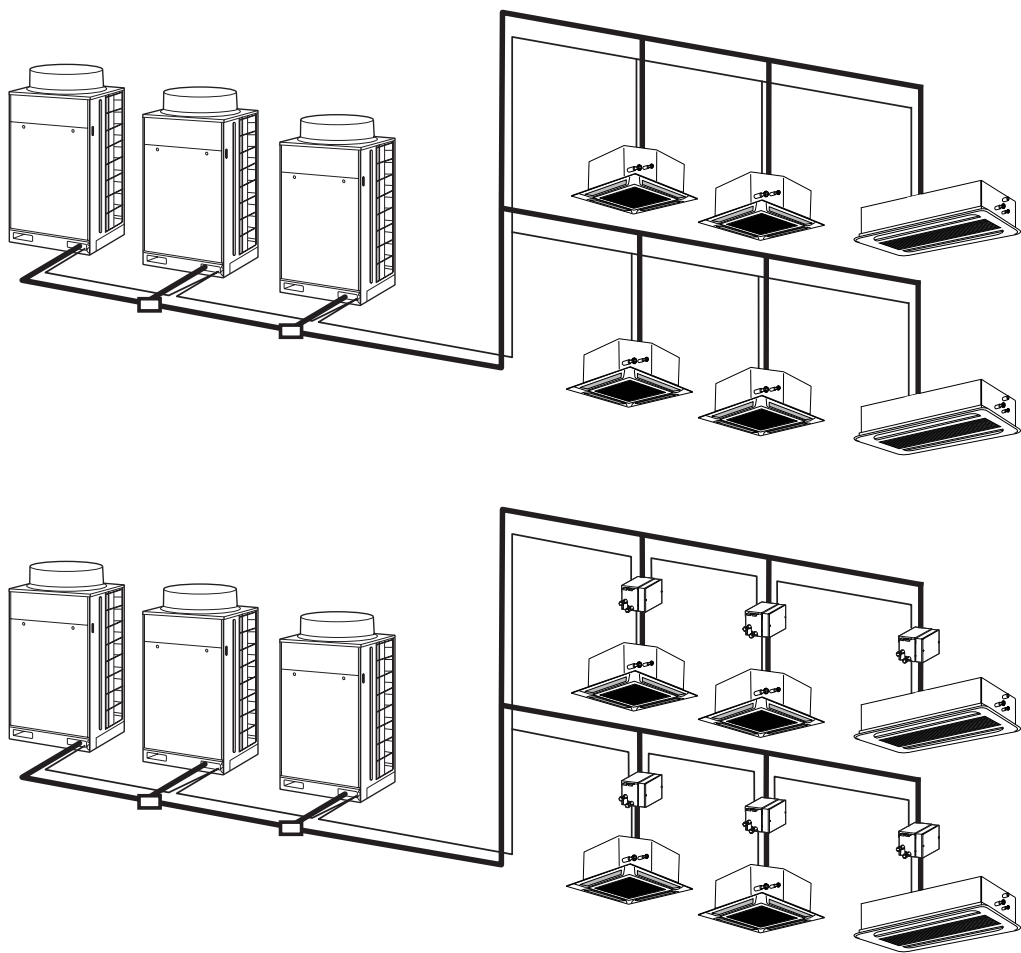


**INSTALLATION AND OPERATION MANUAL
MANUAL DE INSTALACIÓN Y FUNCIONAMIENTO
INSTALLATIONS- UND BETRIEBSHANDBUCH
MANUEL D'INSTALLATION ET DE FONCTIONNEMENT
MANUALE D'INSTALLAZIONE E D'USO**

**MANUAL DE INSTALAÇÃO E DE FUNCIONAMENTO
BRUGER- OG MONTERINGSVEJLEDNING
INSTALLATIE- EN BEDIENINGSHANDLEIDING
HANDBOK FÖR INSTALLATION OCH ANVÄNDING
ΕΓΧΕΙΡΙΔΙΟ ΕΓΚΑΤΑΣΤΑΣΗΣ ΚΑΙ ΛΕΙΤΟΥΡΓΙΑΣ**

**SET FREE SERIES
FSXN**



**ATTENTION:**

This product shall not be mixed with general house waste at the end of its life and it shall be retired according to the appropriated local or national regulations in a environmentally correct way.

Due to the refrigerant, oil and other components contained in Air Conditioner, its dismantling must be done by a professional installer according to the applicable regulations.

Contact to the corresponding authorities for more information.

The above regulation is from the WEEE Directive in EU. Therefore, this is applied only for EU.

**ATENCIÓN:**

Este producto no debe eliminarse con la basura doméstica al final de su vida útil. Debe desecharse de manera respetuosa con el medio ambiente de acuerdo con los reglamentos locales o nacionales aplicables.

Debido al refrigerante, el aceite y otros componentes contenidos en el sistema de aire acondicionado, su desmontaje debe realizarlo un instalador profesional de acuerdo con la normativa aplicable.

Para obtener más información, póngase en contacto con las autoridades competentes.

**ACHTUNG:**

Dass Ihr Produkt am Ende seiner Betriebsdauer nicht in den allgemeinen Hausmüll geworfen werden darf, sondern entsprechend den geltenden örtlichen und nationalen Bestimmungen auf umweltfreundliche Weise entsorgt werden muss.

Aufgrund des Kältemittels, des Öls und anderer in der Klimaanlage enthaltener Komponenten muss die Demontage von einem Fachmann entsprechend den geltenden Vorschriften durchgeführt werden.

Für weitere Informationen setzen Sie sich bitte mit den entsprechenden Behörden in Verbindung.

**ATTENTION:**

Ne doit pas être mélangé aux ordures ménagères ordinaires à la fin de sa vie utile et qu'il doit être éliminé conformément à la réglementation locale ou nationale, dans le plus strict respect de l'environnement.

En raison du frigorigène, de l'huile et des autres composants que le climatiseur contient, son démontage doit être réalisé par un installateur professionnel conformément aux réglementations en vigueur.

Pour de plus amples informations, contactez les autorités compétentes.

**ATTENZIONE:**

Indicazioni per il corretto smaltimento del prodotto ai sensi della Direttiva Europea 2002/96/EC e Dlgs 25 luglio 2005 n. 151 Il simbolo del cassonetto barrato riportato sull'apparecchiatura indica che il prodotto alla fine della propria vita utile deve essere raccolto separatamente dagli altri rifiuti.

L'utente dovrà, pertanto, conferire l'apparecchiatura giunta a fine vita agli idonei centri di raccolta differenziata dei rifiuti elettronici ed elettrotecnici, oppure riconsegnarla al rivenditore al momento dell'acquisto di una nuova apparecchiatura di tipo equivalente. L'adeguata raccolta differenziata delle apparecchiature dismesse, per il loro avvio al riciclaggio, al trattamento ed allo smaltimento ambientalmente compatibile, contribuisce ad evitare possibili effetti negativi sull'ambiente e sulla salute e favorisce il riciclo dei materiali di cui è composta l'apparecchiatura.

Non tentate di smontare il sistema o l'unità da soli poiché ciò potrebbe causare effetti dannosi sulla vostra salute o sull'ambiente. Vogliate contattare l'installatore, il rivenditore, o le autorità locali per ulteriori informazioni.

Lo smaltimento abusivo del prodotto da parte dell'utente può comportare l'applicazione delle sanzioni amministrative di cui all'articolo 50 e seguenti del D.Lgs. n. 22/1997.

**ATENÇÃO:**

O seu produto não deve ser misturado com os desperdícios domésticos de carácter geral no final da sua duração e que deve ser eliminado de acordo com os regulamentos locais ou nacionais adequados de uma forma correcta para o meio ambiente.

Devido ao refrigerante, ao óleo e a outros componentes contidos no Ar condicionado, a desmontagem deve ser realizada por um instalador profissional de acordo com os regulamentos aplicáveis.

Contacte as autoridades correspondentes para obter mais informações.

**BEMÆRK:**

At produktet ikke må smides ud sammen med almindeligt husholdningsaffald, men skal bortskaffes i overensstemmelse med de gældende lokale eller nationale regler på en miljømæssig korrekt måde.

Da klimaanlægget indeholder kølemiddel, olie samt andre komponenter, skal afmontering foretages af en fagmand i overensstemmelse med de gældende bestemmelser.

Kontakt de pågældende myndigheder for at få yderligere oplysninger.

**ATTENTIE:**

Dit houdt in dat uw product niet wordt gemengd met gewoon huisvuil wanneer u het weg doet en dat het wordt gescheiden op een milieuvriendelijke manier volgens de geldige plaatselijke en landelijke reguleringen.

Vanwege het koelmiddel, de olie en andere onderdelen in de airconditioner moet het apparaat volgens de geldige regulering door een professionele installateur uit elkaar gehaald worden.

Neem contact op met de betreffende overheidsdienst voor meer informatie.

**OBS!:**

Det innebär att produkten inte ska slängas tillsammans med vanligt hushållsavfall utan kasseras på ett miljövänligt sätt i enlighet med gällande lokal eller nationell lagstiftning.

Luftkonditioneringsaggregatet innehåller kylmedium, olja och andra komponenter, vilket gör att det måste demonteras av en fackman i enlighet med tillämpliga regelverk.

Ta kontakt med ansvarig myndighet om du vill ha mer information.

**ΠΡΟΣΟΧΗ:**

Σημειώνεται ότι το προϊόν δεν θα πρέπει να αναμειχθεί με τα διάφορα οικιακά απορρίμματα στο τέλος του κύκλου ζωής του και θα πρέπει να αποσυρθεί σύμφωνα με τους κατάλληλους τοπικούς ή εθνικούς κανονισμούς και με τρόπο φιλικό προς το περιβάλλον.

Λόγω του ψυκτικού, του λαδιού και άλλων στοιχείων που περιέχονται στο κλιματιστικό, η αποσυρμαολόγησή του πρέπει να γίνει από επαγγελματίες τεχνικό και σύμφωνα με τους ισχύοντες κανονισμούς.

Για περισσότερες λεπτομέρειες, επικοινωνήστε με τις αντίστοιχες αρχές.



English

From 4th July 2007 and following Regulation EC N° 842/2006 on Certain Fluorinated Greenhouse gases, it is mandatory to fill in the label attached to the unit with the total amount of refrigerant charged on the installation.

Do not vent R410A/R407C into the atmosphere: R410A & R407C are fluorinated greenhouse gases covered by the Kyoto protocol global warming potential (GWP) R410A/R407C: = 1975/1652.5.

Español

Desde el 4 de Julio de 2007 y en base al Reglamento CE N° 842/2006 sobre determinados gases fluorados de efecto invernadero, es obligatorio rellenar la etiqueta suministrada con la unidad con la cantidad total de refrigerante con que se ha cargado la instalación.

No descargue el R410A/R407C en la atmósfera: R410A y R407C son gases fluorados cubiertos por el protocolo de Kyoto con un potencial de calentamiento global (GWP): = 1975/1652.5.

Deutsch

Ab 4. Juli 2007 und folgende Verordnung EG Nr. 842/2006 Bestimmte fluorierte Treibhausgase, auf dem Schild, das sich am Gerät befindet, muss die Gesamtkältemittelmenge verzeichnet sein, die bei der Installation eingefüllt wird.

Lassen sie R410A/R407C nicht in die Luft entweichen: R410A & R407C sind fluorierte treibhausgase, die durch das Kyoto-protokoll erfasst sind. Sie besitzen folgendes treibhauspotential (GWP) R410A/R407C: = 1975/1652.5.

France:

Du 4 Juillet 2007 et en fonction de la Réglementation CE N° 842/2006 concernant certains gaz à effet de serre fluorés, il est obligatoire de remplir l'étiquette attachée à l'unité en indiquant la quantité de fluide frigorigène qui a été chargée à l'installation.

Ne laissez pas le R410A/R407C se répandre dans l'atmosphère: le R410A et le R407C sont des gaz à effet de serre fluorés, couverts par le protocole de Kyoto avec un potentiel de réchauffement global (PRG) R410A/R407C: = 1975/1652.5.

Italiano

Dal 4 Luglio 2007 e in base alla Normativa EC N° 842/2006 su determinati gas fluorurati ad effetto serra, è obbligatorio compilare l'etichetta che si trova sull'unità inserendo la quantità totale di refrigerante caricato nell'installazione.

Non scaricare R410A/R407C nell'atmosfera: R410A e R407C sono gas fluorurati ad effetto serra che in base al protocollo di Kyoto presentano un potenziale riscaldamento globale (GWP) R410A/R407C: = 1975/1652.5.

Português

A partir de 4 de Julho de 2007 e em conformidade com a Regulamentação da UE N° 842/2006 sobre determinados gases fluorados com efeito de estufa, é obrigatório preencher a etiqueta afixada na unidade com a quantidade total de refrigerante carregada na instalação.

Não ventilar R410A/R407C para a atmosfera: o R410A e o R407C são gases fluorados com efeito de estufa abrangidos pelo potencial de aquecimento global (GWP) do protocolo de Quioto: = 1975/1652.5.

Dansk

Fra d. 4. Juli 2007 og i henhold til Rådets forordning (EF) nr. 842/2006 om visse fluourholdige drivhusgasser, skal installationens samlede mængde kølevæske fremgå af den etiket, der er klæbet fast på enheden.

Slip ikke R410A/R407C ud i atmosfæren: R410 & R407C er fluourholdige drivhus-gasser, der er omfattet af Kyoto-protokollens globale opvarmnings-potentiale (GWP) R410A/R407C: = 1975/1652.5.

Nederlands

Vanaf 4 Juli 2007 en conform richtlijn EC N° 842/2006 voor bepaalde fluorbroeikasgassen, dient u de tabel in te vullen op de unit met het totale koelmiddelvolume in de installatie.

Laat geen R410A/R407C ontsnappen in de atmosfeer: R410A & R407C zijn fluorbroeikasgassen die vallen onder het protocol van Kyoto inzake klimaatverandering global warming potential (GWP) R410A/R407C: = 1975/1652.5.

Svenska

Från och med 4 Juli 2007 och enligt reglering EC N° 842/2006 om vissa fluourhaltiga växthusgaser, måste etiketten som sitter på enheten fyllas i med sammanlagd mängd kylmedium som fyllts på under installationen.

Släpp inte ut R410A/R407C i atmosfären: R410A & R407C är fluourhaltiga växthus-gaser som omfattas av Kyotoprotokollet om global uppvärmnings-potential (GWP) R410A/R407C: = 1975/1652.5.

Ελληνικά

Από τις 4 Ιουλίου 2007 και σύμφωνα με τον Κανονισμό 842/2006/ΕΚ για για ορισμένα φθοριούχα αέρια θερμοκηπίου, είναι υποχρεωτική η συμπλήρωση της επισήμανσης που επισυνάπτεται στη μονάδα με το συνολικό ποσό ψυκτικού που εισήχθη κατά την εγκατάσταση.

Μην απελευθερώνετε R410A/R407C στην ατμόσφαιρα τα R410A & R407C είναι φθοριούχα αέρια του θερμοκηπίου που εμπίπτουν στο πρωτόκολλο του κυoto δυναμικο θερμοανσης του πλανητη (GWP) R410A/R407C: = 1975/1652.5

(EN) This equipment contains fluorinated greenhouse gases covered by the Kyoto protocol.
(ES) Este equipo contiene gases fluorados de efecto invernadero contemplados en el protocolo de Kyoto.
(DE) Diese Anlage enthält im Rahmen des Kyoto Protokolls genannte, fluorierte Treibhausgase.
(FR) Cet appareil contient des gaz fluorés à effet de serre visés par le protocole de Kyoto.
(IT) Questa apparecchiatura contiene gas fluorati ad effetto serra che rientrano nel protocollo di Kyoto.
(PT) Este equipamento contém gases fluorados que provocam efeito de estufa, segundo o protocolo de Kyoto.
(DA) Dette udstyr indeholder fluorholdige drivhusgasser, der er omfattet af Kyoto-protokollen.
(NL) Deze apparatuur bevat perfluorovormige broeikasgassen die vallen onder het protocol van Kyoto.
(SV) Denna anläggning innehåller fluorhaltiga växthusgaser som regleras av Kyoto-protokollet.
(EL) Ο παρών εξοπλισμός περιέχει φθορογόνα αέρια θεωρησθέντα τα οποία αναφέρονται στο πρωτόκολλο του Κιότο

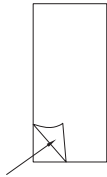
 Do not vent R410A into the atmosphere.
No descargar el R410A en la atmósfera.
Lassen sie R410A nicht in die Luft entweichen.
Ne laissez pas le R410A se répandre dans l'atmosphère.
Non scaricare R410A nell'atmosfera.

 Não efectue a ventilação do R410A para a atmosfera.
Sla R410A ucl i atmosferu.
Laat geen R410A ontsnappen in de atmosfeer.
Släpp inte ut R410A i atmosfären.
Μην εκκενώνετε το R410A στην ατμόσφαιρα.

REFRIGERANT INFORMATION - INFORMACIÓN SOBRE EL REFRIGERANTE - KÜHMITTELINFORMATION
INFORMATION CONCERNANT LE FLUIDE FRIGORIGÈNE - INFORMAZIONI RELATIVE AL REFRIGERANTE
INFORMACIÖES SOBRE O REFRIGERANTE - OPLYSNINGER OM KØLEMIDDEL - INFORMATIE OVER KOELSTOF
KYLINGSINFORMATION - ΣΤΟΙΧΕΙΑ ΚΥΚΛΩΣΤΟΥ ΜΕΣΟΥ

Refrigerant - Refrigerante - Kühlmittel - Fluide frigorigène - Kältemittel - Kooldat - Kylings - Μέσου

	R410A
Factory Charge - Carga de fábrica - Werksbefüllung - Charge en usine (Αντί ή συμπλήρωση) (Carga de fábrica en usinaria) (Anfangs- / Nachschub in der Fabrik) (Carga de fábrica en usinaria) (Anfangs- / Nachschub in der Fabrik)	 kg
Additional Charge - Carga adicional - Zusätzliche Füllmenge - Charge supplémentaire Carga aggiuntiva - Carga adicional - Ekstra påfyllning - Extra vulling - Ytterligere påfyllning Πρόσθετη πλήρωση (Carga adicional) (Zusätzliche Füllmenge) (Charge supplémentaire) (Carga aggiuntiva) (Carga adicional) (Ekstra påfyllning) (Extra vulling) (Ytterligere påfyllning)	 kg
Total Charge - Carga Total - Gesamtfüllmenge - Charge totale - Carica totale Carga total - Samlet påfyllning - Totale vulling - Total påfyllning - Συνολική πλήρωση	 kg



1

2

English

Instructions to fill in the "F-Gas Label":

- 1.- Fill in the Label with indeleble ink the refrigerant amounts: 1 - Factory Charge, 2 - Additional Charge & 3 - Total Charge.
- 2.- Stick the Protection Plastic Film on the F-Gas Label (delivered in a plastic bag with the Manual). To see Figure n° 2.

Español

Instrucciones para rellenar la etiqueta "F-Gas Label":

- 1.- Añote las cantidades en la etiqueta con tinta indeleble: 1 - Carga de Fábrica, 2 - Carga Adicional y 3- Carga Total.
- 2.- Coloque el adhesivo plástico de protección (entregado adjunto al Manual). Ver Figura n° 2.

Deutsch

Anleitung zum Ausfüllen des Etiketts "F-Gas Label":

- 1.- Schreiben Sie die Mengen mit wischfester Tinte auf das Etikett: 1 - Werksbefüllung, 2 - Zusätzliche Befüllung & 3 - Gesamtfüllmenge.
- 2.- Bringen Sie den Schutzaufkleb an (zusammen mit dem Handbuch geliefert). Siehe Abbildung Nr. 2.

France:

Instructions pour remplir l'Étiquette "F-Gas Label":

- 1.- Annotez les quantités sur l'Étiquette avec de l'encre indélébile: 1 - Charge en usine, 2 - Charge supplémentaire et 3 - Charge totale.
- 2.- Placez le plastique autocollant de protection (remis avec le Manual). Voir Figure n° 2.

Italiano

Istruzioni per compilare l'Etichetta "F-Gas Label":

- 1.- Annotare le quantità sull'etichetta con inchiostro indelebile: 1 - Quantità già caricata, 2 - Carica aggiuntiva e 3 - Carica totale.
- 2.- Collocare l'adesivo plastico di protezione (consegnato assieme al Manuale). Vedere Figura n. 2.

Português

Instruções para preencher a etiqueta "F-Gas Label":

- 1.- Anote as quantidades na etiqueta com tinta indelebil: 1 - Carga de fábrica, 2 - Carga adicional e 3 - Carga total.
- 2.- Coloque o adesivo plástico de protecção (fornecido com o Manual). Ver Figura n° 2.

Dansk

Instruktioner til udfyldning af etiketten "F-Gas Label":

- 1.- Angiv mængderne på etiketten med udsletteligt blæk: 1 - Fabrikspåfyldning, 2 - Ekstrapåfyldning & 3 - Samletpåfyldning.
- 2.- Sæt det beskyttende klæbemærke (der leveres sammen med brugervejledningen) på. Se fi g. 2.

Nederlands

Instructies voor het invullen van het label "F-Gas Label":

- 1.- Noteer de hoeveelheden met onuitwisbare inkt op het label: 1 - Fabrieksvulling, 2 - Extra vulling & 3 - Totale vulling.
- 2.- Plaats de plastic beschermband (met de handleiding meegeleverd). Zie Figuur nr. 2.

Svenska

Instruktioner för påfyllning, etiketten "F-Gas Label":

- 1.- Anteckna kvantiteterna på etiketten med permanent bläck: 1 - Fabrikspåfyllning, 2 - Ytterligare påfyllning & 3 - Total påfyllning.
- 2.- Klistra på skyddsfi lmen i plast (fi nns i pårmen till handboken). Se bild nr. 2.

Ελληνικά

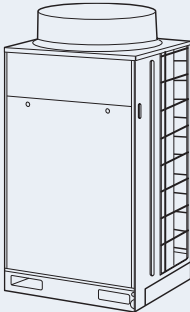
Τρόπος συμπλήρωσης της ετικέτας "F-Gas Label":

- 1.- Σημειώστε στην ετικέτα τις ποσότητες με ανεξίτηλο μελάνι: 1 - Εργοστασιακή πλήρωση, 2 - Πρόσθετη πλήρωση & 3 - Συνολική πλήρωση.
- 2.- Τοποθετήστε το πλαστικό, προστατευτικό αυτοκόλλητο (που έχει παραδοθεί με το Εγχειρίδιο). Ανατρέξτε στην εικόνα 2

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· ΕΞΩΤΕΡΙΚΗ ΜΟΝΑΔΑ



RAS FSXN



RAS-8FSXN	60288346
RAS-10FSXN	60288347
RAS-12FSXN	60288348
RAS-14FSXN	60288349
RAS-16FSXN	60288350
RAS-18FSXN	60288351

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FSN2(E)

RCI



RCIM



RCD



RPC



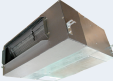
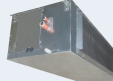
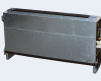
4-way cassette type
Cassette de 4 vías
Cassette 2 voies
4-Wege-Kassette
cassetta a 4 vie
cassete de 4 vias
4-vägskassett
4-weg cassette
4-vejs-kassettype
Κασέτα 4 κατευθύνσεων

2-way cassette type
Cassette de 2 vías
Cassette 2 voies
2-Wege-Kassette
cassetta a 2 vie
cassete de 4 vias
2-vägskassett
2-weg cassette
2-vejs-kassettype
Κασέτα 2 κατευθύνσεων

Ceiling type
Unidad tipo techo
Unité de type gainable
Deckengerät
Unità tipo a soffitto
Unidade de tecto
takmonterad enhet
plafondgemonteerde unit
loftmonteret enhed
μονάδα τοποθετημένη στην οροφή

RCI-1.0FSN2E	RCIM-1.0FSN2	RCD-1.0FSN2	
RCI-1.5FSN2E	RCIM-1.5FSN2	RCD-1.5FSN2	
RCI-2.0FSN2E	RCIM-2.0FSN2	RCD-2.0FSN2	RPC-2.0FSN2E
RCI-2.5FSN2E		RCD-2.5FSN2	RPC-2.5FSN2E
RCI-3.0FSN2E		RCD-3.0FSN2	RPC-3.0FSN2E
RCI-4.0FSN2E		RCD-4.0FSN2	RPC-4.0FSN2E
RCI-5.0FSN2E		RCD-5.0FSN2	RPC-5.0FSN2E
RCI-6.0FSN2E			RPC-6.0FSN2E

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 UNIDADE INTERIOR INDENDØRS AGGREGAT - BINNENTOESTEL - INOMHUSENHET - ΕΣΩΤΕΡΙΚΗ ΜΟΝΑΔΑ
 FSN2(E) ❄️ ⚙️

RPIM	RPI		RPK	RPF	RPII
					
	In the ceiling Conducto Deckeneinbau Gainable A controsoffitto Encastrar no tecto I loftet Inbouwversie I taket Εσωτερικού οροφής		Wall type Tipo pared Type mural Wandgerät Montato a parete Montado na parede väggmonterad op muur gemonteerd vægmonteret συναρμολογημένα στον τοίχο	Floor type Tipo suelo Unité intérieure de type console Bodengerät Unità interna tipo a pavimento Unidade interior embutida no piso golvmøddell av inomhusenhet vloer type binnenuit gulvtype indendørsenhed εσωτερική μονάδα τύπου δαπέδου	Floor concealed type Tipo suelo Type console carrossée Bodeneinbaugerät Tipo nascosto nel pavimento Tipo embutido no piso döld i golvet vloer verborgen type enhed indbygget i gulv τύπος ενσωμάτωσης στο δάπεδο
RPIM-0.8FSN2E(-DU)	RPI-0.8FSN2E				
RPIM-1.0FSN2E(-DU)	RPI-1.0FSN2E		RPK-1.0FSN(H)2M	RPF-1.0FSN2E	RPII-1.0FSN2E
RPIM-1.5FSN2E(-DU)	RPI-1.5FSN2E		RPK-1.5FSN(H)2M	RPF-1.5FSN2E	RPII-1.5FSN2E
	RPI-2.0FSN2E		RPK-2.0FSN2M	RPF-2.0FSN2E	RPII-2.0FSN2E
	RPI-2.5FSN2E		RPK-2.5FSN2M	RPF-2.5FSN2E	RPII-2.5FSN2E
	RPI-3.0FSN2E		RPK-3.0FSN2M		
	RPI-4.0FSN2E		RPK-4.0FSN2M		
	RPI-5.0FSN2E				
	RPI-6.0FSN2E				
		RPI-8.0FSN2E			
		RPI-10.0FSN2E			

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1 GENERAL INFORMATION

1.1 COPYRIGHT

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No type of modification must be made to the equipment without prior, written authorisation from the manufacturer.

1.2 PRODUCT GUIDE

1.2.1 Prior check

NOTE

Check, depending on the name of the model, the type of air conditioning system fitted, the abbreviated code and reference in this instruction manual. This Installation and Operating Manual only refers to SET FREE RAS-(8-54)FSXN outdoor units combined with indoor units from the SYSTEM FREE series.

Check, in accordance with the Installation and Operating Manuals included with the outdoor and indoor units, that all the information necessary for the correct installation of the system is included. If this is not the case, please contact your distributor.

1.2.2 Classification of outdoor unit models

Unit type (outdoor unit): RAS						
		Position-separating hyphen (fixed)				
		Capacity (HP): (8-54)				
		FSX: SET FREE				
		N: R410A refrigerant				
XXX	–	XX	FSX	N		

1.2.3 Combination of outdoor units

The power range of the RAS-(8-54)FSXN outdoor units is obtained by applying one unit (RAS-(8-18)FSXN) or by the combination of two or three outdoor units (RAS-(8-18)FSXN), depending on the instructions in the following tables.

Base units

HP	8	10	12	14	16	18
Model	RAS-8FSXN	RAS-10FSXN	RAS-12FSXN	RAS-14FSXN	RAS-16FSXN	RAS-18FSXN

Combination of base units

HP	20	22	24	26	28	30
Model	RAS-20FSXN	RAS-22FSXN	RAS-24FSXN	RAS-26FSXN	RAS-28FSXN	RAS-30FSXN
Combination	RAS-8FSXN	RAS-8FSXN	RAS-10FSXN	RAS-12FSXN	RAS-14FSXN	RAS-14FSXN
	RAS-12FSXN	RAS-14FSXN	RAS-14FSXN	RAS-14FSXN	RAS-14FSXN	RAS-16FSXN

HP	32	34	36	38	40	42
Model	RAS-32FSXN	RAS-34FSXN	RAS-36FSXN	RAS-38FSXN	RAS-40FSXN	RAS-42FSXN
Combination	RAS-16FSXN	RAS-16FSXN	RAS-18FSXN	RAS-12FSXN	RAS-12FSXN	RAS-12FSXN
	RAS-16FSXN	RAS-18FSXN	RAS-18FSXN	RAS-12FSXN	RAS-12FSXN	RAS-12FSXN
	–	–	–	RAS-14FSXN	RAS-16FSXN	RAS-18FSXN

HP	44	46	48	50	52	54
Model	RAS-44FSXN	RAS-46FSXN	RAS-48FSXN	RAS-50FSXN	RAS-52FSXN	RAS-54FSXN
Combination	RAS-12FSXN	RAS-12FSXN	RAS-12FSXN	RAS-14FSXN	RAS-16FSXN	RAS-18FSXN
	RAS-14FSXN	RAS-16FSXN	RAS-18FSXN	RAS-18FSXN	RAS-18FSXN	RAS-18FSXN
	RAS-18FSXN	RAS-18FSXN	RAS-18FSXN	RAS-18FSXN	RAS-18FSXN	RAS-18FSXN

1.3 SAFETY

1.3.1 Symbols used

During normal air conditioning system design work or unit installation, greater attention must be paid in certain situations requiring particular care in order to avoid injuries and damage to the unit, the installation or the building or property.

Situations that jeopardise the safety of those in the surrounding area or that put the unit itself at risk will be clearly indicated in this manual.

To indicate these situations, a series of special symbols will be used to clearly identify these situations.

Pay close attention to these symbols and to the messages following them, as your safety and that of others depends on it.

DANGER

- *The text following this symbol contains information and instructions relating directly to your safety and physical wellbeing.*
- *Not taking these instructions into account could lead to serious, very serious or even fatal injuries to you and others in the proximities of the unit.*

In the texts following the danger symbol you can also find information on safe procedures during unit installation.

CAUTION

- *The text following this symbol contains information and instructions relating directly to your safety and physical wellbeing.*
- *Not taking these instructions into account could lead to minor injuries to you and others in the proximities of the unit.*
- *Not taking these instructions into account could lead to unit damage.*

In the texts following the caution symbol you can also find information on safe procedures during unit installation.

NOTE

- *The text following this symbol contains information or instructions that may be of use or that require a more thorough explanation.*
- *Instructions regarding inspections to be made on unit parts or systems may also be included.*

1.3.2 Additional information about safety

DANGER

- *HITACHI is not able to foresee all the circumstances which may result in a potential danger.*
- *Do not pour water in the indoor or outdoor unit. These products are fitted with electric components. If water comes into contact with electric components, this will cause a serious electric shock.*
- *Do not handle or adjust the safety devices inside the indoor and outdoor units. The handling or adjustment of these devices may result in serious accident.*
- *Do not open the service cover or access panel of the indoor and outdoor units without disconnecting the main supply.*
- *In the event of fire, switch off the mains, put out the fire immediately and contact your service supplier.*
- *Check that the earth cable is correctly connected.*
- *Connect the unit to a circuit breaker of the specified capacity.*

1 General information

⚠ CAUTION

- Refrigerant leaks may hinder respiration as the gas displaces the air in the room.
- Fit the indoor unit, the outdoor unit, the remote control and the cable at a minimum of 3 metres away from sources of strong radiation from electromagnetic waves, such as medical equipment.
- Do not use sprays, such as insecticides, varnishes or enamels or any other inflammable gas within a metre of the system.
- If the circuit breaker or supply fuse of the unit comes on frequently, stop the system and contact the service supplier.
- Do not carry out maintenance or inspection work yourself. This work must be carried out by qualified service personnel with suitable tools and resources for the work.
- Do not place any foreign material (branches, sticks, etc.) in the air inlet or outlet of the unit. These units are fitted with high speed fans and contact with any object is dangerous.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should not play with the unit.
- RAS-(8-54)FSXN outdoor units are designed for commercial use and for light industry. Installation in homes may lead to electromagnetic interference.

ℹ NOTE

- The air in the room should be renewed and the room ventilated every 3 or 4 hours.
- The system fitter and specialist shall provide anti-leak safety in accordance with local regulations.

1.3.3 Pressure vessel and safety device

This air conditioning equipment is fitted with a high pressure vessel in accordance with the directive on pressure equipment. The recipient has been designed and tested prior to dispatch in accordance with said directive. In addition, in order to avoid abnormal pressures in the equipment, a high pressure switch is fitted in the refrigerant system. This does not require any adjustment. As a result, the air conditioning unit is protected against abnormal pressures.

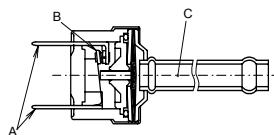
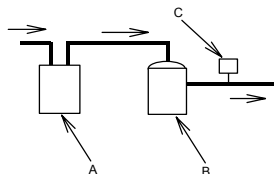
⚠ DANGER

Do not handle, modify or change the high pressure switch in the air conditioning unit. If abnormally high pressure is applied to the elements in the air conditioning unit refrigerant cycle, including the high pressure vessels, these could explode resulting in serious injury or loss of life.

ℹ NOTE

- The label indicating compliance with the directive on pressure equipment, the vessel category and capacity is located on the vessel itself.
- The high pressure switch is marked on the electric circuit diagrams of the outdoor unit as PSH and is connected to the printed circuit board PCB1 of the unit.

Technical specifications of the high-pressure switch: [Control and safety devices](#), see on page 65.



Location of the high pressure switch.

- A. Accumulator.
- B. Compressor.
- C. High pressure switch.

Structure of the high pressure switch.

- A. Connection to the electrical wiring.
- B. Contact point.
- C. Pressure detected.

Start-up and operation:

- Check that all the stop valves are fully open.
- Check that there are no obstacles on the sides of the air conditioning unit inlet/outlet before start-up and during operation.

During maintenance, the high pressure side should be checked regularly. If the pressure is higher than the maximum permitted pressure, stop the system and clean the heat exchanger or remove the cause of the excess pressure.

1.4 PURPOSE OF THIS MANUAL

This air conditioning system has been exclusively designed to supply air conditioning to people in one or more rooms within the installation range of the system.

The air conditioning system must not be used for other purpose such as drying clothes, cooling food or any other process requiring cooling or heating. The air conditioning system should only be installed by qualified personnel, with the necessary resources, tools and equipment, who are familiar with the safety procedures required to successfully carry out the installation.

PLEASE READ AND FAMILIARISE YOURSELF WITH THE MANUAL BEFORE STARTING WORK ON THE INSTALLATION OF THE AIR CONDITIONING SYSTEM. Failure to observe the instructions for installation, use and operation described in this Manual may result in operating failure including potentially serious faults, or even the destruction of the air conditioning system.

It is assumed that the air conditioning system will be installed and maintained by responsible personnel trained for the purpose. If this is not the case, the customer should include all the safety, caution and operating signs in the native language of the personnel responsible.

2 Remote control operation

Do not install the unit in the following places, as this may lead to a fire, deformities, rusting or faults:

- Places where oil is present (including oil for machinery).
- Places with a high concentration of sulphurous gas, such as spas.
- Places where flammable gases may be generated or circulate.
- Places with a saline, acidic or alkaline atmosphere.

Do not install the unit in places where silicon gas is present. Any silicon gas deposited on the surface of the heat exchanger will repel water. As a result, the condensate water will splash out of the collection tray and into the electrical box. Water leaks or electrical faults may eventually be caused. Do not install the unit in a place where the current of expelled air directly affects animals or plants as they could be adversely affected.

1.5 WORKING RANGE

This heat pump and heat recovery system has been designed for the following temperatures. Use the system within this range.

The system can provide refrigeration or heating or can provide refrigeration and heating at the same time.

The following table indicates the temperature range.

Mode		Cooling	Heating
Indoor temperature	Min.	21 °C DB / 15 °C WB	15 °C DB
	Max.	32 °C DB / 23 °C WB	27 °C DB
Outdoor temperature	Min.	-5 °C DB ⁽¹⁾	-20 °C WB ⁽²⁾
	Max.	43 °C DB	15 °C WB

⁽¹⁾ (10 – -5) °C DB, operating control range.

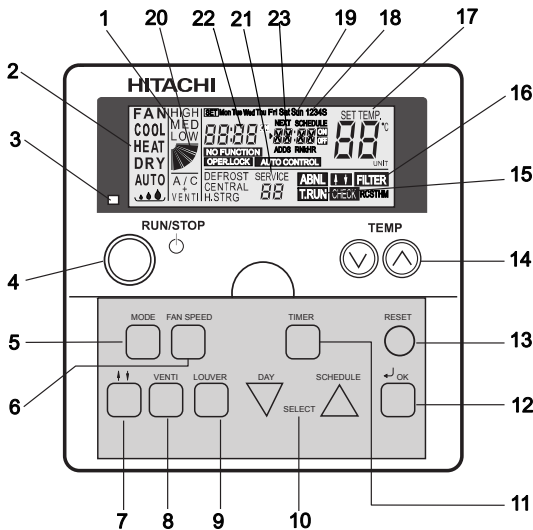
⁽²⁾ (-12 – -20) °C WB, operating control range.

NOTE

DB: dry bulb; **WB:** wet bulb.

2 REMOTE CONTROL OPERATION

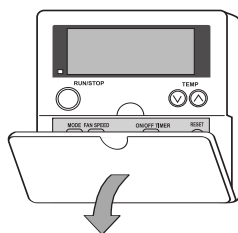
2.1 PC-ART REMOTE CONTROL



2 Remote control operation

Part	No.	Part	No.
1	Fan speed indicator. This shows the selected fan speed: • HIGH/MEDIUM/LOW Total fan indicator. This indicates if the total heat exchanger has been selected. • A/C: air conditioning only. • VENT: ventilation only. • A/C + VENT: air conditioning and ventilation.	13	RESET. Filter reset button. Press after cleaning the filter. The FILTER indication disappears and the next cleaning period starts. Operation is also stopped.
2	Operating mode indicator. Indicates the selected operating mode: • FAN: fan. • COOL: cooling. • HEAT: heating. • DRY: dehumidifying. • AUTO: automatic (cooling/heating).	14	TEMP buttons for setting the temperature.
3	Run display. Red indicator.	15	T.RUN test run indicator. This lights up during a TEST RUN or CHECK.
4	RUN/STOP. Stop/start switch for the air conditioning system.	16	ABNML display (alarm).
5	MODE. Operating mode switch.	17	SET TEMP indicator (temperature setting).
6	FAN SPEED. Fan speed setting.	18	1234S indicator (programme number setting).
7	Panel operating switch.	19	Weekly indicator Mon Tue ... Sun. Indicates that the central station or CSNet control is operating.
8	VENTI: Selection of total ventilation operating mode.	20	Swing louver indicator. DEFROST indicator.
9	LOUVER. Louver switch.	21	SERVICE indicator. Indicates change to special operations.
10	SELECTDAY/SCHEDULE. Day/programme selector. Increases or reduces the day/programme value setting for operation with timer.	22	Time indicator.
11	TIMER button. Activates or deactivates the timer.	23	Time indicator. Indicates the programmed time.
12	OK button.		

2.2 PRELIMINARY INFORMATION



To open the cover, pull in the direction shown by the arrow.



NOTE

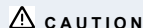
- If the fan speed is set to LOW and the outside temperature is higher than 21 °C, the compressor will be subject to excess load while operating in heating mode. Therefore, the fan should be set to HIGH or MEDIUM to avoid activation of the safety devices.
- When the system is restarted after being switched off for more than approximately 3 months, it should be checked by the service supplier.
- Switch off the mains switch when the system is inoperative for a long time. Otherwise, the system will consume electricity while the oil heater is active, even if the compressor is off.

2 Remote control operation

2.3 PROCEDURE FOR OPERATION IN COOLING, HEATING, DEHUMIDIFYING AND VENTILATION MODE

Before operation:

- Switch on the power supply approximately 12 hours before starting the unit if it has been disconnected for a long time. Do not start the unit immediately after switching on the mains power supply as this could damage the compressor if it is not warm enough.
- Make sure that the outdoor unit is not covered in ice or snow. If it is, remove ice or snow with warm water (not hotter than 50 °C). If the water temperature is higher than 50 °C, the plastic parts may be damaged.

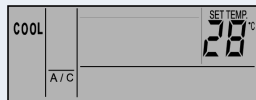


1. Switch on the power supply.

Three vertical lines are displayed on the liquid crystal display, with the text A/C or VENTI.

2. Press MODE.

Press MODE repeatedly to change the text, in the following order, from COOL, to HEAT, DRY until FAN (in models with cooling mode only; COOL, DRY and FAN). (The figure shows the selected mode COOL.



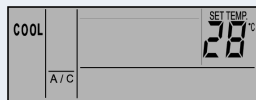
3. Press RUN/STOP.

The text RUN (red) lights up. The system starts up automatically.



NOTE

Adjusting the temperature, fan speed and direction of the air louver: the setting is stored the first time and it is not necessary to reset the unit every day. When it is necessary to change the setting, please refer to chapter Procedure for adjusting the temperature, fan speed and direction of the air louver, see on page 6.



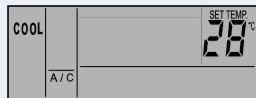
4. Disconnecting the system. (STOP)

Press RUN/STOP again. The text RUN (red) appears. The system stops automatically.



NOTE

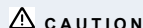
The fan may carry on working for approximately 2 minutes after the heating mode is stopped.



2.4 PROCEDURE FOR ADJUSTING THE TEMPERATURE, FAN SPEED AND DIRECTION OF THE AIR LOUVER

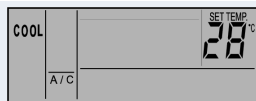
Do NOT touch the OK button.

- The OK button is only used for maintenance tasks.
- If the OK button is pressed accidentally and the operating mode switches to test mode, press the button again for approximately 3 seconds, wait 10 seconds and press it again.
- The operating mode switches to normal mode.



Temperature setting

- Set the temperature by pressing TEMP or .
- The temperature increases 1 °C each time is pressed (max. 30 °C).
- The temperature decreases 1 °C each time is pressed (min. 19 °C for COOL, DRY and FAN modes; min. 17 °C for HEAT mode). (The figure shows the temperature setting at 28 °C.)



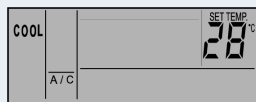
Fan speed setting

- Press FAN SPEED.
 - If FAN SPEED is pressed repeatedly, the display changes successively from HIGH to MEDIUM and LOW, in this order.
 - For normal operation, select the fan speed HIGH.
- (The figure shows the speed set to MED.)



NOTE

In DRY mode, the fan speed automatically changes to LOW and cannot be changed (however, the display shows the actual setting).



Adjusting the direction of the swing louver

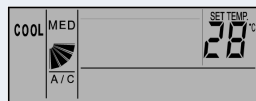
Press LOUVER: the louver starts to swing. Press the button again to set the position of the louver. Press repeatedly and the louver swings and stops successively.

- Fixed position
The indication shows the direction of the air flow.
- Position of the automatic oscillation
The indications change continuously according to the swing of the louver.



NOTE

In heating mode, the angle of the louver changes automatically.



2 Remote control operation

2.5 PROCEDURE FOR VENTILATION MODE

This function is only available when the total heat exchanger is connected.

If the following procedures are carried out and the total heat exchanger is not connected, the NO FUNCTION indication flashes for 5 seconds.

Ventilation

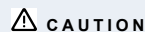
- Press VENTI.

When VENTI is pressed repeatedly, the indication changes, in this order, from A/C to VENTI and A/C + VENTI.
(The figure shows the A/C + VENTI setting).

NOTE

Please contact your HITACHI distributor or supplier for detailed information.

If the mode changes to VENTI during the individual operation of the air conditioning system, this stops. If the mode changes to A/C during the individual operation of the total heat exchanger, this stops.



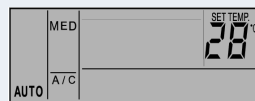
2.6 PROCEDURE FOR AUTOMATIC HEATING/VENTILATION MODE (COOL/HEAT)

The automatic heating/cooling mode should be configured using the optional function. Please contact your HITACHI distributor or supplier for detailed information. This function allows the operating mode (cool or heat) to be changed automatically, depending on the difference between the set temperature and the intake air temperature.

If the intake air temperature is 3 °C higher than the set temperature, the unit operation switches to COOL mode. If it is 3 °C lower than the set temperature, the unit operation changes to HEAT mode.

NOTE

- If the heat mode has been set with the fan speed at LOW, the protective devices will stop the system frequently. In this case, set the fan speed to HIGH or MED.**
- If the outside temperature is higher than approximately 21 °C, the heating mode is not available. The temperature difference between the cooling and heating mode is fairly significant when this function is used. Therefore, this function should not be used to supply air conditioning to a room when a precise temperature and humidity control is required.**



2.7 PROCEDURE FOR ADJUSTING THE SWING LOUVER

Model	Indication							
RCI	Angle of louver (approx.)	25°	30°	35°	40°	50°	55°	60°
	Cooling	✓	✓	✳	✓	✓	—	—
	Heating	✓	✓	✓	✓	✓	☀	✓
RCD	Angle of louver (approx.)	40°	45°	50°	55°	60°	65°	70°
	Cooling	✓	✓	✳	✓	✓	—	—
	Heating	✓	✓	✓	✓	✓	☀	✓
RPC	Angle of louver (approx.)	Horizontal	15°	30°	40°	50°	60°	80°
	Cooling	✓	✓	✳	✓	✓	—	—
	Heating	✓	✓	✓	✓	✓	☀	✓
RPK	Angle of louver (approx.)	35°	40°	45°	50°	55°	60°	70°
	Cooling	✳	✓	✓	✓	✓	—	—
	Angle of louver (approx.)	40°	45°	50°	55°	60°	65°	70°
	Heating	✓	✓	✓	✓	✓	✓	☀

✓ Angle of louver which can be selected

— Angle of louver that cannot be selected

☀ Angle of louver recommended for heating

✳ Angle of louver recommended for cooling

2 Remote control operation

Swing louver adjustment.

- 1 When LOUVER is pressed, the swing louver begins to operate. The margin of the angle of swing is approximately 70° from the horizontal position to the vertical position. When the symbol  moves, this indicates that the louver is operating in continuous mode.
- 2 When the swing movement of the louver is no longer required, press LOUVER again. The louver stops at the angle indicated by the direction of the symbol .
- 3 The air discharge angle is set at 20° for the RCI series and 40° for the RCD series during start-up in heating and defrost mode, when the thermostat is operating. When the outlet air temperature is more than approximately 30 °C, the swing louvers come on.

Setting the louver position

- 1 For the COOL and DRY modes, the air discharge angle can be set to 5 different positions. In heating mode, it can be set to 7 positions.
- 2 To set the position of the louver, press LOUVER to start the swinging movement, and then press again when the louver is in the required position.
- 3 The air discharge angle is set at 20° for the RCI series and 40° for the RCD series during start-up in heating and defrost mode, when the thermostat is operating. When the outlet air temperature is more than approximately 30 °C, the swing louvers come on.
RCI and RCD: when the louver angle is set to 55° for RCI, 65° for RCD or 70° for both series during heating mode and the unit is switched to cooling mode, the louvers are automatically set at an angle of 45° for RCI or 60° for RCD.

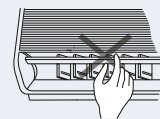
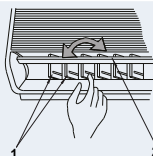
NOTE

There is a difference between the true angle of the louver and the angle shown on the liquid crystal display. When LOUVER is pressed, the louver does not stop immediately. The louver moves with an additional swing. If the louvers are moved during cleaning or for any other reason, select the automatic adjustment to return the four louvers to the same position.

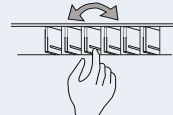
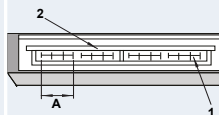
Do not turn the air louver manually. This could damage the mechanism (in all the units).

CAUTION

- Wall type (RPK):
Manually set the vertical louvers to direct the air discharge in the required direction.
Do not swing leaf 1 to the left or leaf 2 to the right of the vertical louver-1-.
- Automatic louver adjustment:
When the unit is not operating, two air louvers are automatically stopped in the closed position.



- Ceiling type (RPC):
The vertical louver has four sets -A- of louvers. Manually set the vertical louvers -1- to direct the air discharge in the required direction.



NOTE

Models not fitted with swing louver do not display the above instructions on the remote control. In any case, the louver must be adjusted manually.

2.8 PROCEDURE FOR TIMER OPERATION

Setting the time and date

1. Press SELECT (▼) DAY for more than 3 seconds to change to the date setting mode.
The text SET appears and the day flashes. All the days are displayed, except the current day.



2. Press SELECT (▼) DAY until the current day flashes and press OK.
The date is shown and the time flashes.



3. Press SELECT (▲ ▼) DAY / SCHEDULE to select the hour and, then press again.
The hour is displayed and the minutes flash.

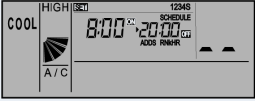
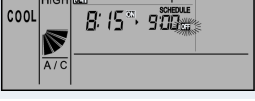
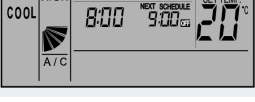


4. Press SELECT (▲ ▼) DAY / SCHEDULE to select the minutes and, then press again.
The time setting mode is completed and the unit returns to normal mode. The minutes are displayed and the text SET goes out. The seconds begin from zero.



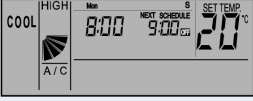
2 Remote control operation

Timer setting (programming)

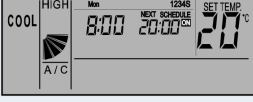
1. Press TIMER: The texts SET and SCHEDULE appear. Programme number "1" flashes and the other number are displayed.	
2. When SCHEDULE (▲) is pressed, the programme number changes: [1] → [2] → [3] → [4] → [S] → [1] → • Select [S] to set the on/off time and the change of temperature. • Press TIMER to switch off the texts SET and SCHEDULE and the unit returns to normal mode.	
3. Press OK and the selected programme number is displayed. The indicators for the other programme numbers switch off and the start-up time for the selected programme number flashes.	
4. Press SELECT (▲ ▼) DAY / SCHEDULE to select the hour and, then press again. The hour is displayed and the minutes flash.	
5. Press SELECT (▲ ▼) DAY / SCHEDULE to select the minutes and, then press again. The minutes are displayed and the off time flashes.	
6. Set the off time in the same way as the start-up time. After the minutes have been set, the off time is displayed. If the programme number [1][2][3][4] is activated, the display changes to the programme number shown in step 2. If [S] is selected, please see the section about setting the change in temperature for further details.	
7. By pressing (▲ ▼) DAY / SCHEDULE, the SET and SCHEDULE indicators switch off and the unit returns to normal mode.	

2 Remote control operation

Definition of the programme to be applied

1. Press (▲ ▼) DAY / SCHEDULE for more than 3 seconds, the display SET is shown. All the days and programme numbers are displayed.	
2. Press (▲ ▼) DAY / SCHEDULE until the day to be changed flashes. When pressed, the day flashes [Mon] → [Tue] → ... → [Sun] → [Mon-Sun] → [Mon-Fri] → [Sat, Sun] → [Mon] ... If several days are flashing, the same setting applies to all the days.	
3. Press (▲) DAY until the programme number to be changed flashes.	
4. Press (▼) SCHEDULE to display the SCHEDULE indicator. Next, the programme number defined in step 3 is applied to the days set in step 2. Press OK to activate or deactivate the programme. When the programme is active, the SCHEDULE indication lights up.	

Cancellation of timer

In normal mode, press (▲ ▼) DAY / SCHEDULE for more than 3 seconds. The NEXT SCHEDULE indicator flashes. (Cancellation of all timers)	
While the timer is in cancellation mode, press (▲ ▼) DAY / SCHEDULE for more than 3 seconds. The NEXT SCHEDULE indication lights up. (Activation of the timer)	

2 Remote control operation

Temperature change setting (energy saving mode)

1. Switch on as described in steps 1 and 2 of the "Timer setting" section and select programme "S".	
2. Switch on as described in steps 4, 5 and 6 of the "Timer setting" section and set the switching on or off time. The temperature setting is displayed.	
3. Select change of temperature by pressing (▲ ▼). "3" or "5" may be selected. If RESET is pressed now, the temperature change is not set and "--" is displayed. When TIMER is pressed, the temperature is displayed and the mode changes to programme number selection.	
4. When TIMER is pressed, the SET and SCHEDULE indicators switch off and the unit returns to normal mode.	

NOTE

- On completion of the procedure, the temperature display changes.
- On completion of the procedure, the temperature setting of CSNET NET WEB or PSC-A64S has a normal range, while the remote control changes to a new range.
- The increase or decrease of the temperature setting during the programmed time ($\pm 3^{\circ}\text{C}$ or $\pm 5^{\circ}\text{C}$) varies according to the operation mode.
 - When the system is operating in FAN, COOL or DRY modes, the temperature variation is +.
 - When the system is operating in HEAT mode, the temperature variation is -.

Automatic operation with heating (protection against freezing)

1. In normal mode, press for more than 3 seconds to change the operating mode. The automatic heating mode is activated and the ON indicator is displayed to the right of the current time. The ON indicator flashes while the automatic heating mode is operating.	
Cancellation While the system is operating in automatic heating mode, press MODE for more than 3 seconds to return to normal mode. The automatic heating mode is switched off and the ON indicator displayed to the right of the current time switches off.	

NOTE

If the room temperature is lower than the predefined setting (5, 10 or 15 $^{\circ}\text{C}$, selected using an optional setting), the heating starts automatically. When the room reaches the set temperature, the unit stops working.

2 Remote control operation

Operating lock method

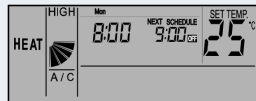
To prevent the buttons from being used incorrectly ⁽¹⁾, the button operation can be locked.

1. In normal mode, press SELECT (▲ ▼) for more than 3 seconds. The operating lock is activated and the OPER.LOCK indicator is displayed. If a button is pressed when the operating lock is on, the OPER.LOCK indicator flashes.



Cancellation

While the lock function is on, hold down (▲ ▼) and SELECT at the same time for more than 3 seconds to return to normal mode. The operating lock is cancelled and the OPER.LOCK indicator switches off.

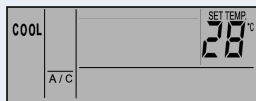


NOTE

⁽¹⁾ The button to be locked can be selected in "change of operating mode", "temperature setting", "air flow" and "automatic louver" using an optional setting (F8-Fb) of up to 4 elements. The setting can be modified from CSNET or from the secondary remote control.

2.9 ON-SCREEN DISPLAYS DURING NORMAL OPERATION

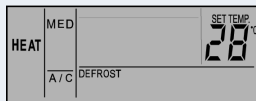
- Thermal controller
When the thermal controller is operating, the fan speed changes to LOW and the display does not change. (In heating mode only).



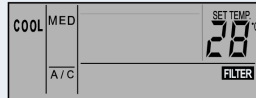
- Defrost
When the system is operating in defrost mode, the text DEFROST is displayed.
The indoor fan slows down or stops (depending on the selected setting).
The louver is set in a horizontal position at 35°. However, the text display on the screen remains lit. (The figure shows the setting DEFROST.)



When the unit stops during defrost mode, the text RUN (red) goes out.
However, the system continues showing the text DEFROST and the unit starts up when the defrosting is completed.



- Filter
Filter blocked: the text FILTER lights up when the filter is blocked with dust, etc.
Cleaning the filter: press RESET after cleaning the filter. The text FILTER goes out.



3 Automatic controls

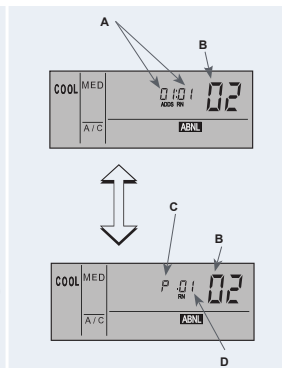
2.10 ON-SCREEN DISPLAYS DURING ABNORMAL OPERATION

- **Malfunction**
The RUN (red) indicator flashes.
The ALARM indicator appears on the liquid crystal display.
The screen also displays the indoor unit number -A-, the alarm code -B- and the model code -C-. If there are various indoor units connected, the above mentioned information is shown for each one of them -D-.
Write down the indications and contact your HITACHI service supplier.
- **Power shortage**
All displays disappear.
If the unit stops due to a power shortage, it will not start again, even though the power comes back on. Carry out the start-up operations again.
If the power shortage lasts less than 2 seconds, the unit will start again automatically.
- **Electrical noise**
The displays can disappear from the screen and the unit can stop. This is because the microcomputer has been activated to protect the unit from electrical noise.



NOTE

If the wireless remote control is used for the wall-type indoor unit, remove the connectors (CN25) that are connected to the indoor PCB. Otherwise the unit will not work. The stored data cannot be erased unless the remote control is initialised.



Model code	
Indication	Model
H	Heat pump
P	Inverter
F	Multi (SET-FREE)
C	Refrigeration only
E	Other
b	Double, triple and quadruple

3 AUTOMATIC CONTROLS

3.1 AUTOMATIC CONTROLS

The system is equipped with the following functions:

Three-minute protection

The compressor remains at a standstill for a minimum of three minutes once stopped. If the system restarts approximately 3 minutes after stoppage, the RUN indicator is enabled. However, cooling or heating operating mode remains switched off and does not start until after three minutes.

Frost formation prevention during cooling mode

When the system is used in a room at a low temperature, cooling mode can be switched to fan mode for a moment to prevent frost from forming on the indoor heat exchanger.

Low-speed air control during heating mode operations

When the compressor is stopped while the thermostat is switched off or when the system is automatically defrosting, the fan is set to low speed or stops.

Automatic defrost cycle

When heating mode is stopped by pressing the RUN/STOP button, a check is made for frost on the outdoor unit and, where necessary, defrost is run for a maximum of 10 minutes.

Automatic restart after a power shortage

If the electricity supply is interrupted for short periods (of up to 2 seconds), the remote control will store the settings and the unit will restart when the electricity supply is re-established.

Contact your distributor where an automatic restart is required after an electricity shortage of more than 2 seconds (optional function).

Systems equipped with a heat pump will also be fitted with the following functions:

Operating overload prevention

When the outdoor temperature is too high during heating mode, this operating mode is stopped due to the outdoor thermistor being enabled until the temperature drops.

Hot start during heating mode

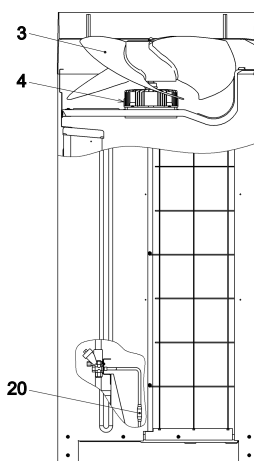
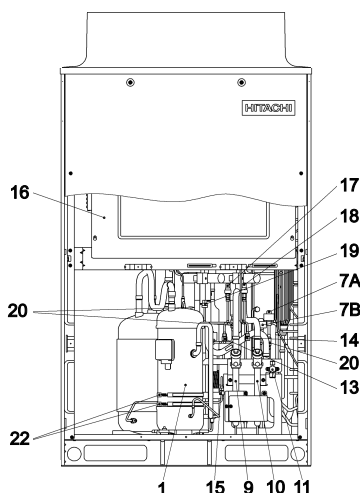
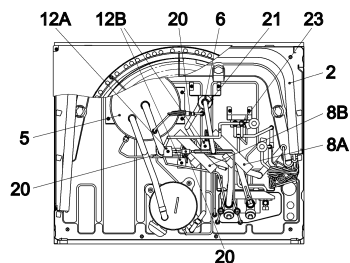
To prevent cold air discharge, the fan speed is controlled from the low-speed position to that defined in line with the discharge air temperature. The louver is set horizontally at the same time.

Compressor hot start

The FSXN series requires electricity connection four hours prior to start-up (stoppage code d1-22). Where start-up is required within four hours: [Test run](#), see on page 61.

4 PART NAMES

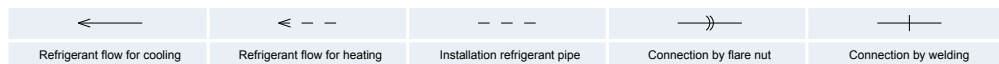
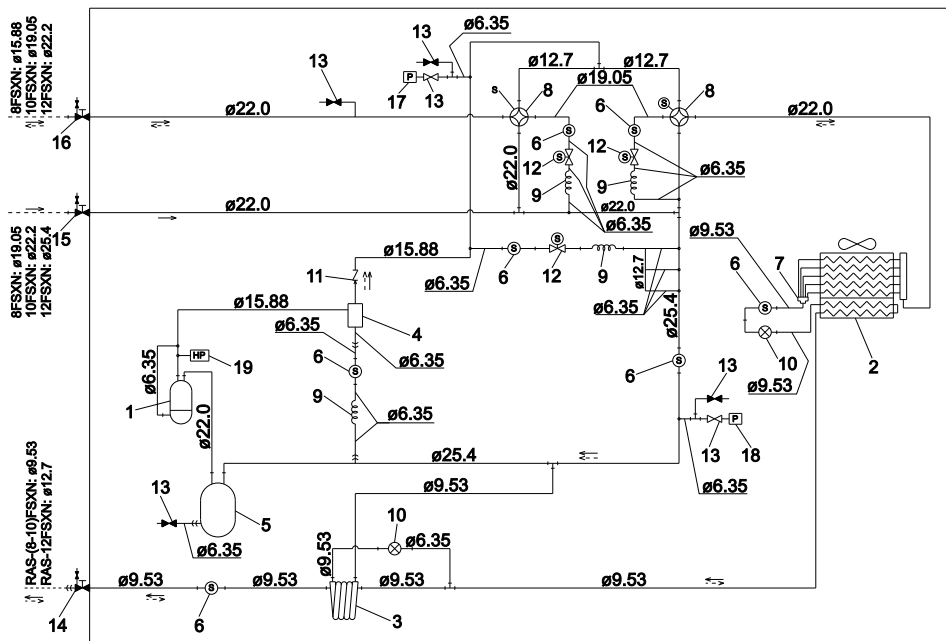
4.1 RAS-(8-12)FSXN (EXAMPLE)



Part	No.	Part	No.
1	Compressor (Inverter)	12A	Solenoid valve SVA (3 parts)
2	Heat exchanger	12B	Solenoid valve SVG (3 parts)
3	Fan	13	Check joint (low pressure)
4	Fan motor	14	Check joint (high pressure)
5	Accumulator	15	Check joint (for oil)
6	Oil separator	16	Electrical box
7A	Electronic expansion valve MV1	17	Low-pressure sensor
7B	Electronic expansion valve MVB	18	High-pressure sensor
8A	Reversing valve RVR1	19	Protection pressure switch
8B	Reversing valve RVR2	20	Filter (7 parts)
9	Stop valve (gas, low pressure)	21	Check valve
10	Stop valve (gas, high pressure)	22	Crankcase heater (2 parts)
11	Stop valve (liquid)	23	Dual-tube heat exchanger

5 REFRIGERANT CYCLE

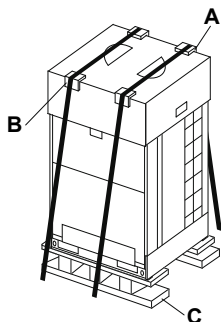
5.1 RAS-(8-12)FSXN (EXAMPLE)



Part	No.	Part	No.
1	Compressor	11	Check valve
2	Heat exchanger	12	Solenoid valve
3	Dual-tube heat exchanger	13	Check joint
4	Oil separator	14	Stop valve (liquid)
5	Accumulator	15	Stop valve (gas, low pressure)
6	Filter	16	Stop valve (gas, high pressure)
7	Distributor	17	Refrigerant pressure sensor (high pressure)
8	Reversing valve	18	Refrigerant pressure sensor (low pressure)
9	Capillary tube	19	Protection pressure switch
10	Electronic expansion valve		

6 TRANSPORT, LIFTING AND HANDLING OF THE UNITS

6.1 TRANSPORT OF OUTDOOR UNIT



When transporting the unit, make sure that it is securely and correctly fastened to the vehicle to avoid damage. To avoid damage, use appropriate textile slings -A- and cardboard protection -B- to ensure that the unit is immobilised without damaging it.

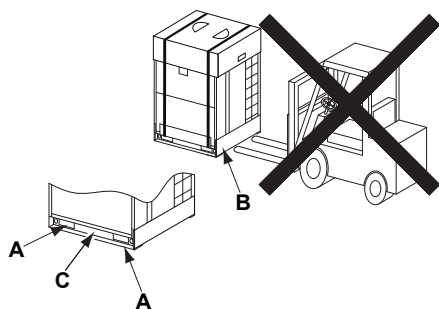
Use a suitable crane with the required loading capacity on flat ground when loading and unloading the unit.

CAUTION

Do not place other material on top of the outdoor units during transport and storage.

If the unit is not installed immediately, it should be stored in a suitable location, protected from the elements, especially in saline atmospheres and from rodents. The unit must be stored with all the transport protection with which it was supplied and with the wooden base -C- fitted.

6.2 HANDLING



When handling loads with fork-lift trucks, special care should be taken to prevent injury to individuals in the vicinity or damage to the unit itself.

CAUTION

National and local legislation must be observed with respect to driving and the handling of loads with fork-lift trucks.

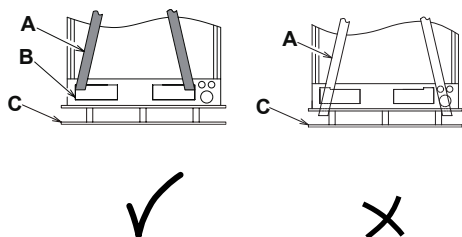
The only places in which the forks of the fork-lift truck can be inserted are through the openings -A- of the unit base.

Do not apply excessive force to these openings, with either the forks or other tools. This could damage the base of the unit.

Do not move the unit by pushing it on side -B- of the base with the forks of the fork-lift truck or by applying force on zone -C-.

Do not use wheelbarrows to move the unit.

6.3 LIFTING METHOD



ANGER

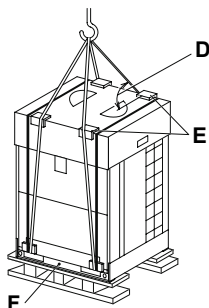
- Always use textile slings in good condition, without cuts or wear, and with the correct capacity for lifting the outdoor unit.
- Do not fit the slings on the wooden base -C- of the unit. The wooden base is only designed to protect the base of the unit during transportation; it will not withstand the strain of lifting the unit.
- Do not use metal cables to lift the unit. Metal cables may slip on the wooden base supporting the unit and could cause the unit to tilt or fall during the lifting operation.

Do not remove any of the protective packaging from the unit to protect it during handling and lifting.

The unit should only be lifted from the base.

Fit the hoisting slings -A- through the openings -B- on the base of the unit.

7 Unit installation



Slightly tighten the two hoisting slings.

Insert protection -E- between where the slings touch the upper protective cardboard packaging of the unit. The slings must not touch the unit.

The slings should form an angle of more than 60° -D- with the upper part of the unit. The unit should be kept horizontal throughout the lifting operation. If necessary, tie guide ropes on to prevent the unit from swinging freely during the lifting process.

Do not apply force to zone -F-.



⚠ DANGER

No-one should remain in the radius of action of the crane during the lifting process.

7 UNIT INSTALLATION

7.1 PRELIMINARY CONDITIONS FOR POSITIONING OF OUTDOOR UNIT

Mount the outdoor unit in a shady location or where it will not be exposed to direct sunlight, or to high temperatures. It should also be a well-ventilated spot.

Mount the outdoor unit so that noises and the discharge of air from the unit will not bother neighbours or the surrounding environment.

Install the outdoor unit in an area of limited access to the general public.

In cold climates, ice may form on the unit. When installing the unit, make sure that ice falling off the unit could not pose a risk to passers-by.

When installing the outdoor unit in areas covered by snow, mount the covers supplied by the fitter on the top of the unit and on the heat exchanger inlet side.

Do not install the outdoor unit in zones where dust or contamination could block the outside heat exchanger.

Do not install the outdoor unit in areas with a high air content of oil, saline atmospheres or aggressive gases such as sulphur.

Do not install the outdoor unit close to sources of strong electromagnetic radiation or in areas where electromagnetic waves radiate directly towards the electrical box and the components of the unit. Install the unit as far as possible from these sources (minimum 3 metres); electronic noise may result in the incorrect operation of the unit.

⚠ CAUTION

In areas with high electromagnetic turbulence, a fuse may blow or the unit stop or an alarm may be triggered. In this case, stop the system and restart it to remove the alarm.

Make sure that the base of the foundations is flat and strong enough to bear the weight of the unit.

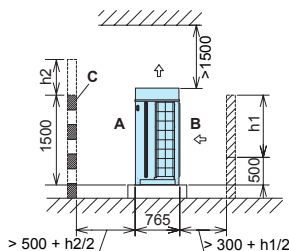
Install the outdoor unit in an area with enough space around the unit to permit service and maintenance tasks.

⚠ CAUTION

• **The aluminium fins have sharp edges. Take special care to avoid injury.**

• **The outdoor unit must be installed on rooftops or in areas not accessible by the user. Only service technicians and maintenance personnel are permitted access to the unit.**

7.2 INSTALLATION SPACE



NOTE

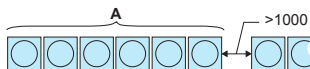
Side view. All measurements are in mm.

7 Unit installation

Calculate the service space required during the installation of the unit, based on the following:

- If there are no walls either in front or behind the unit, a space of 500 mm is necessary in front -A- and 300 mm behind -B-.
- If the front wall is higher than 1500 mm, a space of $(500 + h/2)$ mm is required at the front -A-.
- If the rear wall is higher than 500 mm, a space of $(300 + h/2)$ mm is required at the back -B-.
- If a wall -C- is installed in front of the unit, a ventilation hole should be made in the wall.
- When the space over the unit is less than 1500 mm, or the space around the unit is closed, a conduct is required to prevent short-circuits between the intake air and the discharge air.
- If there are any obstacles in the space over the unit, the four sides of the unit should be left open.

7.3 INSTALLATION

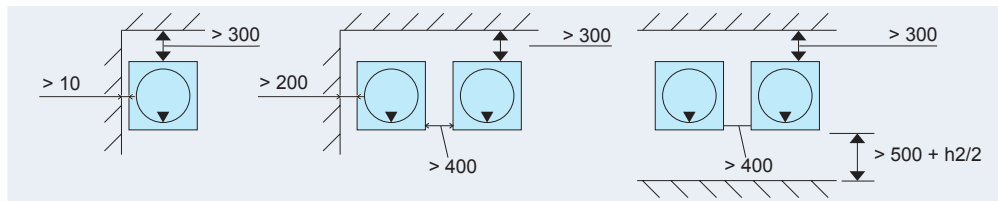


NOTE

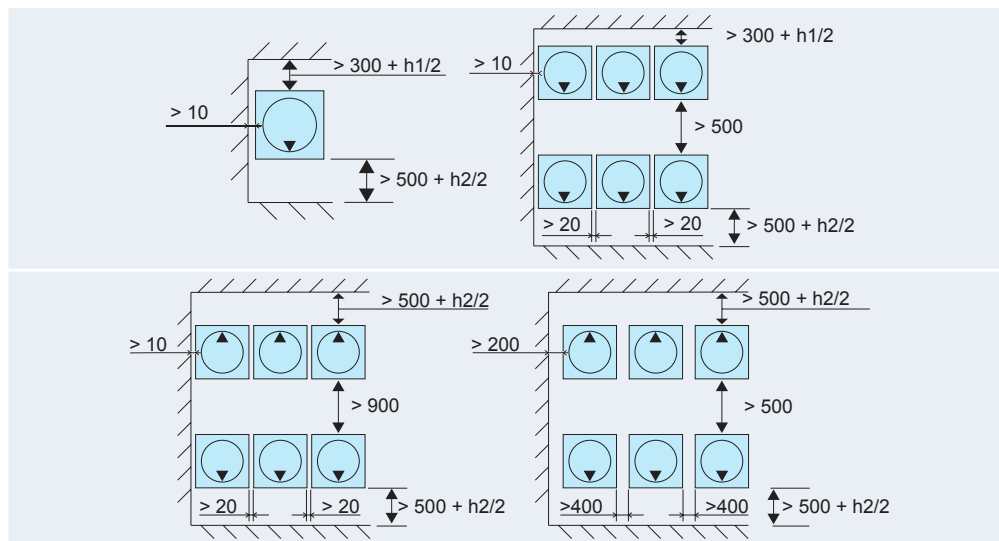
- Top view. All measurements are in mm. The arrow ▼ indicates the front side of the unit.
- The dimensions given in the following figures include the spaces required for standard installation and maintenance tasks for operation in refrigeration mode at an outdoor temperature of 35 °C.
- If the outdoor temperature is higher and there is a possibility of short-circuits between the intake air and the discharge air, the most appropriate dimensions are determined by calculating the air flow current in comparison with the measurements given.
- A maximum group of six units a metre apart is permitted for multiple group installation.
- If the unit is surrounded by walls on all four sides, leave one of the walls partially open.

7.3.1 Installation with walls in two directions

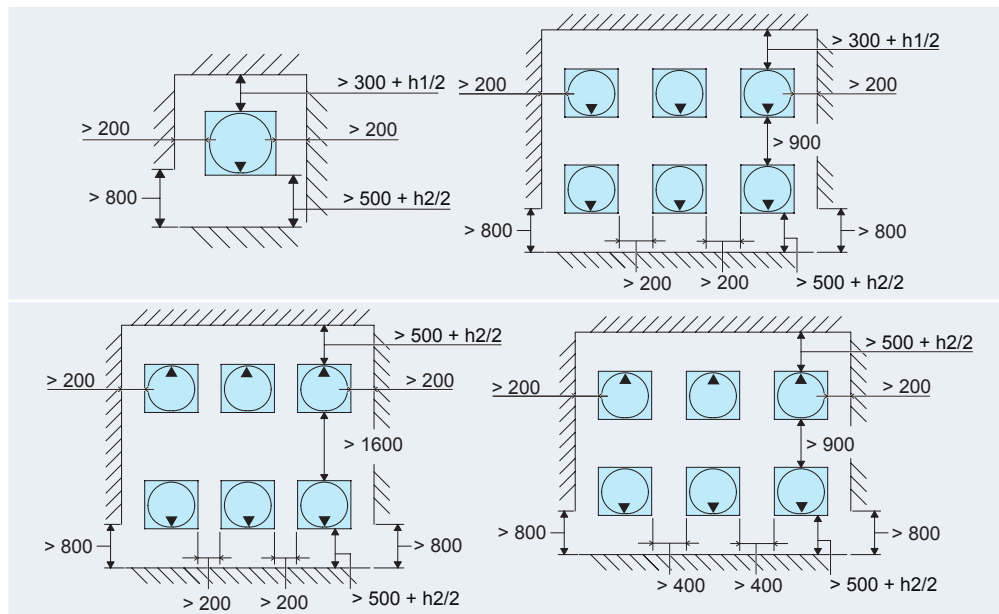
If the units are installed adjacent to high buildings, without walls in two directions, a space of 300 mm is required at the rear of the unit.



7.3.2 Installation with walls in three directions

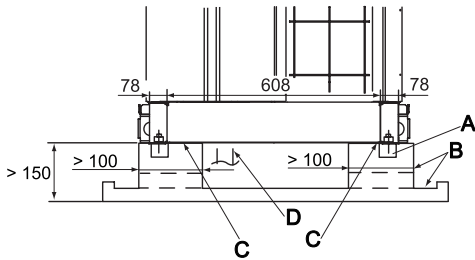


7.3.3 Installation with walls in four directions



7.4 FOUNDATION AND ANCHORAGE OF OUTDOOR UNIT

7.4.1 Foundations



NOTE

All measurements are in mm.

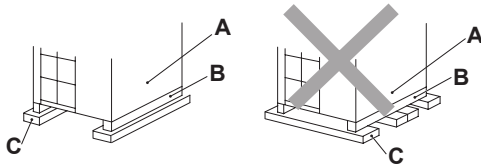
- A. Mortar housing $\phi 100 \times 150$.
- B. Drainage 100×20 .
- C. Anti-vibration insulation material.
- D. Refrigerant pipes.

The foundations for the installation of the outdoor unit must be more than 150 mm above ground level.

The foundations require perimeter drainage to help drain condensation. When a system of condensation drainage pipes is required for the outdoor unit, the genuine accessory DBS-TP10A should be used. Do not fit drainage pipes or collection trays in cold climates, as they could freeze and break.

⚠ DANGER

Drainage must not take place in areas frequented by pedestrians. In low temperatures, the drainage water could freeze and lead to falls.



The foundations must be able to bear the weight of the whole of the base of the unit and should be laid as shown in the diagram.

- A. Front part of the unit.
- B. Base of unit.
- C. Foundations.

Check the front-rear line and the sides of the unit are level: there should not be more than 10 mm difference between each side.

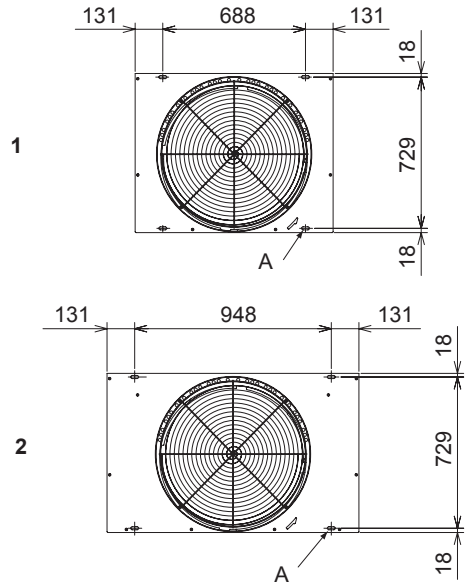
The foundation must be sufficiently strong to ensure that the outdoor unit:

- Is not tilted.
- Does not produce strange noises.
- Remains secure in the event of strong winds or earthquakes.

7.4.2 Position of anchorage bolts

NOTE

All measurements are in mm.



Secure the outdoor unit using the field-supplied anchorage bolts.

A. Openings for the anchorage bolts (4x) 38×15 .

1. Outdoor unit SET FREE RAS-(8-12)FSXN
2. Outdoor unit SET FREE RAS-(14-18)FSXN

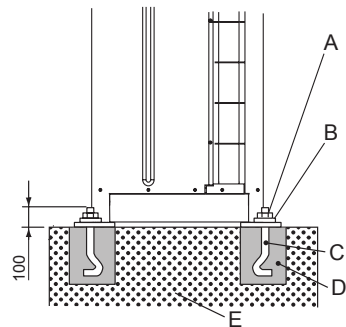


Diagram of fastening of outdoor unit using field-supplied anchorage bolts.

- A. Nut.
- B. Washer.
- C. M12 anchorage bolt.
- D. Mortar fill.
- E. Concrete.

8 PIPING WORK AND REFRIGERANT CHARGE

8.1 REFRIGERANT PIPE SELECTION

8.1.1 Refrigerant pipe selection

The RAS-(8-54)FSXN outdoor units can work as a heat pump system, by means of a two-pipe system (gas pipe and liquid pipe), or they can work as a heat recovery system by means of a three-pipe system (high and low pressure pipes and liquid pipe), requiring in addition the CH units supplied as accessories.

There is an optional specific pipe connection kit available according to the power of the outdoor unit:

Operating mode	Outdoor unit	No. of units	Connection kit	Indications:
Heat pump system	RAS-(20-24)FSXN	2	MC-20AN	- Gas pipe: 1 set. - Liquid pipe: 1 set.
	RAS-(26-36)FSXN	2	MC-21AN	
	RAS-(38-54)FSXN	3	MC-30AN	
Heat recovery system	RAS-(20-24)FSXN	2	MC-20XN	- Gas pipe, high pressure: 1 set. - Gas pipe, low pressure: 1 set. - Liquid pipe: 1 set.
	RAS-(26-36)FSXN	2	MC-21XN	
	RAS-(38-54)FSXN	3	MC-30XN	

◆ Pipe size selection

Select the pipe size in line with the following instructions:

- Between the outdoor unit and the branch pipe (multikit): select the same pipe connection size as for the outdoor unit.
- Between the branch pipe (multikit) and the indoor unit: select the same pipe connection size as for the indoor unit.

⚠ CAUTION

- Do not use refrigerant pipe sizes other than those indicated in this manual. The diameter of the refrigerant pipes depends directly on the power of the outdoor unit.
- If larger diameter refrigerant pipes are used, the circuit lubrication oil tends to separate from the gas carrying it. The compressor will be seriously damaged due to a lack of lubrication.
- If smaller diameter refrigerant pipes are used, the gas or liquid refrigerant will have serious difficulties in circulating. System performance will be affected. The compressor will run under more severe conditions than foreseen and will be damaged in a short space of time.

◆ Multikit or distributor selection

ⓘ NOTE

- Pipe connection sizes on outdoor units, indoor units and the multikit or distributor vary depending on the system. Consult the Service Manual for the SET FREE Series FSXN.
- The sizes of the indoor and outdoor units are different. Adjust the flare adapter (accessory) to the indoor pipe connection.

8.1.2 Copper pipes, sizes, connection and insulation

◆ Copper pipes and sizes

⚠ CAUTION

- The copper pipe used in the refrigeration installations is different to the copper pipe used in installations carrying domestic or heating water.
- The copper pipe for refrigeration installations is especially treated for outdoors and indoors. The interior surface finish makes it easier for the refrigerant to circulate and withstands the action of the lubricant oil applied to outdoor equipment.

Prepare the copper pipes provided by the supplier.

Select the pipe with the appropriate diameter and thickness. Use the table below to select the most appropriate pipe:

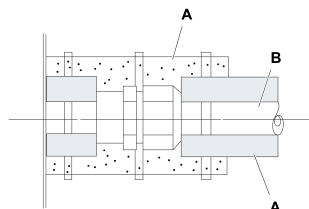
Nominal diameter		Thickness mm	Supply	Nominal diameter		Thickness mm	Supply
mm	Inches			mm	Inches		
6.35	1/4	0.80	Roll	25.4	1	1.00	Pipe
9.53	3/8	0.80	Roll	28.6	1-1/8	1.00	Pipe
12.7	1/2	0.80	Roll	31.75	1-1/4	1.10	Pipe
15.88	5/8	1.00	Roll	38.1	1-1/2	1.35	Pipe
19.05	3/4	1.00	Pipe	41.3	1-5/8	1.45	Pipe
22.2	7/8	1.00	Pipe	44.45	1-3/4	1.55	Pipe

8 Piping work and refrigerant charge

Always use clean copper pipes with no signs of knocks or cracks. Make sure there is no dust or dampness on the inside. Before you install the pipes, clean the inside with oxygen-free nitrogen gas to eliminate any remains of dust or other substances.

⚠ CAUTION

- **Do not use hand saws, circular saws, abrasive grinders or other tools that generate shavings.**
- **Strictly follow national or local regulations regarding occupational health and safety.**
- **Wear appropriate means of protection during cutting or brazing operations and installation (gloves, eye protection, etc).**



On completing the installation of the refrigerant pipes -B-, insulate them appropriately using suitable insulating material -A- and seal the open space between the holes made and the pipe, as shown in the figure.

◆ Size of pipes for outdoor unit (2 pipes)

Model	Gas	Liquid (mm)
RAS-8FSXN	ø19.05 (ø19.05 - ø22.2)	ø9.53 (ø9.53 - ø12.7)
RAS-10FSXN	ø22.2 (ø22.2 - ø25.4)	ø9.53 (ø9.53 - ø12.7)
RAS-12FSXN	ø25.4 (ø25.4 - ø28.6)	ø12.7 (ø12.7 - ø15.88)
RAS-14FSXN		
RAS-16FSXN	ø28.6 (ø28.6 - ø31.75)	ø12.7 (ø12.7 - ø15.88)
RAS-18FSXN	ø28.6 (ø28.6 - ø31.75)	ø15.88 (ø15.88 - ø19.05)
RAS-20FSXN		
RAS-22FSXN		
RAS-24FSXN		
RAS-26FSXN	ø31.75 (ø31.75 - ø34.9)	ø19.05 (ø19.05 - ø22.2)
RAS-28FSXN		
RAS-30FSXN		
RAS-32FSXN		
RAS-34FSXN	ø38.1 (ø38.1 - ø41.3)	ø19.05 (ø19.05 - ø22.2)
RAS-36FSXN		
RAS-38FSXN		
RAS-40FSXN		
RAS-42FSXN		
RAS-44FSXN		
RAS-46FSXN		
RAS-48FSXN		
RAS-50FSXN		
RAS-52FSXN		
RAS-54FSXN		

8 Piping work and refrigerant charge

◆ Size of pipes for outdoor unit (3 pipes)

Model	Gas		Liquid (mm)
	Low pressure (mm)	High pressure (mm)	
RAS-8FSXN	ø19.05 (ø19.05 - ø22.2)	ø15.88 (ø15.88 - ø19.05)	ø9.53 (ø9.53 - ø12.7)
RAS-10FSXN	ø22.2 (ø22.2 - ø25.4)	ø19.05 (ø19.05 - ø22.2)	ø9.53 (ø9.53 - ø12.7)
RAS-12FSXN	ø25.4 (ø25.4 - ø28.6)	ø22.2 (ø22.2 - ø25.4)	ø12.7 (ø12.7 - ø15.88)
RAS-14FSXN			
RAS-16FSXN	ø28.6 (ø28.6 - ø31.75)	ø22.2 (ø22.2 - ø25.4)	ø12.7 (ø12.7 - ø15.88)
RAS-18FSXN	ø28.6 (ø28.6 - ø31.75)	ø22.2 (ø22.2 - ø25.4)	ø15.88 (ø15.88 - ø19.05)
RAS-20FSXN			
RAS-22FSXN	ø28.6 (ø28.6 - ø31.75)	ø25.4 (ø25.4 - ø28.6)	ø15.88 (ø15.88 - ø19.05)
RAS-24FSXN			
RAS-26FSXN	ø31.75 (ø31.75 - ø34.9)	ø25.4 (ø25.4 - ø28.6)	ø19.05 (ø19.05 - ø22.2)
RAS-28FSXN	ø31.75 (ø31.75 - ø34.9)	ø28.6 (ø28.6 - ø31.75)	ø19.05 (ø19.05 - ø22.2)
RAS-30FSXN			
RAS-32FSXN			
RAS-34FSXN			
RAS-36FSXN			
RAS-38FSXN	ø38.1 (ø38.1 - ø41.3)	ø31.75 (ø31.75 - ø34.9)	ø19.05 (ø19.05 - ø22.2)
RAS-40FSXN			
RAS-42FSXN			
RAS-44FSXN			
RAS-46FSXN			
RAS-48FSXN			
RAS-50FSXN			
RAS-52FSXN			
RAS-54FSXN			

◆ Pipe connection



Cover the end of the pipe appropriately when it is to be inserted through holes in walls and roofs, etc.

Keep the ends of the pipes covered while other installation work is being carried out to avoid the entry of dampness or dirt.

Do not place the pipes directly on the ground without appropriate protection or adhesive vinyl tape to cover the ends.

Where the pipe installation is not completed for a certain amount of time, braze the ends of the pipe to seal. Then fill it with oxygen-free nitrogen gas through a Schrader valve to avoid the accumulation of humidity and/or contamination through dirt.

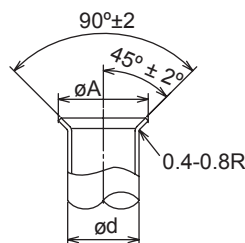
NOTE

- Where polyethylene foam insulation is used, a 10 mm thick layer should be used for the liquid pipe and between 15 and 20 mm for the gas pipe.
- Install the insulation after the pipe surface temperature has dropped to the same temperature as that of the room, otherwise the insulation may melt.

Do not use insulating material that contains NH_3 (ammonium), as it could damage the copper in the pipe and subsequently cause leaks.

Where the fitter has supplied his own branches, these should be appropriately insulated to avoid decreases in capacity in line with to environmental conditions and dew on the surface of the piping due to low pressure.

Dimensions of flared pipe



8 Piping work and refrigerant charge

Perform the widening operations in accordance with the measurements shown below.

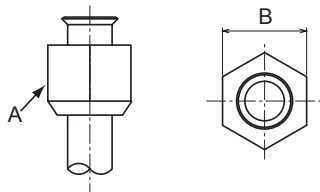
Diameters (mm)	A* ⁰ _{-0.4} (mm)
ø6.35	9.1
ø9.53	13.2
ø12.7	16.6
ø15.88	19.7
ø19.05	— (1)

(1) Not possible to perform the widening using pipe. In this case, use a connection with flare fitting.

Selection of the connection with flare fitting

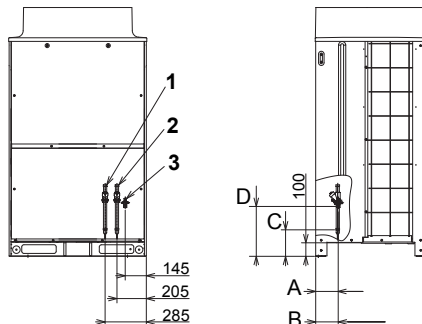
It is not possible to perform the widening operation, if copper is used in pipes. In this case, use a connection with flare fitting.

Minimum thickness of the connection	
Diameters (mm)	R410A
ø6.35	0.5
ø9.53	0.6
ø12.7	0.7
ø15.88	0.8
ø19.05	0.8
ø22.2	0.9
ø25.4	0.95
ø28.6	1.0
ø31.75	1.1
ø38.1	1.35
ø43.3	1.45
ø44.5	1.55



Distance between sides -B- of the nut -A-	
Diameters (mm)	-B-
ø6.35	17
ø9.53	22
ø12.7	26
ø15.88	29
ø19.05	36

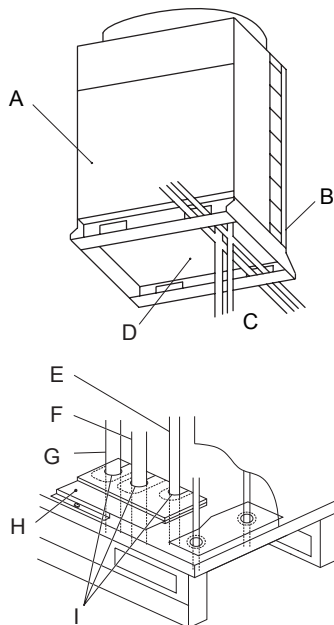
◆ Connection of pipes from the installation to the outdoor unit



1. Gas connection (low pressure) (only for heat recovery systems, with CH units).
2. Gas connection (high pressure)
3. Liquid connection.

Outdoor unit	A	B	C	D
RAS-(8-12)FSXN	155	155	185	345
RAS-(14-18)FSXN	170	175	180	325

◆ Connection position of outdoor unit pipes



Fit and secure refrigerant pipes correctly to prevent vibrations and strain on the stop valves.

The pipes may be fitted in three directions (front, rear or inferior) from the base of the unit.

Remove the cover of the gas and liquid pipes -H- and connect using the accessories factory-supplied with the unit: [Accessories factory-supplied with the unit](#), see on page 25.

8 Piping work and refrigerant charge

Fit the cover on the pipes and completely seal around them and the cover to prevent the entrance of water, rodents and dirt.

- A. Front
- B. Rear
- C. Lower side
- D. Base.

- E. Liquid pipe.
- F. Gas pipe (high pressure)
- G. Gas pipe (low pressure) (only for heat recovery systems, with CH units).
- H. Cover of refrigerant gas and liquid pipes.
- I. Cover insulation.

◆ Accessories factory-supplied with the unit

Accessory		Application					
		RAS-8FSXN	RAS-10FSXN	RAS-12FSXN	RAS-14FSXN	RAS-16FSXN	RAS-18FSXN
Accessory for pipes: connection for refrigerant pipe (high pressure) ⁽¹⁾		ø22.2~ø15.88	ø22.2~ø19.05	—	ø25.4~ø22.2	ø25.4~ø22.2	ø25.4~ø22.2
Accessory for pipes: connection for refrigerant pipe (high/low pressure)		ø22.2~ø19.05	—	ø22.2~ø25.4	—	ø25.4~ø28.6	ø25.4~ø28.6
Accessory for pipes: connection for refrigerant pipe (high/low pressure)		—	—	ø9.53~ø12.7	—	—	ø12.7~ø15.88
Power wiring clamp		(x1)					
Tie		(x3)					
Bushing for power wiring feed through		(x2)					
Bushing for communication wiring feed through		(x2)					
Bolt (spare)		(x3)					
Unit combination model label		(x1)					

⁽¹⁾ only for heat recovery systems.

NOTE

Please contact your HITACHI distributor if any of the accessories has not been supplied with the unit.

8.1.3 Pipe connection kit

◆ SET FREE FSXN (two pipes)

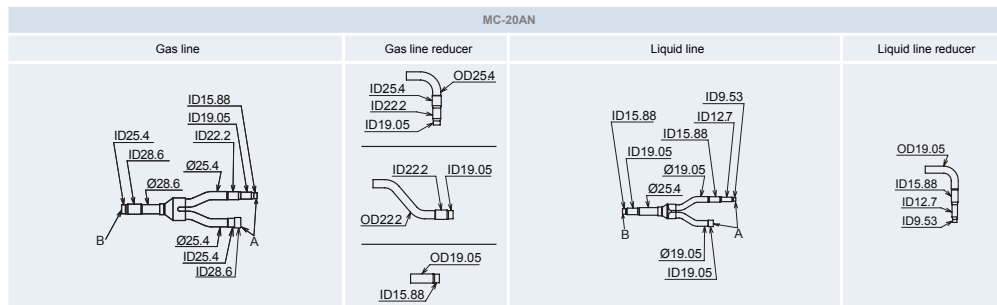
Key:

ID: inner diameter.
OD: outer diameter.

Quantity: 1.
All measurements are in mm.

A: towards the outdoor unit.
B: towards the indoor unit.

C: towards connection kit 1.
D: towards connection kit 2.



8 Piping work and refrigerant charge

MC-21AN

Gas line	Gas line reducer	Liquid line	Liquid line reducer
Diagram showing gas line connection for MC-21AN. It includes a main horizontal pipe with a branch. Labels include ID31.75, ID38.1, ID25.4, ID28.6, ID31.75, ID34.9, and Ø31.75. Arrows indicate flow from B to A.	Diagram showing gas line reducer for MC-21AN. It includes a vertical pipe with a horizontal branch. Labels include OD38.1, ID41.3, ID31.75, ID28.6, ID25.4, and OD31.75.	Diagram showing liquid line connection for MC-21AN. It includes a main horizontal pipe with a branch. Labels include ID15.88, ID9.53, ID12.7, ID19.05, ID25.4, and Ø19.05. Arrows indicate flow from B to A.	Diagram showing liquid line reducer for MC-21AN. It includes a vertical pipe with a horizontal branch. Labels include OD19.05, ID15.88, ID12.7, and ID9.53.

MC-30AN Connection kit 1

Gas line	Gas line reducer	Liquid line	Liquid line reducer
Diagram showing gas line connection for MC-30AN Connection kit 1. It includes a main horizontal pipe with a branch. Labels include ID31.75, ID25.4, ID28.6, ID31.75, ID38.1, ID34.9, and Ø31.75. Arrows indicate flow from B to A.	Diagram showing gas line reducer for MC-30AN Connection kit 1. It includes a vertical pipe with a horizontal branch. Labels include OD31.75, ID31.75, ID28.6, ID25.4, ID31.75, ID28.6, OD31.75, OD38.1, ID41.3, and ID34.9.	Diagram showing liquid line connection for MC-30AN Connection kit 1. It includes a main horizontal pipe with a branch. Labels include ID15.88, ID9.53, ID12.7, ID15.88, ID19.05, ID25.4, and Ø19.05. Arrows indicate flow from B to A.	Diagram showing liquid line reducer for MC-30AN Connection kit 1. It includes a vertical pipe with a horizontal branch. Labels include OD19.05, ID15.88, ID12.7, and ID9.53.

MC-30AN Connection kit 2

Gas line	Gas line reducer	Liquid line	Liquid line reducer
Diagram showing gas line connection for MC-30AN Connection kit 2. It includes a main horizontal pipe with a branch. Labels include ID31.75, ID25.4, ID28.6, ID31.75, ID38.1, ID34.9, and Ø31.75. Arrows indicate flow from B to A.	Diagram showing gas line reducer for MC-30AN Connection kit 2. It includes a vertical pipe with a horizontal branch. Labels include OD31.75, ID31.75, ID28.6, ID25.4, ID25.4, ID28.6, OD31.75, and ID28.6.	Diagram showing liquid line connection for MC-30AN Connection kit 2. It includes a main horizontal pipe with a branch. Labels include ID15.88, ID9.53, ID12.7, ID15.88, ID19.05, ID25.4, and Ø19.05. Arrows indicate flow from B to A.	Diagram showing liquid line reducer for MC-30AN Connection kit 2. It includes a vertical pipe with a horizontal branch. Labels include OD19.05, ID15.88, ID12.7, ID9.53, OD15.88, and ID19.05.

◆ SET FREE FSXN (three pipes)

Key:

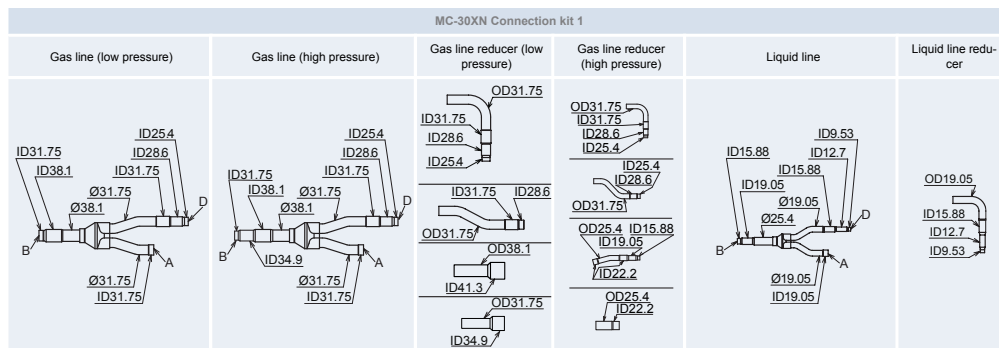
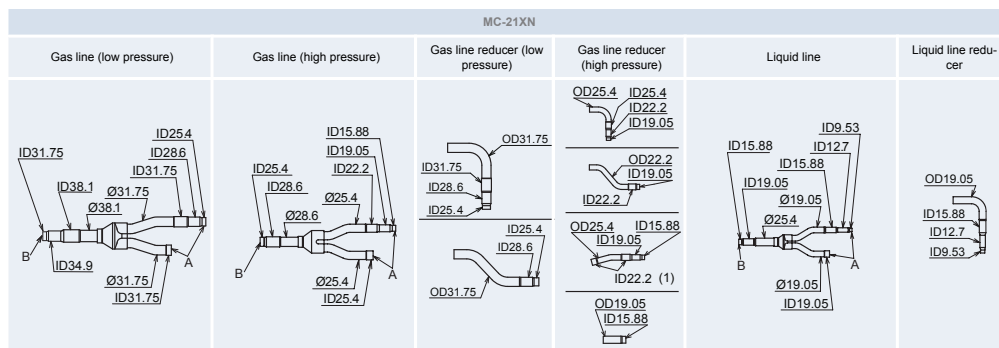
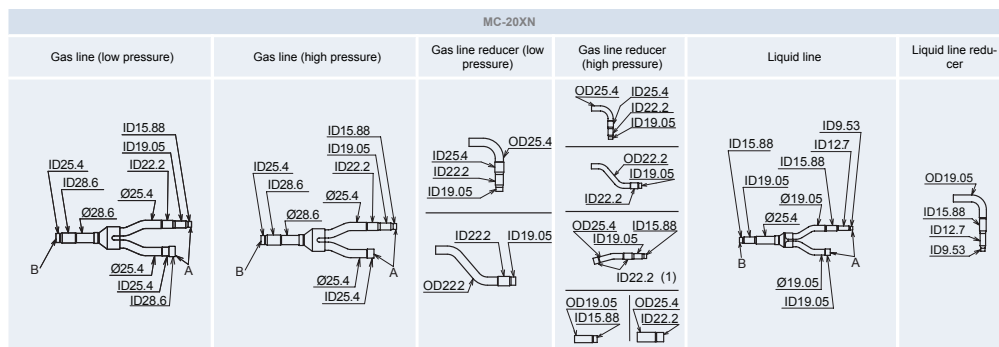
ID: inner diameter.
OD: outer diameter.

Quantity: 1. (1): quantity 2.
All measurements are in mm.

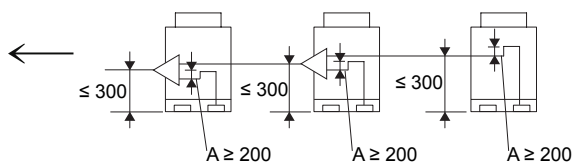
A: towards the outdoor unit.
B: towards the indoor unit.

C: towards connection kit 1.
D: towards connection kit 2.

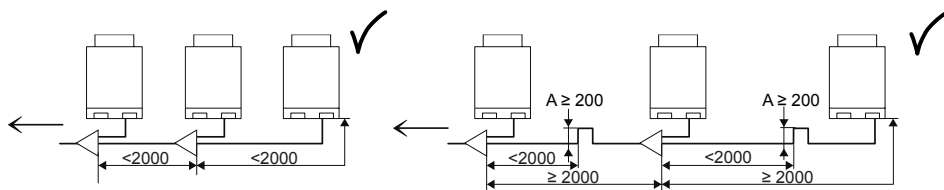
8 Piping work and refrigerant charge



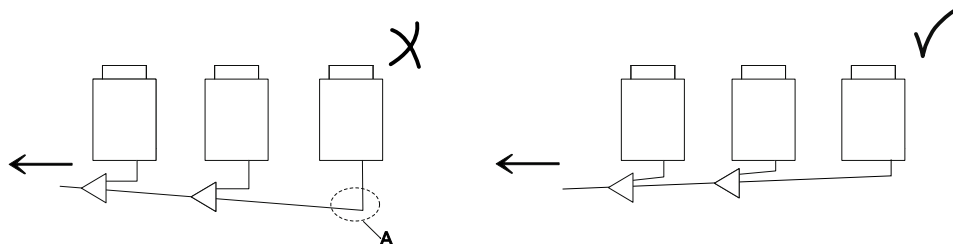
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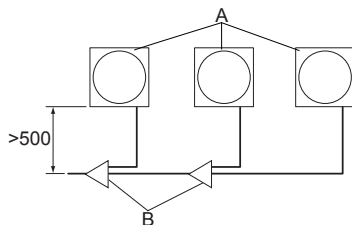
If the connection kit is placed above the refrigerant pipe connection of the outdoor unit, keep a maximum of 300 mm between the connection kit and the base of the outdoor unit. In addition, an oil recovery unit -A- (minimum 200 mm) should be fitted between the connection kit and the outdoor unit.



If the length of the refrigerant gas and liquid pipes between outdoor units is greater than two metres, the oil recovery unit should be fitted on the gas pipe to prevent the build-up of refrigerant oil.



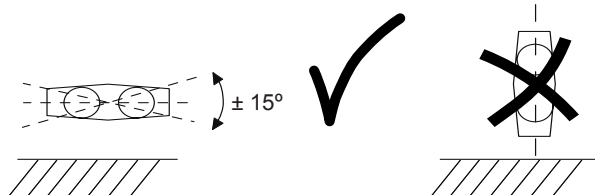
Place the refrigerant pipes of the outdoor units horizontally, or slightly tilted towards the side of the indoor units to prevent the build-up of refrigerant oil at the lowest point -A-.



If the refrigerant pipes are opposite the outdoor unit, there should be a minimum of 500 mm between the outdoor units and the connection kits -B- for maintenance operations.


NOTE

The 500 mm space is required when replacing the unit compressor.



Install the connection kits parallel to the floor ($\pm 15^\circ$).

8.1.5 General instructions on the installation of refrigerant pipes

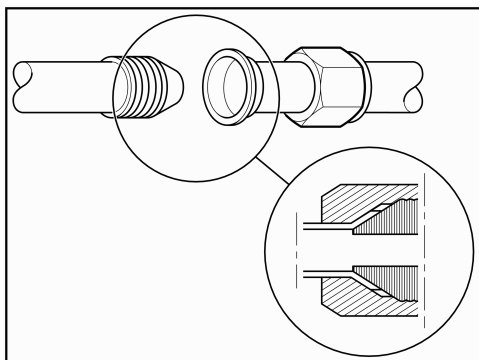
The copper pipe used for the installation must be specific for refrigeration systems: *Copper pipes and sizes*, see on page 21.

The diameter of the refrigerant pipes depends directly on the power of the outdoor unit. The pipe diameter allocated must be respected, in line with the instructions given in Chapter *Pipe size selection*, see on page 21.

The units must be located and the gas pipes laid, particularly when the outdoor unit is at a different height to the indoor unit, in line with the instructions given in chapter *Precautions for the installation of the outdoor unit*, see on page 28.

System performance depends on the distance between the outdoor and indoor unit. This aspect must be taken into account for the installation of the refrigerant pipe. The outdoor units are factory-charged with sufficient refrigerant for a standard installation of certain characteristics. Where the system installation requirements involve an increase in the distance between the outdoor and indoor unit, refrigerant must be added to the installation in line with the instructions given in Chapter *Refrigerant charge*, see on page 50.

◆ Flared connection mounting



Apply a thin layer of oil to the cone opening for refrigeration systems. Line up the end of the flared pipe to face the fitting to which it is to be threaded.

Gently rest the female cone on the male cone and check that the measurement is correct. Keep the connection lined up with one hand and gently thread on the flare nut with the other.

Tighten the connection to the corresponding tightening torque indicated in the table below.

Nominal diameter		Tightening torque
mm	Inches	
6.35	1/4	20 Nm
9.53	3/8	40 Nm
12.7	1/2	60 Nm
15.88	5/8	80 Nm
19.05	3/4	100 Nm
22.2	7/8	—
25.4	1	—
28.6	1-1/8	—

⚠ CAUTION

- **Secure the fixed connection with a suitable wrench and use a torque wrench to tighten the flare nut on the threaded connections.**
- **Do not exceed the torque value indicated in the table. The fitting can become misshapen and the connection may leak.**

◆ Refrigerant pipe insulation

The refrigerant circulates through the pipes at a very low temperature (several degrees below zero, depending on the time of year and the installation). The difference in temperature with the ambient air is extremely large and causes two significant phenomena to be taken into account:

- Cold irradiation along the entire pipe.
- Condensation of the humidity in the surrounding air.

Actually, cold irradiation is the temperature gain experienced by the gas, as when it circulates under pressure and at such low temperatures along the inside of the pipes, it is actually liquid and obtains the outdoor temperature (boiling at a very low temperature) to turn into gas.

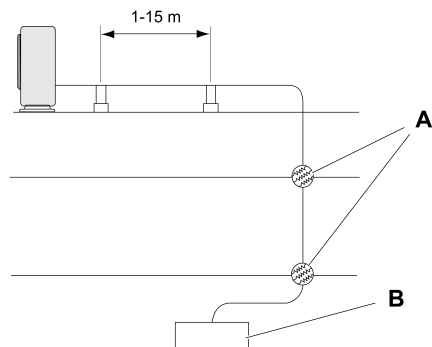
As a result of the temperature gain (although it is actually perceived as cold emission), it loses its capacity to cool and the system does not perform as expected. Furthermore, the humidity in the surrounding air condenses on the pipe and the greater the temperature difference and the longer the pipe, the more water is produced.

In view of this, the refrigerant pipes must be fitted with a suitable insulation system that prevents the increase in temperature of the refrigerant and the subsequent loss of energy and the condensation of water along the entire pipe.

Refrigerant pipes must always be separately insulated, using closed cell insulation foam designed especially for refrigeration. This insulation foam, supplied by the installer, can be obtained in different formats. The most common is in the form of sheets and rolls of tubes of different diameters. Furthermore, all connections between the different sections of insulation tubes must be reinforced with adhesive tape of the same characteristics. Once all of the unit installation and adjustment work is complete, all threaded joints and valves must also be covered with adhesive tape.

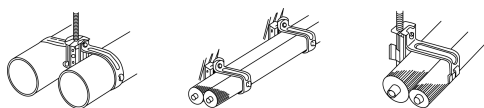
8 Piping work and refrigerant charge

◆ Refrigerant pipe suspension



Only suspend the refrigerant pipes at specific points of the building. Whenever possible, avoid suspending them from parts subject to structural movement, e.g. places close to expansion joints or outer walls, etc. Prevent the refrigerant pipes from touching weak parts of the building, such as walls (non-structural), partition walls, ceilings, etc. Otherwise, operating noise may be caused by pipe vibrations (pay special attention in the case of short pipes).

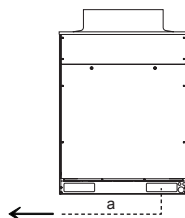
A: points where the refrigerant pipes pass through the different structural parts of the building.
B: indoor unit.



Use suitable suspension systems for refrigeration pipes or clamps to suspend the pipes, as shown in the diagram.

8.1.6 Refrigerant pipe connection for heat pump systems (2 pipes)

◆ Pipe sizes for RAS-(8-18)FSXN (Base unit)



All measurements are in mm.

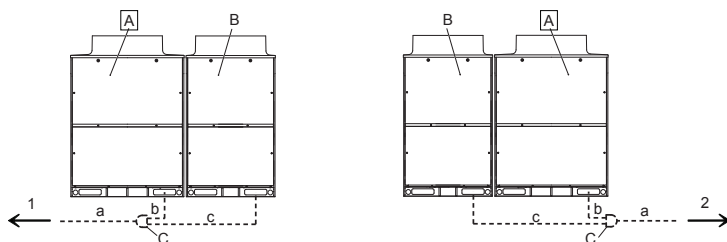
Model		RAS-8 FSXN	RAS-10 FSXN	RAS-12 FSXN	RAS-14 FSXN	RAS-16 FSXN	RAS-18 FSXN
a	Gas	19.05	22.2	25.4	25.4	28.6	28.6
	Liquid	9.53	9.53	12.7	12.7	12.7	15.88

If the main refrigerant pipe specified in the table is not available at the installation location, select the size given in brackets. In this case, prepare a suitable reducer.

Main pipe	Alternative pipe and reducer	Main pipe	Alternative pipe and reducer
9.53	(9.53-12.7)	22.2	(22.2-25.4)
12.7	(12.7-15.88)	25.4	(25.4-28.6)
15.88	(15.88-19.05)	28.6	(28.6-31.75)
19.05	(19.05-22.2)	—	—

8 Piping work and refrigerant charge

◆ Pipe sizes for RAS-(20-36)FSXN (Combination of two units)



A: main outdoor unit; B: secondary outdoor unit; C: connection kit; 1: indoor units on left side; 2: indoor units on right side.

Install the outdoor units and connect the refrigerant pipes as shown in the diagram. Please refer to the table to determine the appropriate connection kit and the diameter of the pipes for each unit

All measurements are in mm.

Combination of base units

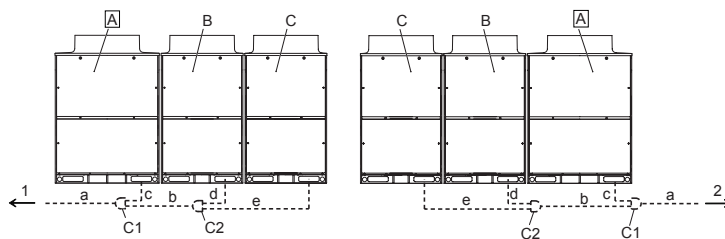
Model		RAS-20 FSXN	RAS-22 FSXN	RAS-24 FSXN	RAS-26 FSXN	RAS-28 FSXN	RAS-30 FSXN	RAS-32 FSXN	RAS-34 FSXN	RAS-36 FSXN
Unit A		RAS-12 FSXN	RAS-14 FSXN	RAS-14 FSXN	RAS-14 FSXN	RAS-14 FSXN	RAS-16 FSXN	RAS-16 FSXN	RAS-18 FSXN	RAS-18 FSXN
Unit B		RAS-8 FSXN	RAS-8 FSXN	RAS-10 FSXN	RAS-12 FSXN	RAS-14 FSXN	RAS-14 FSXN	RAS-16 FSXN	RAS-16 FSXN	RAS-18 FSXN
Connection kit		MC-20AN				MC-21AN				
a	Gas	28.6	28.6	28.6	31.75	31.75	31.75	31.75	31.75	38.1
	Liquid	15.88	15.88	15.88	19.05	19.05	19.05	19.05	19.05	19.05
b	Gas	25.4	25.4	25.4	25.4	25.4	28.6	28.6	28.6	28.6
	Liquid	12.7	12.7	12.7	12.7	12.7	12.7	12.7	15.88	15.88
c	Gas	19.05	19.05	22.2	25.4	25.4	25.4	28.6	28.6	28.6
	Liquid	9.53	9.53	9.53	12.7	12.7	12.7	12.7	12.7	15.88

If the main refrigerant pipe specified in the table is not available at the installation location, select the size given in brackets. In this case, prepare a suitable reducer.

Main pipe	Alternative pipe and reducer	Main pipe	Alternative pipe and reducer
9.53	(9.53-12.7)	25.4	(25.4-28.6)
12.7	(12.7-15.88)	28.6	(28.6-31.75)
15.88	(15.88-19.05)	31.75	(31.75-34.9)
19.05	(19.05-22.2)	38.1	(38.1-41.3)
22.2	(22.2-25.4)	—	—

8 Piping work and refrigerant charge

◆ Pipe sizes for RAS-(38-54)FSXN (Combination of three units)



A: main outdoor unit; B: secondary outdoor unit; C: secondary outdoor unit; C1: connection kit 1; C2: connection kit 2; 1: indoor units on left side; 2: indoor units on right side.

Install the outdoor units and connect the refrigerant pipes as shown in the diagram. Please refer to the table to determine the appropriate connection kit and the diameter of the pipes for each unit.

All measurements are in mm.

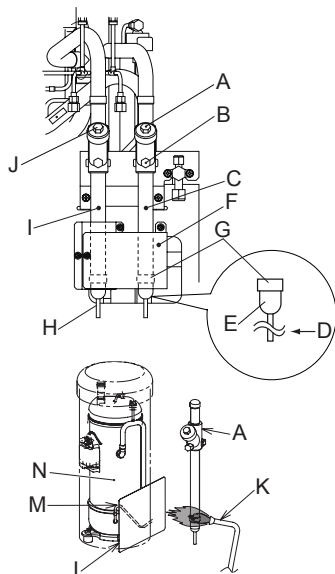
Combination of base units

Model	RAS-38 FSXN	RAS-40 FSXN	RAS-42 FSXN	RAS-44 FSXN	RAS-46 FSXN	RAS-48 FSXN	RAS-50 FSXN	RAS-52 FSXN	RAS-54 FSXN
Unit A	RAS-14 FSXN	RAS-16 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN
Unit B	RAS-12 FSXN	RAS-12 FSXN	RAS-12 FSXN	RAS-14 FSXN	RAS-16 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN
Unit C	RAS-12 FSXN	RAS-12 FSXN	RAS-12 FSXN	RAS-12 FSXN	RAS-12 FSXN	RAS-12 FSXN	RAS-14 FSXN	RAS-16 FSXN	RAS-18 FSXN
Connection kit		MC-30AN							
a	Gas	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
	Liquid	19.05	19.05	19.05	19.05	19.05	19.05	19.05	19.05
b	Gas	28.6	28.6	28.6	31.75	31.75	31.75	31.75	31.75
	Liquid	15.88	15.88	15.88	19.05	19.05	19.05	19.05	19.05
c	Gas	25.4	28.6	28.6	28.6	28.6	28.6	28.6	28.6
	Liquid	12.7	12.7	15.88	15.88	15.88	15.88	15.88	15.88
d	Gas	25.4	25.4	25.4	25.4	28.6	28.6	28.6	28.6
	Liquid	12.7	12.7	12.7	12.7	12.7	15.88	15.88	15.88
e	Gas	25.4	25.4	25.4	25.4	25.4	25.4	28.6	28.6
	Liquid	12.7	12.7	12.7	12.7	12.7	12.7	12.7	15.88

If the main refrigerant pipe specified in the table is not available at the installation location, select the size given in brackets. In this case, prepare a suitable reducer.

Main pipe	Alternative pipe and reducer	Main pipe	Alternative pipe and reducer
9.53	(9.53-12.7)	25.4	(25.4-28.6)
12.7	(12.7-15.88)	28.6	(28.6-31.75)
15.88	(15.88-19.05)	31.75	(31.75-34.9)
19.05	(19.05-22.2)	38.1	(38.1-41.3)
22.2	(22.2-25.4)	—	—

◆ Gas stop valve



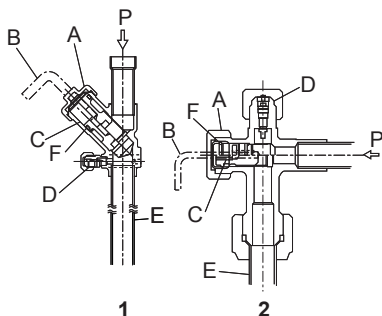
Make sure that valves -A- and -J- (not used) are completely closed.
Connect the charge pipe to the stop valve -B- and release gas from the gas pipe -C-.
Remove the cover -F- from the stop valve.
Cut off the end -D- of the stop pipe -E- (ø6.35) and check that there is no gas in the pipe -C-. Do not cut the end -H- of the stop pipe (ø6.35) -I- to prevent leaks of refrigerant. If the end of the stop pipe is cut, close it completely.

⚠ DANGER

Check that there is no gas inside the pipe before removing the stop pipe. Otherwise, the pipe may explode when heated with the blow torch.

Remove the stop pipe at the welded section -G- using a blow torch -K-. Special care should be taken to ensure that the flame from the blow torch does not fall on the body of the stop valve -A-, on the compressor -N- and cover or on the insulation bushings by inserting a metal plate -L- in front of the oil return pipe -M-.

◆ Details of the gas and liquid stop valves



1. Gas valve.
2. Liquid valve.
- A. Plug.

Tightening torque	
Gas	50–58 Nm
Liquid	30–42 Nm

- B. Hexagonal wrench. To open or close the valve.
- C. Valve. Turn to the left: open; turn to the right: close.

Tightening torque	
Gas, 8–12 HP	18–22 Nm
Gas, 14–18 HP	20–25 Nm
Liquid	7–9 Nm

- D. Check joint. Only a flexible charge pipe may be connected.

Tightening torque	
Gas	9–14 Nm
Liquid	14–18 Nm

- E. Refrigerant gas/liquid pipe.
- F. O-ring.
- P. Refrigerant gas/liquid pressure.

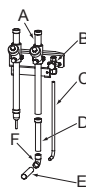
⚠ CAUTION

- Do not force the valve open buffer; this could damage the seat of the valve. A spare valve seat is not supplied.
- When performing the start-up test, open valve to the full. Otherwise, the system may be damaged.

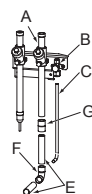
8 Piping work and refrigerant charge

◆ Refrigerant pipe connection

RAS-8FSXN



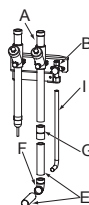
RAS-10FSXN



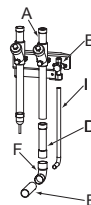
RAS-12FSXN



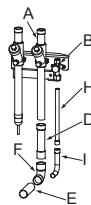
RAS-14FSXN



RAS-16FSXN



RAS-18FSXN



- A. Stop valve (gas, high pressure).
- B. Stop valve (liquid).
- C. Liquid pipe (field-supplied).
- D. Pipe accessory.
- E. Gas pipe, high pressure (field-supplied).

- F. L-bend (field-supplied)
- G. Adapter (field-supplied).
- H. Accessory pipe.
- I. Liquid pipe (field-supplied).

⚠ DANGER

- Check that the gas and liquid stop valves are fully closed.
- Check that there is no gas inside the pipe before removing the stop pipe. Otherwise, the pipe may explode when heated with the blow torch.

Special care should be taken to ensure that the flame from the blow torch does not fall on the body of the stop valve, on the compressor and cover or on the insulation bushings; insert a metal plate in front of the oil return pipe: [Gas stop valve](#), see on page 34.

Connect the indoor units to the outdoor units using copper pipes specifically for use with refrigerant. When laying the pipes make sure that they do not directly rest on or touch walls or other parts of the building (when the refrigerant is flowing through the pipes, this could cause strange noises).

Specific torques for the flared connections: [Flared connection mounting](#), see on page 30.

While welding, apply a flow of nitrogen gas inside the pipe.

Fully insulate the refrigerant pipes.

⚠ CAUTION

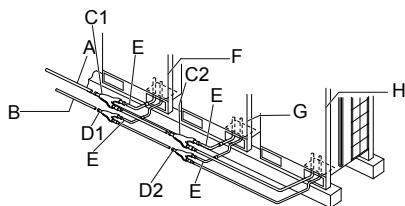
Fit the pipe protection provided with the outdoor unit on completion of the installation work. Otherwise, the unit may be damaged by the entrance of snow, water or rodents.

◆ Pipe connection kit (optional)

No.	Mode	Application in outdoor units		Model	Notes
		Outdoor unit	No. of outdoor units		
Pipe connection kit	Heat pump system	RAS-(20-24)FSXN	2	MC-20AN	For two pipes: • Gas: 1 part. • Liquid: 1 part.
		RAS-(26-36)FSXN	2	MC-21AN	
		RAS-(38-54)FSXN	3	MC-30AN	

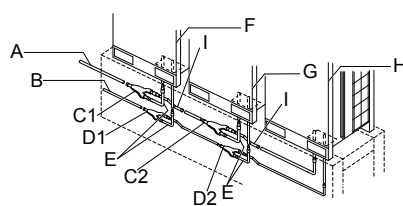
◆ Example of installation (38 HP: 2 pipes)

Connection of front or rear pipes



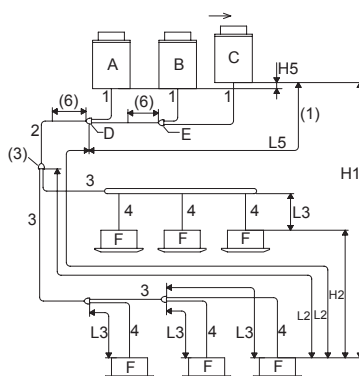
- A. Gas pipe (field-supplied).
- B. Liquid pipe (field-supplied).
- C1. Gas connection kit 1.
- C2. Gas connection kit 2.
- D1. Liquid connection kit 1.
- D2. Liquid connection kit 2.

Lower pipe connection



- E. Accessory for connection of pipes (L-shaped).
- F. Outdoor unit 1.
- G. Outdoor unit 2.
- H. Outdoor unit 3.
- I. Accessory for connection of pipes (Z-shaped).

◆ Size of pipes (ø mm) and selection of multikit (2 pipes)



A: main outdoor unit

B, C: secondary outdoor units

D: connection kit 1

E: connection kit 2

F: indoor units

Size of pipes

1. Pipe diameter for the outdoor unit.

2. Diameter of the main pipe (from the base unit or connection kit 1 to the first branch)⁽²⁾.

HP outdoor unit	Equivalent pipe length < 100 m		HP outdoor unit	Equivalent pipe length < 100 m	
	Gas	Liquid		Gas	Liquid
8	19.05	9.53	(18-24)	28.6	15.88
10	22.2	9.53	(26-34)	31.75	19.05
(12/14)	25.4	12.7	(36-54)	38.1	19.05
16	28.6	12.7	—	—	—

8 Piping work and refrigerant charge

3. Pipe diameter after first branch⁽³⁾.

Total HP indoor unit	Gas	Liquid	Total HP indoor unit	Gas	Liquid
< 6	15.88	9.53	(16-17.99)	28.6	12.7
(6-8.99)	19.05	9.53	(18-25.99)	28.6	15.88
(9-11.99)	22.2	9.53	(26-35.99)	31.75	19.05
(12-15.99)	25.4	12.7	> 36	38.1	19.05

4. Pipe diameter between multikit and indoor unit⁽⁴⁾.

HP indoor unit	Gas	Liquid	HP indoor unit	Gas	Liquid
(0.8-1.5)	12.7	6.35 ⁽⁵⁾	8.0	19.05	9.53
2.0	15.88	6.35 ⁽⁵⁾	10.0	22.2	9.53
(2.5-5.0)	15.88	9.53	—	—	—

Pipe working conditions

Part		Make	Permitted pipe length ⁽⁷⁾	
			≤ Recommended number of connected indoor units	≥ Recommended number of connected indoor units
Total pipe length		Current total liquid pipe length	≤ 1000 m ⁽⁸⁾	≤ 300 m
Maximum pipe length	Current length	L1	≤ 165 m	≤ 165 m
	Equivalent length		≤ 190 m	≤ 190 m
Maximum pipe length between the multikit of the first branch and each indoor unit		L2	≤ 90 m	≤ 40 m
Maximum pipe length between each multikit and each indoor unit		L3	≤ 40 m	≤ 30 m
Pipe length between connection kit 1 and each outdoor unit		L5	≤ 10 m	≤ 10 m
Difference in height between outdoor and indoor units	Highest outdoor unit	H1	≤ 50 m	≤ 50 m
	Lowest outdoor unit		≤ 40 m	≤ 40 m
Difference in height between indoor units		H2	≤ 15 m	≤ 15 m
Difference in height between outdoor units		H5	≤ 0.1 m	≤ 0.1 m



NOTE

- ⁽¹⁾ The connection kit is taken into account from the side of the indoor unit (as connection kit 1).
- ⁽²⁾ When the maximum equivalent refrigerant pipe length (L1) from the outdoor unit/connection kit 1 to the indoor unit is greater than 100 m, the diameter of the gas/liquid pipe from the outdoor unit/connection kit 1 to the first branch must be increased using the reducer (field-supplied).
- ⁽³⁾ Where the refrigerant pipe length is greater than 100 m, the pipe diameter does not have to be increased after the first branch. Where the size of the multikit is greater than that of the first branch, adjust the size of the multikit to the first branch. Where the diameter of the pipe selected after the first branch is greater than the diameter of the pipe after it, use the same diameter as the inlet pipe.
- ⁽⁴⁾ The pipe diameter -4- must be the same as that of the indoor unit connection.
- ⁽⁵⁾ Where the liquid pipe length is greater than 15 m, use 9.53 mm diameter pipe and a reducer (field-supplied).
- ⁽⁶⁾ Keep a direct distance of 500 mm or greater after the connection kit.
- ⁽⁷⁾ The installation conditions for the refrigerant pipes are different depending on the number of indoor units connected.
- ⁽⁸⁾ The total pipe length permitted must be less than 1000 m due to the maximum additional refrigerant charge limitation.



NOTE

- Check that the gas pipe and the liquid pipe are equivalent in terms of length and installation system.
- Use the multikit system for branching of the indoor units and the CH unit.
- Install the indoor unit and the multikit according to the instructions given in this manual.
- Where the length of pipe L3 between each multikit and each indoor unit is considerably longer than on another indoor unit, the refrigerant will not flow correctly and performance is lower in comparison with other models (recommended pipe length: up to 15 m).

8 Piping work and refrigerant charge

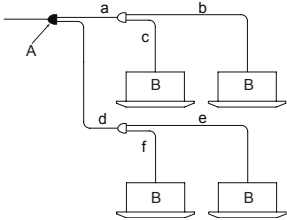
Pipe branching restrictions

Follow the instructions given in the table below for pipe installation (field-supplied).

Maximum pipe length between the multikit of the first branch and each indoor unit (L2)	Main pipe branch ⁽¹⁾		Capacity ratio of the indoor units after the main branch	Branch and distributor combination
	Pipe length after the branch	Number of main pipe branches		
≤ 40 m	a+b+c ≤ 30 m or d+e+f ≤ 30 m	No limit	—	Available (Figures 3 and 4)
	a+b+c > 30 m or d+e+f > 30 m	Up to 2		
From 41 m to 90 m	—	Up to 1 (Figure 1)	≥ 40% (Figure 2)	Not available

NOTE

⁽¹⁾ Main pipe branch: distribution from one (1) multikit to two (2) multikits.

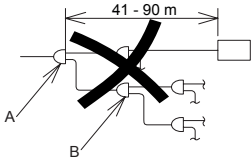


A: main branch

B: indoor units

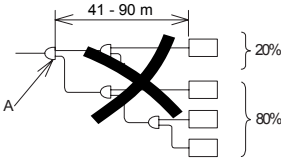
Figure 1: two branches on the main pipe

Figure 2: capacity ratio of the indoor units ≤ 40%



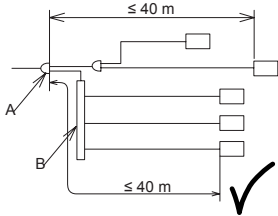
A: main branch
B: secondary branch

Figure 3: distributor used as branching for three pipes and branching for two pipes

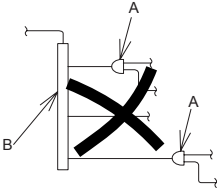


A: main branch

Figure 4: do not connect a branch to a distributor



A: branch
B: distributor

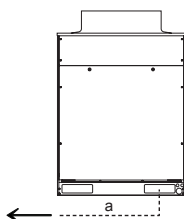


A: branch
B: distributor

8 Piping work and refrigerant charge

8.1.7 Refrigerant pipe connection for heat recovery systems (3 pipes)

◆ Pipe sizes for RAS-(8-18)FSXN (Base unit)



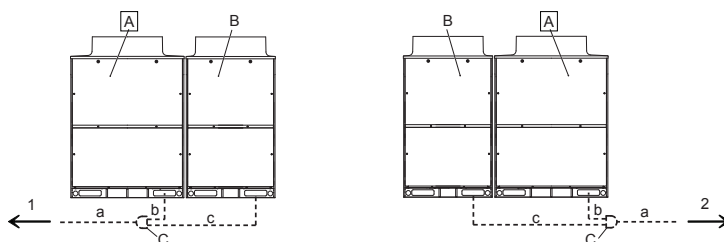
All measurements are in mm.

Model		RAS-8 FSXN	RAS-10 FSXN	RAS-12 FSXN	RAS-14 FSXN	RAS-16 FSXN	RAS-18 FSXN
a	Gas (low pressure)	19.05	22.2	25.4	25.4	28.6	28.6
	Gas (high pressure)	15.88	19.05	22.2	22.2	22.2	22.2
	Liquid	9.53	9.53	12.7	12.7	12.7	15.88

If the main refrigerant pipe specified in the table is not available at the installation location, select the size given in brackets. In this case, prepare a suitable reducer.

Main pipe	Alternative pipe and reducer	Main pipe	Alternative pipe and reducer
9.53	(9.53-12.7)	22.2	(22.2-25.4)
12.7	(12.7-15.88)	25.4	(25.4-28.6)
15.88	(15.88-19.05)	28.6	(28.6-31.75)
19.05	(19.05-22.2)	—	—

◆ Pipe sizes for RAS-(20-36)FSXN (Combination of two units)



A: main outdoor unit; B: secondary outdoor unit; C: connection kit; 1: indoor units on left side; 2: indoor units on right side.

Install the outdoor units and connect the refrigerant pipes as shown in the diagram. Please refer to the table to determine the appropriate connection kit and the diameter of the pipes for each unit

All measurements are in mm.

8 Piping work and refrigerant charge

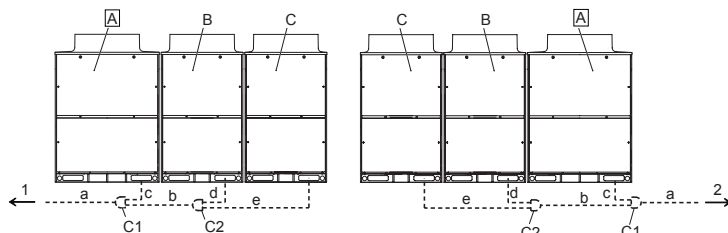
Combination of base units

Model	RAS-20 FSXN	RAS-22 FSXN	RAS-24 FSXN	RAS-26 FSXN	RAS-28 FSXN	RAS-30 FSXN	RAS-32 FSXN	RAS-34 FSXN	RAS-36 FSXN
Unit A	RAS-12 FSXN	RAS-14 FSXN	RAS-14 FSXN	RAS-14 FSXN	RAS-14 FSXN	RAS-16 FSXN	RAS-16 FSXN	RAS-18 FSXN	RAS-18 FSXN
Unit B	RAS-8 FSXN	RAS-8 FSXN	RAS-10 FSXN	RAS-12 FSXN	RAS-14 FSXN	RAS-14 FSXN	RAS-16 FSXN	RAS-16 FSXN	RAS-18 FSXN
Connection kit	MC-20XN			MC-21XN					
a	Gas (low pressure)	28.6	28.6	28.6	31.75	31.75	31.75	31.75	31.75
	Gas (high pressure)	22.2	25.4	25.4	25.4	28.6	28.6	28.6	28.6
	Liquid	15.88	15.88	15.88	19.05	19.05	19.05	19.05	19.05
b	Gas (low pressure)	25.4	25.4	25.4	25.4	25.4	28.6	28.6	28.6
	Gas (high pressure)	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2
	Liquid	12.7	12.7	12.7	12.7	12.7	12.7	15.88	15.88
c	Gas (low pressure)	19.05	19.05	22.2	25.4	25.4	25.4	28.6	28.6
	Gas (high pressure)	15.88	15.88	19.05	22.2	22.2	22.2	22.2	22.2
	Liquid	9.53	9.53	9.53	12.7	12.7	12.7	12.7	15.88

If the main refrigerant pipe specified in the table is not available at the installation location, select the size given in brackets. In this case, prepare a suitable reducer.

Main pipe	Alternative pipe and reducer	Main pipe	Alternative pipe and reducer
9.53	(9.53-12.7)	22.2	(22.2-25.4)
12.7	(12.7-15.88)	25.4	(25.4-28.6)
15.88	(15.88-19.05)	28.6	(28.6-31.75)
19.05	(19.05-22.2)	31.75	(31.75-34.9)

◆ Pipe sizes for RAS-(38-54)FSXN (Combination of three units)



A: main outdoor unit; B: secondary outdoor unit; C: secondary outdoor unit; C1: connection kit 1; C2: connection kit 2; 1: indoor units on left side; 2: indoor units on right side.

Install the outdoor units and connect the refrigerant pipes as shown in the diagram. Please refer to the table to determine the appropriate connection kit and the diameter of the pipes for each unit.

All measurements are in mm.

8 Piping work and refrigerant charge

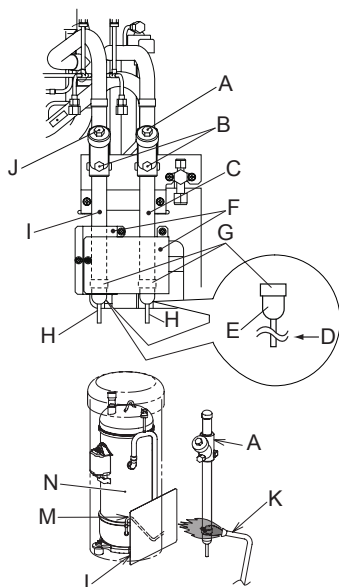
Combination of base units

Model	RAS-38 FSXN	RAS-40 FSXN	RAS-42 FSXN	RAS-44 FSXN	RAS-46 FSXN	RAS-48 FSXN	RAS-50 FSXN	RAS-52 FSXN	RAS-54 FSXN
Unit A	RAS-14 FSXN	RAS-16 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN
Unit B	RAS-12 FSXN	RAS-12 FSXN	RAS-12 FSXN	RAS-14 FSXN	RAS-16 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN	RAS-18 FSXN
Unit C	RAS-12 FSXN	RAS-12 FSXN	RAS-12 FSXN	RAS-12 FSXN	RAS-12 FSXN	RAS-12 FSXN	RAS-14 FSXN	RAS-16 FSXN	RAS-18 FSXN
Connection kit	MC-30XN								
a	Gas (low pressure)	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
	Gas (high pressure)	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75
	Liquid	19.05	19.05	19.05	19.05	19.05	19.05	19.05	19.05
b	Gas (low pressure)	28.6	28.6	28.6	31.75	31.75	31.75	31.75	31.75
	Gas (high pressure)	25.4	25.4	25.4	28.6	28.6	28.6	28.6	28.6
	Liquid	15.88	15.88	15.88	19.05	19.05	19.05	19.05	19.05
c	Gas (low pressure)	25.4	28.6	28.6	28.6	28.6	28.6	28.6	28.6
	Gas (high pressure)	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2
	Liquid	12.7	12.7	15.88	15.88	15.88	15.88	15.88	15.88
d	Gas (low pressure)	25.4	25.4	25.4	25.4	28.6	28.6	28.6	28.6
	Gas (high pressure)	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2
	Liquid	12.7	12.7	12.7	12.7	12.7	15.88	15.88	15.88
e	Gas (low pressure)	25.4	25.4	25.4	25.4	25.4	25.4	28.6	28.6
	Gas (high pressure)	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2
	Liquid	12.7	12.7	12.7	12.7	12.7	12.7	12.7	15.88

If the main refrigerant pipe specified in the table is not available at the installation location, select the size given in brackets. In this case, prepare a suitable reducer.

Main pipe	Alternative pipe and reducer	Main pipe	Alternative pipe and reducer
9.53	(9.53-12.7)	25.4	(25.4-28.6)
12.7	(12.7-15.88)	28.6	(28.6-31.75)
15.88	(15.88-19.05)	31.75	(31.75-34.9)
19.05	(19.05-22.2)	38.1	(38.1-41.3)
22.2	(22.2-25.4)	—	—

◆ Gas stop valve



Check that the high pressure valves -A- and low pressure valves -J- are completely closed.

Connect the charge pipe to the stop valves -B- and release gas from the high pressure pipe -C- and low pressure pipe -I-.

Cut off the end -D- of the stop pipe -E- ($\phi 6.35$) and check that there is no gas in the high and low pressure gas pipe.

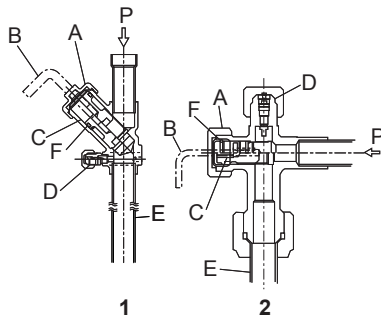
Remove the covers -F- from the stop valve.

⚠ DANGER

Check that there is no gas inside the pipe before removing the stop pipe. Otherwise, the pipe may explode when heated with the blow torch.

Remove the stop pipes at the welded section -G- using a blow torch -K-. Special care should be taken to ensure that the flame from the blow torch does not fall on the body of the stop valve -A- and -J-, on the compressor -N- and cover or on the insulation bushings by inserting a metal plate -L- in front of the oil return pipe -M-.

◆ Details of the gas and liquid stop valves



1. Gas valve.
2. Liquid valve.
- A. Plug.

Tightening torque	
Gas	50–58 Nm
Liquid	30–42 Nm

- B. Hexagonal wrench. To open or close the valve.
- C. Valve. Turn to the left: open; turn to the right: close.

Tightening torque	
Gas, 8–12 HP	18–22 Nm
Gas, 14–18 HP	20–25 Nm
Liquid	7–9 Nm

- D. Check joint. Only a flexible charge pipe may be connected.

Tightening torque	
Gas	9–14 Nm
Liquid	14–18 Nm

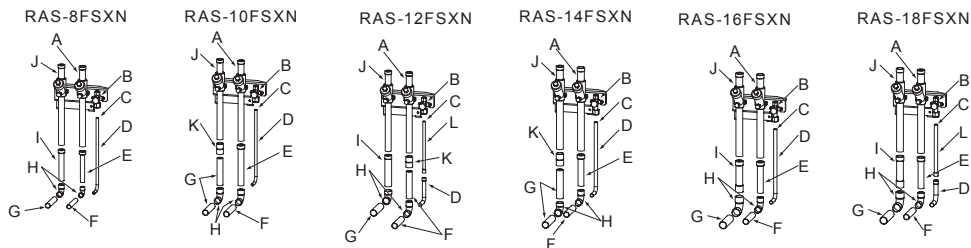
- E. Refrigerant gas/liquid pipe.
- F. O-ring.
- P. Refrigerant gas/liquid pressure.

⚠ CAUTION

- Do not force the valve open buffer; this could damage the seat of the valve. A spare valve seat is not supplied.
- When performing the start-up test, open valve to the full. Otherwise, the system may be damaged.

8 Piping work and refrigerant charge

◆ Refrigerant pipe connection



- A. Stop valve (gas, high pressure).
- B. Stop valve (liquid).
- C. Flared connection.
- D. Liquid pipe (field-supplied).
- E. Pipe accessory.
- F. Gas pipe, high pressure (field-supplied).

- G. Gas pipe, low pressure (field-supplied).
- H. L-bend (field-supplied)
- I. Pipe accessory.
- J. Stop valve (gas, low pressure).
- K. Pipe accessory.
- L. Pipe accessory.

⚠ DANGER

- Check that the gas and liquid stop valves are fully closed.
- Check that there is no gas inside the pipe before removing the stop pipe. Otherwise, the pipe may explode when heated with the blow torch.

Special care should be taken to ensure that the flame from the blow torch does not fall on the body of the stop valve, on the compressor and cover or on the insulation bushings; insert a metal plate in front of the oil return pipe: [Gas stop valve](#), see on page 34.

Connect the indoor units to the outdoor units using copper pipes specifically for use with refrigerant. When laying the pipes make sure that they do not directly rest on or touch walls or other parts of the building (when the refrigerant is flowing through the pipes, this could cause strange noises).

Specific torques for the flared connections: [Flared connection mounting](#), see on page 30.

While welding, apply a flow of nitrogen gas inside the pipe.

Fully insulate the refrigerant pipes.

⚠ CAUTION

Fit the pipe protection provided with the outdoor unit on completion of the installation work. Otherwise, the unit may be damaged by the entrance of snow, water or rodents.

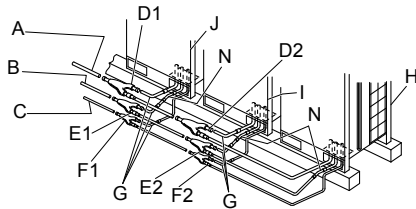
◆ Pipe connection kit (optional)

No.	Mode	Application in outdoor units		Model	Notes
		Outdoor unit	No. of outdoor units		
Pipe connection kit	Heat recovery system	RAS-(20-24)FSXN	2	MC-20XN	For three pipes: • Gas, high pressure: 1 part. • Gas, low pressure: 1 part. • Liquid: 1 part.
		RAS-(26-36)FSXN	2	MC-21XN	
		RAS-(38-54)FSXN	3	MC-30XN	

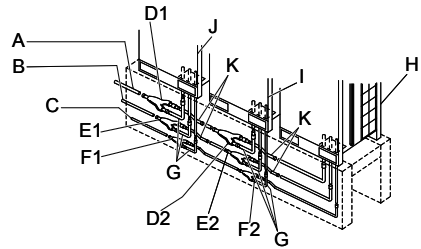
8 Piping work and refrigerant charge

◆ Example of installation (38 HP: 3 pipes)

Connection of front or rear pipes



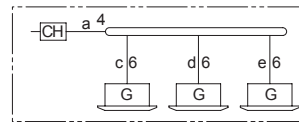
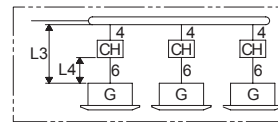
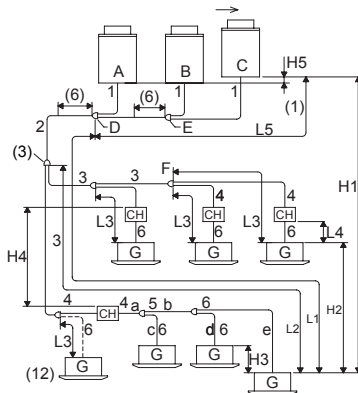
Lower pipe connection



- A. Gas pipe, low pressure (field-supplied).
- B. Gas pipe, high pressure (field-supplied).
- C. Liquid pipe (field-supplied).
- D1. Gas connection kit, low pressure 1.
- D2. Gas connection kit, low pressure 2.
- E1. Gas connection kit, high pressure 1.
- E2. Gas connection kit, high pressure 2.

- F1. Liquid connection kit 1.
- F2. Liquid connection kit 2.
- G. Accessory for connection of pipes (L-shaped).
- H. Outdoor unit 3.
- I. Outdoor unit 2.
- J. Outdoor unit 1.
- K. Accessory for connection of pipes (Z-shaped).
- N. Accessory for connection of pipes.

◆ Size of pipes (ø mm) and selection of multikit (3 pipes)



A: main outdoor unit

B, C: secondary outdoor units

D: connection kit 1

E: connection kit 2

G: indoor units

3 pipes (high and low pressure gas, liquid)

2 pipes (gas, liquid)

2 pipes (low pressure gas, liquid)

Size of pipes

1. Pipe diameter for the outdoor unit.

8 Piping work and refrigerant charge

2. Diameter of the main pipe (from the base unit or connection kit 1 to the first branch) (3 pipes)⁽²⁾.

HP outdoor unit	Gas, low pressure	Gas, high pressure	Liquid	HP outdoor unit	Gas, low pressure	Gas, high pressure	Liquid
8	19.05	15.88	9.53	(22/24)	28.6	25.4	15.88
10	22.2	19.05	9.53	26	31.75	25.4	19.05
(12/14)	25.4	22.2	12.7	(28-36)	31.75	28.6	19.05
16	28.6	22.2	12.7	(36-54)	38.1	31.75	19.05
(18/20)	28.6	22.2	15.88	—	—	—	—

3. Pipe diameter after first branch (3 pipes)⁽³⁾.

Total HP indoor unit	Gas, low pressure	Gas, high pressure	Liquid	Total HP indoor unit	Gas, low pressure	Gas, high pressure	Liquid
< 6	15.88	12.7	9.53	(18-21.99)	28.6	22.2	15.88
(6-8.99)	19.05	15.88	9.53	(22-25.99)	28.6	25.4	15.88
(9-11.99)	22.2	19.05	9.53	(26-35.99)	31.75	28.6	19.05
(12-15.99)	25.4	22.2	12.7	> 36	38.1	31.75	19.05
(16-17.99)	28.6	22.2	12.7	—	—	—	—

4. Pipe diameter between the CH unit and the multikit (3 pipes and 2 pipes)⁽⁹⁾.

CH unit	Maximum combination of indoor units ⁽⁸⁾	Capacity of indoor units	3 pipes		2 pipes	
			Gas, low pressure	Gas, high pressure	Gas	Liquid
CH-6.0N1	7	(0.8-1.5)	15.88	12.7	12.7 ⁽¹⁵⁾	9.53
		(1.6-4.0)	15.88	12.7	15.88	9.53
		(4.1-6.0)	19.05	15.88	15.88	9.53
CH-10.0N1	8	(6.1-8.0)	19.05	15.88	19.05	9.53
		(8.1-10.0)	22.2	19.05	22.2	9.53

5. Pipe diameter for 2 pipes and multikit.

Total HP indoor unit	Gas	Liquid	Total HP indoor unit	Gas	Liquid
< 6	15.88	9.53	(12-15.99)	25.4	12.7
(6-8.99)	19.05	9.53	(16-17.99)	28.6	12.7
(9-11.99)	22.2	9.53	(18-25.99)	28.6	15.88

6. Pipe diameter between multikit and indoor unit⁽⁴⁾.

HP indoor unit	Gas	Liquid	HP indoor unit	Gas	Liquid
(0.8-1.5)	12.7	6.35 ⁽⁵⁾	8.0	19.05	9.53
2.0	15.88	6.35 ⁽⁵⁾	10.0	22.2	9.53
(2.5-5.0)	15.88	9.53	—	—	—

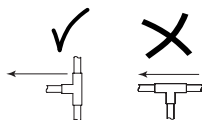
8 Piping work and refrigerant charge

Pipe working conditions

Part		Make	Permitted pipe length ⁽¹³⁾	
			≤ Recommended number of connected indoor units	≥ Recommended number of connected indoor units
Total pipe length		Current total liquid pipe length	≤ 1000 m ⁽¹⁴⁾	≤ 300 m
Maximum pipe length	Current length	L1	≤ 165 m	≤ 165 m
	Equivalent length		≤ 190 m	≤ 190 m
Maximum pipe length between the multikit of the first branch and each indoor unit		L2	≤ 90 m	≤ 40 m
Maximum pipe length between each multikit and each indoor unit		L3	≤ 40 m	≤ 30 m
Total pipe length between the CH unit and each indoor unit		L4 *a+b+c+d+e	CH-6.0N1: ≤ 30 m	CH-6.0N1: ≤ 30 m
			CH-10.0N1: ≤ 10 m	CH-10.0N1: ≤ 10 m
Pipe length between connection kit 1 and each outdoor unit		L5	≤ 10 m	≤ 10 m
Difference in height between outdoor and indoor units	Highest outdoor unit	H1	≤ 50 m	≤ 50 m
	Lowest outdoor unit		≤ 40 m	≤ 40 m
Difference in height between indoor units		H2	≤ 15 m	≤ 15 m
Difference in height between indoor units using the same CH unit		H3	≤ 4 m	≤ 4 m
Difference in height between CH units		H4	≤ 15 m	≤ 15 m
Difference in height between outdoor units		H5	≤ 0.1 m	≤ 0.1 m

NOTE

- ⁽¹⁾ The connection kit is taken into account from the side of the indoor unit (as connection kit 1).
- ⁽²⁾ When the maximum equivalent refrigerant pipe length (L1) from the outdoor unit/connection kit 1 to the indoor unit is greater than 100 m, the diameter of the liquid pipe from the outdoor unit/connection kit 1 to the first branch must be increased using the reducer (field-supplied).
- ⁽³⁾ Where the refrigerant pipe length is greater than 100 m, the pipe diameter does not have to be increased after the first branch. Where the size of the multikit is greater than that of the first branch, adjust the size of the multikit to the first branch. Where the diameter of the pipe selected after the first branch is greater than the diameter of the pipe after it, use the same diameter as the inlet pipe.
- ⁽⁴⁾ The pipe diameter -6- must be the same as that of the indoor unit connection.
- ⁽⁵⁾ Where the liquid pipe length is greater than 15 m, use 9.53 mm diameter pipe and a reducer (field-supplied).
- ⁽⁶⁾ Keep a direct distance of 500 mm or greater after the connection kit.
- ⁽⁷⁾ In the case of branches, where the pipe length between the three-pipe branch -F- and the furthest indoor unit exceeds 5 m, use a T-branch pipe for the three-branch liquid pipe (corresponding to the same diameter, as per JIS B8607).



- ⁽⁸⁾ Where the number of connectable indoor units is greater than four, the high/low-pressure gas, gas and liquid pipes, -4-, -5- and -6-, must be increased by one measurement, respectively.
- ⁽⁹⁾ The liquid pipe does not have to be connected to the CH unit. See Table 6 for the pipe diameter between the multikit and the indoor unit.
- ⁽¹⁰⁾ Where the combination of indoor unit capacities is 10 HP for the CH-10.0N1 unit, performance will drop by approximately 5% in refrigeration and 10% in heating.
- ⁽¹¹⁾ The excess total capacity may lead to insufficient performance and abnormal operating noise. Check that the installation is within the total capacity values.
- ⁽¹²⁾ For operations in refrigeration mode only, connect the indoor units using gas and liquid pipes (without the CH unit). The total capacity in refrigeration mode only must be less than 50% the total capacity of the indoor units.
- ⁽¹³⁾ The installation conditions for the refrigerant pipes are different depending on the number of indoor units connected.
- ⁽¹⁴⁾ The total pipe length permitted must be less than 1000 m due to the maximum additional refrigerant charge limitation.
- ⁽¹⁵⁾ Where the branch is after the CH unit and the capacity of the connected indoor unit is (0.8-1.5) HP, use a 15.88 mm diameter for the gas pipe.

NOTE

- Check that the gas pipe and the liquid pipe are equivalent in terms of length and installation system.
- Use the multikit system for branching of the indoor units and the CH unit.
- Install the indoor unit, the multikit and the CH unit according to the instructions given in this manual.
- Where the length of pipe L3 between each multikit and each indoor unit is considerably longer than on another indoor unit, the refrigerant will not flow correctly and performance is lower in comparison with other models (recommended pipe length: up to 15 m).

8 Piping work and refrigerant charge

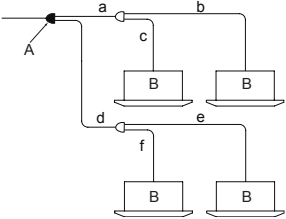
Pipe branching restrictions

Follow the instructions given in the table below for pipe installation (field-supplied).

Maximum pipe length between the multikit of the first branch and each indoor unit (L2)	Main pipe branch ⁽¹⁾		Capacity ratio of the indoor units after the main branch	Branch and distributor combination
	Pipe length after the branch	Number of main pipe branches		
≤ 40 m	a+b+c ≤ 30 m or d+e+f ≤ 30 m	No limit	—	Available (Figures 3 and 4)
	a+b+c > 30 m or d+e+f > 30 m	Up to 2		
From 41 m to 90 m	—	Up to 1 (Figure 1)	≥ 40% (Figure 2)	Not available

NOTE

⁽¹⁾ Main pipe branch: distribution from one (1) multikit to two (2) multikits.

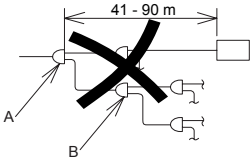


A: main branch

B: indoor units

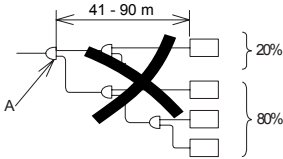
Figure 1: two branches on the main pipe

Figure 2: capacity ratio of the indoor units ≤ 40%



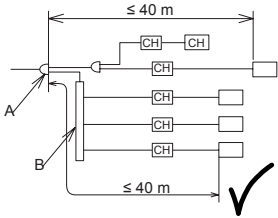
A: main branch
B: secondary branch

Figure 3: distributor used as branching for three pipes and branching for two pipes



A: main branch

Figure 4: do not connect a branch to a distributor



A: branch
B: distributor

A: branch
B: distributor

8 Piping work and refrigerant charge

8.1.8 Refrigerant charge

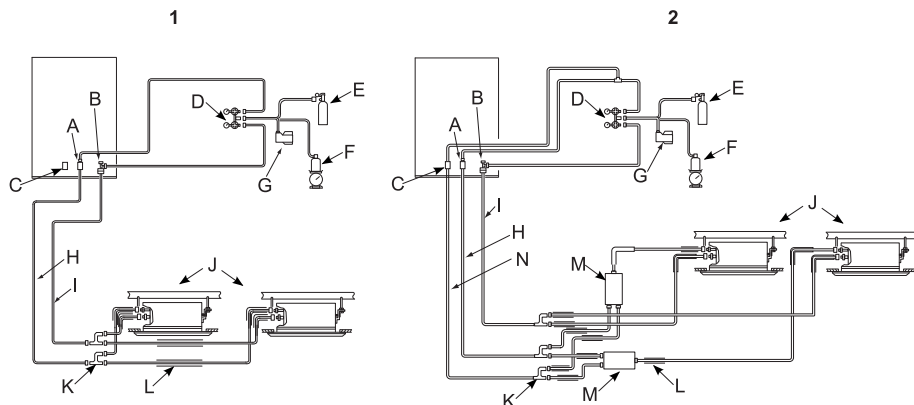
◆ Installation airtight test

Check that the stop valves are fully closed; to do so, remove the covers and check that the valves are closed to the corresponding torque:

- Heat pump system: *Details of the gas and liquid stop valves, see on page 34.*
- Heat recovery system: *Details of the gas and liquid stop valves, see on page 42.*

Check that the outdoor and indoor units are connected via the field-supplied refrigerant pipes.

Check the suspension of the refrigerant pipes as described in chapter *Refrigerant pipe suspension, see on page 31.*



1. Heat pump system.
 2. Heat recovery system.
- A. Stop valve, high pressure (gas).
 - B. Stop valve (liquid).
 - C. Stop valve, low pressure (gas).
 - D. Measurement indicators.
 - E. Nitrogen gas bottle.
 - F. Refrigerant bottle and balance.

- G. Vacuum pump.
- H. Refrigerant gas pipe, high pressure.
- I. Refrigerant liquid pipe
- J. Indoor units.
- K. Multikit.
- L. Insulation.
- M. CH unit.
- N. Refrigerant gas pipe, low pressure.

Check the seal of the welds and flared connections. To do so, connect the measurement indicators on the check joints of the stop valves and on one vacuum pump or nitrogen gas bottle, using the flexible charge pipes of the indicators.

NOTE

- **Only tools and indicators specifically for use with R410A refrigerant gas should be used.**
- **Do not open the stop valves on the outdoor unit.**

⚠ DANGER

Only use nitrogen gas when testing for leaks. Never use oxygen, acetylene or fluorocarbon gas; these could result in an intoxication or explosion.

Apply a maximum pressure of 4.15 MPa of nitrogen gas to the installation.

Check there are no refrigerant leaks in the welds and the flared connections of all the system. To do so, use a gas leak sensor or a soap and water solution. If any leaks are found in the installation, repair and repeat the airtight test.

◆ Installation vacuum

Connect the measurement indicators on the check joints of the stop valves.

NOTE

Only tools and indicators specifically for use with R410A refrigerant gas should be used.

Vacuum the installation to a maximum pressure of -0.1 MPa (-756 mmHg) or lower.

On completion of the vacuum, close the indicator valve and switch off the vacuum pump.

Check that the pressure reading on the indicators remains stable for an hour or more. If this is not the case, check there are no refrigerant leaks at the welds and the flared connections of all the system.

NOTE

If the maximum pressure of -0.1 MPa (-756 mmHg) or less is not obtained, and there are no leaks, keep the vacuum pump running for one or two hours.

8 Piping work and refrigerant charge

If any leaks are found in the installation, repair and repeat the airtight test.

Replace the stop valve covers and tighten to the corresponding torque:

- Heat pump system: [Details of the gas and liquid stop valves](#), see on page 34.
- Heat recovery system: [Details of the gas and liquid stop valves](#), see on page 42.

◆ Quantity of refrigerant charged in the W0 outdoor unit

Outdoor unit	Quantity of refrigerant charged in the W0 outdoor unit (kg)	Outdoor unit	Quantity of refrigerant charged in the W0 outdoor unit (kg)
RAS-8FSXN	6.5	RAS-14FSXN	9.0
RAS-10FSXN	6.5	RAS-16FSXN	9.0
RAS-12FSXN	7.0	RAS-18FSXN	10.5

NOTE

For combinations of two or three outdoor units, the quantity of refrigerant corresponds to the sum of the refrigerant charged in each of the units.

◆ Maximum additional refrigerant charge

The total additional charge must not exceed the maximum additional refrigerant charge indicated in the following table.

Outdoor unit	Maximum additional refrigerant charge (kg)	Outdoor unit	Maximum additional refrigerant charge (kg)
RAS-(8/10)FSXN	28	RAS-(18-24)FSXN	51
RAS-12FSXN	36	RAS-(26-54)FSXN	63
RAS-(14/16)FSXN	40	—	—

◆ Method of calculation of the total additional refrigerant charge

Although the outdoor unit is supplied charged with refrigerant, it is necessary to add a certain additional amount depending upon the length of the refrigerant pipes and the capacity ratio of the indoor units.

The different factors determining the total additional refrigerant charge (W) in the system are given as W1, W2 and W3.

The additional quantity of refrigerant is calculated using the following method.

W1: additional refrigerant charge according to the length of the refrigerant liquid pipes.

Nominal diameter		Total length (m)	Quantity of refrigerant per metre of pipe	Additional refrigerant charge (kg)
mm	Inches			
ø 22.2	7/8	___ m	x 0.39	
ø 19.05	3/4	___ m	x 0.28	
ø 15.88	5/8	___ m	x 0.19	
ø 12.7	1/2	___ m	x 0.12	
ø 9.53	3/8	___ m	x 0.06	
ø 6.35	1/4	___ m	x 0.03	
Total additional refrigerant charge =				___ kg

W2: additional refrigerant charge per indoor unit

No of indoor units of 8 and 10 HP	Amount of refrigerant per unit	Additional refrigerant charge (kg)
	x 1.0 kg/unit	___ kg

NOTE

It is not necessary to increase the additional refrigerant charge for indoor units with less than 8 HP.

W3: Additional refrigerant charge according to the connection capacity ratio of indoor units

Connection capacity ratio of indoor units = total capacity of indoor units / total capacity of outdoor unit

Ratio of indoor units	Additional refrigerant charge (kg)
< 100%	0 kg
(100–115) %	0.5 kg
(116–130) %	1.0 kg

W: total additional refrigerant charge

$$\text{Total additional refrigerant charge (kg)} = W1 + W2 + W3$$

NOTE

Check that the total additional refrigerant charge is not greater than the values given in: **Maximum additional refrigerant charge**, see on page 49.

Refrigerant charge

Once the installation has been emptied, check that the stop valves are fully closed; to do so, remove the caps and check that they are closed with the corresponding torque:

- Heat pump system: **Details of the gas and liquid stop valves**, see on page 34.
- Heat recovery system: **Details of the gas and liquid stop valves**, see on page 42.

Charge the total additional refrigerant as calculated in chapter: **Method of calculation of the total additional refrigerant charge**, see on page 49.

If it is not possible to charge the total quantity of additional refrigerant, proceed as follows:

Fully open the gas stop valve (in the case of the outdoor units of heat recovery systems, open the high and low pressure gas valves).

Start the system running in cooling mode and open the liquid outlet valve of the measurement indicators connected to the check joints of the stop valves. Slightly open the liquid stop valve (tolerance of quantity of total additional refrigerant: 0.5 kg).

When all the refrigerant has been charged, fully open the liquid stop valve.

CAUTION

- Only charge the quantity of additional refrigerant as calculated in chapter **Method of calculation of the total additional refrigerant charge**, see on page 49. Too low or too high a charge could cause damage to the compressor.
- The refrigerant should be charged through the liquid stop valve. If the refrigerant is charged through the gas stop valves, the compressor will be damaged.

Fill in the F-Gas Label.

Automatic system to estimate the amount of refrigerant charged in the unit

Fit all covers and lids on the unit, except for the electrical box and service covers.

Connect the power supply to the indoor and outdoor units in the same refrigeration cycle for the function to automatically estimate the amount of refrigerant charged in the unit.

NOTE

- This function is applicable when the outdoor temperature range is between 0 and 43 °C DB (DB: dry bulb) and the indoor temperature is between 10 and 32 °C DB (DB: dry bulb).
- For RAS-(20-54)FSXN units, the indications, verifications and consultations of the seven-segment display should be done on the main unit.
- The electricity supply to the outdoor unit must remain connected twelve hours prior to the test to heat up the compressor oil.

Turn the DSW5 contact number four (on PCB1) to ON.



The seven-segment display on the unit will indicate:

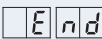
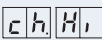
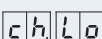


Check the seven-segment display and press PSW1. The outdoor unit fan and the compressor will start up. The display will indicate:

The function to automatically estimate the amount of refrigerant charged in the unit takes between 30 and 40 minutes to make the necessary checks.

8 Piping work and refrigerant charge

Check the result obtained with the following table:

Display indication	Result	Indications
	Sufficient charge	The refrigerant charge is sufficient. Turn the DSW5 contact number four (on PCB1) to OFF and carry out the test run.
	Excessive charge	The refrigerant charge is excessive. Calculate the refrigerant charge according to the length of the refrigerant pipes. Collect the charged refrigerant appropriately and charge the unit with correct amount of refrigerant.
	Insufficient charge	The refrigerant charge is insufficient. Check whether the unit has been charged with additional refrigerant. Calculate the refrigerant charge according to the length of the refrigerant pipes. Charge the unit with the correct amount of refrigerant.
	Abnormal completion	Locate the cause of the abnormal completion in line with the instructions below. Once the cause of the abnormal completion has been solved, restart the check. 1. Is the DSW5 contact number four (on PCB1) turned to ON before the power supply is connected? 2. Are all indoor units ready and waiting before DSW5 contact number four (on PCB1) is turned to ON? 3. Is the outdoor ambient temperature within the working ranges established (0 ~ 43 °C)? (In some cases, when the number of indoor units connected exceeds the maximum number recommended and the outdoor temperature is above 35 °C, the check cannot be made). 4. Is the total operating capacity ratio of the indoor units 30% or less? 5. Is DSW4 contact number four (forced compressor stoppage) turned to OFF?

Turn the DSW5 contact number four (on PCB1) to OFF when the refrigerant charge is sufficient. Wait at least three minutes before turning the DSW5 contact number four (on PCB1) to OFF so that the outdoor unit is ready to start operating.

NOTE

- During the check, the seven-segment display may change to the protection control code due to the protection control being activated, although this is quite normal.
- Consult the information on the inside of the unit service cover for further information on the protection control code.

CAUTION

- Releasing refrigerant into the atmosphere is forbidden.
- Where the amount of refrigerant charged in the system is to be corrected, it must be collected appropriately.
- Follow the instructions given on the specific label attached to the unit with regards to the refrigerant.
- Fill in the F-Gas Label.

8.1.9 Precautions in the event of refrigerant leaks

DANGER

Fitters and the designers of the installations must strictly observe local and national legislation, and local codes regarding safety requirements in the event of refrigerant leaks.

◆ Maximum permitted concentration of hydrofluorocarbon (HFC)

The R410A refrigerant gas, used in the equipment, is fireproof and not toxic.

DANGER

In the event of a leak, the gas will spread around the room, displacing the air, and could therefore result in asphyxia.

The maximum permitted concentration of HFC R410A gas in the air is 0.44 kg/m³, in accordance with standard EN378-1. Therefore, efficient measures should be adopted to ensure the concentration of R410A gas in the air is kept below 0.44 kg/m³ in the event of a leak.

◆ Calculation of the refrigerant concentration

- 1 Calculate the total quantity of refrigerant *R* (kg) charged in the system; to do so, connect all the indoor units of the rooms in which you wish to have air conditioning.
- 2 Calculate the volume *V* (m³) of each room.
- 3 Calculate the refrigerant concentration *C* (kg/m³) of the room in accordance with the following formula:

$$R / V = C$$

R: Total quantity of refrigerant charged (kg).

V: volume of the room (m³).

C: concentration of refrigerant (= 0.44 kg/m³ for R410A gas).

8.1.10 Drainage pipes

◆ Condensation drainage system

When the outdoor unit operates in refrigeration or heating mode, there is a build-up of condensation of the ambient humidity which, together with rain water, requires draining.

◆ Countermeasures in the event of refrigerant leaks

The room should have the following characteristics in case of a leak of refrigerant:

- 1 Opening without shutter to permit the circulation of fresh air in the room.
- 2 Opening without door measuring 0.15%, or greater, of the floor surface.
- 3 A fan with a capacity of at least 0.4 m³/minute per tonne of Japanese refrigerant (= volume displaced by the compressor / 5.7 m³/h) or greater, connected to a gas sensor in the air conditioning system which uses the refrigerant.

DANGER

Special attention should be given to areas where the refrigerant may be deposited and stay in the room, such as basements or similar, as it is heavier than air.

8 Piping work and refrigerant charge

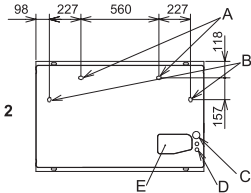
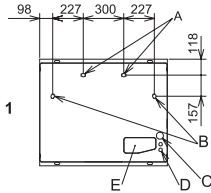
Select a location for the unit which permits adequate drainage. If necessary, mount an installation suitable for the drainage of condensation.

- DANGER**
 - *Drainage must not take place in areas frequented by pedestrians. In low temperatures, the drainage water could freeze and lead to falls. If it is necessary to install the outdoor unit in an area frequented by pedestrians, an additional drainage tray should be fitted.*
 - *Do not fit drainage pipes or collection trays in cold climates, as they could freeze and break.*

If a condensation drainage kit is required for the outdoor unit, use the optional drainage kit DBS-TP10A.

NOTE

All measurements are in mm.



Base of outdoor unit

1. SET FREE RAS-(8-12)FSXN

2. SET FREE RAS-(14-18)FSXN

A. Drainage hole ø26. For the optional drainage kit DBS-TP10A.

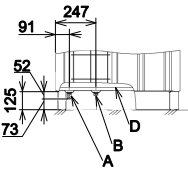
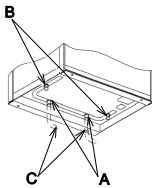
B. Drainage hole ø26. For optional drainage plug.
- C. Opening for power wiring feed through.

D. Opening for communication wiring feed through

E. Opening for feed through of refrigerant pipes 235 x 113.

◆ Installation position of the optional drainage kit DBS-TP10A

Installation position (example: RAS-10FSXN, lower and side views).



- A. Drain pipe.

B. Optional drain plug.

C. Drain pipes (field-supplied).

D. Base of unit.

Drain kit components

Model	Description	Material/colour	Quantity	Application
DBS-TP10A	Drain pipe	PP/black	2	Drain pipe connection
	Drain plug	PP/black	2	Drain pipe plug
	Rubber plug	CR/black	4	Pipe and pipe seal

9 ELECTRICAL WIRING

9.1 GENERAL INFORMATION

⚠ CAUTION

- Before any work to the electrical wiring or regular inspections, switch off the mains power supply of the indoor and outdoor units. Wait three minutes before starting installation or maintenance work.
- Make sure that the interior and exterior fans have come to a complete standstill before starting work on the electrical wiring or regular inspections.
- Protect cables, the drainage pipe, electrical components, etc. from rodents and insects; otherwise these might damage unprotected components and this could result in fire.
- Do not allow cables to come into contact with the refrigerant pipes, metal edges, printed circuit boards (PCB) or the electric components inside the unit; the cables may be damaged and this could result in fire.

nents inside the unit; the cables may be damaged and this could result in fire.

- Firmly secure the cables inside the indoor unit with plastic flanges.
- Before starting work on the installation of the outdoor unit, place the DSW7 in the correct position according to the expected supply voltage: **Setting of the DSW switches on PCB1**, see on page 58.

⚠ DANGER

- Use an earth leakage breaker with medium sensitivity, and an activation speed of 0.1 or less. If this is not fitted, there is a risk of electric shock and/or fire.
- Install an earth leakage breaker, fuse and circuit breaker for each outdoor unit power line. Not fitting it may cause an electric shock or fire.

9.2 GENERAL VERIFICATIONS

- 1 Make sure the electric components supplied by the fitter (main power switches, circuit breakers, wires, connectors and connection terminals) have been selected correctly in line with the electrical data given.
 - a The electricity supply to the unit should be via an exclusive power control switch and protective circuit breaker, certified and installed in accordance with local or national safety regulations.
 - b The electricity supply for the outdoor and indoor units should be separate. Connect the voltage supply wiring for each group of indoor units to the same outdoor unit (maximum capacity for each group of indoor units: 26 HP).
 - c For heat recovery systems, the CH unit and the indoor unit of the same refrigerant cycle can be supplied from the same mains power switch.
- 2 Check that the supply voltage is between 90 and 110% of the rated voltage. Where the voltage capacity is too low, it will not be possible to start the system due to the drop in voltage.
- 3 Sometimes, the refrigeration/heating system is not able to operate correctly in the following cases:
 - When the system is supplied from the same supply line as other major consumers (heavy machinery, power inverter systems, cranes, welding machinery, etc).
 - When the supply cables of the major consumers and the refrigeration/heating system are very close together.

In these cases, induction in the wiring to the refrigeration/heating system may arise due to a rapid change in the electricity consumption of the above consumers and their start-up. Therefore before starting installation work, check the regulations and standards concerning adequate protection of the power supply line.

ⓘ NOTE

For further information, please refer to the applicable legislation in the country in which the unit is to be fitted.

- 4 During the preliminary preparation work of the electricity supply line for the unit, the provisions in local and national legislation must never be violated.
- 5 Check that the earth cable is correctly connected.

⚠ DANGER

- Never connect the earth cable to the refrigerant pipes. The gas in the pipes could cause a fire.
- Do not connect the earth cable to the lighting rod. The electrical potential of earth would increase abnormally.

9.3 CONNECTION OF THE POWER SUPPLY CIRCUITS

9.3.1 Cable sizes

Model	Supply voltage	Maximum current (A)	Cross-section of the power cable		Cross-section of the service cable	
			EN60 335-1 (mm ²) ⁽¹⁾	MLFC (mm ²) ⁽²⁾	EN60 335-1 (mm ²) ⁽¹⁾	MLFC (mm ²) ⁽²⁾
RAS-8FSXN	3N~ 400V 50Hz	12	2.5	2.0	0.75	0.75
RAS-10FSXN		16	2.5	2.0		
RAS-12FSXN		22	6	3.5		
RAS-14FSXN		26	6	5.5		
RAS-16FSXN		29	10	5.5		
RAS-18FSXN		31	10	8		

⁽¹⁾ The cross-sections of the cable should be selected for the maximum current of the unit, in accordance with European Standard EN60 335-1.

⁽²⁾ The cross-sections of the cable have been selected for the maximum current of the unit, in accordance with cable MLFC (Flame Retardant Polyflex Wire) manufactured by HITACHI Cable Ltd., Japan.

ⓘ NOTE

Do not use cables that are lighter than the normal flexible coated polychloroprene cable (code H05RN-F).

9.3.2 Main breaker switch

Model	Supply voltage	Maximum current (A)	ELB ⁽¹⁾		CB ⁽²⁾
			Rated current (A)	Sensitivity (mA)	Rated current (A)
RAS-8FSXN	3N~ 400V 50Hz	12	40	30	20
RAS-10FSXN		16	40	30	20
RAS-12FSXN		22	40	30	30
RAS-14FSXN		26	40	30	40
RAS-16FSXN		29	63	30	40
RAS-18FSXN		31	63	30	50

⁽¹⁾ ELB: earth leakage breaker (field-supplied)

⁽²⁾ CB: circuit breaker (field-supplied)

9.3.3 Voltage supply

Service voltage

Between 90 and 110% of the rated voltage.

Start-up voltage

Between 85 and 115% of the rated voltage.

Voltage imbalance

Up to 3% in each phase, measured at the main terminal of the outdoor unit.

Electromagnetic compatibility

According to Directive 2004/108/EC (89/336/EEC) regarding electromagnetic compatibility, the following table indicates: the maximum allowed impedance Z_{max} of the system at the connection point of the user's power supply, as per EN61000-3-11.

Model	Z_{max} (Ω)	Model	Z_{max} (Ω)
RAS-8FSXN	—	RAS-14FSXN	0.11
RAS-10FSXN	—	RAS-16FSXN	0.11
RAS-12FSXN	—	RAS-18FSXN	0.08

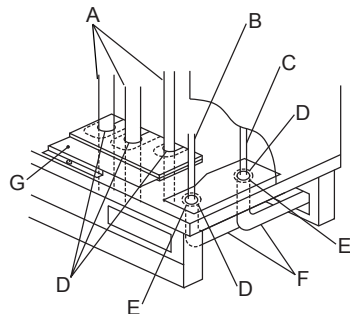
Harmonics

In relation to IEC 61000-3-2 and IEC 61000-3-12, the situation of harmonics for each model is as follows:

Situation of the models in relation to IEC 61000-3-2 and IEC 61000-3-12 Ssc "xx"	Model	Ssc "xx" (kVA)
Unit compliant with IEC 61000-3-2 (professional use).	RAS-8FSXN	—
	RAS-10FSXN	—
Unit compliant with IEC 61000-3-12.	—	—
This equipment complies with IEC 61000-3-12 provided that the short-circuit power Ssc is greater than or equal to xx (see Ssc column) at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power Ssc greater than or equal to xx (see Ssc column)	RAS-14FSXN	5089
	RAS-16FSXN	1593
	RAS-18FSXN	1532
The authorities responsible for the electrical power supply can apply restrictions relating to harmonics.	RAS-12FSXN	—
Unit(s) outside the scope of IEC 61000-3-12.	—	—

9 Electrical wiring

9.3.4 Connection of outdoor units



Remove cover -G- to the refrigerant pipes -A-.

The power -C- and communication -B- cables should be inserted in the unit through the pre-drilled holes and lower rubber bushing -E- provided, using a different protective duct -F- for each one.

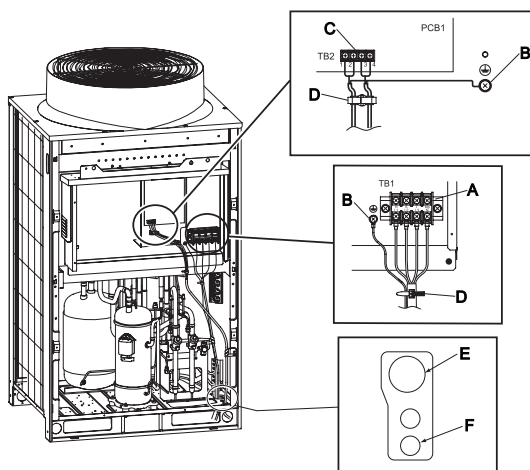
NOTE

Do not insert the supply and communication cables together through the same protective duct. Keep a minimum distance between them of 50 mm.

Fit the cover on the pipes -G- and completely seal access -D- of the pipes to the unit, to prevent the entrance of water, rodents and dirt.
Do not allow the cables to touch the refrigerant pipes, sharp metal edges or electrical components from inside the unit.

NOTE

- **Fasten the power cables with the flanges provided inside the unit.**
- **Attach unused rubber bushings with adhesive.**
- **Make a drainage hole in the lowest part of the protective duct.**



Connect the three-phase power cables on terminals L1, L2, L3 and N of the TB1 -A- terminal box and connect the earth cable to the screw-in terminal -B-. Use insulated terminals or heat-shrink covers.

Connect the communication cables on the terminals on the TB2 box -C- of the PCB1 circuit board -D-:

- From the indoor units to the outdoor unit: terminals 1 and 2.
- From the outdoor unit to the next outdoor unit in the same refrigerant cycle: terminals 3 and 4.

E: $\varnothing 53$ mm pre-drilled hole for power cables.

F: $\varnothing 26$ mm pre-drilled hole for communication cables.

NOTE

Completely seal the entrance to the duct using sealant, etc. to prevent water from entering it.

Tighten the connection terminals as shown in the following table:

Size	Tightening torque (Nm)
M4	(1.0–1.3)
M5	(2.0–2.4)
M6	(4.0–5.0)
M8	(9.0–11.0)
M10	(18.0–23.0)

9.3.5 Connection of indoor units

Connect each outdoor unit to a power supply line. Install an earth leakage breaker, fuse and circuit breaker for each outdoor unit power line.

Connect each group of indoor units corresponding to an outdoor unit to a voltage supply line (maximum capacity for each group of indoor units: 26 HP). Install an earth leakage breaker, fuse and circuit breaker for each group of indoor units.

Connect the communication cable between the indoor units, the CH units and the outdoor units.

Connect the communication cable on the corresponding units to the same refrigerant cycle. (Where the refrigerant pipe of the indoor unit is connected to the outdoor unit, connect the communication cable to the same indoor unit).


NOTE

Connecting the refrigerant pipe and the communication cable to units in different refrigeration cycles may lead to operating problems.

Use shielded twisted pair cable or shielded pair cable. Do not use cable with three or more conductors.

Use the same type of cables for the H-LINK system of units in each refrigerant cycle.

Ensure a minimum distance of 50 mm between the power cables and the communication cables and 1500 mm between these and the power cables of other electrical devices. Where this is not possible, install power cables in a metal duct separate from the others.

Connect the communication cables to TB2 terminals 1 and 2 on outdoor unit A (main unit):

- Between the outdoor unit and the indoor unit.
- Between the outdoor unit and the CH unit.
- Between the outdoor unit and the indoor unit on other refrigeration cycles.


CAUTION

Do not connect power cables to communication terminals (TB2). This could damage the circuit board.

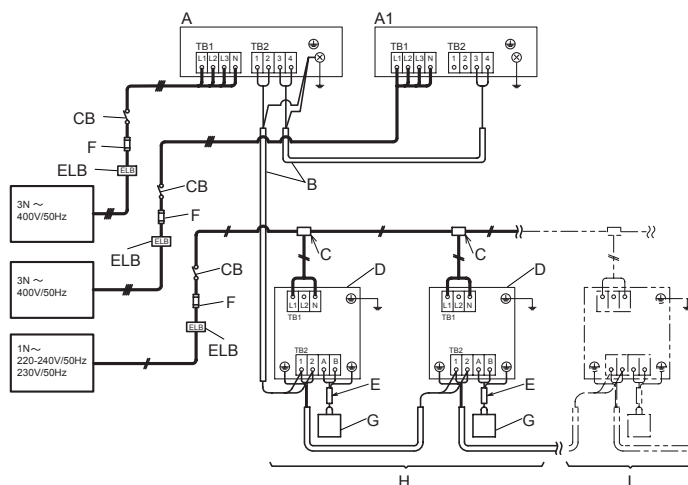
In heat recovery systems, connect the indoor unit communication cable (used exclusively for refrigeration) to TB2 terminals 1 and 2 on the CH unit.

Connect the earthing cable for the outdoor units, the indoor units and the CH units. Earthing connections below a resistance of 100 Ω (max.) must be made by skilled personnel.


NOTE

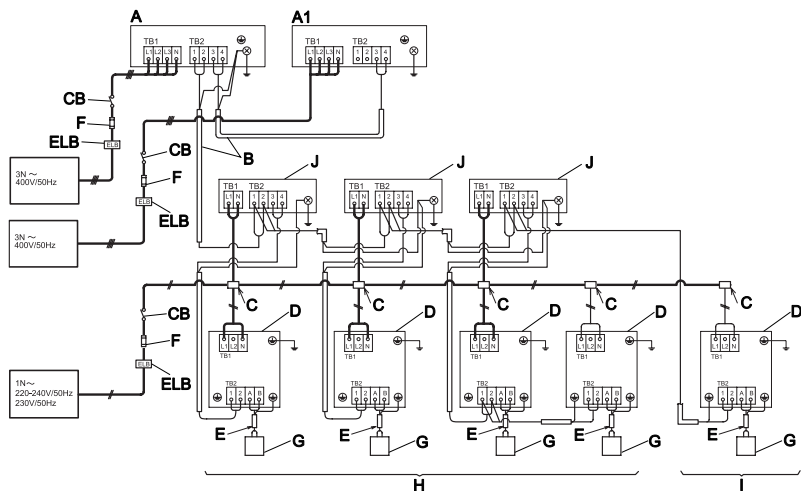
- 1 Set the DSW switches on the main and secondary units for the combination of (20-54) HP outdoor units.
- 2 An alarm is triggered if the communication cables between the outdoor units are connected to terminals 1 and 2 for H-LINK II.
- 3 Where an alarm is indicated on the display of the main outdoor unit, follow the instructions given to make the necessary checks.
- 4 Make the function settings from the main outdoor unit.
- 5 Maximum number of refrigeration groups with one remote control: 64.
Maximum number of indoor units connected: 160.

◆ Connection diagram: heat pump system



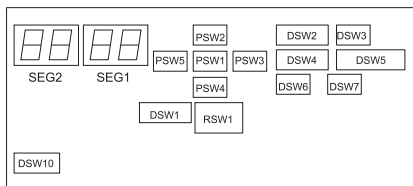
A	Main outdoor unit
A1	Secondary outdoor unit
B	Operation wiring (shielded twisted pair cable or shielded pair cable) 5 Vdc non-polar H-LINK (field-supplied)
C	Distribution box (field-supplied)
D	Indoor units
E	Operation wiring (shielded twisted pair cable or shielded pair cable) (field-supplied)
F	Fuse (field-supplied)
G	PC-ART remote control
H	Indoor unit system No 0
I	Indoor unit system No 1
CB	Circuit breaker (field-supplied)
ELB	Earth Leakage Breaker (field-supplied)

◆ Connection diagram: heat recovery system



A	Main outdoor unit
A1	Secondary outdoor unit
B	Operation wiring (shielded twisted pair cable or shielded pair cable) 5 Vdc non-polar H-LINK (field-supplied)
C	Distribution box (field-supplied)
D	Indoor units
E	Operation wiring (shielded twisted pair cable or shielded pair cable) (field-supplied)
F	Fuse (field-supplied)
G	PC-ART remote control
H	Indoor unit system No 0
I	Indoor unit system No 1
J	CH unit
CB	Circuit breaker (field-supplied)
ELB	Earth Leakage Breaker (field-supplied)

9.4 SETTING OF THE DSW SWITCHES ON PCB1



Location of the DSW switches on PCB1.

⚠ CAUTION

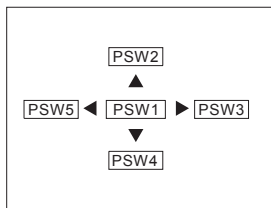
Before changing the settings of the DIP switches, the voltage supply should be disconnected. Otherwise, the new settings will not be valid.

9 Electrical wiring

NOTE

- Only the DIP DSW1, DSW2 and DSW4 switches can be set while the voltage supply is connected.
- The symbol "▲" indicates the position of the DIP switches. The figures show the position of the DIP switch once the position setting has been completed.
- With the DSW4 switch, the unit starts or stops after 10 to 20 sec. of the switch being enabled.

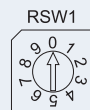
- Record the number of the outdoor unit to tell it apart from others during service and maintenance operations in this area:



PSW buttons on PCB1
PSW1: accept.
PSW2, 3, 4 and 5: for checking.

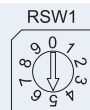
DSW1, RSW1: refrigerant cycle number setting

- Setting required.
- Setting before RSW1 supply: 0.
- Setting before DSW1 supply: 0 (digit of tens).
- Set each outdoor unit number on each refrigerant cycle.
- Outdoor and indoor units belonging to the same refrigerant cycle: setting the same cycle number in the outdoor and indoor units (indoor units: DSW5 and RSW2).



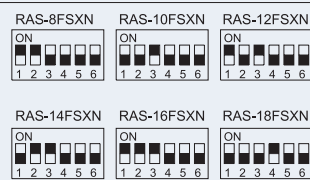
DSW1, RSW1: setting example for refrigerant cycle number 25

- Maximum refrigerant cycle number setting: 63.



DSW2: capacity setting

Setting not required.



DSW3

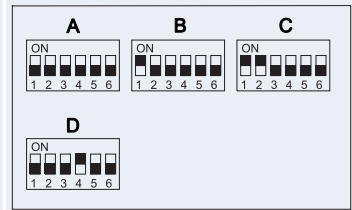
Setting not required.



DSW4: test run and service settings

Setting required.

- A: setting before supply:
- B: refrigeration test run.
- C: heating test run.
- D: forced stop of the compressor.



DSW5: emergency operation /test run and service setting

Setting not required. Activate only when the following functions are used:

- Contact 1: except No 1, compressor operation.
- Contact 2: except No 2, compressor operation.
- Contact 4: Monitoring of refrigerant quantity.



DSW6: setting outdoor unit number

Setting required.

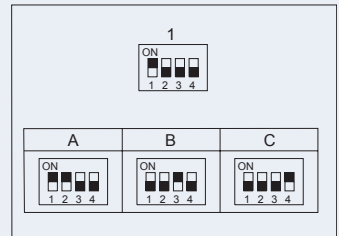
- 1: setting before supply:

NOTE

This combination of outdoor units must be set.

Setting for combination of units:

- A: unit 1 (main).
- B: unit 2.
- C: unit 3.



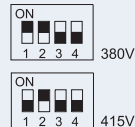
DSW7: supply voltage setting

Setting required.

- Setting before supply: 380 V.

NOTE

This setting is necessary in outdoor units supplied with 400 V.



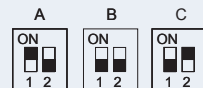
DSW10: communication setting

Setting required.

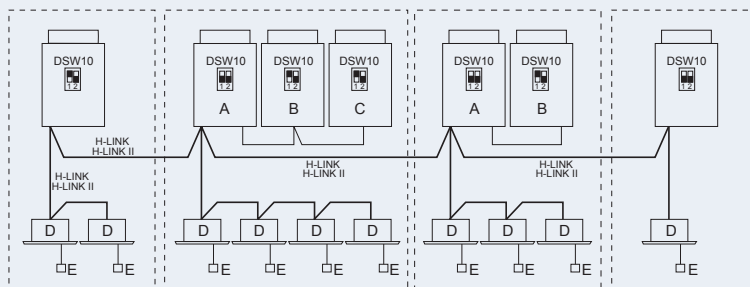
- A: setting before supply:
- B: cancellation of final resistance.

NOTE

• C: If the communication circuit fuse has opened, the PCB1 board can only be recovered by activating contact 2.



DSW10: switch setting example



A. Main unit.
B. Secondary unit.
C. Secondary unit.

D. Indoor units.
E. Remote control.

10 TEST RUN

10.1 PRELIMINARY CHECKS

The test run must be carried out according to the instructions given in chapter [Test run](#), see on page 61.

⚠ DANGER

Do not use the system until all of the check points have been verified. As with the test run for the indoor unit, check the Installation and maintenance manual for the indoor unit and the CH unit.

Make sure the refrigerant pipes and communication cables between the outdoor and indoor units are connected to the same refrigeration cycle. Failure to do so could lead to abnormal operations or a serious accident. Check that the setting of the refrigerant cycle DSW switches (DSW1 and RSW1 on outdoor units, DSW5 and RSW2 on indoor units) and of the unit number (RSW) of the indoor units is suitable for the system. Check whether the DIP switch setting specified on the printed circuit of the indoor and outdoor units is correct. Pay particular attention to the outdoor unit no., the refrigerant cycle no. and the terminal resistance.

Make sure the electrical resistance is greater than 1 MΩ by measuring the resistance between the ground and the terminal of the electrical components. If not, do not use the system until the electrical leak has been detected and repaired. Do not apply voltage to the communication terminals (Outdoor unit: TB2 1, 2, 3, 4 / Indoor unit: TB2 1, 2, A, B / CH unit: TB2 1, 2, 3, 4).

Check that all cables, L1, L2, L3 and N (R, S and T) are correctly connected to the power line. If they are not correctly connected, the unit will not work and the remote control will indicate alarm code "05". When this occurs, check and change the power line phase according to the sheet attached to the rear of the service cover.

⚠ CAUTION

Make sure the main power supply switch has been on for over 12 hours to heat up the compressor oil using the heating elements.

The FSXN series outdoor units do not work for 4 hours after the power supply line has been connected (stoppage code d1-22). Where the unit is to be started within 4 hours, release the protection control as follows:

- 1 Switch on the power supply to the outdoor unit.
- 2 Wait 30 seconds.
- 3 Press PSW5 on the outdoor unit PCB for more than 3 seconds to release code d1-22. Where a remote control is used for releasing, press Air Flow and Auto Louver at the same time for 3 seconds.

10.2 TEST RUN

- Check that the stop valves on the outdoor unit are fully open (gas, low-pressure: only in heat recovery systems) and start the system. (Where

Where several base units are combined, stick the label on the main unit in a visible place (outdoor unit 1) so that the outdoor unit A can be easily identified. Do not stick the main label on the secondary unit (outdoor units 2 and 3).

⚠ CAUTION

Where the total insulation resistance of the unit is below 1 MΩ, the compressor insulation resistance may be low due to the refrigerant held in the compressor. This may occur if the unit is not used for long periods.

- 1 **Disconnect the compressor cables and measure the insulation resistance of the compressor. If the resistance value is greater than 1 MΩ, the insulation fault has occurred in another electrical component.**
- 2 **If the insulation resistance is below 1 MΩ, disconnect the compressor cable on the inverter PCB. Then switch on the main power supply to apply current to the crankcase heating elements. Once current has been received for more than 3 hours, re-measure the insulation resistance. (Current may be required for longer, depending on the air conditions, the pipe length or the condition of the refrigerant) Check the insulation resistance and re-connect the compressor. Where the earth leakage breaker is tripped, check the recommended size: [Main breaker switch](#), see on page 54.**

ℹ NOTE

- 1 **Make sure the electric components in the installation (earth leakage breaker, circuit breaker, cables, connectors and cable terminals) have been selected correctly in line with the electrical data given in this Manual. Also make sure that these components are compliant with national and local codes.**
- 2 **Use shielded cables (> 0.75 mm²) for communication installation wiring to avoid electromagnetic noise. (Shielded cable must be less than 1000 m in total length and its size must be compliant with local codes.)**
- 3 **Check the connection of the power wiring terminals (terminals "L1" to "L1" and "N" to "N"). A C supply voltage 380-415 V. If it is different, some components could be damaged.**

base units are combined, check that the stop valves on all outdoor units connected are fully open).

- Carry out the test run on the indoor units in sequence, one by one. Then check the concordance of the refrigerant pipe system and the electrical wiring system. (System conformity cannot be checked if there are several indoor units operating at the same time.)
- Follow the procedure indicated below to carry out the test run. Make sure the test run is completed problem-free.

NOTE

Where there are two remote controls (main and secondary), first carry out the test run using the main remote control.

- Press MODE and CHECK on the PC-ART remote control at the same time for 3 seconds to enable TEST RUN mode. TEST RUN will be displayed on the screen. The total number of indoor units connected is indicated on the screen.
 - ♦ For other optional remote controls (wireless remote control or remote control), follow the instructions given in the Installation and maintenance manual supplied with the optional remote control to carry out the test run.
 - ♦ Where several indoor units are controlled simultaneously using the same remote control, check that the number of indoor units connected is indicated on the screen.
 - ♦ Where the number indicated is incorrect, the automatic self-directing function is not correctly performed because the wiring is incorrect or there is electrical noise, etc. Switch off the power supply and repair the wiring before checking the following points. Do not switch on or off for the next 10 seconds.
 - The indoor unit power supply is not switched on or the wiring is incorrect.
 - Incorrect connection of the indoor units or of the communication cable.
 - Incorrect setting of the RSW and DSW switches (cancelled setting) on the indoor unit PCB.
- Press MODE to set the operating mode.
- Press RUN/STOP. The on/off light switches on before the test begins. The 2-hour off timer will be automatically enabled. OFF Timer and

2HR will be displayed on the screen. The initial air flow setting is HI, although the setting can be changed.

- ♦ Check the working range: [Working range](#), see on page 4.
- ♦ Consider the following when the system is operating.
 - Do not touch any of the parts in the discharge gas area, as the compressor chamber and the pipes are at temperatures of over 90 °C.
 - Do not press the magnetic breaker button. This could cause a serious accident.
 - Do not touch any of the electrical components for at least 3 minutes after the main switch has been switched off.
 - Check that the settings of the refrigerant pipes and electrical wiring are for the same system. Switch on the indoor units one by one to do so.
- Press AUTO LOUVER and check that the louver moves normally, with no abnormal noise. Press AUTO LOUVER again to stop the louver. If any abnormal noises are heard, remove the panel and adjust the installation of the connection parts on the cover in the corner of the panel. Make sure the panel is correctly fitted to the unit to prevent it from being deformed.
- The temperature control will not be valid even though the protection device is enabled during the test run. If an alarm is triggered, locate the cause of the problem in chapter [Alarm codes](#), see on page 64. Once the problem has been solved, restart the test run.
- Check the temperature, the pressure, the operating frequency and the numbers of the indoor unit connected on the 7 segment display, according to the "Checking the outdoor unit using the 7-segment display in PCB1" label attached to the rear of the front cover on the outdoor unit.
- To complete the test run, wait for 2 hours or press the RUN/STOP button again.

NOTE

For further information on function settings, consult the Service Manual for FSXN series outdoor units.

10.3 TEST RUN CHECK LIST

MODEL:	
SERIAL No.	
MFG COMPRESSOR No.	
NAME AND ADDRESS OF CUSTOMER:	
DATE:	

- 1 Does the indoor unit fan turn in the correct direction? _____
- 2 Does the outdoor unit fan turn in the correct direction? _____
- 3 Are any abnormal noises audible in the compressor? _____
- 4 Has the unit been running for at least twenty (20) minutes? _____
- 5 Check the temperature of the room:

Inlet:	No. 1	DB/WB _____ °C	No. 2	DB/WB _____ °C	No. 3	DB/WB _____ °C	No. 4	DB/WB _____ °C
Outlet:		DB/WB _____ °C		DB/WB _____ °C		DB/WB _____ °C		DB/WB _____ °C
Inlet:	No. 5	DB/WB _____ °C	No. 6	DB/WB _____ °C	No. 7	DB/WB _____ °C	No. 8	DB/WB _____ °C
Outlet:		DB/WB _____ °C		DB/WB _____ °C		DB/WB _____ °C		DB/WB _____ °C

- 6 Check the outside temperature:

Inlet	DB/WB _____ °C
Outlet	DB/WB _____ °C

- 7 Check the temperature of the refrigerant:

Discharge gas temperature	Td = _____ °C
Liquid pipe temperature	Te = _____ °C

- 8 Check the pressure:

Discharge pressure	Pd = _____ kg/cm²G
Intake pressure	Ps = _____ kg/cm²G

- 9 Check the voltage:

Rated voltage	_____ V	—	—
Service voltage	L1-L2 _____ V	L1-L3 _____ V	L2-L3 _____ V
Initial voltage	_____ V	—	—
Phase imbalance	1-(V/Vm) =	—	—

- 10 Check the compressor input current:

Input	_____ kW
Intake pressure	_____ kW

- 11 Is the refrigerant charge OK? _____
- 12 Do the operating control devices work correctly? _____
- 13 Do the safety devices work correctly? _____
- 14 Has the unit been checked for refrigerant leaks? _____
- 15 Is the unit clean inside and out? _____
- 16 Are all the panels of the unit fastened securely? _____
- 17 Are the panels of the cabinet fastened so that they do not make any noise? _____
- 18 Is the filter clean? _____
- 19 Is the heat exchanger clean? _____
- 20 Are the stop valves open? _____
- 21 Does the water flow freely through the drainage pipe? _____

11 ALARM CODES

11.1 ALARM CODES

Code	Category	Fault	Possible cause
01	Indoor unit	Protection device activation (float switch)	Float switch activation (high water level in drain pan or abnormality in drain pipe, float switch or drain pan).
02	Outdoor unit	Protection device activation (disconnection due to high pressure)	PSH activation (pipe blockage, excess refrigerant, mixture of inert gas).
03	Transmission	Abnormality between indoor and outdoor	Incorrect wiring, loose terminals, disconnect cable, blown fuse, outdoor unit switched off.
04		Abnormality between inverter PCB and outdoor PCB	Inverter PCB - Outdoor PCB transmission fault (loose connector, broken cable, blown fuse).
04.		Abnormality between fan controller and outdoor PCB	Fan controller - Outdoor PCB transmission fault (loose connector, broken cable, blown fuse).
05	Power phase	Abnormality in the power phases	Incorrect power supply, inverted phase connection, open phase.
06	Voltage	Abnormal inverter voltage	Outdoor voltage drop, insufficient power.
06.		Abnormal fan controller voltage	Outdoor voltage drop, insufficient power.
07	Cycle	Drop in discharge gas overheating	Excessive refrigerant charge, thermistor fault, incorrect wiring, incorrect pipe connection, expansion valve locked in open position (connector disconnected).
08		Increase in discharge gas temperature	Insufficient refrigerant charge, pipe blockage, thermistor fault, incorrect wiring, incorrect pipe connection, expansion valve locked in closed position (connector disconnected).
0A	Transmission	Abnormality between outdoor and indoor	Incorrect wiring, broken cable, loose terminals.
0b	Outdoor unit	Direction of the outdoor unit incorrectly set	Set direction of the outdoor units (secondary units) duplicated in the same refrigerant cycle system.
0C		Main unit of the outdoor unit incorrectly set	Two (or more) outdoor units defined as the "main unit" in the same refrigerant cycle system.
11	Indoor unit sensor	Air inlet thermistor	Incorrect wiring, disconnected wiring, broken cable, short circuit.
12		Air outlet thermistor	
13		Frost protection thermistor	
14		Gas pipe thermistor	
19	Fan motor	Indoor fan protection device activation	Fan motor overheating, locking.
21	Outdoor unit sensor	High-pressure sensor	Incorrect wiring, disconnected wiring, broken cable, short circuit.
22		Outdoor air thermistor	
23		Discharge gas thermistor at top of compressor	
24		Heat exchanger liquid pipe thermistor	
25		Heat exchanger gas pipe thermistor	
29		Low-pressure sensor	
31	System	Incorrect capacity setting on outdoor and indoor units	Combination capacity incorrectly set. Excessive or insufficient total indoor unit capacity.
35		Indoor unit no. incorrectly set	Indoor unit no. duplicated in same reference group.
38		Abnormality in the collection circuit for outdoor unit protection	Protection detection device fault (incorrect wiring of outdoor PCB).
39	Compressor	Abnormal operating current in constant speed compressor	Overcurrent, blown fuse, current sensor fault, instant power supply fault, voltage drop, abnormal power supply.

12 Control and safety devices

Code	Category	Fault	Possible cause
3A	Outdoor unit	Abnormal outdoor unit capacity.	Outdoor unit capacity > 54 HP.
3b		Voltage or combination of outdoor unit models incorrectly set	Voltage or combination of secondary and main units incorrectly set.
3d		Abnormal transmission between the main unit and the secondary unit(s)	Incorrect wiring, disconnected wiring, broken cable, PCB fault.
43	Protection device	Low-pressure decrease protection device activation	Defective compression (compressor or inverter fault, loose power supply connection).
44		Low-pressure increase protection device activation	Overload during cooling, high temperature with heating, locked expansion valve (loose connector).
45		High-pressure increase protection device activation	Overload (obstruction, short pitch), pipe blockage, excess refrigerant, mixture of inert gas.
47		Low-pressure decrease protection device activation (vacuum protection)	Insufficient refrigerant, refrigerant pipes, blockage, expansion valve locked in open position (loose connector).
48		Inverter overcurrent protection device activation	Overload, compressor fault.
51	Sensor	Abnormal inverter current sensor	Current sensor fault.
53	Inverter	Inverter error signal detection	Controller IC error signal detection (overcurrent, low-voltage and short-circuit protection).
54		Abnormal inverter fin temperature	Abnormal inverter fin thermistor, heat exchanger blockage, fan motor fault.
55		Inverter fault	Inverter PCB fault.
57	Fan controller	Fan controller protection activation	Controller IC error signal detection (overcurrent, low-voltage and short-circuit protection), instant overcurrent.
5A		Abnormal fan controller fin temperature	Fin thermistor fault, heat exchanger blockage, fan motor fault.
5b		Overcurrent protection activation	Fan motor fault.
5c		Abnormal fan controller sensor	Current sensor fault (instant overcurrent, increased fin temperature, low voltage, earthing fault, step-out).
EE	Compressor	Compressor protection alarm (cannot be reset from the remote controller)	This alarm code is displayed when the following alarms are triggered three times within six hours: 02, 07, 08, 39, 43 to 45, 47.
b1	Outdoor unit number setting	Unit number or direction number of the outdoor unit incorrectly set	A number greater than 64 has been set for the refrigerant cycle or direction.
b5	Indoor unit number setting	Connection number of the indoor unit incorrectly set	There are more than 17 units not corresponding to H-LINK II connected to one system.
C1	CH unit	Incorrect indoor unit connection	There are 2 or more CH units connected between the outdoor and indoor units.
C2		Connection number of the indoor unit incorrectly set	There are 9 or more indoor units connected to the CH unit
C3		Incorrect indoor unit connection	Indoor units from different refrigerant cycles have been connected to the CH unit.

12 CONTROL AND SAFETY DEVICES

12.1 CONTROL AND SAFETY DEVICES

Compressor protection

The compressor is protected by the following devices and their combinations:

1. Pressure switch: this switch stops the compressor when the discharge pressure exceeds the set value.

13 Basic troubleshooting

2. Oil heater: this band-type heater protects against the formation of foam on the oil during cold starts and remains enabled when the compressor is at a standstill.

Model		RAS-(8-12)FSXN	RAS-(14-18)FSXN
Compressor			
Pressure switches		Automatic restart (one per compressor)	
High pressure	Disconnection	MPa	4.15 ^{-0.05} ..0.15
	Connection	MPa	3.20 ^{+0.15}
Fuse capacity (3~, 400 V, 50 Hz)		40x2	40x2 + 32x2
Oil heater			
Power		W	40x2 40x4
CCP timer		Not adjustable	
Time setting		min.	3
Direct current module for fan			
Fuse capacity		A	20x1

13 BASIC TROUBLESHOOTING

13.1 BASIC TROUBLESHOOTING

CAUTION

If there is a leak in the indoor unit, it smells of smoke or white smoke is coming from the unit, switch off the unit immediately and contact your HITACHI supplier.

SITUATIONS WHICH ARE NOT CONSIDERED AS A FAULT

- Sound of damaged part: when starting or stopping the system, a screeching noise may be heard. This is due to heat deformation of the plastic parts. This is a normal situation.
- Sound of refrigerant flowing: as the system starts or stops, the sound of the refrigerant flowing along the pipes is audible.
- Smells from the indoor unit: smells cling to the indoor unit after a long period of time. Clean the air filter and the panels or allow to ventilate.
- Steam from the outdoor unit heat exchanger: during de-icing, ice on the outdoor unit heat exchanger melts, producing steam.
- Condensation on the air panel: if the system has been operating in cooling mode for a long period of time in high humidity (over 27 °C DB, 80% relative humidity), condensation may form on the air panel.
- Condensation on the cabinet: if the system has been operating in cooling mode for a long period of time in high humidity (over 27 °C DB, 80% relative humidity), condensation may form on the cabinet.

THE SYSTEM DOES NOT WORK

Check whether the SET TEMPERATURE switch is set to the correct temperature.

FAULTY OPERATION OF THE REFRIGERATION OR HEATING SYSTEM

- Check the outdoor or indoor units for obstructions in the air flow.
- Make sure that there are not too many sources of heat in the room.
- Check that the air filter is not blocked up with dust.
- Check whether or not the doors /windows are open. Check that the temperature is within the working range.

IF THE PROBLEM PERSISTS...

If the problem persists after performing the above checks, please contact your service supply, giving them the following details:

- Name of the model of unit.
- Description of the problem.
- Alarm code number shown on the liquid crystal panel.

NOTE

Keep the main switch of the outdoor unit on (except when the system is not going to be used for a long period of time), as the compressor oil heater deactivates.

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