

HITACHI HARC-BX E

HITACHI

INSTALLATION AND OPERATION MANUAL
MANUAL DE INSTALACION Y FUNCIONAMIENTO
INSTALLATIONS- UND BEDIENSHANDBUCH
MANUEL D'INSTALLATION ET DE FONCTIONNEMENT
MANUALE D'INSTALLAZIONE E D'USO

MANUAL DE INSTALAÇÃO E DE FUNCIONAMENTO
BRUGER- OG MONTERINGSVEJLEDNING
INSTALLATE- EN BEDIENINGSHANDLEIDING HANDBOK
FÖR INSTALLATION OCH ANVÄNDNING
ΕΓΧΕΙΡΙΔΙΟ ΕΚΑΤΑΣΤΑΣΗΣ ΚΑΙ ΛΕΙΤΟΥΡΓΙΑΣ

BUILDING MANAGEMENT SYSTEM (BMS) CONNECTION ADAPTER



INSTALLATION AND OPERATION MANUAL - HARC-BX E

HITACHI

PMML0077/0 A - 11/03 - Printed in Spain

PMML0077/0 A - 11/03

Read and understand this manual before using this connection adapter. Keep this manual for future reference.

Lea atentamente el presente manual antes de utilizar el sistema de adaptador de conexión. Guárdelo para futuras consultas.

Lesen Sie dieses Handbuch gründlich durch, bevor Sie diese einher Anschlussadapter. Benutzen Sie dieses Handbuch für eventuelle auftretende Fragen oder Probleme.

Lisez ce manuel jusqu'à totale compréhension avant d'installer cet adaptateur de connexion. Conservez ce manuel afin de vous y référer ultérieurement.

Leggere e comprendere il presente manuale prima di utilizzare il adattatore di connessione. Conservare il presente manuale per la consultazione futura.

Leza e compreenda este manual antes de utilizar este adaptador de ligação. Guarde este manual para referência futura.

Læs denne vejledning grundigt, inden du tager forbindelsesadapteren i brug. Gem vejledningen til fremtidig opslag.

Lees deze handleiding goed door voordat u de aansluitadapter gebruikt. Bewaar de handleiding voor later gebruik.

Läs denna handbok nogal innan anslutningsadaptern används. Spara handboken för framtida bruk.

Διαβάστε προσεκτικά αυτό το εγχειρίδιο πριν τη χρήση του χείρ προσαρμοστή σύνδεσης. Κρατήστε το εγχειρίδιο για μελλοντική αναφορά.

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1 INTRODUCTION

1.1. Preface

- This BMS connection adapter is applied to the packaged air conditioners.
- Do not place the adapter in a place where flammable gas, or oil mist may stay exit, it will cause a fire, a fire disaster, deformation of machines, corrosion or breakage.
 - Places where oil mists or steams drifts.
 - Places where sulfide gas form as hot spring drifts.
- Do not install air conditioner in the following places, it may cause corrosion to the machine.
 - Places where high in salt contents surrounding as coast regions.
 - Places where with atmosphere of acidity and alkalinity humid place
- In case of using a medical equipment generating electro-magnetic waves, HARC-BX E should be installed in an area where free from direct radiation to avoid malfunction of package air conditioners.
- In case of using those equipment and radios generating electro-magnetic waves, HARC-BX E should be placed where a location is at least 3 m away from this equipment to avoid any radiation transmitting in the air.
- Avoid placing the adapter where exposed to direct sunlight.

1.2. Safety Summary

- Read and understand this "SAFTETY SUMMARY" before the installation work.
- The precautions described on this manual are distinguished as "WARNING" and "CAUTION". "WARNING" indicates specifically high risk to have serious consequences caused by the improper installation, which could result in severe personal injury or death. However, "CAUTION" indicates there is still possibility of risk, which could result in serious consequences circumstantially. The both precaution signs contain important description of safety to follow.
- Conduct test run and check if there are any abnormality after the installation work has completed.

■ Explanation of signs

**DANGER:**

This sign indicates where user mishandles or misapply its operation, which could result in severe personal injury or death.

**CAUTION:**

This sign indicates general users or non-specific users are forced to act.

**ATTENTION:**

This sign indicates restriction.

■ Installation action

**WARNING:**

- *Ensure that installation is done by following this manual to avoid any electric shock, fire disaster and injury by falling down HARC-BX E.*
- *Check to ensure that the adapter is fixed firmly to avoid injury by falling.*
- *To avoid the fire or fire disaster, do not install the adapter in a place where there are possibility of generating or flow of flammable gases.*

■ Electrical Work

**WARNING:**

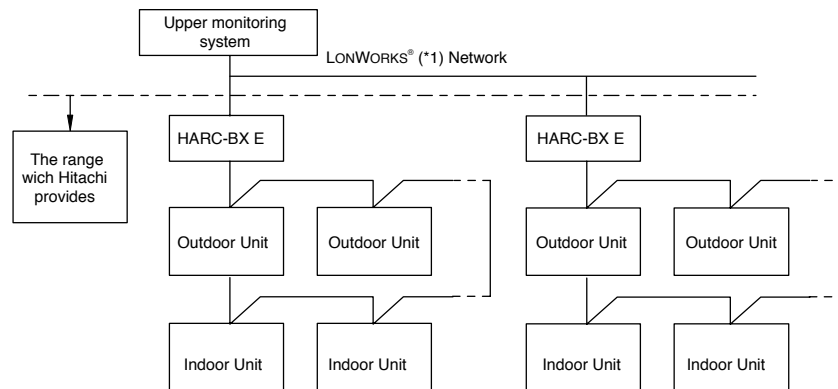
- *To avoid any electric shock, ask the shop where a qualified electrician is provided to do the electrical work.*
- *Electrical work should be done according to "the local regulations" and "Installation Maintenance Manual", and ensure to use the specific circuit to avoid insufficient electrical circuit capacity or installation defect which will cause any electrical shock and fire hazards causing.*
- *Specific cables, which connected between package air conditioner and HARC-BX E and upper monitoring equipment and HARC-BX E should be applied to avoid miss-select the cables, which will cause fire hazards and electrical shock.*
- *When the cover of HARC-BX E is needed to open due to any electrical wiring works or inspections, power supply should be completely switched OFF to avoid any electrical shock.*

2 SYSTEM CONSTITUTION

2.1. System Constitution

The Internal Constitution of BMS connection using HARC-BX E is displayed in the Figure below.

The description of HARC-BX E is written on this manual. As for the other equipment to setup the system, read the attached installation manual respectively.



(*1) LONWORKS® is the Register trademark of Echelon Corporation in US and other countries

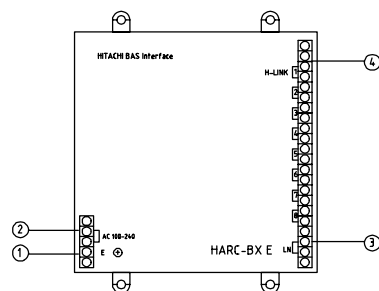


WARNING:

- Ensure that shield wire is grounded

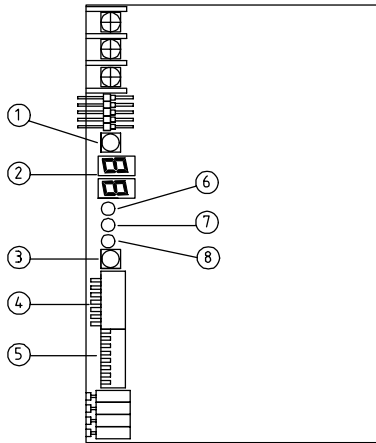
2.2. Name of parts

Name of each part of HARC-BX E is displayed in the figure below.



- ① Power Source Terminal to connect to AC220~240V Power Source
- ② Earth Terminal to be ground
- ③ Terminal Board for Unit Transmission to connect H-Link
- ④ Terminal Board for Upper System, to connect Transmission Line for Upper System Monitoring

2.3. Name of Parts (Control Board)



- ① **PSW No. 1 (M.CLR)**: Push Switch for checking connected unit quantity
- ② **7-Segment (*)**: Present state of HARC-BX E
- ③ **PSW No.2 (LON-SERV)**: Push Switch for transmission neuron ID. (Service Pin)
- ④ **8P DSW No. 1 (S201) (**)**: Dip Switch System Setting of HARC-BX E
- ⑤ **8P DSW No. 2 (S202) (***)**: Dip Switch for setting Functions of HARC-BX E .
- ⑥ **Power Source Display LED (PWR)**: Light is ON when the power is supplied.
- ⑦ **Transmission Display LED (H-L)**: Transmission state with H-LINK
- ⑧ **Transmission Display form Upper System LED (LON)**: Transmission state with Upper Monitoring Equipment

(*) 8P DSW No.1 S201:

Read 4.1 "Setting of Dip Switch" for the detail and function of HARC-BX E .

(**) 8P DSW No.2.S202:

Read 4.1 "Setting of Dip Switch".8P DSW No.1 and No.2 are used for self-inspection. for details, refer to the 5.1 "Self-Inspection of HARC-BX E " .

(***) 7-Segment:

Read 4.2 "Test Run" 4.3 "Abnormal Indication" for the details of 7-Segment's display.

2.4. Specifications of HARC-BX E

■ Hardware Specification

Item	Specification
Power Source	AC240V±10%(50/60Hz)
Power Consumption	30W(max)
Outer Dim	Width:240 mm, Height:285 mm, Depth:128.5 mm (When installed inside box)
Mass	2.3kg
Installation Condition	Indoor
Temperature Condition	0~45 °C
Humidity Condition	10~80% (No dewing)

■ Telecommunication Specifications for Packaged Air Conditioner

Item	Specifications
Communication Unit	Packaged Air Conditioner
Communication Line	Non-polar 2 wire system
Telecommunication System	Half-duplex Telecommunication
Synchronous System	Asynchronous Communication Method
Telecommunication Speed	9600 bps
Wiring Length	1000 m (Total length)
Quantity of Connection	Standard Type:Max. quantity of units;64 Option A Type:Max. quantity of units;64 Option B Type:Max. quantity of units;32

■ Telecommunication Specifications for Upper System

Item	Specifications
Communication Unit	Upper monitoring equipment
Transmission Protocol	Lon Talk Protocol (*1)
Access Method	Predicted persistent CSMA/CD System
Coded System	Differential Manchester Code
Telecommunication Speed	78000 bps
Maximum Wiring Length	500 m (Bus Total length)

(*1) Lon Talk is a Registered Trademark of Echelon Corporation in U.S. and other countries.

3 INSTALLATION WORK

This manual provides operational instructions for HARC-BX E from installation to turning on the power source. The procedure of the instruction is described in the table below.

Handling Procedure

No.	Items	Contents
1	Selection of Installation Position	The precautions on the installation
2	Installation Work	Installation Method and its precautions
3	Wiring Connection Manner	Power Supply and Wiring Procedure for Communication
4	Setting of Dip Switch	Description of Dip Switch and its Setup Method
5	Power Supply	Points to be checked

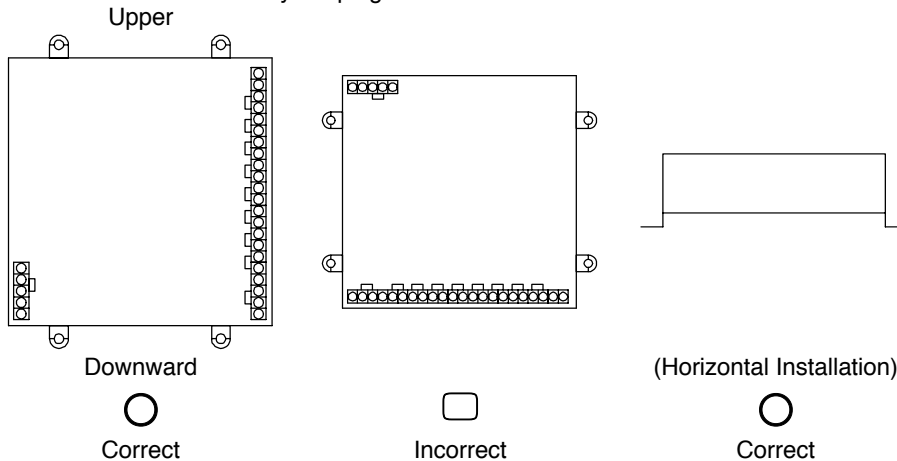
3.1. Selection of Installation Place

Select a suitable place to install as applicable to the following conditions:

1. The appropriate installation place should be as described in Preface of this manual.
2. The installation place should be within the grounded Control Panel made of metal.

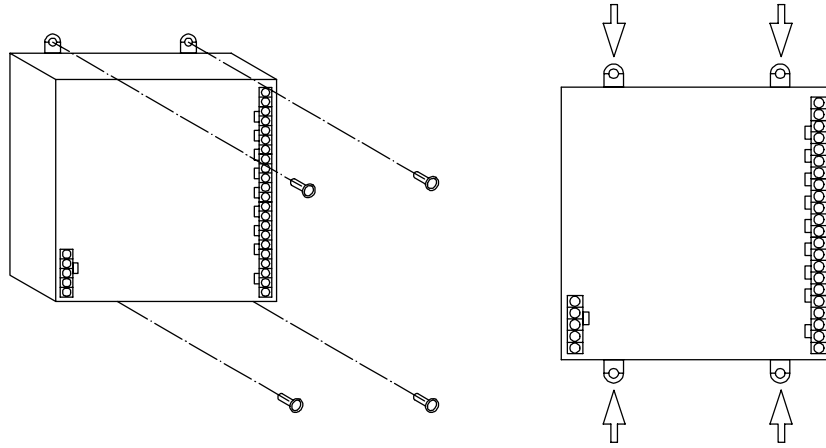
3.2. Installation Procedures

1. Install the HARC-BX E by keeping the screw terminal board at the lower side.



3/8 INSTALLATION WORK

2. Fixing Method by Screw(M4) (Screws: Field-supplied)
By using screw (M4 Screw, 4Position), fix HARC-BX E on the wall.



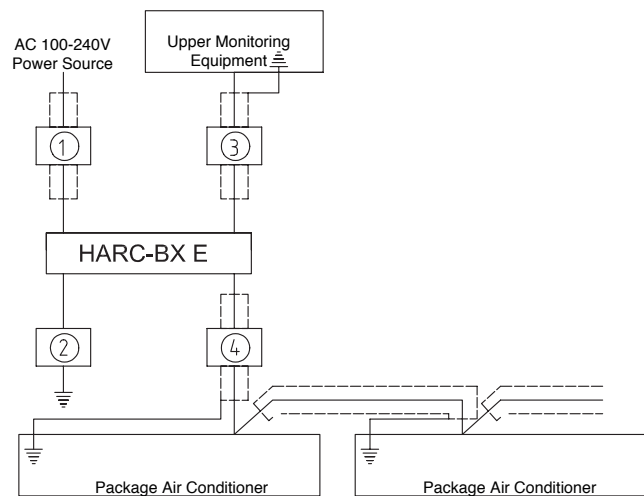
4 WIRING CONNECTION

Read and understand SAFETY SAMMARY as described in the beginning of this manual before starting up wiring work.

- Wiring work should perform according to "the local regulations" and the instruction of utility company beforehand.
- Wiring work should be performed by qualified electrician.
- Electircal leakage breaker should be porvided according to "the local regurations".

4.1. Wiring

1. Wiring work of Power supply Wiring for HARC-BX E, transmission cable between packaged air conditioners, and transmission cable between upper monitoring equipment are required for HARC-BX E.
2. Wiring Method.



No.	Connecting Equipment	Specifications of Wiring
①	Power Source Wiring for HARC-BX E	AC100V 2mm ² 2coresshield
②	Earth (ground) Cable	Follow the Local Standard
③	Upper Monitoring Equipment	Follow the instructions of Management person on the upper system equipment. (*2)
④	Transmission Line for Package Air Conditioners	1P-0.75 mm ² Twisted pair cable (*1)

4/10 WIRING CONNECTION

- (*1) Ensure to apply Twisted cable
Recommended Cable Types:

-	Japan Cable Industrial Associations	Hitachi Cable Co., Ltd.	Japan Cable Co., Ltd.	Integral power consumption
Non-shielded	JKEV	KPEV	KNPEV	KPEV
Shielded (Copper Foil)	JKEV-S	KPEV-S	KNPEV-S	KPEV-S
Shielded(Twisted)	JKEV-SB	KPEV-SB	KNPEV-SB	KPEV-SB

- (*2) LONWORKS® Network Cable

Use the cable that Echelon Co., Ltd. recommends and follow the instructions of the manufacturer of the upper monitoring equipment.

For the details on this, refer to the manual, Echelon Co., Ltd. provided, "FTT□10A Free Topology Transceiver User's Guide". As for the user's reference, cable types and characteristics of parameter are described in the table below.

■ Cable Type and Characteristics

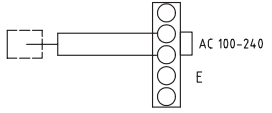
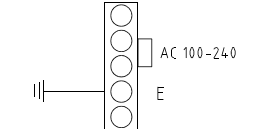
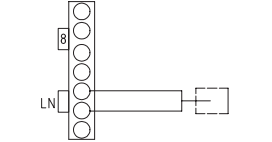
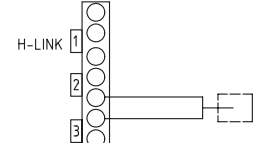
Cable	Diameter of Wire/AWG	Electric Resistivity Ω/km	Capacitance nF/km	Vprop % of Light Velocity
Belden 85102, Single/Twist pair, Q'ty of Core 19/29, Without Shield, 150 °C	1.3mm/16	28	56	62
Belden 8471, Single/Twist pair, Number of Core 19/29, Without Shield, 60 °C	1.3mm/16	28	72	55
Level VI 22AWG, Twist pair, Single Core, Without Shield	0.65mm/22	106	49	67
JY(St)Y2□2□0.8, 4 Lines Spiral Twist, Single Core, With Shield	0.8mm/20.4	73	98	41
TIA568A Category 5, 24AWQ, Twist Pair	0.51mm/24	168	46	58

In case of using a shielded cable, the cable should be connected to the ground through film resistance of metal, range of 470kΩ 1/4W(wattage) and accuracy of error under 10% to prevent from building up of static charges.

4.2. Electrical Wiring

1. Turn OFF the main power switch connected to the wire of HARC-BX E and the surrounding equipment to connect wire.
2. Wiring work should be conducted according to the table described below. The “No.” showing in the table indicates the wire of “Wiring Method”.

■ Electrical Wiring

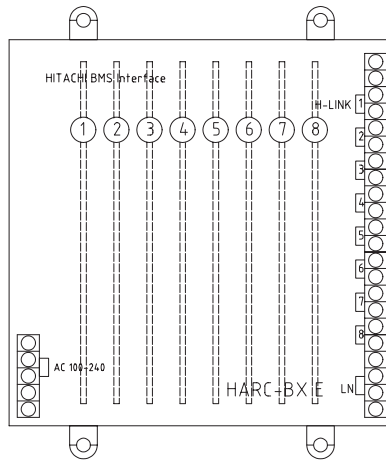
Section	No.	Wiring Method	Remarks
Power Line	①		
	②		
Control Circuit	③		Non-polar
	④		Non-polar Refer to Sec.3.3

4/12 WIRING CONNECTION

4.3. Arrangement of the Installation of PCB and H-LINK Terminals

As described in the figure below, 8 PCBs which are built into HARC-BX E and H-LINK Terminals correspond to the both sides of the same numbers, 1 to 8 within ○ and □ respectively.

In order that PCB would be able to communicate with unit it must be connected to same H-LINK than unit.



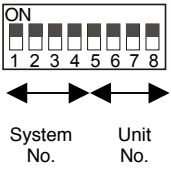
5 TEST RUN

5.1. Setting of Dip Switch

1. Setting Dip Switch before power supply.
2. Remove the front board to set Dip Switch.
3. Dip Switch setting for each PCB is different.
4. Setting for 8 Pins Dip Switch (S201)

















Setting of 8 Pins DipSwitch (S201) are determined by the system numbers and the unit numbers of the applicable Indoor Units to which the PCB controls.

Setting procedure for the system number and the unit number are as shown in the table below.

8 Pins Dip Switch Setup (S201)	Description
	<p>Setting of 8 pins DSW (S201) are determined by the system numbers and the unit numbers of the applicable Indoor Units to which the PCB controls.</p> <p>In case of the standard specification and option A specification, PCB will control 8 units from the system No. and unit No., which have been set. For instance, if system No.1 along with unit 1 is set, relevant PCB will control unit No.1 to 8 from system No.1. The unit No. should be set from either of No. 1 or 9.</p> <p>In case of option B, PCB will control 4 units from the system and unit numbers, which have been set. For instance, if system No.1 along with unit No. 1 is set, relevant PCB will control unit No. 1 to 4 from system No.1. The unit No. should be set from either of No.1, 5, 9 or 13.</p>





The details are outlined below.

Setting for the required system numbers are described in the table below.

System No.	Setting Pin No.1 to No.4	System No.	Setting Pin No.1 to No.4	System No.	Setting Pin No.1 to No.4	System No.	Setting Pin No.1 to No.4
1		5		9		13	
2		6		10		14	
3		7		11		15	
4		8		12		16	

5/14 TEST RUN

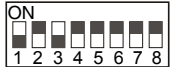

Next, setting for the required unit numbers are described below.

System No.	Setting Pin No.5 to No.8	System No.	Setting Pin No.5 to No.8	System No.	Setting Pin No.5 to No.8	System No.	Setting Pin No.5 to No.8
1		5		9		13	

5. Setting of 8 Pins Dip Switch (S202)

Setting of 8 Pins DipSwitch (S202) is determined depending of the PCB quantity for each H-LINK line.

Setting procedure for the system number and the unit number are described in the table below.

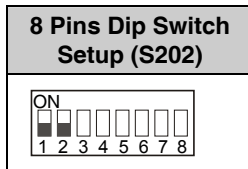
8 Pins Dip Switch Setup (S202)	Description
	Set only 1 PCB among other PCBs in a single H-LINK.
	Set the rest of the PCB other than the above.

5.2. Test Run

1. Check if all procedures for "Wiring Connection" and "Dip Switch Setup" are completed.
2. Turn ON the Power supply according to the following procedure.
Switch ON the packaged air conditioners.
And then, Switch ON the HARC-BX E.
3. Check the connection of HARC-BX E.
The 7-Segment display will change as described in the table below, after switching ON HARC-BX E. Check the 7-Segment display.

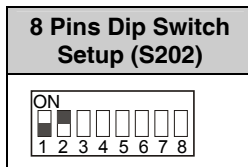
Step	7-Segment Display	Status
1	-	Power OFF
2	88	End of system initialization
3	22	Under Checking of Package Air Conditioner, Remote Control Switch Group Connection Q'ty
4	00	Normal Transmission Between HARC-BX E, and Package Air Conditioner are undertaking.

4. Check how many numbers of identified Indoor unit.
The amounts of Indoor unit, which HARC-BX E has identified will display on the 7-Segment after pressing the PUSH SWITCH (PSW [M.CLR]) on HARC-BX E with indicating "00" on the 7-Segment display. (Check if the amounts of actual Indoor Units are identical to these).
5. After the quantity of recognizable Indoor Units are found, check the system numbers and unit numbers of the Indoor Units, which HARC-BX E has identified.
Switch ON the Pin No. 2 of 8 Pins DipSwitch (S202). All the system numbers and unit numbers of the recognizable Indoor Units will display on the 7-Segment after pressing the PUSH SWITCH (PSW[M.CLR] on HARC-BX E. If the multiple Indoor Units are identified, the system numbers and unit numbers of the identified Indoor Units will be sequentially displayed by every pressing of PUSH SWITCH (PSW[CLR]). The system numbers will display on the left side of 7-Segment and the unit numbers will display on the right side. (Check if the quantity of actual Indoor Units are identical to these).



7-Segment Display	Description	7-Segment Display	Description	7-Segment Display	Description	7-Segment Display	Description
0	System No. 1 or Unit No. 1	4	System No. 5 or Unit No. 5	8	System No. 9 or Unit No. 9	C	System No. 13 or Unit No. 13
1	System No. 2 or Unit No. 2	5	System No. 6 or Unit No. 6	9	System No. 10 or Unit No. 10	d	System No. 14 or Unit No. 14
2	System No. 3 or Unit No. 3	6	System No. 7 or Unit No. 7	A	System No. 11 or Unit No. 11	E	System No. 15 or Unit No. 15
3	System No. 4 or Unit No. 4	7	System No. 8 or Unit No. 8	b	System No. 12 or Unit No. 12	F	System No. 16 or Unit No. 16

6. Switch OFF the Pin No. 2 of 8 Pins Dip Switch (S202) after completing all the checking. Test Run has completed.



5.3. Abnormal Indication

1. Abnormality will be identified with 7-Segment Display of HARC-BX E .

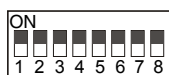
7-Segment Display	Phenomenon	Content of Abnormality
11	Abnormality in Initial Connection at	No Remote Control Switch Group were found (failure to conform the connection).
44	Transmission Abnormality in Entire Remote Control Switch Group	No response for 70 seconds after the remote control switch group has been conformed.

6 MAINTENANCE AND SERVICE

6.1. Self-Inspection for HARC-BX E

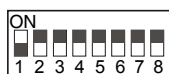
Self-Inspection to identify the abnormality of HARC-BX E can be conducted by the following procedures.

1. Turn ON the power supply with leaving 8 Pins DSW [S202] OFF. (The 7-Segment shows "88" and is lit OFF).

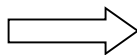


8 Pins DSW (S202)

2. Turn ON only No. 1 pin of 8-pin DSW (201).



8 Pins DSW (S201)



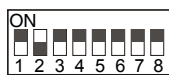
7-Segment Display

10 1E

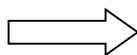
Normal

Abnormal

3. Turn OFF No. 1 pin of 8-pin DSW (201), and turn ON only No. 2 pin (This work should be conducted with setting End Terminal Resistance on H-Link additionally).



8 Pins DSW (S201)



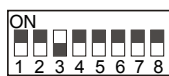
7-Segment Display

20 2E

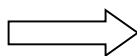
Normal

Abnormal

4. Turn OFF No. 2 pin of 8-pin DSW (201), and turn ON only No. 3 pin.



8 Pins DSW (S201)

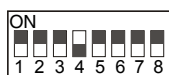


7-Segment Display

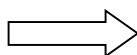
30*

- * The total number of pins that have been set ON from No. 1 to NO. 5 out of 8 Pins DSW [S202] will appear on the right side of display, and "3" on the left side of display.

5. Turn OFF No. 2 pin of 8-pin DSW (201), and turn ON only No. 3 pin.



8 Pins DSW (S201)



7-Segment Display

4- ↔ 88

The above indication will be repeated

6.2. Troubleshooting

The following table indicates possible trouble-shooting upon the abnormal operation in the unit.

Ensure that power supply is switched OFF before starting the check.

No.	Phenomenon	Items to be checked	Action
1	HARC-BX E does not activate even though power supply is ON. (No indication on the 7-Segment).	Check if power cable is connected.	Connect power cable.
		Check if power is supplied.	Power source voltage should be measured. If the voltage measure shows out of normal range of 100-240±10%[V], wire systems and wiring procedures should be inspected and examined.
		Check if Power Supply Display (PWRs ON).	Lighting OFF indicates that there is a possibility of the failure of internal power source. Contact your nearest service centre.
		Check if power supply terminal screws are loosed.	Ensure to tighten firmly.
		Check if LED (PWR or transmission display is lit).	Check the transmission circuit of air conditioners by the self-inspection function. And check the circuit if transmission circuit in packaged air conditioners is operating normally.
		Check if LED (LON or transmission display is lit).	Check the upper transmission circuit by self-inspection function. And check the circuit if upper transmission circuit is operating normally.
		Check if LED (LON or transmission display is blinking on the regular intervals (1 to 2sec)).	Blink indicates that there is a possibility of the failure of internal power source. Contact to your nearest services centre.

No.	Phenomenon	Items to be checked	Action
2	<p>HARC-BX E does not identify the air conditioner even though power supply is ON. (" I I" displayed on the 7-Segment).</p> <p>After the indication of "II" on the 7-Segment with check mode, the quantity of actual air conditioners did not identical to these addresses.</p>	Check if the Dip Switches on HARC-BX E are set correctly.	Dip Switch should be re-set according to the section 4.1 in the installation maintenance manual and operation manual for how to set HARC-BX E Dip Switch.
		Check if the system and address of the air conditioner are set correctly.	Address should be re-set according to the section 4.2 in the installation maintenance manual and operation manual.
		Check if transmission cable with air conditioners is disconnected.	Connection of wire should be examined.
		Check if manufacturer's specified transmission cable connected with air conditioners is used.	Use Twist pair cable (0.75 mm ²).
		Check if transmission cable connected with air conditioners is wired along the power source wire.	Provide a space of at least 150 mm between wires.
		Check if end terminal resistance and quantity on the transmission cable between air conditioner are set correctly.	Only one end resistance should be set in one system. (Resistance between wire is approx. 150 Ω).
		Check if transmission circuit is operating normally upon the self-inspection.	End resistance should be set to the transmission wire of air conditioner.
		Check if the power supply of air conditioners is ON.	Air conditioner should be turned ON.
		Check if transmission cable between air conditioners is disconnected.	Connection of wiring should be examined.
		Check if LED (H-L) for transmission display is ON.	Check transmission circuit of air conditioner by self-inspection. And check if transmission circuit of air conditioners is operating normally.
3	<p>7-Segment indicates "44".</p>	Check if manufacturer's specified transmission cable connected with air conditioners is used.	Use Twist pair cable (0.75 mm ²).
		Check if transmission cable connected with air conditioners is wired along power source wire.	Provide a space of at least 150 mm between wires.
		Check if end terminal resistance and quantity on the transmission cable between air conditioners are set correctly.	Only one end resistance should be set in one system. (Resistance between wire will be approx. 150 Ω).
		Check if transmission circuit is operating normally upon the self-inspection.	End resistance should be set to the transmission wire of air conditioners side.
		Check if the power supply of air conditioners is ON.	Air conditioners should be turned ON.
		Check if manufacturer's specified transmission cable connected with air conditioner is used.	Use Twist pair cable (0.75 mm ²).
		Check if transmission cable connected with air conditioner is wired along power source wire.	Provide a space of at least 150 mm between wires.
		Check if end terminal resistance and quantity on the transmission cable between air conditioner are set correctly.	Only one end resistance should be set in one system. (Resistance between wire will be approx. 150 Ω).
		Check if transmission circuit is operating normally upon the self-inspection.	End resistance should be set to the transmission wire at the air conditioner side.

6.3. Periodical Inspection

The unit should be periodically inspected in order to ensure dependable performance and long life operation.

1. Ambient Conditions:

- Inspect that the internal temperature of cabinet panel is not abnormally too high.
- Inspect that the temperature of unit case is not abnormally too high.
- Inspect and remove any dusts, fine metal powder and lubrication.

2. Displays:

- Check that power supply display LED (PWR) is lit.
- Check that transmission display LED (H-L,LON) shows ON/OFF.
- Check if 7-segment shows other digits other than "00".

3. Mounting and connected Part:

- Check to ensure that the mounting screws, power supply, transmission cable screws are tightened firmly.
- Check to ensure that the other screws are tightened firmly.



WARNING:

Do not use the cleaning agent containing acid compound such as thinner for cleaning. If used, it may cause of discoloration of the coating surface and melting of plastic case.