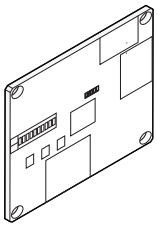
Installation manual

Modbus adapter



EKMBPP1
EKMBPP1A

Installation manual
Modbus adapter

English

Table of contents

1 About this document

Target audience

Authorised installers

About the documentation

The instructions delivered with the kit are intended to guide you through the installation of the EKMBPP1(A) adapter into a KRP1BC101 installation box and through the connection and configuration of the EKMBPP1(A) adapter.

Read this installation manual prior to use and keep it for future reference. Also read the installation manual of the indoor unit before installing the EKMBPP1(A) adapter.

Damage caused by non-observance of these instructions are not under the responsibility of Daikin.

Documentation set

This document is part of a documentation set. The complete set consists of:

- **General safety precautions:**
  - Safety instructions that you must read before installing
  - Format: paper (in the box of the indoor unit)
- **Installation manual:**
  - Installation instructions
  - Format: paper (supplied in the kit)

The latest revision of the supplied documentation is published on the regional Daikin website and is available via your dealer.

The original instructions are written in English. All other languages are translations of the original instructions.

2 Specific installer safety instructions

Always observe the following safety instructions and regulations.

General

DANGER

All wiring MUST be performed by an authorised electrician and MUST comply with the applicable national wiring regulation. **Possible consequence:** property damage and electrocution.

Installation (see "5 Installation" [▸ 10])

DANGER: RISK OF ELECTROCUTION

- Turn off the indoor unit power supply before mounting the PCB.
- Do NOT handle the PCB with wet hands.
- Do NOT let the PCB get wet.
- Do NOT disassemble, modify or repair the PCB.
- Turn OFF the indoor unit power supply if the PCB is damaged.
- **Possible consequence:** electrocution.

DANGER: RISK OF ELECTROCUTION

Connect the earth wires correctly. **Possible consequence:** electrocution.

DANGER: RISK OF ELECTROCUTION

Do NOT connect or turn on power supply before you have mounted the adapter, connected the electrical wiring and have closed the adapter.

DANGER: RISK OF ELECTROCUTION

When powered by the indoor unit or any other non-SELV (Safety Extra Low Voltage) power supply, all external wiring and electrically attached devices MUST be double insulated to prevent access by non-qualified persons. When this is not possible, the EKMBPP1(A) MUST be powered by a SELV power supply.

DANGER: RISK OF ELECTROCUTION

Do NOT turn on the indoor unit power supply before you have mounted the PCB inside the unit (with or without installation box or mounting plate), connected the electrical wiring and closed the indoor unit or indoor unit switch box. **Possible consequence:** electrocution.

2 Specific installer safety instructions

WARNING

When applying this Modbus adapter (EKMBPP1(A)), the installation requirements described in the indoor and outdoor unit installation manuals of the system to which this Modbus adapter is connected, including any countermeasures, remain applicable.

For systems NOT using R32 refrigerant, this Modbus adapter can be the only (and main) remote controller connected. For systems using R32 refrigerant, the installation of additional remote controllers may be required.

Hand-over to the user (see "7 Hand-over to the user" [▸ 33])

DANGER

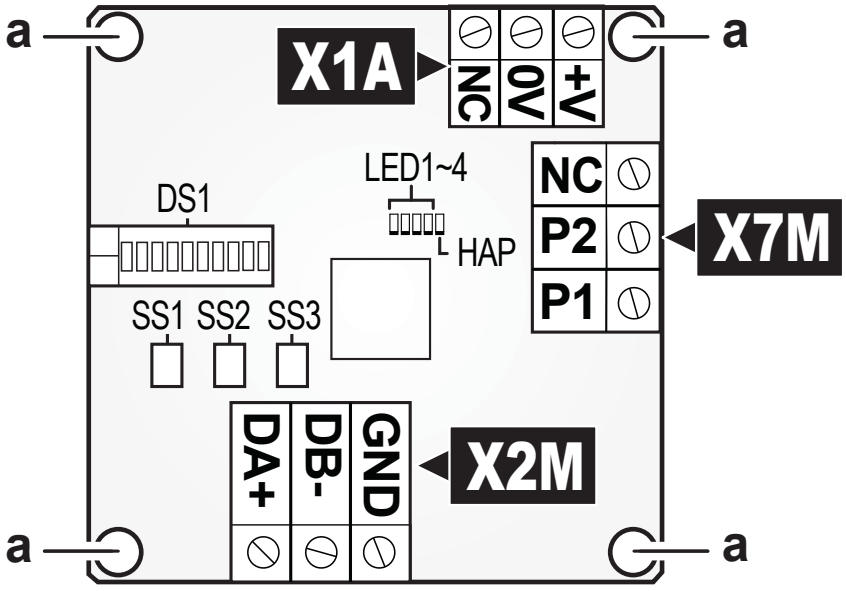
- Do NOT disassemble, modify, or repair the adapter. This can cause fire, electrical shock, or injury.
- Do NOT allow the adapter to get wet or use it when bathing or doing similar activities with water. This can cause electrical shock or fire.
- Do NOT use the adapter near medical equipment, or persons using cardiac pacemakers or defibrillators. This can cause life-threatening electromagnetic interference.
- Do NOT use the adapter near auto-control equipment such as automatic doors or fire alarm equipment. This can cause accidents due to erroneous equipment behaviour.
- In case of abnormal odour or sound, overheating, or smoke coming out of the adapter, immediately disconnect the indoor unit from its power supply. Otherwise, this can lead to fire or malfunction. If this happens, consult your dealer.
- In case you drop or damage the adapter, disconnect the indoor unit from its power supply. Otherwise, this can lead to fire or malfunction. If this happens, consult your dealer.

3 About the kit

The EKMBPP1(A) kit is a Modbus interface to monitor and control the VRV and Sky Air ranges of air conditioners, as well as the VAM and VKM ventilation units. The interface is compatible with units that have a P1P2 remote controller connection, allowing control of up to 16 units in a single group. Functionality includes:

- Group control of unit settings (setpoint, fan speed, operation mode, airflow direction, on/off state)
- Control over the lock state of individual remote controller buttons
- Control limiting (limit possible user adjustments to specified ranges)
- Control over settings specific to VAM and VKM units (fan speed, damper control, on/off state)
- Unit monitoring (group and individual readback of unit data)
- Smart Grid control on Sky Air ranges.

3.1 Components



X1A Power supply connector

X2M RS-485 connector (Modbus)

X7M P1P2 connector

LED*, **HAP** Status LEDs (see "6 Configuration" [▸ 18] for more information about LED behaviour)

DS1 DIP switch

SS* Slide switches

a Mounting holes

3.2 Basic parameters

Parameter	Value
Power supply	Regulated voltage: 15~24 V DC, 120 mA maximum 3 W
Operating temperature	-10°C~50°C
Storage temperature	-25°C~70°C
Relative humidity	maximum 95% at 40°C, non-condensing

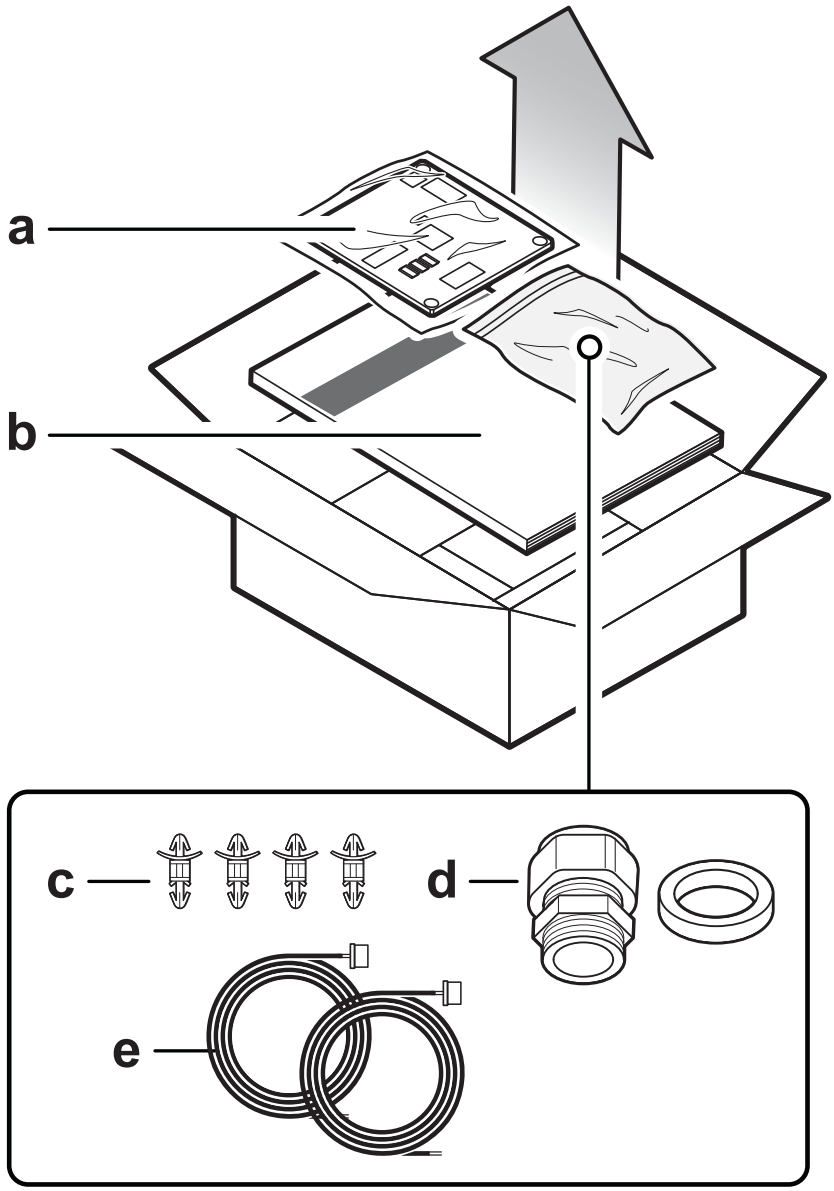
3.3 Compatibility

Make sure the indoor unit is compatible with the kit.

For an exhaustive list of compatible models and the corresponding required installation box, see the compatibility matrix or data book of the indoor unit or the general catalogue.

4 About the box

4.1 To unpack the adapter



a EKMBPP1(A) Modbus adapter PCB
b Installation manual
c PCB clamp (4×)
d Cable gland and locknut (M20×1.5)
e Wire harness for power supply (2×)

5 Installation

5.1 Precautions when installing the kit

DANGER: RISK OF ELECTROCUTION

- Turn off the indoor unit's power supply before installing the kit.
- Do NOT handle the kit with wet hands.
- Do NOT let the kit get wet.
- Do NOT disassemble, modify or repair the kit.
- Turn OFF the indoor unit's power supply if the kit is damaged.
- **Possible consequence:** electrocution.

WARNING

When applying this Modbus adapter (EKMBPP1(A)), the installation requirements described in the indoor and outdoor unit installation manuals of the system to which this Modbus adapter is connected, including any countermeasures, remain applicable.

For systems NOT using R32 refrigerant, this Modbus adapter can be the only (and main) remote controller connected. For systems using R32 refrigerant, the installation of additional remote controllers may be required.

5.2 Preparing the installation site

The EKMBPP1(A) is an option PCB. The installation procedure and installation location of the PCB vary depending on the unit(s). See the installer reference guide of the indoor unit for more information.

The KRP1BC101 installation box described in this manual has to be installed onto the indoor unit. In case of a field supplied casing, see the installation manual of that casing for more information on the installation location. See "5.3 To install the Modbus adapter" [▸ 11] for installation instructions.

INFORMATION

Also read the maximum cable length requirements set out in "5.4.1 Overview of electrical connections" [▸ 14].

5.3 To install the Modbus adapter

Install the EKMBPP1(A) inside the indoor unit, in the space foreseen for the option PCB. See the installer reference guide of the indoor unit for more information.

In case of KRP1BC101 installation box, follow the procedure in "5.3.1 To install the Modbus adapter with the KRP1BC101 installation box" [▸ 11] and the KRP1BC101 installation manual.

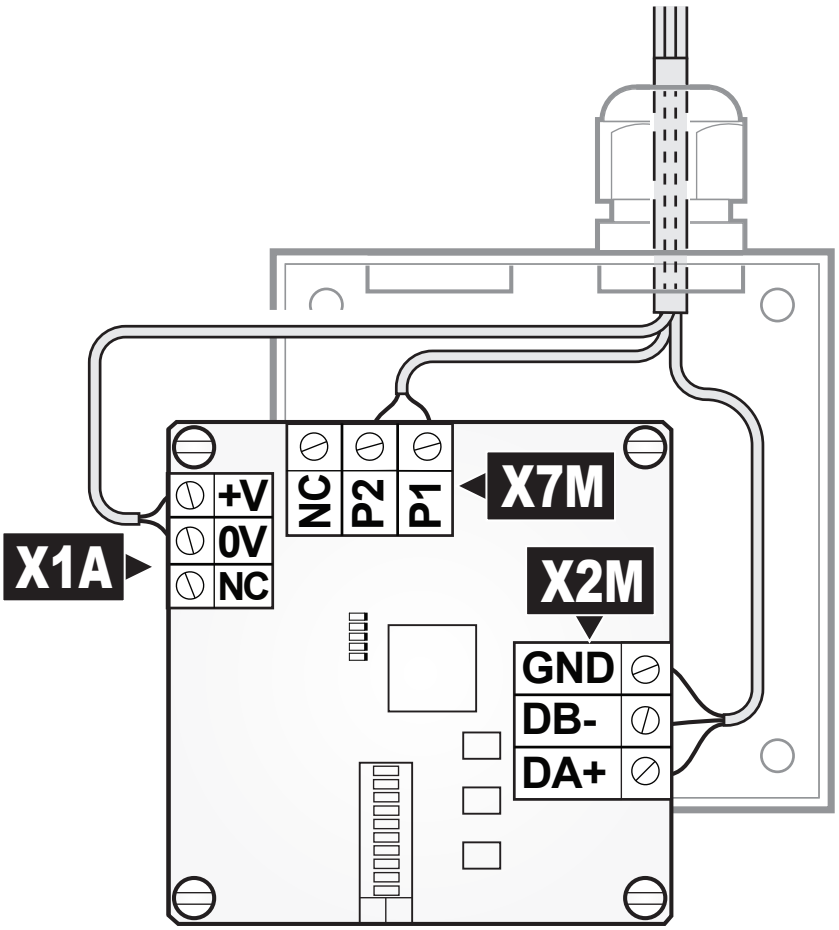
In case of field supplied casing, follow the procedure in "5.3.2 To install the Modbus adapter PCB with field supplied casing" [▸ 13] and the installation manual of that casing.

5.3.1 To install the Modbus adapter with the KRP1BC101 installation box

The steps below only describe the procedure for the KRP1BC101 installation box.

1. Open the KRP1BC101 installation box.
2. Replace the left black cable entry ring on the KRP1BC101 installation box with the cable gland and locknut (M20×1.5) provided in the EKMBPP1(A) kit.
3. Replace the right black cable entry ring on the KRP1BC101 installation box with the blinding bush provided in the KRP1BC101 kit.
4. Insert the PCB clamps into the mounting holes of the PCB.
5. Prepare the wiring while the PCB is still outside the installation box. The KRP1BC101 installation box is a tight space. It is recommended to prepare the wiring before installing the PCB inside the installation box.

- Insert 10~15 cm of the power supply cable, the RS-485 cable, and the P1P2 cable together through a heat shrink tube (field supplied) and use a heat gun to shrink the tube. Leave enough free room at the end of the cables so they can still be connected easily to the PCB once inside the installation box.
- With the cable gland oriented on top of the box, insert the power supply cable, the RS-485 cable, and the P1P2 cable through the right cable gland, from the outside of the box to the inside. Inside the box, the cables must split again into three separate cables so they can reach their respective terminals without any strain, as shown on the following figure.
- Connect the wiring to the PCB. For more information, also see "5.4 Connecting the electrical wiring" [▸ 13].



6 Install the PCB with the PCB clamps into the KRP1BC101 installation box. Make sure the PCB is oriented in the right direction:

- The cable glands on top of the box.
- X1A connector to the left.
- X7M connector below the cable glands.
- X2M connector to the right.

7 Provide wire strain relief.

- Inside the box: Tighten the cable glands. Leave enough cable slack inside the installation box before tightening.

8 Close the box with the screw provided in the KRP1BC101 kit.

9 Follow the installation instructions of the KRP1BC101 installation box. Make sure the box is mounted onto the indoor unit for earthing as described in the KRP1BC101 manual.

5.3.2 To install the Modbus adapter PCB with field supplied casing

In case of field supplied casing, EKMBPP1(A) MUST be installed using:

- A double insulated plastic box, or
- A metal box which is earthed properly to be compliant to the applicable electrical safety norm.

DANGER: RISK OF ELECTROCUTION

Connect the earth wires correctly. **Possible consequence:** electrocution.

5.4 Connecting the electrical wiring

DANGER: RISK OF ELECTROCUTION

Do NOT connect or turn on power supply before you have mounted the adapter, connected the electrical wiring and have closed the adapter.

DANGER: RISK OF ELECTROCUTION

When powered by the indoor unit or any other non-SELV (Safety Extra Low Voltage) power supply, all external wiring and electrically attached devices MUST be double insulated to prevent access by non-qualified persons. When this is not possible, the EKMBPP1(A) MUST be powered by a SELV power supply.

5.4.1 Overview of electrical connections

Power supply

	Connector X1A (screw terminal)
	See the manual of the indoor unit
	Only use harmonised wire providing double insulation suitable for the applicable voltage (1 m wiring harness included as accessory). Wire size: 0.32~1.25 mm² Maximum length: 10 m
	Voltage: see "3.2 Basic parameters" [▸ 8][(a)]

[(a)] When not powering the kit from the unit, make sure the external power supply adheres to the power supply specification.

Indoor unit (P1P2)

	Connector X7M (screw terminal)
	See the manual of the indoor unit
	Only use harmonised wire providing double insulation suitable for the applicable voltage. Wire size: 0.75~1.25 mm² Maximum length: 500 m
	Voltage: 16 V DC — 120 mA

Modbus Interface (RS-485)

	Connector X2M (screw terminal)
	See the installation manual of the Modbus interface

	RS-485 cables must use 24 AWG stranded, twisted pair, shielded or unshielded to CAT3, CAT4 or CAT5 specification. Use a twisted pair for connections DA, DB and an extra core for connection GND. Maximum length: 500 m

5.4.2 To connect the power supply

Power supplied by the indoor unit

Power for EKMBPP1(A) can be supplied from the indoor unit PCB.

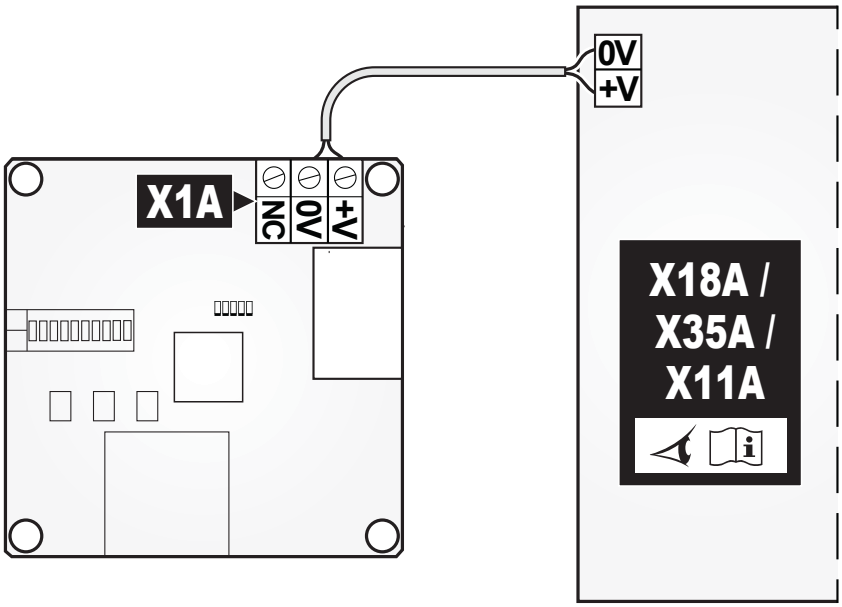
For Sky Air units, connect to X35A on the indoor unit PCB.

For VRV units, connect to either X18A or X35A on the indoor unit PCB. See the indoor unit installer reference guide to determine the correct terminal.

For VAM units, connect to either X11A, X18A or X35A on the VAM PCB.

1 Connect the wiring harness (EKMBPP1(A) accessory) to screw terminal X1A on the EKMBPP1(A).

2 Connect the other end of the wiring harness to the indoor unit PCB.



External power supply

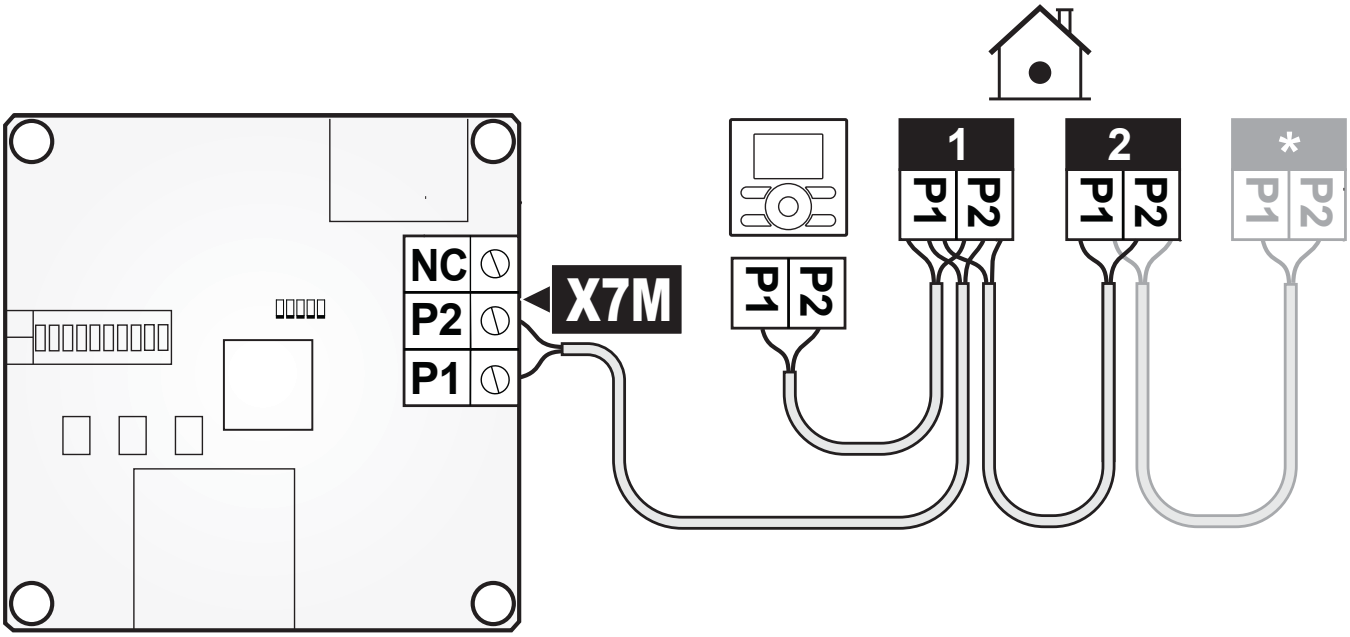
The EKMBPP1(A) can be powered by an external power supply (field supplied). For more information, see "3.2 Basic parameters" [▸ 8].

5.4.3 To connect the P1P2 wiring

INFORMATION

- The indoor unit's P1P2 terminal can be connected to maximum 2 controllers.
- In the indoor unit switch box, the cable is connected to the same terminals the user interface is connected to (P1P2). For more information, see the installation manual of the indoor unit.
- The 2 wires from the cable are NOT polarised. When connecting them to the terminals, their polarity does NOT matter.

1 Connect indoor unit terminals P1 and P2 to the EKMBPP1(A) terminals P1 and P2 on the X7M connector.



2 Ensure strain relief by routing the cable along the cable path suggested in the indoor unit installation manual.

INFORMATION

- The EKMBPP1(A) can operate in Master or Slave mode with any remote controller. Note that some wireless remote controllers (BRC*) may require the corresponding receiver to be configured to operate in Sub (S) mode when the EKMBPP1(A) is in Main (M) mode. See the installation manual of the unit for more information.
- Only 1 Modbus master is allowed.

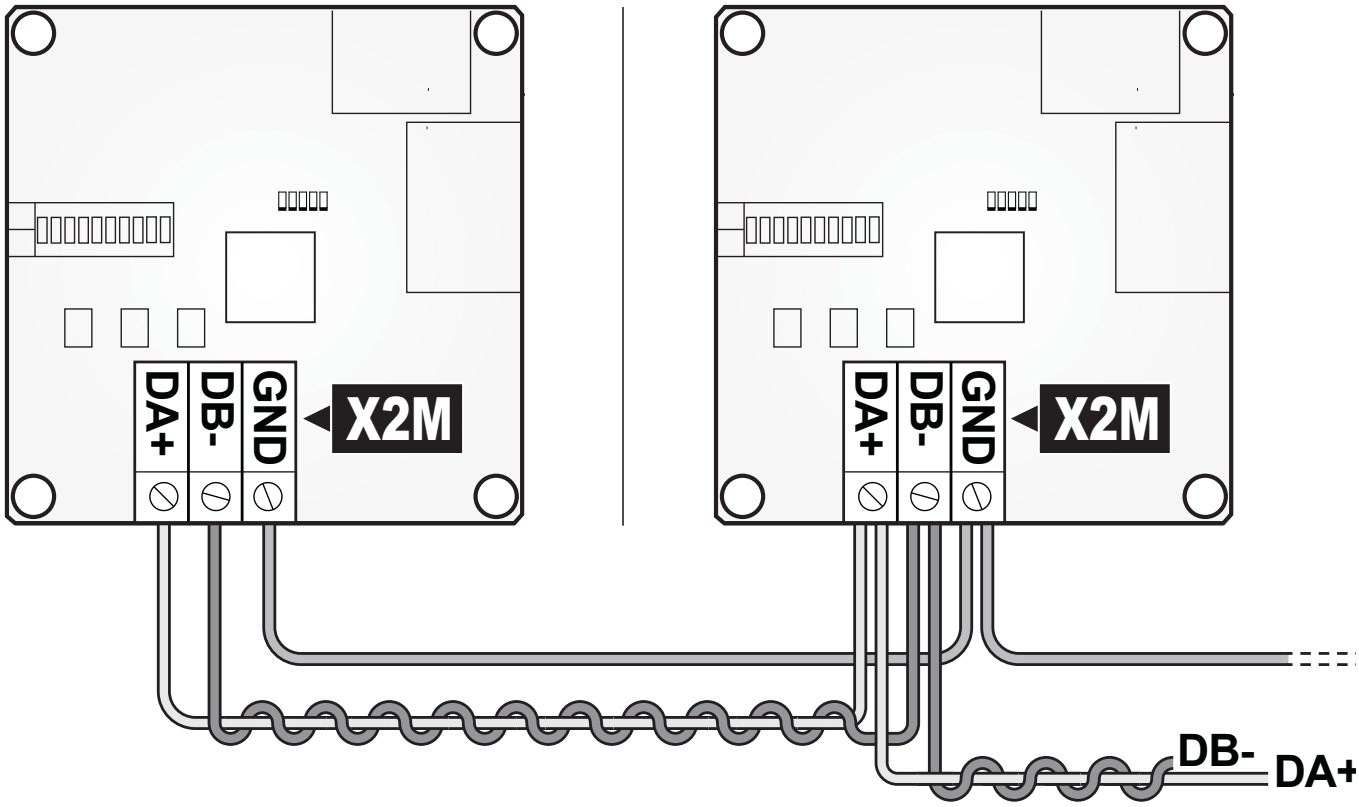
INFORMATION

Only valid for EKMBPP1A: No more than 32 Modbus devices including the Modbus Master must be installed on a single network bus. Additional devices can be added by using the RS-485 physical layer repeater.
Only valid for EKMBPP1: No more than 7 EKMBPP1 devices must be installed on a single network bus.

5.4.4 To connect the RS-485 wiring

The RS-485 D-Bus MUST be installed using a twisted pair cable, as shown in the following figure, to connect terminals DA(+) and DB(-).

- Terminal DA(+) MUST be connected to all other DA(+) terminals, on every EKMBPP1(A) kit.
- Terminal DB(-) MUST be connected to all other DB(-) terminals, on every EKMBPP1(A) kit.
- The common terminal ground (GND) MUST be connected together, on every EKMBPP1(A) kit. When using a shielded cable, the shield can be used for this purpose.



NOTICE

It is recommended that the GND connection is connected to local earth at a single point only.

For information on the terminating resistance, see "6.3.4 Terminating resistor settings" [▸ 23].

6 Configuration

6.1 Status LEDs

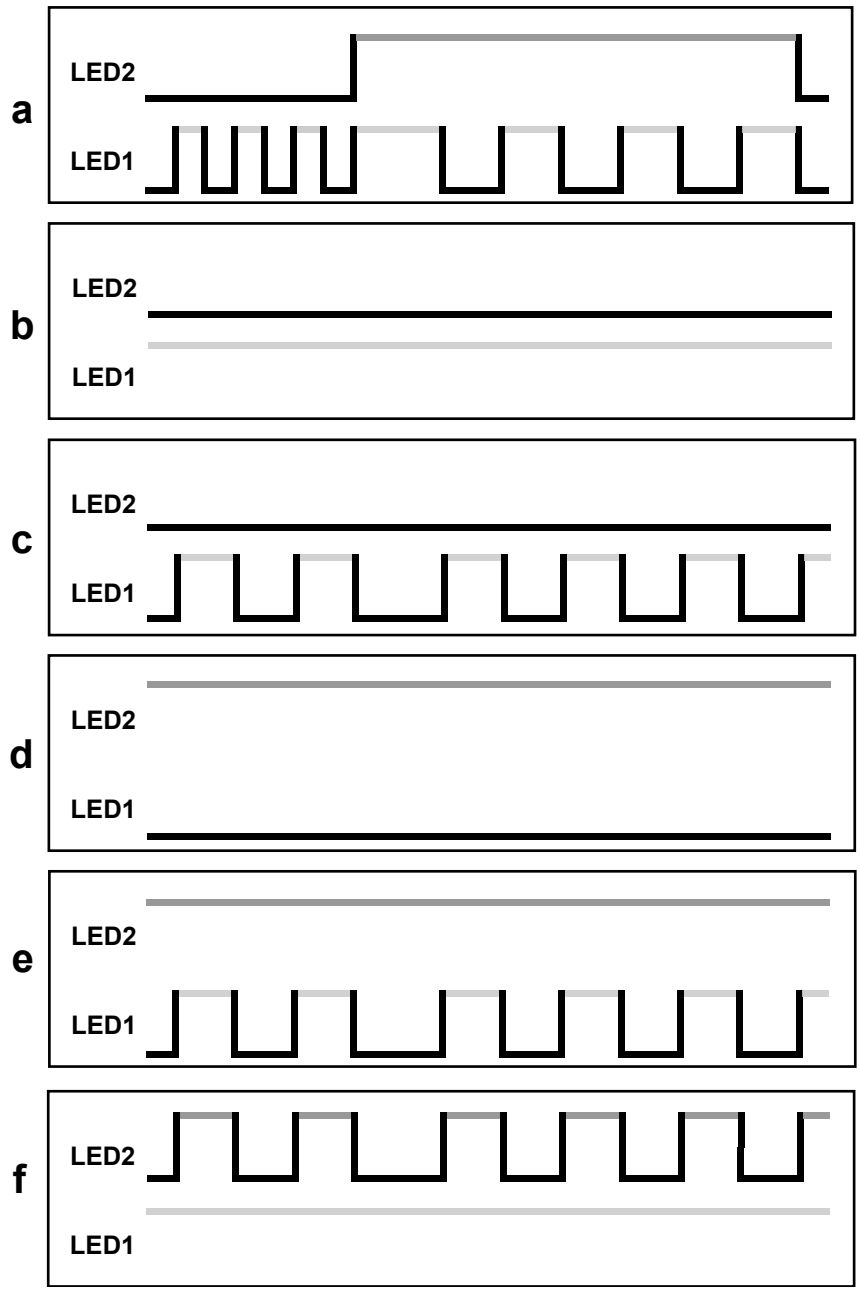
The EKMBPP1(A) has 5 LEDs that display information about the current status. See "3.1 Components" [▸ 7] for the location of the LEDs on the PCB.

LED	Description
LED1	Status LED 1 (A)
LED2	Status LED 2 (B)
LED3	Indicates receiving P1P2 communication[(a)]
LED4	Indicates receiving Modbus (RS-485) communication[(a)]
HAP	Indicates normal CPU operation[(b)]

[(a)] LED blinks for 20~40 ms every time communication is received.

[b] LED blinks at a 400 ms interval.

LED 1 and LED 2 behaviour



LED 1 Green LED
LED 2 Red LED
LED ON
LED ON
LED OFF
a Power-up sequence
b No error
c P1P2 search mode
d Unit error
e U5 error (AC unit is missing)
f RS-485 communicaton timeout

6.2 P1P2 communication

The EKMBPP1(A) enters P1P2 search mode in three cases:

1 When the adapter is powered on, it enters the P1P2 search mode. The adapter cycles between Sub mode and Main mode.
2 If the adapter is in Main mode, it enters the P1P2 search mode when a communication error occurs with all connected indoor units.
3 If the adapter is in Sub mode, it enters the P1P2 search mode when a communication error occurs with the main R/C.

When the power is first turned on, the adapter operates in Sub mode. The adapter waits for an initial request from the main remote controller. The adapter then switches to Main mode if no initial command is received for 90 seconds after power ON. In Main mode, the adapter performs auto addressing and attempts to assign addresses to indoor units. If there is no response, the adapter will try to auto address again. If there is still no response, the adapter will switch back to Sub mode. Upon switching back to Sub mode, the adapter listens for a command for 15 seconds before switching to Main mode again.

6.3 Modbus protocol

Parameter	Value
Network	3 wire RS-485
Mode	Modbus RTU Slave
Baud rate	9600
Parity	None
Stop bits	1
Register Base	0

6.3.1 Modbus address range

Set the Modbus address range (0~63) with the DIP switch. See "3.1 Components" [▸ 7] for the location of the LEDs on the PCB.

See "10.1 Modbus addresses" [▸ 36] for an overview of all Modbus address DIP switch combinations.

6.3.2 Modbus registers

The EKMBPP1(A) supports 2 types of registers: holding registers and input registers.

Register type	Access	Function(s)
Holding register	Read/Write	Control and command, readback and monitoring
Input register	Read-only	Readback and monitoring

The input registers are used to access all analogue and digital values. The register values are 2 byte (16 bit) values. Depending on the values accessed, a number of specific conventions apply to the data types the registers return:

Data type	Value range	Convention
Digital	0~1	▪ 0: False ▪ 1: True
Integer	0~65535	No value scaling required.
Temperature	0~65535	▪ To allow for greater precision, temperatures values are returned multiplied by 100. ▪ Negative temperature values are returned as signed integers. Any value > 32767 is to be converted into a negative value by subtracting 65536 from it.[(a)]

[(a)] For example, a readback value of 2050 is a positive temperature (< 32767): 2050/100 = 20.50°C. However, a readback value of 65036 is a negative temperature (> 32767): 65036−65536 = −500. Dividing −500 by 100 results in a temperature of −5.00°C.

Accessing the registers is done using any of the following standard Modbus functions:

Function code (hex code)	Function name	Register count
03 (03h)	Read holding register	1~10
04 (04h)	Read input register	1~10
06 (06h)	Preset single holding register	1
16 (10h)	Preset multiple holding registers	1~10

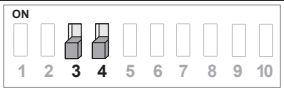
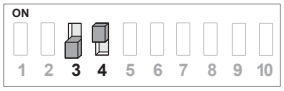
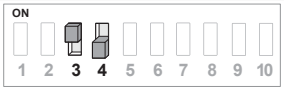
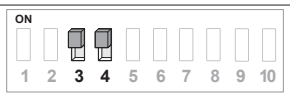
INFORMATION

Throughout this document, when reference is made to any registers, the notation of registers and their addresses follows a consistent format:

- `H0010` where `H` indicates a holding register, and `0010` refers to the register address.
- `I0010` where `I` indicates an input register, and `0010` refers to the register address.

6.3.3 Modbus master timeout

The EKMBPP1(A) can be configured to operate with an optional Modbus master timeout. When no holding register occurs for a period of 120 seconds, a timeout event occurs: all units switch on with their current settings and the status LEDs indicate an RS-485 communication timeout. For more information about LED behaviour, see "6.1 Status LEDs" [▸ 18].

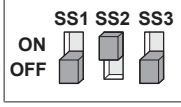
DIP switch setting	Timeout configuration
	No Modbus master timeout
	No Modbus master timeout
	Modbus master timeout in case no holding register write command occurs for 120 seconds. ▪ All units switch on with the current settings. ▪ Remote controllers are unlocked. ▪ The value of the Global Update register is set to OnChange.
	Modbus master timeout in case no holding register write command occurs for 120 seconds. ▪ All units switch on with the current settings. ▪ The lock state of the remote controllers remains unchanged. However, remote controller ON/OFF operation is unlocked. If it is switched OFF after this, the remote controller ON/OFF operation is locked again.

INFORMATION

The Modbus master timeout ONLY overrules the `Recommended on` and `Forced on` Smart Grid operation in case no holding register write command is received for 120 seconds. The `Forced off` Smart Grid operation will NOT be overruled.

6.3.4 Terminating resistor settings

The EKMBPP1(A) has 3 slide switches to set the terminating resistance. See "3.1 Components" [▸ 7] for the location of the slide switches on the PCB.

Terminating resistor setting	Resistance (Ω)
	0
	100
	120

6.4 Control functions

6.4.1 Unit control

Holding registers allow the EKMBPP1(A) to control the functions of Sky Air and VRV air conditioning units that are available from the standard remote controller.

For more information about the types of registers and possible data types, see "6.3.2 Modbus registers" [▸ 21]. The following holding registers are available:

Holding register	Address	Name	Range[a]	Description
`H0001`	40002	Setpoint	16~32	-
`H0002`	40003	Fan speed[b]	1~5[c]	▪ 1: Low ▪ 2: Medium Low[d] ▪ 3: Medium ▪ 4: Medium High[d] ▪ 5: High[e]

Holding register	Address	Name	Range[a]	Description
H0003	40004	Operation mode[f]	0~4[g]	▪ 0: Auto ▪ 1: Heating ▪ 2: Fan/Ventilation[h] ▪ 3: Cooling ▪ 4: Dry
H0004	40005	Airflow direction[i]	1~7[j]	▪ 1: Swing ▪ 2: 0 degrees ▪ 3: 20 degrees ▪ 4: 45 degrees ▪ 5: 70 degrees ▪ 6: 90 degrees
H0005	40006	ON/OFF	0~1[k]	▪ 0: OFF ▪ 1: ON

[a] If a value is out of range, it will be set to the upper or lower limit value.
[b] If the indoor unit enters a Fan speed that is not defined, the register value will not be updated.
[c] If the value is out of range, Fan speed will be set to 3: Medium.
[d] In case the unit supports 5 fan speed settings. If the unit has 3 fan speed settings, only values 1, 3 and 5 (Low, Medium and High) are applicable.
[e] When the indoor unit fan speed is set to Auto, the register will read 5 (High).
[f] If the indoor unit enters an Operation mode that is not defined, the register value will not be updated.
[g] If the value is out of range, it will be ignored.
[h] In case of ventilation units.
[i] If the indoor unit enters an Airflow direction that is not defined, the register value will not be updated.
[j] If the value is out of range, 0 will be set to 0: P0; 7 or more will be set to 7: Swing.
[k] If the value is out of range, ON/OFF will be set to 1: ON.

6.4.2 Control update mode

Each of the unit control functions (see "6.4.1 Unit control" [▸ 23]) has a corresponding update register. The update register determines how the control commands update the unit and whether the corresponding remote controller button(s) are locked or unlocked. The following update modes are available:

Update mode	Remote controller button(s)	Functionality
0:LastTouch	Unlocked	Unit setting updates when a holding register write occurs even if the value remains unchanged.
1:Central	Locked	The corresponding remote controller button(s) are locked. The value in the holding register is repeatedly written to the unit.
2:Local	Unlocked	Updates to the holding registers are not sent to the unit.
3:OnChange	Unlocked	Unit setting updates when a holding register write occurs, ONLY if the value changes.

Update mode 0 (LastTouch) allows unit setting updates to be performed via the remote controller or using Modbus registers. As such, this requires that writing to the Modbus holding register only occurs when a change is made. Update mode 3 (OnChange) is used when repeated writes to the Modbus holding register occur, but unit setting updates will ONLY be sent to the unit if the value written to the register changes.

If an undefined value is written to the Control update mode register, the Modbus adapter will not execute any control over the corresponding item.

INFORMATION

Smart Grid operation is not compatible with update mode 2 (Local).

The Global Update register (H0010) can be used to set all update registers with a single command. Alternatively, the other registers can be written to individually to only update a certain unit control function value:

Holding register	Address	Name	Update mode
H0010	40011	Global Update	▪ 0: LastTouch ▪ 1: Central ▪ 2: Local ▪ 3: OnChange
H0011	40012	Setpoint Update	
H0012	40013	Fanspeed Update	
H0013	40014	Mode Update	
H0014	40015	Airflow direction Update	
H0015	40016	ON/OFF Update	

INFORMATION

On power up, the default update mode for all holding registers is LastTouch (0).

6.4.3 Control limiting

The holding registers for control limiting allow adjustments to settings made by a remote controller or a central controller to be limited to specified ranges. In case of setpoints, optional limitation of minimum and maximum values is possible. Fan speed, airflow direction and mode controls can also be limited to specific settings using an inhibit value. When the limit value is set to 0, no control limiting is applied.

The inhibit values for fan speed, mode and airflow direction are calculated by adding together the individual inhibit values for each setting to be inhibited. **Example:** You want to limit the possible operation modes someone can select with the remote controller (or a central controller) to Heating and Cooling. The inhibit values of the Auto, Fan and Dry modes are added together: 1 (Auto) + 4 (Fan) + Dry (16) = 21. In this case, 21 is the correct inhibit value.

Holding register	Address	Name	Range / Description[a]
H0020	40021	Setpoint Min	16~32[b]
H0021	40022	Setpoint Max	16~32[b]
H0022	40023	Fan Speed Inhibit	Inhibit value:[c] ▪ 2: Low ▪ 4: Medium Low ▪ 8: Medium ▪ 16: Medium High ▪ 32: High
H0023	40024	Mode Inhibit	Inhibit value:[c] ▪ 1: Auto ▪ 2: Heating ▪ 4: Fan ▪ 8: Cooling ▪ 16: Dry

Holding register	Address	Name	Range / Description[a]
H0024	40025	Airflow direction Inhibit	Inhibit value:[c] ▪ 2: Swing ▪ 4: 0 degrees ▪ 8: 20 degrees ▪ 16: 45 degrees ▪ 32: 70 degrees ▪ 64: 90 degrees

[a] When the value is set to 0, no control limiting is applied.

[b] Setpoint Min > Setpoint Max is invalid. If a limit is applied for Setpoint Min, also apply a limit for Setpoint Max to avoid an invalid setting (Setpoint Min > 0 (No Limit)).

[c] If everything is inhibited, the Inhibit is invalid. The default setting on power up is No Limit. When an inhibited setting is selected, the non-restricted setting with the lowest inhibit value will be set instead.

6.4.4 VAM-specific control

In addition to the standard unit control functions (see "6.4.1 Unit control" [▸ 23]), the EKMBPP1(A) can be used to control functions specific to VAM and VKM units. The following holding registers are available:

Holding register	Address	Name	Range	Description
H0030	40031	Ventilation Mode	0~2[a]	▪ 0: Auto ▪ 1: Cross flow / Heat recovery ▪ 2: Bypass
H0031	40032	Ventilation Rate	1~2[b]	▪ 1: Low ▪ 2: High

[a] If the value is out of range, Ventilation Mode will be set to 0: Auto.

[b] If the Ventilation Rate is set to Automatic, the register will read 2: High. If the value is out of range, Ventilation Rate will read 2: High.

6.4.5 Smart Grid control

The Smart Grid control holding registers allow for control over connected AC units in the Sky Air range. For more information about Smart Grid operation modes, see "6.6 Smart Grid" [▸ 31].

Holding register	Address	Name	Range	Description
H0055	40056	Smart Grid operation mode	0~3	▪ 0: Free running ▪ 1: Forced off ▪ 2: Recommended on ▪ 3: Forced on

Holding register	Address	Name	Range	Description
H0056	–	–	–	Reserved for future use
H0057	–	–	–	Reserved for future use

6.5 Readback data

All readback data is available in the input registers.

6.5.1 Remote controller readback

Input register	Address	Name	Range
I0050	30051	Remote controller temperature (for 1 indoor unit only)	°C multiplied by 100 (available for 1 indoor unit only)
I0051	30052	Remote controller operation mode (group)[(a)]	▪ 0: Idle/Fan ▪ 1: Heating ▪ 2: Cooling ▪ 3: Heating and cooling

[(a)] For IAQ units, or when operation mode is set to Ventilation, the register value is fixed at 0.

INFORMATION

The remote controller temperature sensor value (I0050) is only available if there is only 1 indoor unit on the P1P2 network. In addition, the remote controller (if present) has to be configured as Sub. When there are multiple indoor units, or when the remote controller (if present) is configured as Main, the register is fixed at 0.

6.5.2 Group readback

Group data registers provide a summary of the data from all active indoor units on the network.

Input register	Address	Name	Range	Description
I0020	30021	Unit Count	0~16	Number of units found on the network
I0021	30022	Is Error	0~1	▪ 0: No error ▪ 1: At least 1 unit in error
I0022	30023	Error Code	0~65535	▪ 255: No error ▪ Other values: error code from first unit in error
I0023	30024	Return Air Average	°C × 100	Average of all unit return air temperatures

Input register	Address	Name	Range	Description
I0024	30025	Filter Alarm	0~1	▪ 0: No alarm ▪ 1: At least one unit with filter alarm
I0025	30026	Return Air Min	°C × 100	Minimum of all unit return air temperatures
I0026	30027	Return Air Max	°C × 100	Maximum of all unit return air temperatures
I0030	30031	Thermo On	0~3	Summary of unit operation:[(a)] ▪ 0: Idle/Fan ▪ 1: Heating ▪ 2: Cooling ▪ 3: Heating and cooling
I0035	30036	Defrost	0~1	▪ 0: No defrost ▪ 1: At least 1 unit in defrost[(b)]

[(a)] When there is a mix of units in Idle/Fan and Heating operation mode, the register will read 1 (Heating). When there is a mix of units in Idle/Fan and Cooling operation mode, the register will read 2 (Cooling).

[(b)] Indicates an indoor unit in pressure equalisation, Hot start/Pre-heat, or an outdoor unit in Defrost operation.

6.5.3 Unit readback

Unit data is available for each of the indoor units connected to the P1P2 network. The first two digits of the unit input register indicate the indoor unit number ((0~15)+1=1~16). The unit number (+1) is multiplied by 100, and an offset is added to the number to indicate a specific feature.

Input register			Name	Range	Notes
Unit 1	…	Unit 16			
I0120	…	I1620	Unit exists	0~1	▪ 0: No unit found ▪ 1: Unit found
I0121	…	I1621	Is Error	0~1	▪ 0: No unit error ▪ 1: Unit in error
I0122	…	I1622	Error code	0~65535	▪ 255: No error ▪ Other values: error code
I0123	…	I1623	Return Air Temperature	°C × 100	Unit return air sensor value
I0124	…	I1624	Filter Alarm	0~1	▪ 0: No alarm ▪ 1: Filter alarm
I0130	…	I1630	Thermo On	0~2	▪ 0: Idle/Fan ▪ 1: Heating ▪ 2: Cooling

Input register			Name	Range	Notes
Unit 1	…	Unit 16			
I0131	…	I1631	Coil In Temperature[a]	°C × 100	Coil inlet temperature
I0132	…	I1632	Coil Out Temperature[a]	°C × 100	Coil outlet temperature

[a] Values are only available when the EKMBPP1(A) is operating in P1P2 Main mode.

The following table outlines the logic to determine the register addresses for every unit (1~16). The second and third digits indicate the indoor unit number.

Unit 1 input register	Unit 1 address	…	Unit 16 input register	Unit 16 address
I0120	30121	…	I1620	31621
I0121	30122	…	I1621	31622
I0122	30123	…	I1622	31623
I0123[2]	30124	…	I1623	31624
I0124	30125	…	I1624	31625
I0130	30131	…	I1630	31631
I0131	30132	…	I1631	31632
I0132	30133	…	I1632	31633

6.5.4 Error codes

The error codes generated by the EKMBPP1(A) are encoded using a standard table to allow standard Daikin error codes to be generated from the readback value.

Code value	Meaning
0	Waiting for data
255	No error
14384	(80) Group error, timeout, on no units found
14388	(84) Unit missing, reported if unit data previously observed
All others	Default unit error codes

Error codes that are returned from the Modbus input register are 16 bit values. The error code is encoded in the 16 bit value by encoding the pair of 8 bit error characters in the high and low byte parts of the 16 bit value. Each of the 8 bit values represents an ASCII character. Combined, the two ASCII characters form the default unit error code. For more information about unit errors, see the installer reference guide of the unit.

6.6 Smart Grid

In case the air conditioning system is connected to a third-party device able to provide Smart Grid requests (e.g. a power meter connected to the grid), the EKMBPP1(A) is able to receive this information and use it in order to execute Smart Grid requests to control the power consumption of the system. When a Smart Grid request is made, the values of the operation ON/OFF state, operation mode and setpoint of the unit are stored in memory, to be restored when the grid requests normal operation again. There are 4 possible Smart Grid operation mode requests:

Free running (normal operation)

There is no Smart Grid intervention. The unit operates normally, respecting any local and scheduled configuration.

Forced off (blocked operation)

There is a Smart Grid request to switch the unit OFF. All units connected to the adapter are switched OFF.

Recommended on

There is a Smart Grid request to consume power, if possible.

- All units connected to the adapter are switched ON.
- Room buffering (space heating/cooling) will be applied. The system will heat up or cool down to the setpoint ±1°C.

Forced on

There is a Smart Grid request to consume power.

- All units connected to the adapter are switched ON.
- Room buffering (space heating/cooling) will be applied. The room will heat up or cool down to the setpoint ±2°C.

INFORMATION

Smart Grid requests can be overruled, except for `Forced off` operation. When trying to overrule `Forced off` operation by requesting operation ON, the EKMBPP1(A) will immediately request operation OFF again.

INFORMATION

The Modbus master timeout ONLY overrules the `Recommended on` and `Forced on` Smart Grid operation in case no holding register write command is received for 120 seconds. The `Forced off` Smart Grid operation will NOT be overruled.

INFORMATION

In case control limiting is applied to the remote controller (see "6.4.3 Control limiting" [▸ 26]), the Smart Grid request will only change unrestricted settings. For example, if the setpoint is restricted to a certain value, a `Forced on` request will switch the unit on, but it will not change the setpoint. However, note that a `Forced off` request is executed regardless of any set remote controller limits. Setpoint restrictions can also be set from another centralised controller or a remote controller. These restrictions will overrule the Smart Grid setpoint change and thus deactivate the Smart Grid request.

INFORMATION

After a power failure of the adapter, check the setpoint on the remote controller to make sure the unit is operating as expected. If the setpoint deviates from the current configuration, change the setpoint manually on the remote controller. This will restore the correct configuration. Building Management Systems can implement logic to automatically detect the situation and restore the correct configuration.

INFORMATION

Only 1 Modbus master is allowed. If the system is under control by a Smart Grid provider, this means it cannot be controlled by a BMS (building management system) at the same time and vice versa.

6.7 Software update

To perform software updates, a PC cable (EKPCCAB4) and the Updater Tool are required. Connect the EKMBPP1(A) to a PC with the PC cable. The latest version of the Updater Tool can be downloaded from the Daikin Business Portal.

7 Hand-over to the user

After having installed and configured the adapter, hand over this installation manual to the user and make the user aware of the following safety precautions.

DANGER

- Do NOT disassemble, modify, or repair the adapter. This can cause fire, electrical shock, or injury.
- Do NOT allow the adapter to get wet or use it when bathing or doing similar activities with water. This can cause electrical shock or fire.
- Do NOT use the adapter near medical equipment, or persons using cardiac pacemakers or defibrillators. This can cause life-threatening electromagnetic interference.
- Do NOT use the adapter near auto-control equipment such as automatic doors or fire alarm equipment. This can cause accidents due to erroneous equipment behaviour.
- In case of abnormal odour or sound, overheating, or smoke coming out of the adapter, immediately disconnect the indoor unit from its power supply. Otherwise, this can lead to fire or malfunction. If this happens, consult your dealer.
- In case you drop or damage the adapter, disconnect the indoor unit from its power supply. Otherwise, this can lead to fire or malfunction. If this happens, consult your dealer.

8 Disposal

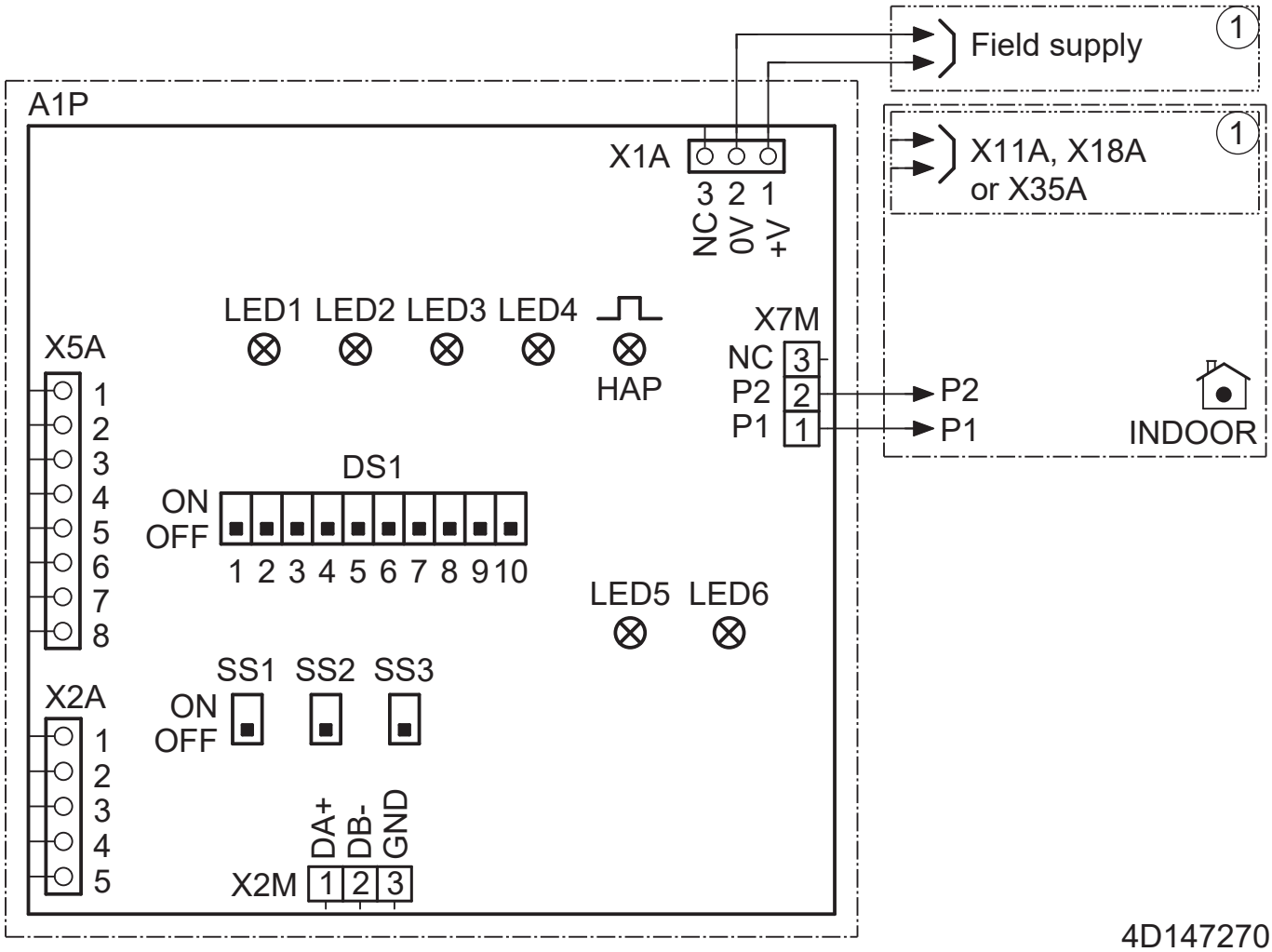
- Units are marked with the following symbol:

This means that electrical and electronic products may NOT be mixed with unsorted household waste. Do NOT try to dismantle the system yourself: dismantling the system MUST be done by an authorised installer and MUST comply with applicable legislation.
Units MUST be treated at a specialised treatment facility for reuse, recycling and recovery. By ensuring this product is disposed of correctly, you will help to prevent potential negative consequences for the environment and human health. For more information, contact your installer or local authority.

9 Technical data

A **subset** of the latest technical data is available on the regional Daikin website (publicly accessible). The **full set** of the latest technical data is available on the Daikin Business Portal (authentication required).

9.1 Wiring diagram



Earth wiring

① Several wiring possibilities

Option

Not mounted in switch box

Wiring depending on model

PCB

Indoor unit

HAP, **LED*** Light-emitting diode (service monitor is green)

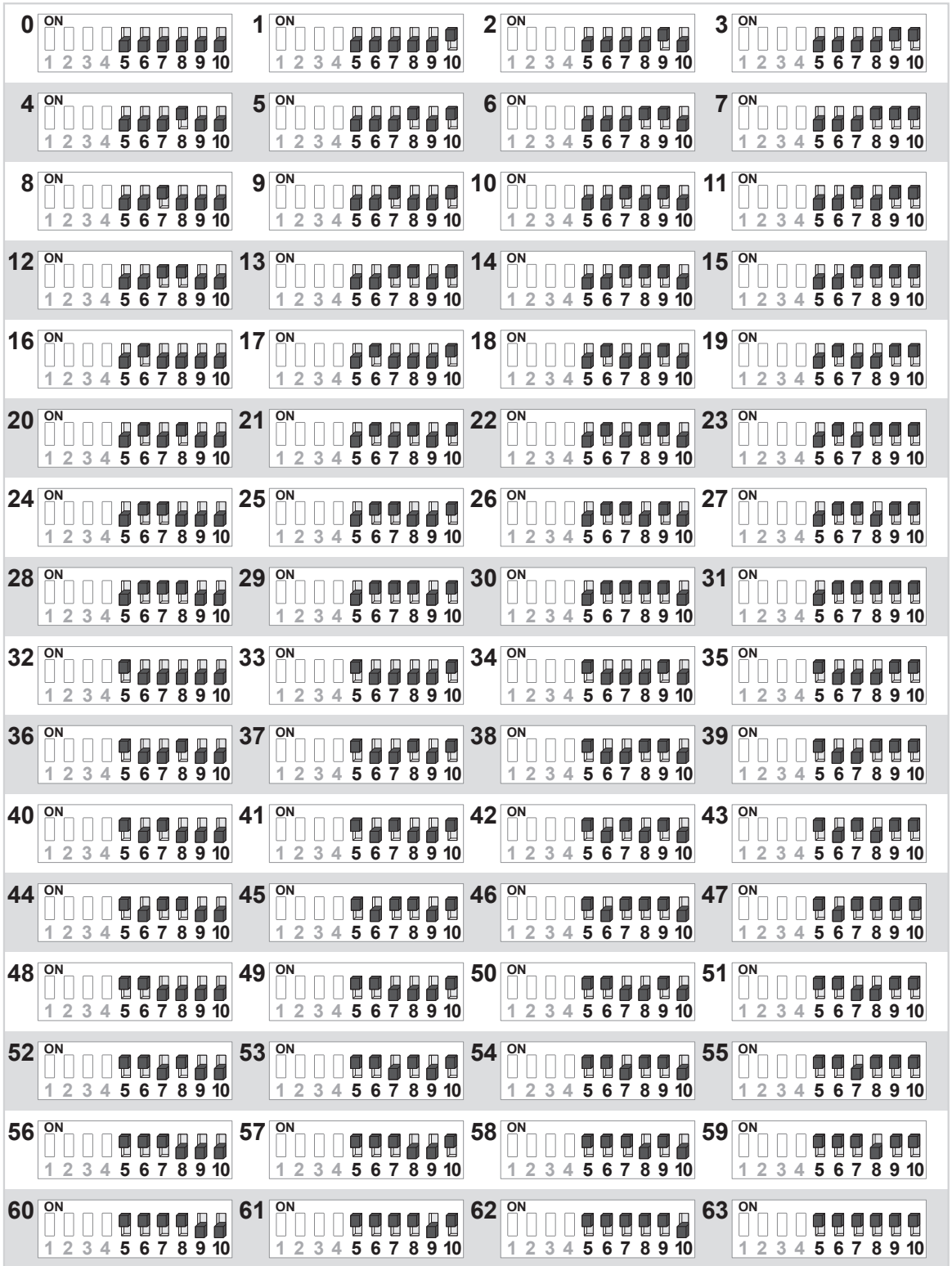
SS* Slide switch

X*A, **X*M**, **CN***, **TN*** Connector

X2A Connector for SW Updater Tool

10 Appendix

10.1 Modbus addresses



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