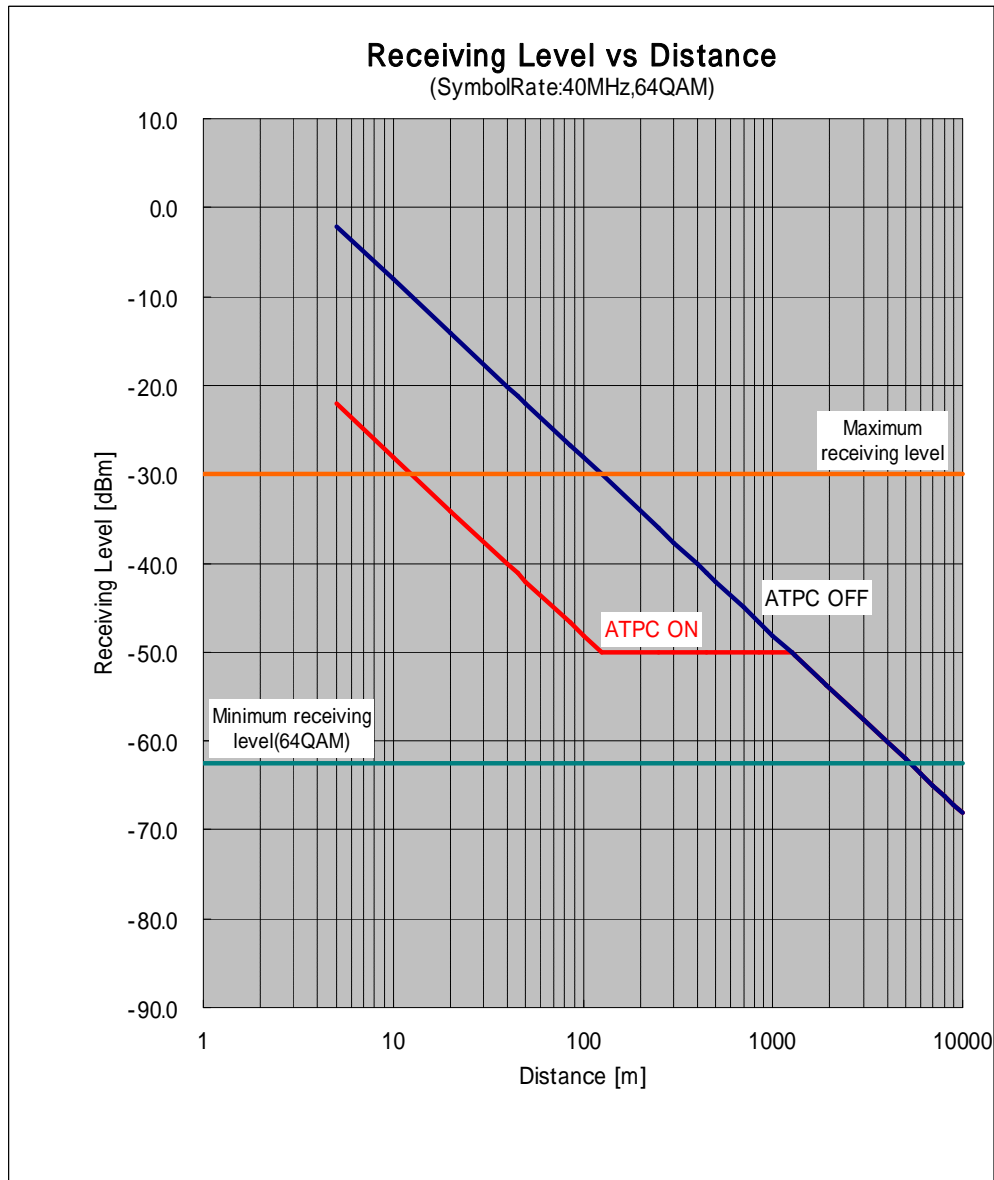


Figure 5-45 Receiving Level and Distance (SymbolRate:40MHz,64QAM)

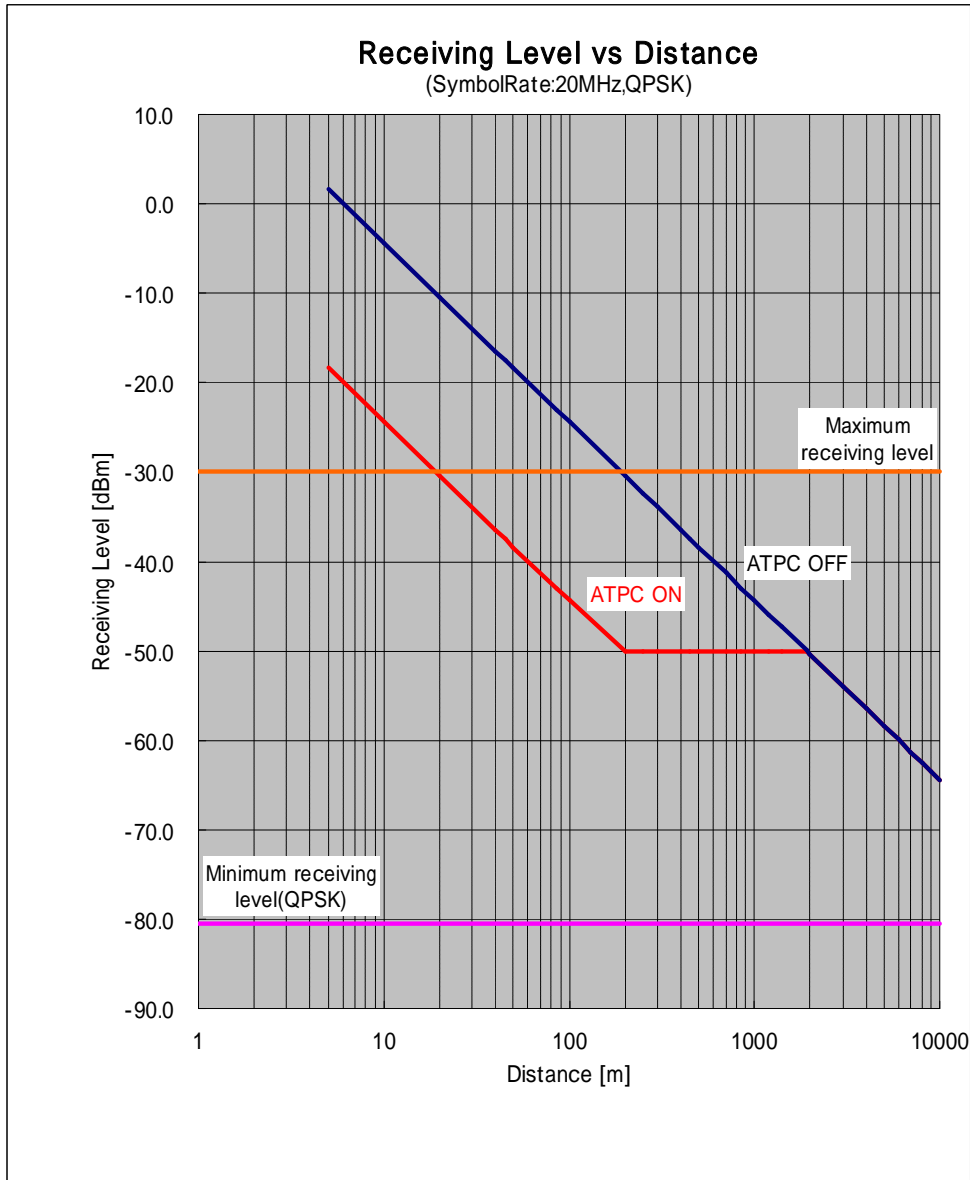


Figure 5-46 Receiving Level and Distance (SymbolRate:20MHz,QPSK)

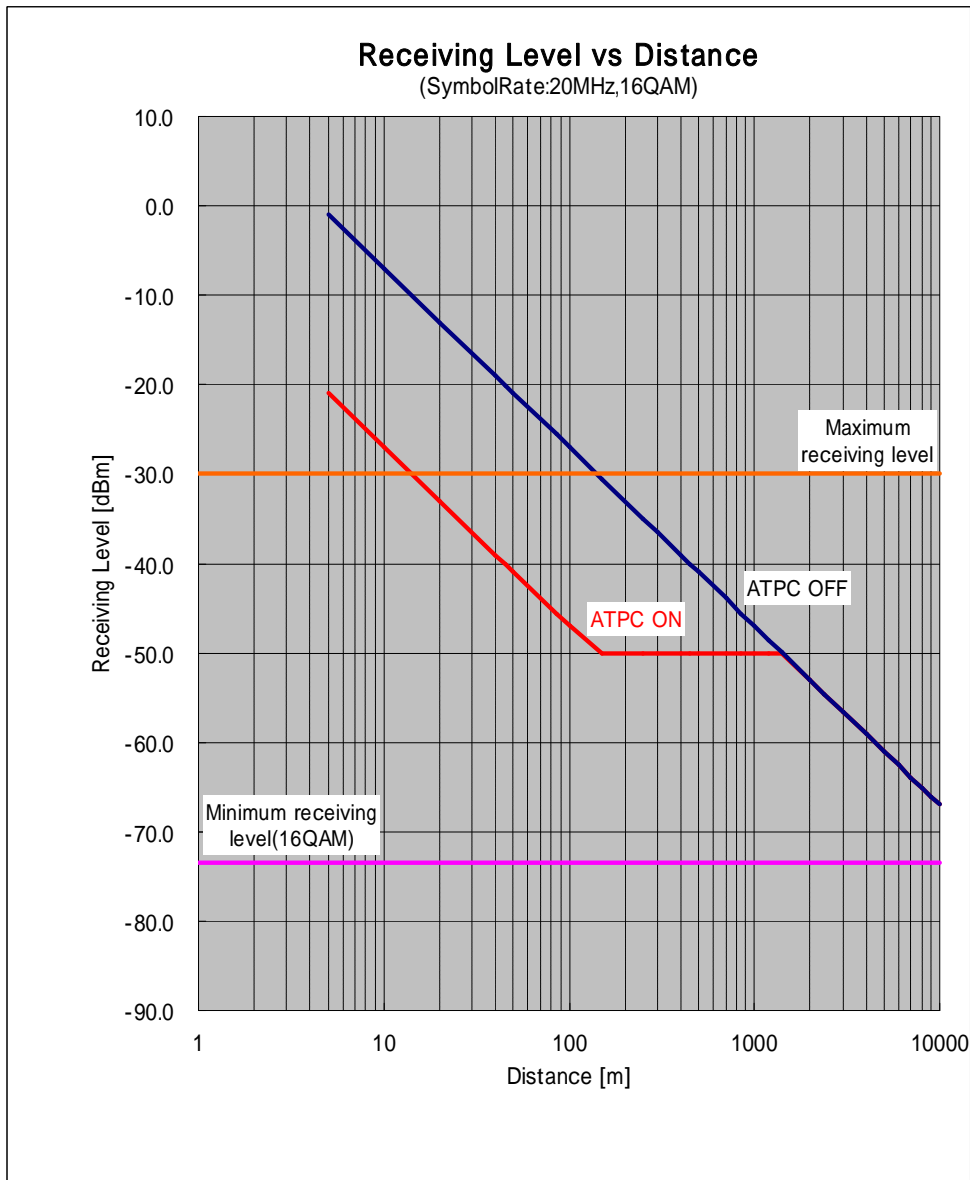


Figure 5-47 Receiving Level and Distance (SymbolRate:20MHz,16QAM)

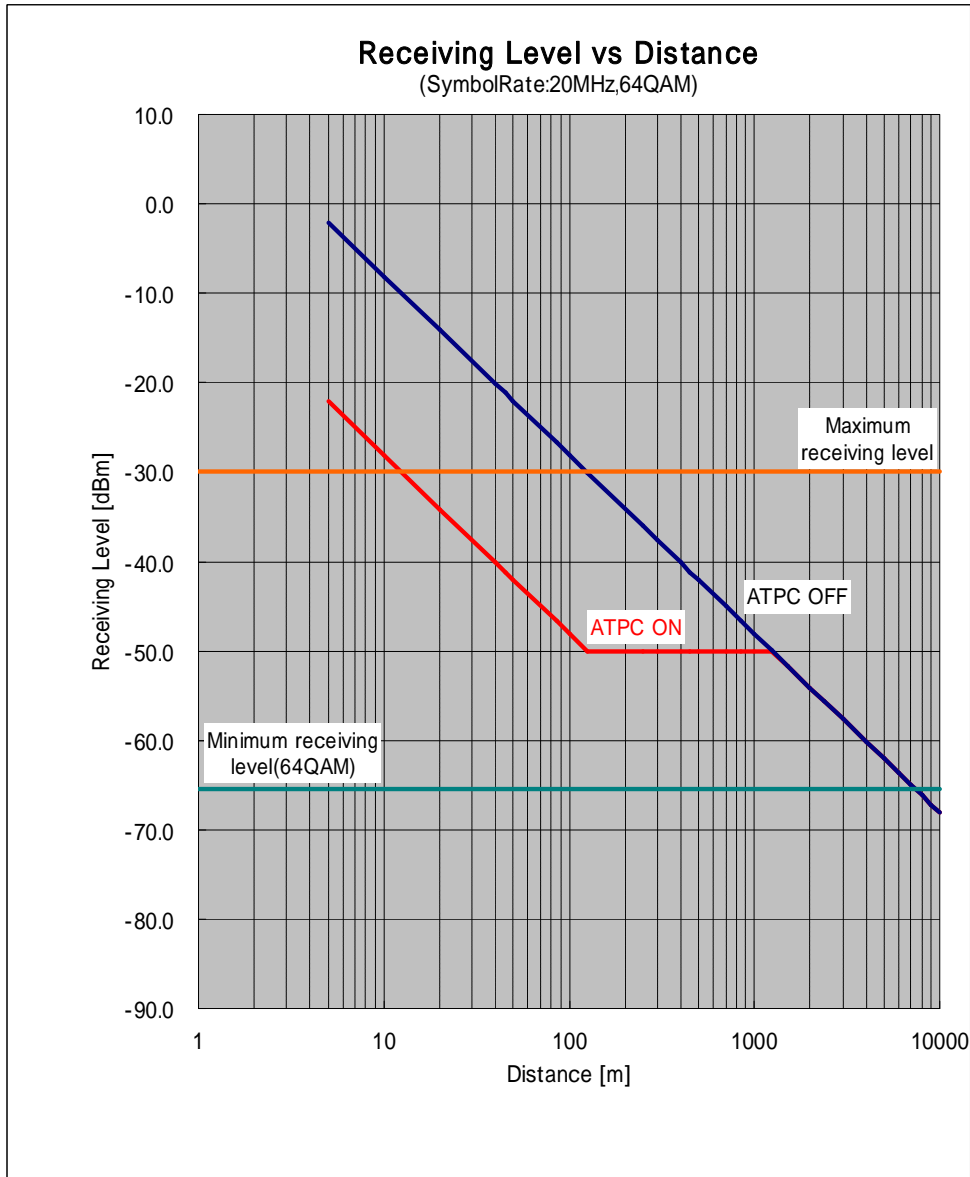


Figure 5-48 Receiving Level and Distance (SymbolRate:20MHz,64QAM)

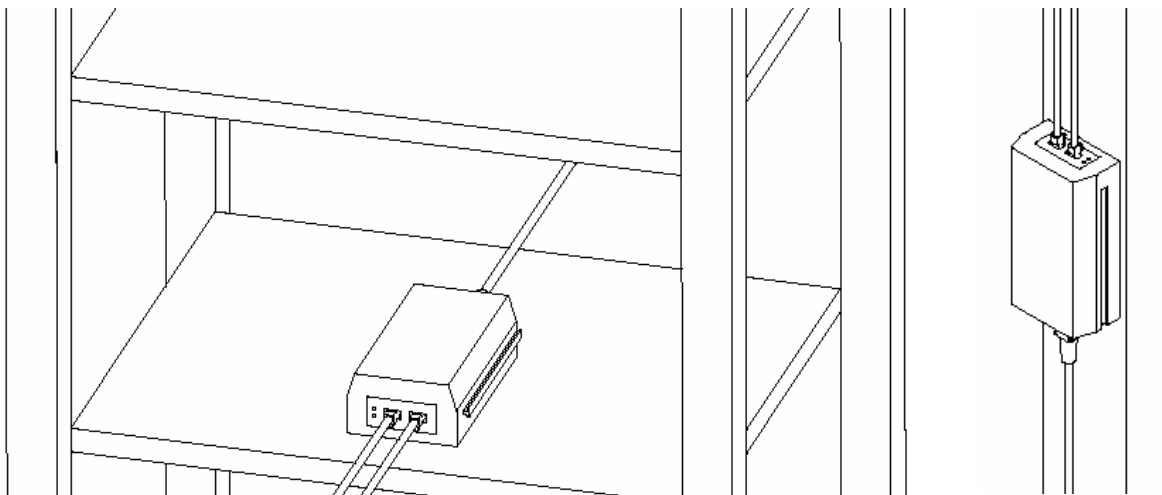


## 5.8. Installing the PoE PSE (master/slave)

PoE PSE (Power sourcing equipment) installed in indoor

It is an example of installing the PoE PSE.

About the installation of the PoE PSE, please install it according to the instruction manual of the PoE PSE.



On the plate

On the wall

Figure 5-44 Installing the PoE PSE

## 5.9. Connecting Cables to the WT (master/slave)

Connecting (1) Ethernet cable, (2) Ground wire and (3) Power supply

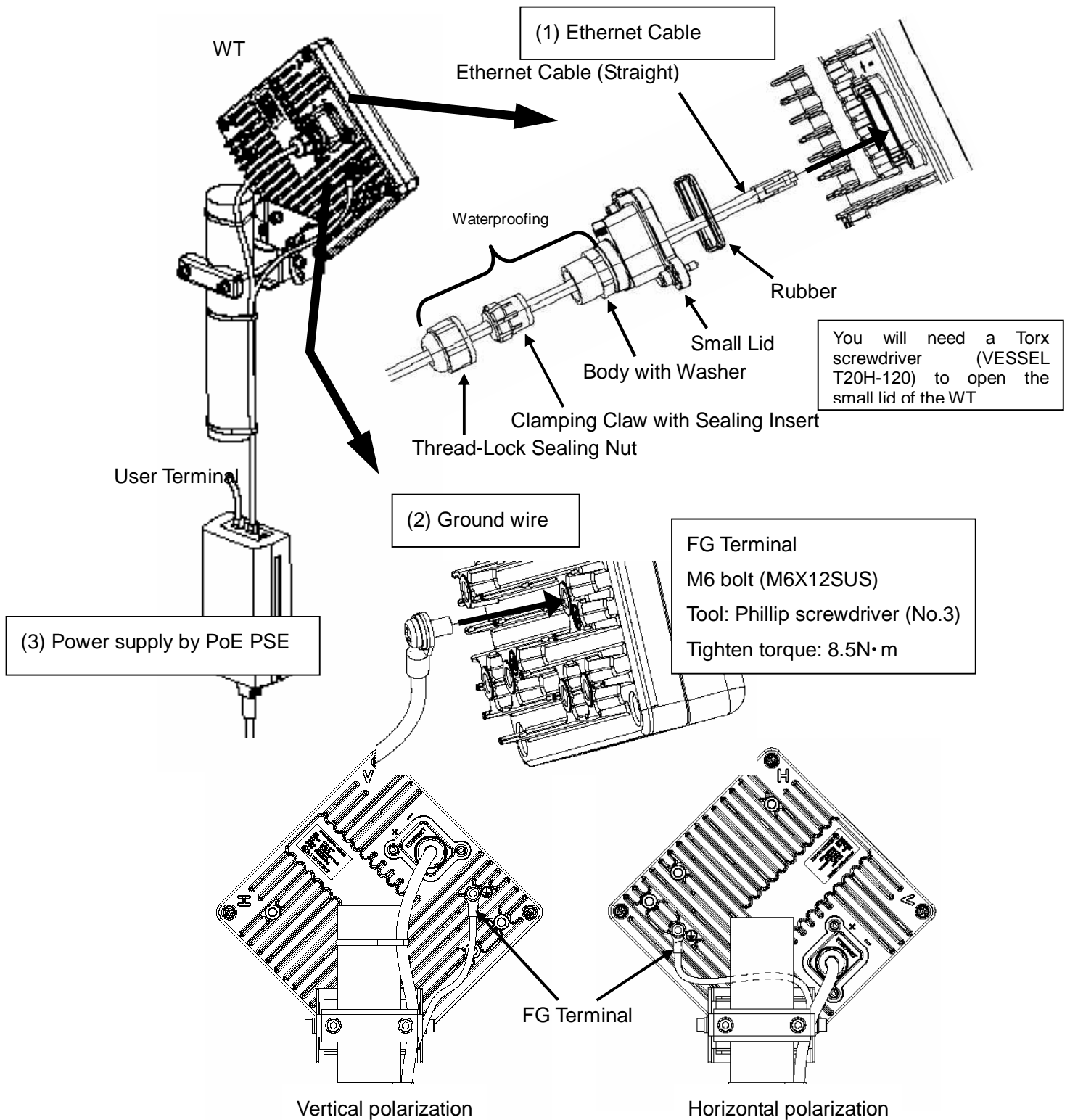




Figure 5-45 Connecting Cables to the WT

(1) Ethernet Cable	
Cable contents	connect the WT and the PoE PSE
Interface	1000BASE-T, 100BASE-TX, 10BASE-T
Cable length	Maximum 100m. In case of PoE HUB use : 100m is from the WT to PoE HUB In case of PoE injector use: 100m is from the WT via PoE injector to HUB. (Because, there is no function of terminate PHY in the PoE injector)
Connector shape	RJ-45
Pin assign	- ETHER signal: MDI-X - POWER: IEEE802.3at Type2
Cable type	Ethernet cable for outdoor, STP(Shield Twisted Pair)
Range of applicable outer	diameter $\phi$ 4.0 mm - 7.0mm

(2) Ground wire	
Cable contents	Connect the ground wire.
Applicable Cable	Ground wire 1.6 $\square$ (AWG#14)
Applicable terminal	FG terminal M6 nut.
Note	ground resistance is 100 $\Omega$ or less

(3) power supply by PoE PSE	
contents	Power supply for The WT is supplied by PoE PSE (Power over Ethernet Power Sourcing Equipment).
PoE specification	- POWER: IEEE802.3at Type2 - Interface: 1000BASE-T
The PoE PSE which confirmed connection with the WT.	- PoE injector : PD-9001G-40/SP ( Microsemi ) *1 (The PD-9001G-40/SP provides also surge protection functionality.)

Remark \*1: JRC doesn't offer PoE PSE. Please buy PoE PSE directly from PoE PSE bender.

	Please connect a ground wire to FG terminal surely.
	At the time of trouble and short circuit, It may cause the electric shock.

## 5.10. Waterproofing WT Small lid

Step1 Loosen the sealing nut (a) and remove the sealing nut (a), Clamping Claw (b), Sealing Insert (c) and insert Ethernet cable (f) and attach an Ethernet plug (please be careful about insertion direction).

Please do not take the body (d) and the washer (e) off the Small lid (g).

Applicable LAN cable diameter: 4.0 mm to 7.0mm

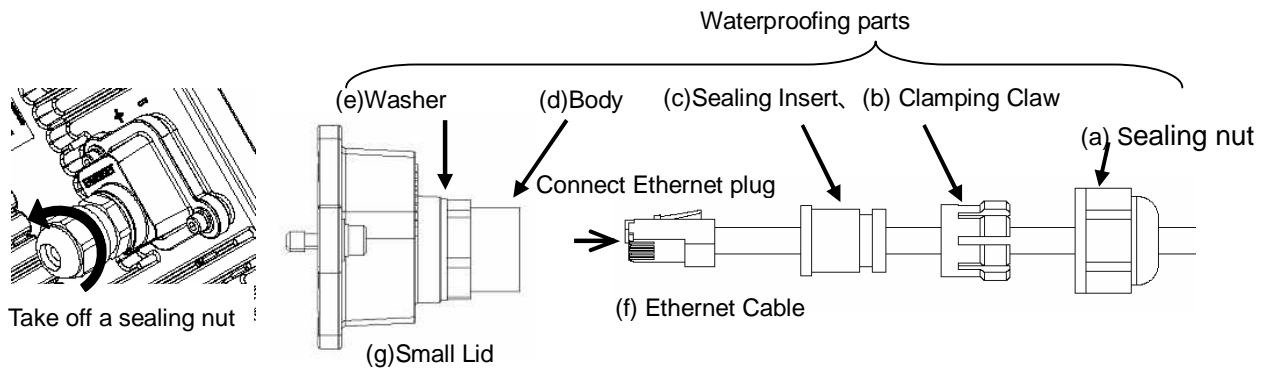


Figure 5-46

**!** Please do not use the Ethernet cable out of application cable diameter ( $\phi$  4.0mm to 7.0mm).  
 • Please do not take the body (d) and the washer (e) off the small lid. If you take it off, you must tighten it by torque 1.2 to 1.5N / m completely.

Step2 The Ethernet cable connects with the Ethernet connector of the WT after passing through the Small lid (g) (with the body (d) and the Washer (e)). ( figure 2 31).

Fix the Small lid to the WT and fit Sealing Insert (c), Clamping Claw (b) and Sealing nut (a)

The sealing nut is tightened by torque 1.2 to 1.5N/m.

When tightening the sealing nut (a) by hand, you must completely tighten it.

When using a tool (box wrench, spanner), you must tighten up 90 degrees (a quarter turn) from the point that felt tightening load

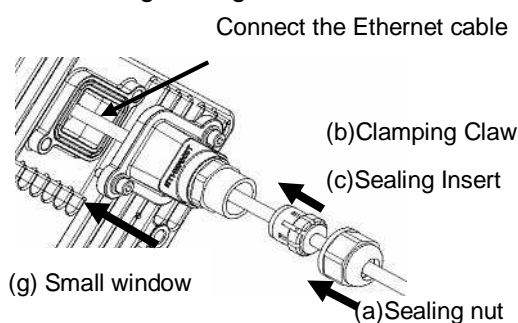


Figure 5-47

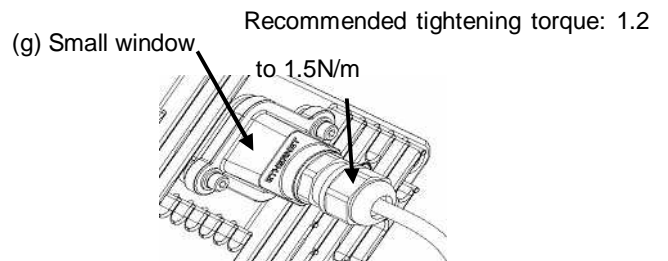


Figure 5-48

Step3 Fix the Ethernet cable to the pole by cable ties.

Bend the Ethernet cable and fix it appropriate so that does not take the load on the Ethernet cable.

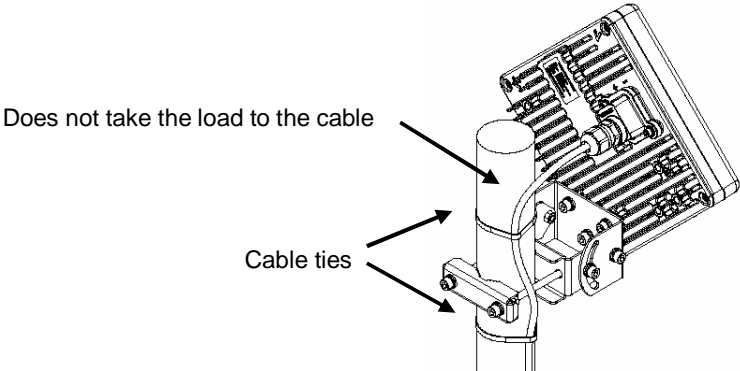


Figure 5-49

Step4 Wrap the self-bonding tape around the Small lid for waterproofing.

Using an appropriate length of self-bonding tape, wrap the tape around both the small Lid of the WT (at its base) and spacer one complete turn (1). After one turn, wrap about some turns around the Ethernet cable by overlapping one-half of the previous turn (2). Reverse the wrapping direction and wrap about another some turns back to the small Lid (3).

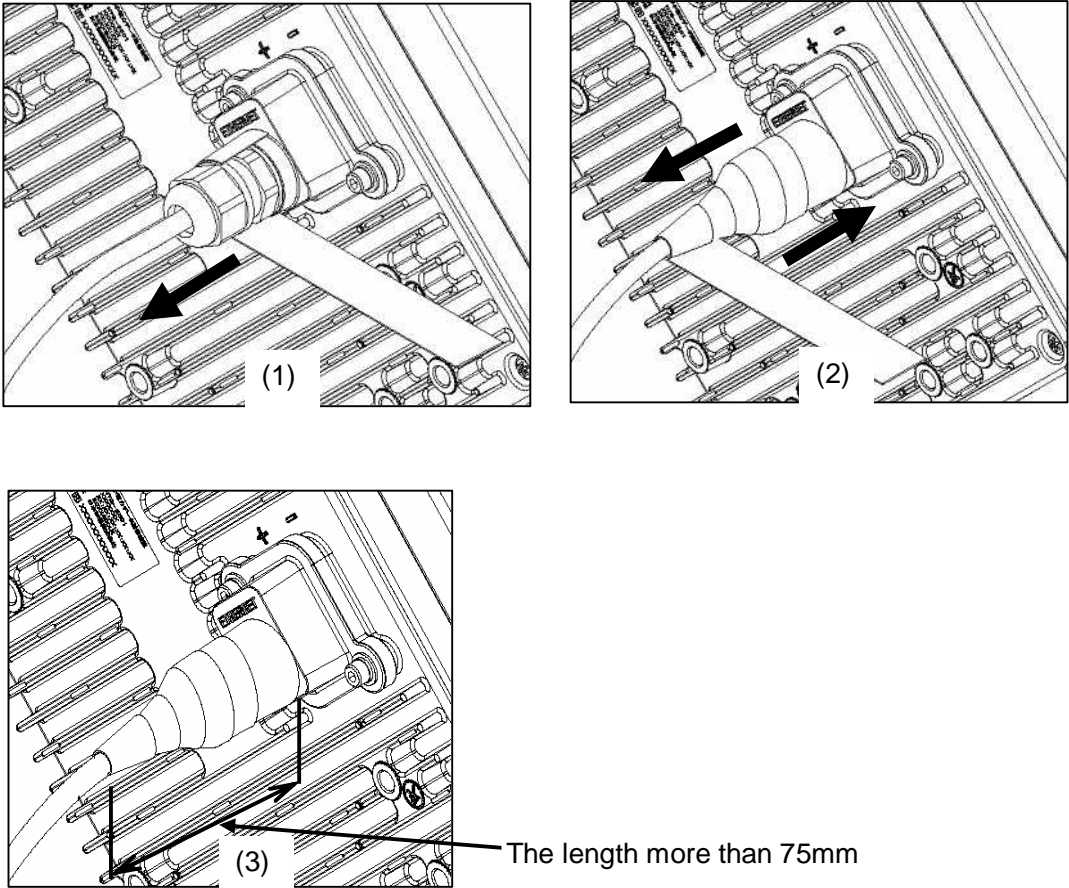


Figure 5-50

- For the stretching margin of self-bonding tape, see the instruction manual for the product.
- When wrapping self-bonding tape, start at the base of the small window and end at the end of the waterproof sleeve. Next, reverse the direction and end at the base of the small window. This procedure makes an attractive wrapping and improves the waterproof effect by making any air pockets less likely.
- Overlapping the wraps also protects against air pockets.
- Press evenly along the entire length of tape to remove air pockets.
- Make sure that there are no air pockets between the self-bonding tape and the small window of the WT or the waterproofing parts. Air pockets will degrade the waterproofing effect.

Step5 Wrap the PVC tape around the Small lid to protect it from ultraviolet rays.

Wrap the PVC tape so that the cold-shrinkable tube is completely hidden. Wrap the tape from the small Lid of the WT to the Ethernet cable, overlapping half of the previous layer (1). Next, reverse the wrapping direction and wrap one more time to the starting point (2).

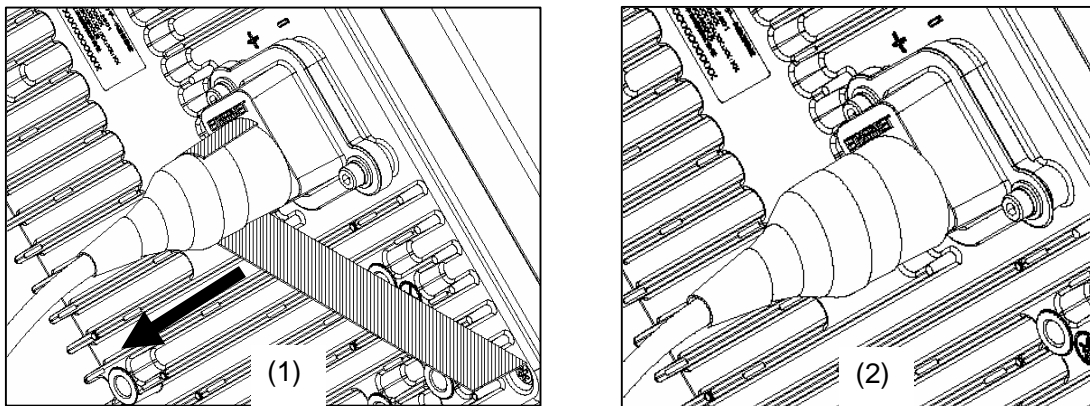


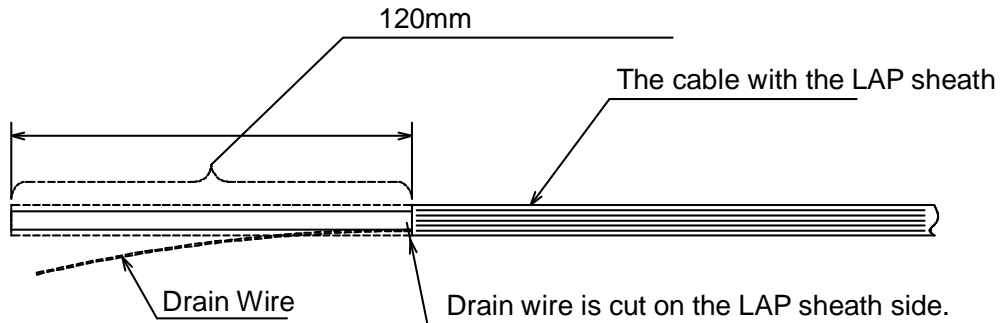
Figure 5-51

- Please never get the small lid inside wet with water. It causes the trouble.
- Please fix the each part of the waterproofing parts to small lid without a missing part. It cause of poor waterproofing.

## 5.11. When you use the cable with the LAP sheath for outdoor

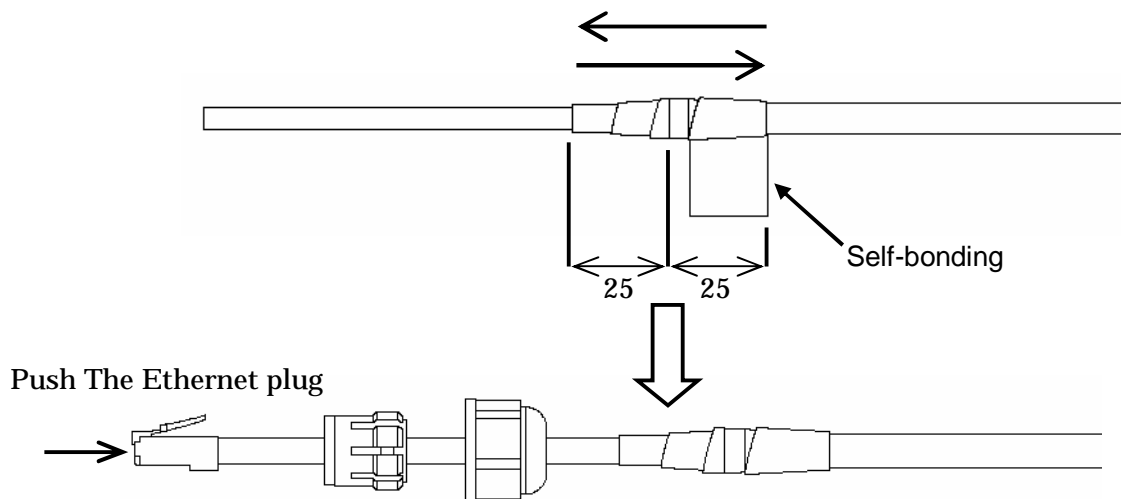
### Step 1 . Processing of LAP sheath

- The LPA sheath is peeled off from the cable point to 120mm.
- It cuts it in the part peeled off when there is drain wire.



### Step 2 . Processing of cutting part

- To prevent water being infiltrated in the wire, the self-bonding tape is rolled in the part where the LAP sheath was peeled off as shown in the figure below.
- The Ether plug is installed with the thread-lock sealing nut, the clamping claw and the sealing insert passed.





- For the stretching margin of self-bonding tape, see the instruction manual for the product.
- When wrapping self-bonding tape, start at the base of the small window and end at the end of the waterproof sleeve. Next, reverse the direction and end at the base of the small window. This procedure makes an attractive wrapping and improves the waterproof effect by making any air pockets less likely.
- Overlapping the wraps also protects against air pockets.
- Press evenly along the entire length of tape to remove air pockets.
- Make sure that there are no air pockets between the self-bonding tape and the small window of the WT or the waterproofing parts. Air pockets will degrade the waterproofing effect.

Step 3 . Fixation of cable Ethernet, Installation of waterproofing parts.

See 「 5.10Waterproofing WT Small lid 」

Step4 Wrap the self-bonding tape around the Small lid for waterproofing.

Using an appropriate length of self-bonding tape, wrap the tape around both the small Lid of the WT (at its base) and spacer one complete turn. After one turn, wrap about some turns around the Ethernet cable by overlapping one-half of the previous turn (1). Reverse the wrapping direction and wrap about another some turns back to the small Lid (2).

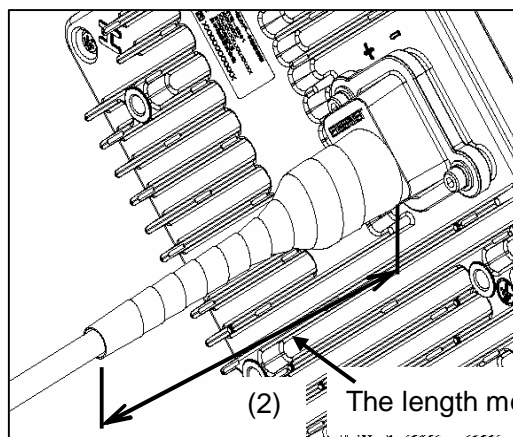
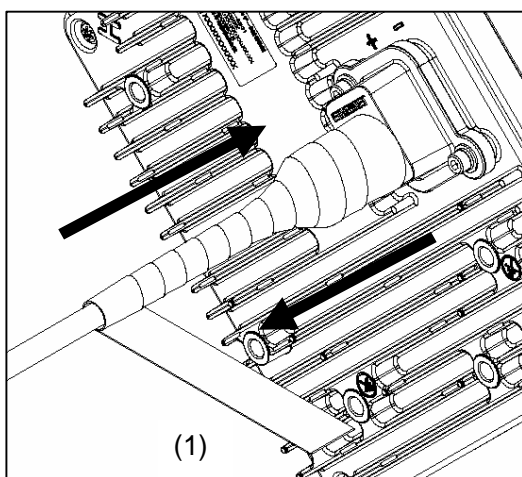


Figure 5-52

Step5 Wrap the PVC tape around the Small lid to protect it from ultraviolet rays.

Wrap the PVC tape so that the cold-shrinkable tube is completely hidden. Wrap the tape from the small Lid of the WT to the Ethernet cable, overlapping half of the previous layer (1). Next, reverse the wrapping direction and wrap one more time to the starting point (2).



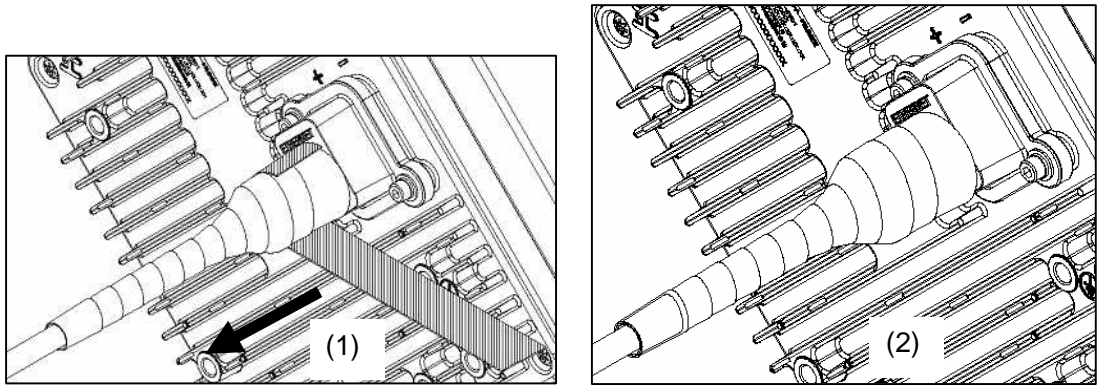


Figure 5-53

## 5.12. Testing

### 5.12.1. Ping test

Connect the WT and the PC as shown in Figure 5-54. Use the PC to perform a ping test in the following procedure.

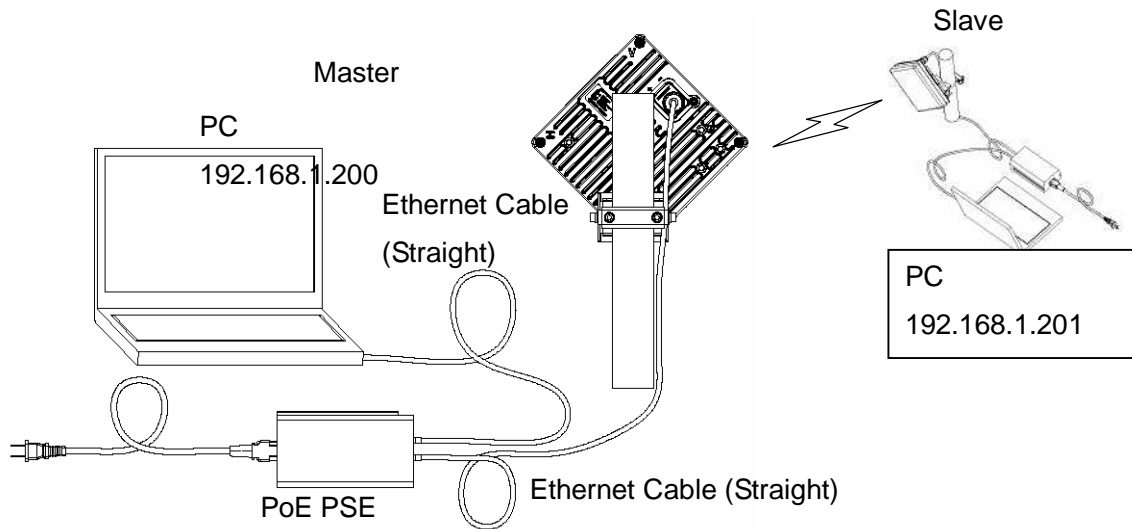


Figure 5-54 Ping Test System Diagram

Step 1: Start the Windows command prompt.

Step 2: Type the following command and press the Return key.

Ping xxx.xxx.xxx.xxx, where xxx.xxx.xxx.xxx shows the IP address of the opposite PC.

Step 3: After the command is run, check that a reply as shown in Figure 5-55 returns.

```
Microsoft Windows [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.

C:\Documents and Settings\Unknown User>ping 192.168.1.201

Pinging 192.168.1.201 with 32 bytes of data:
Reply from 192.168.1.201: bytes=32 time<10ms TTL=128
Reply from 192.168.1.201: bytes=32 time<10ms TTL=128
Reply from 192.168.1.201: bytes=32 time<10ms TTL=128
Reply from 192.168.1.201: bytes=32 time<10ms TTL=128

Ping statistics for 192.168.1.201:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Documents and Settings\Unknown User>
```

The screenshot shows a Windows command prompt window with the following text: "Microsoft Windows [Version 5.00.2195] (C) Copyright 1985-2000 Microsoft Corp. C:\Documents and Settings\Unknown User>ping 192.168.1.201 Pinging 192.168.1.201 with 32 bytes of data: Reply from 192.168.1.201: bytes=32 time<10ms TTL=128 Reply from 192.168.1.201: bytes=32 time<10ms TTL=128 Reply from 192.168.1.201: bytes=32 time<10ms TTL=128 Reply from 192.168.1.201: bytes=32 time<10ms TTL=128 Ping statistics for 192.168.1.201: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 0ms, Average = 0ms C:\Documents and Settings\Unknown User>". Red boxes highlight the command "ping 192.168.1.201" (labeled "Step 2") and the four "Reply from 192.168.1.201" lines (labeled "Step 3").

Figure 5-55 Ping Test

## 5.12.2. Measure the Received Blocks Discarded Rate

Connect the Management Tool and measure the Received Blocks Discarded Rate in the following procedure:

- Step 1: Start the Management Tool (Login Class: admin, operator, monitor).
- Step 2: Select Monitoring > Traffic Counter tab.
- Step 3: Click the Counter Clear button to start traffic measurement after counter reset.
- Step 4: After traffic measurement for any length of time, Click the Get counter button to display the traffic measurement result.
- Step 5: Check "Received Blocks Discarded Rate."

### Traffic Counter

<input type="button" value="Get counter"/> <input type="button" value="Save file"/> <input type="button" value="Counter clear"/>			
Master			
Ingress Rate	0.2Mbps		
Egress Rate	0.2Mbps		
Ingress Byte Counter	49839Byte		
Egress Byte Counter	3219790Byte		
Ethernet Ingress Counter	372		
Buffer Overflow Counter	48		
Ethernet Egress Counter	2993		
Received Blocks Discarded Rate/ Number of Received Blocks	QPSK	16QAM	64QAM
	1.47E-06 2715895	0.00E+00 55800	0.00E+00 123125648
Slave			
Ingress Rate	0.2Mbps		
Egress Rate	0.0Mbps		
Ingress Byte Counter	3222055Byte		
Egress Byte Counter	46641Byte		
Ethernet Ingress Counter	3003		
Buffer Overflow Counter	10		
Ethernet Egress Counter	346		
Received Blocks Discarded Rate/ Number of Received Blocks	QPSK	16QAM	64QAM
	0.00E+00 2703099	0.00E+00 60240	0.00E+00 125772800

Figure 5-56 Measure the Received Blocks Discarded Rate

### 5.13. Check sheet

Check operation of the WT (Master/Slave) using the check sheet below.

Table 5-2 Check sheet

WT	Serial number		Test date		
Test type	Test condition	Check item		Pass/fail	Measured value
Check the Cable between WT and PoE	Maintenance Tool	Connect the Management Tool to the WT and confirm that login is possible normally.			
Receive level	Maintenance Tool	Connect the Management Tool to the WT and measure the receive level.			dBm
measure the Received Blocks Discarded Rate	Maintenance Tool	Connect the Management Tool to the WT and measure the Received Blocks Discarded Rate			
Ping TEST	PC	Check the reply from opposite PC.			-

## 6. Standard Tools for installation

The table below lists the tools used during installation or maintenance of the units.

Table 6-1 Tools Used

No.	Unit name	Used for:		Tightening torque [N•cm]	Tool
1	WT	Small lid	M4	127	Torx driver (VESSEL T20H-120)
2		Mounting bracket	M6	850	Allen wrench (Width across flats: 5)
3		FG Terminal	M6	850	#2 phillips screwdriver
4		Ethernet cable			Crimping tool for RJ-45 (Release-after-crimp type)

The appropriate tightening torque is  $\pm 10\%$  of the value indicated in the table.

## 7. INITIAL VALUES

### 7.1.1. Initial values for WT(Master) parameters (Point to point System)

Table 7-1 lists the WT defaults set in the factory.

No.	Parameters 1	Parameters 2	Initial values
<b>QoS and Traffic Control</b>			
12	Buffer Size Configuration ( Master )	Class 7	1000 [KB]
13		Class 6	1000 [KB]
14		Class 5	1000 [KB]
15		Class 4	1000 [KB]
16		Class 3	1000 [KB]
17		Class 2	1000 [KB]
18		Class 1	1000 [KB]
19		Class 0	1000 [KB]
20	Buffer Size Configuration ( Slave )	Class 7	1000 [KB]
21		Class 6	1000 [KB]
22		Class 5	1000 [KB]
23		Class 4	1000 [KB]
24		Class 3	1000 [KB]
25		Class 2	1000 [KB]
26		Class 1	1000 [KB]
27		Class 0	1000 [KB]
28	COS assignment for Management Communication from Master to Slave		7
29	QoS Priority Class Configuration(Master)	Class 7	In Service
30		Class 6	In Service
31		Class 5	In Service
32		Class 4	In Service
33		Class 3	In Service
34		Class 2	In Service
35		Class 1	In Service
36		Class 0	In Service

No.	Parameters 1	Parameters 2	Initial values
37	QoS Priority Class Configuration(Slave)	Class 7	In Service
38		Class 6	In Service
39		Class 5	In Service
40		Class 4	In Service
41		Class 3	In Service
42		Class 2	In Service
43		Class 1	In Service
44		Class 0	In Service
45	DL /UL Ratio	Dynamic TDD	Fixed
46		DL Ratio	50 [%]
47	COS [0-7] vs. Priority Class [0-7]("7" is the highest Priority) Table	COS 值 7	7
48		COS 值 6	0
49		COS 值 5	0
50		COS 值 4	0
51		COS 值 3	0
52		COS 值 2	0
53		COS 值 1	0
54		COS 值 0	0
55	Master		IP Precedence
56	TOS vs. COS [0-7] Table	7 ~ 0	0
57	Master		DSCP
58	TC [0-255] vs. COS [0-7] Table	63 ~ 0	0
59	Master	except following EtherTypes	0
60	EtherType vs. COS [0-7] Table	15 setting items	Not set
61	Slave		IP Precedence
62	Slave TOS vs. COS [0-7] Table	7 ~ 0	0
63	Slave		DSCP
64	TC [0-255] vs. COS [0-7] Table	63 ~ 0	0
65	Slave	except following EtherTypes	0
66	EtherType vs. COS [0-7] Table	15 setting items	Not set
67	Policing Rate(Master)	Class7 ~ 0 ( QPSK )	0[Mbps]
68		Class7 ~ 0 ( 16QAM )	
69		Class7 ~ 0 ( 64QAM )	
70	Policing Rate(Slave)	Class7 ~ 0 ( QPSK )	0[Mbps]
71		Class7 ~ 0 ( 16QAM )	
72		Class7 ~ 0 ( 64QAM )	

No.	Parameters 1	Parameters 2	Initial values
73	Shaping Rate(Master)	Class7 ~ 0 ( QPSK )	0[Mbps]
74		Class7 ~ 0 ( 16QAM )	
75		Class7 ~ 0 ( 64QAM )	
76	Shaping Rate(Slave)	Class7 ~ 0 ( QPSK )	0[Mbps]
77		Class7 ~ 0 ( 16QAM )	
78		Class7 ~ 0 ( 64QAM )	
<b>Configuration (Radio)</b>			
79	Operating Mode		P-P(Master)
80	Symbol Rate		40.0 [MHz]
81	Frame ID Number		1
82	Encryption Parameter		1234567890
83	Maximum Service Distance		7 [km]
84	ATPC	MTPC Transmitted Level	5.0 [dBm]
85		ATPC	Enable
86			
87	Network Element Name		Not set
88	Scanning CH Range		4 ~ 42[CH]
89			
90			Modulation
91	Modulation	DL Modulation Scheme	64QAM
92		UL Modulation Scheme	64QAM
93	RF Transmission	Master	Enable
94		Slave	Enable
<b>Configuration (Network)</b>			
95	IPv4	IPAddress	192.168.1.100
96		Subnet mask	255.255.255.0
97		Default gateway	Not set
98			Disable
99	IPv6	IPAddress	Not set
100		Default gateway	Not set
101	Ethernet configuration		1000BASE-T(AUTO)
102			Disable
103	Management VLAN TAG ( No.1 )	VID	0
104		COS	0
105			Disable
106	Management VLAN TAG ( No.2 )	VID	0
107		COS	0
108			Disable
109	Management VLAN TAG ( No.3 )	VID	0
110		COS	0
111	<SNMP>		Disable
121	OpS1	IPv4	0.0.0.0



No.	Parameters 1	Parameters 2	Initial values
113		IPv6	Not set
114	<SNMP> OpS2		Disable
115		IPv4	0.0.0.0
116		IPv6	Not set
117	<SNMP> OpS3		Disable
118		IPv4	0.0.0.0
119		IPv6	Not set
120	<SNMP> Community Name (SNMP v2)	Get Community Name 1	Public
121		Set Community Name 1	Public
122		Get Community Name 2	Public2
123		Set Community Name 2	Public2
124		Get Community Name 3	Public3
125		Set Community Name 3	Public3
126	<SNMP> User Name (SNMP v3)(User1)	User Name	username1
127		Authentication protocol	MD5
128		Authentication Password	0000000000000000
129		Encryption protocol	AES
130		Encryption Password	0000000000000000
131		Access Control	Read Only
132	<SNMP> User Name (SNMP v3)(User2)	User Name	username2
133		Authentication protocol	MD5
134		Authentication Password	0000000000000000
135		Encryption protocol	AES
136		Encryption Password	0000000000000000
137		Access Control	Read Only
138	<SNMP> User Name (SNMP v3)(User3)	User Name	username3
139		Authentication protocol	MD5
140		Authentication protocol	0000000000000000
141		Encryption protocol	AES
142		Encryption Password	0000000000000000
143		Access Control	Read Only
144	<SNMP> Trap destination 1		Disable
145		IPv4	0.0.0.0
146		IPv6	Not set
147		SNMP Version	SNMPv2
148		SNMPv2 Community Name	Public
149		SNMPv3 User Name	username
150		Authentication protocol	MD5
151		Authentication protocol	0000000000000000
152		Encryption protocol	AES
153		Encryption Password	0000000000000000

No.	Parameters 1	Parameters 2	Initial values
154	<SNMP> Trap destination 2		Disable
155		IPv4	0.0.0.0
156		IPv6	Not set
157		SNMP Version	SNMPv2
158		SNMPv2 Community Name	public2
159		SNMPv3 User Name	username2
160		Authentication protocol	MD5
161		Authentication protocol	0000000000000000
162		Encryption protocol	AES
163		Encryption Password	0000000000000000
<b>Configuration (Boot Sector Selection)</b>			
164	Master Boot Sector	Select bank A/B after reset	Bank A
	Slave Boot Sector	Select bank A/B after reset	Bank A
<b>Configuration (Date and Time)</b>			
165	Date and Time		2000/00/00 00:00:00
166	Clock Setting Mode		PC time
167	NTP Server	IPv4	Not set
168		IPv6	Not set
169		Host	Not set
170		IPv4 ( DNS Server ) Primary	0.0.0.0
171		IPv4 ( DNS Server ) Secondary	0.0.0.0
172		IPv6 ( DNS Server ) Primary	Not set
173		IPv6 ( DNS Server ) Secondary	Not set
174		The Time zone Name	UTC-04:30
		Set summer time ( + 1 hour )	Not set
<b>Configuration (Login class password)</b>			
175	Login Class password	Admin	admin1234
176		Installation	inst1234
177		Operator	ope1234
178		Monitor	moni1234

## 7.1.2. Initial values for WT (Slave) parameters (Point to point System)

Table 7-2 lists the WT (Slave) defaults set in the factory.

No.	Parameters 1	Parameters 2	Initial values
<b>Traffic Control</b>			
12	COS assignment for Management Communication from Master to Slave		7
<b>Configuration (Radio)</b>			
20	Operating Mode		P-P(Master)
21	Symbol Rate		40.0 [MHz]
22	Frame ID Number		1
23	Encryption Parameter		1234567890
24	MTPC	MTPC Transmitted Level	5.0 [dBm]
25	Network Element Name		Not set
<b>Configuration (Network)</b>			
27	IPv4	IPAddress	192.168.1.100
28		Subnet mask	255.255.255.0
29		Default gateway	Not set
30			Disable
31	IPv6	IPAddress	Not set
32		Default gateway	Not set
33	Ethernet configuration		1000BASE-T(AUTO)
34			Disable
35	Management VLAN TAG ( No.1 )	VID	0
36		COS	0
37			Disable
38	Management VLAN TAG ( No.2 )	VID	0
39		COS	0
40			Disable
41	Management VLAN TAG ( No.3 )	VID	0
42		COS	0
<b>Configuration (Login class password)</b>			
45	Login Class password	Admin	admin1234
46		Installation	inst1234
47		Operator	ope1234
48		Monitor	moni1234

## 8. Revision History

Version	Date	Description
Ver1.0	13/Nove./2011	first edition
Ver1.1	26/Dec./2011	<ul style="list-style-type: none"> <li>- Page 3-22 and Page 5-58, pin assign :change from MDI to MDI-X (Error correction for Typo)</li> <li>- Page 3-22 and Page 5-58, Cable type : addition “STP(Shield Twisted Pair)”, (Error correction for Typo)</li> <li>- Page 2-9 , Change Minimum receiving level (Error correction for Typo)</li> <li>- Page 5-25, Table 8-1: addition the Pole</li> <li>- Figure 5-43 to 48, delete it, because there were the same figures.</li> </ul>
Ver1.2	26/Mar./2012	<ul style="list-style-type: none"> <li>-Page 2-9 Transmit output power 16QAM and 64QAM (Error correction for Typo)</li> <li>-Page 1-5 1.2CERTIFICATION NOTE FROM INDUSTRY CANADA: addition French explanation and Error correction for Typo</li> <li>- Page 2-12, Add nameplate(b) for CE mark</li> <li>- Page 1-5, Add 1.3.Required by RSS-191, clause 5.1(a)</li> <li>- Page 1-5, Add 1.4.For Europe (R&amp;TTE)</li> </ul>
Ver1.3	20/Apr/2012	-Page 1-6, Add 1.5. Declaration of Conformity (DoC)

## 9. Others

- Ethernet is a registered trademark of XEROX Corporation.

**WIPAS2**  
**Instruction Manual**  
**H-7YZCM5107B**  
**Rev. 1.3**  
**20/Apr./2012**

 *Japan Radio Co., Ltd.*