



MITSUBISHI Low-Voltage Air Circuit Breakers type AE



CC-Link Interface unit (BIF-CC)

INSTRUCTION MANUAL

ACB types covered in this manual

AE630-SW AE1000-SW AE1250-SW AE1600-SW

AE2000-SWA

AE2000-SW AE2500-SW AE3200-SW

AE4000-SWA

AE4000-SW AE5000-SW AE6300-SW


IMPORTANT NOTE: Before using these Series AE breakers, please read these instructions carefully, and make sure that all actual users also read them.


● SAFETY PRECAUTIONS ●



Make sure to observe the following matters of safety


- Before using the device, make sure to read these safety precautions and instruction manual thoroughly. The cautionary items noted herein are of the utmost importance for the safe use of this device, and should always be strictly followed.
- Make sure that the final user receives this manual.
- This instruction manual is prepared for an electrical expert.


The following symbols have been used:

 DANGER	Failure to follow these instructions may result in dangerous conditions, which in turn could lead to severe personal injury or even death.
---	--

 CAUTION	Failure to follow these instructions may result in dangerous conditions, which could result in moderate to slight personal injury or damage to equipment and facilities
--	---

	This means prohibition. Never ignore this indication.
	Make sure to follow these instructions without fail.

 DANGER
<ul style="list-style-type: none">● Do not use the device on the conditions over range. Failure to do so may result in fire.● Do not touch the terminals. There is a risk of electrical shock.

 CAUTION
<ul style="list-style-type: none">● A qualified electrician should install this equipment.● Make sure to tighten the terminal screws to the torque specified in this manual. Failure to do so may result in malfunction or fire.● Do not install in areas subject to high temperatures, high humidity, dust, corrosive gas, vibrations, shocks, etc. To do so may result in malfunction or fire.● Install so that trash, concrete dust, iron filings or rainwater cannot get into the device interior. Failure to do so may result in malfunction or fire.

■ EMC Directive

In IEC60947-2, following EMC tests are required.

- 1) Radiated radio frequency emission
- 2) Radiated radio frequency electromagnetic field immunity

BIF-CC is confirmed to IEC60947-2 in accordance with following conditions.

- 1) BIF-CC shall be installed in the panel board. It effects not only for safe against electric shock but also to interrupt noise emission from the device.
- 2) When attaching the panel's top plate or base plate, mask painting and weld so that good surface contact can be made between the panel and plate.
- 3) To ensure good electrical contact with the panel board, mask the paint on the installation bolts of the inner plate in the panel board so that contact between surfaces can be ensured over the widest possible area.
- 4) Earth the panel board with a thick wire so that a low impedance connection to ground can be ensured even at high frequencies (*ground resistance: 100 ohm or less).
- 5) Provide an earthing point near the BIF-CC. Earth the FG terminal of BIF-CC with the thickest and shortest wire possible (*ground resistance: 100 ohm or less). The FG terminal function is to pass the noise generated in the BIF-CC or the noise from outside to the ground, so an impedance that is as low as possible must be ensured. Also, in case that the CC-Link cable is extracted to the outside of the panel board, earth it at point close to the exit of panel board. An appropriate installation has the effect of suppressing the generation of the electromagnetic induction and the high frequency noise.
- 6) If the measure described above does not provide sufficient shielding effects, fit ferrite cores to the power supply line of BIF-CC. We recommend ferrite core made by TDK (type: ZCAT2032-0930). For CC-Link cables, however, do not use ferrite cores.
- 7) CC-Link cable, Internal transmission cable and BIF-CON cable shall be kept distance more than 100mm from the power distribution circuit. However, when parallel installation with the power distribution circuit is required, it is necessary to increase to 300mm.

■ Dielectric voltage test

The dielectric voltage test should be executed according to the table below. Do not test in points other than a following table because unit is damaged.

Measuring point	Condition	Notes
Between main circuit and BIF-CC terminals (P1 and P2)	2500VAC 1min.	1. Connect terminals (DA, DB, DG, SLD and FG) to the earth side. 2. Apply voltage across the entire terminals (DA, DB, DG, SLD and FG).
Between main circuit and BIF-CC terminals (DA, DB, DG, SLD and FG)		
Between BIF-CC terminals (P1 and P2) and BIF-CC terminals (DA, DB, DG, SLD and FG)	1500VAC 1min.	
Between main circuit and BIF-CON terminals (C1, C2, A1, A2, U1 and U2)	2500VAC 1min.	
Between BIF-CC terminals (P1 and P2) and BIF-CON terminals (C1, C2, A1, A2, U1 and U2)		
Between BIF-CC terminals (DA, DB, DG, SLD and FG) and BIF-CON terminals (C1, C2, A1, A2, U1 and U2)		
BIF-CON terminals (C1 and C2), BIF-CON terminals (A1 and A2), BIF-CON terminals (U1 and U2), each other	1500VAC 1min.	1. Connect terminals (DA, DB, DG, SLD and FG) to the earth side. 2. Apply voltage across the entire terminals (DA, DB, DG, SLD and FG).

■ Guarantee

The period of guarantee is for 1 year from the sale date except in case of the failure has been caused by bad handling of the device.

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1. System Overview

BIF-CC (CC-Link Interface unit) is used for monitoring and operating ACB with CC-Link network.

- Monitoring:
 - Measurement items (current, voltage, power, harmonics, energy, etc)
 - Trip and alarm information (present status, history)
 - Breaker status (Breaker ON/OFF status, Position of Breaker (*BIF-CON and BIF-CL is required)).
- Operating:
 - Breaker control (ON/OFF/Spring charge) (*CC/SHT/MD and BIF-CON is required).
 - Reset (Trip indicator, Maximum and Minimum measurement, history information).

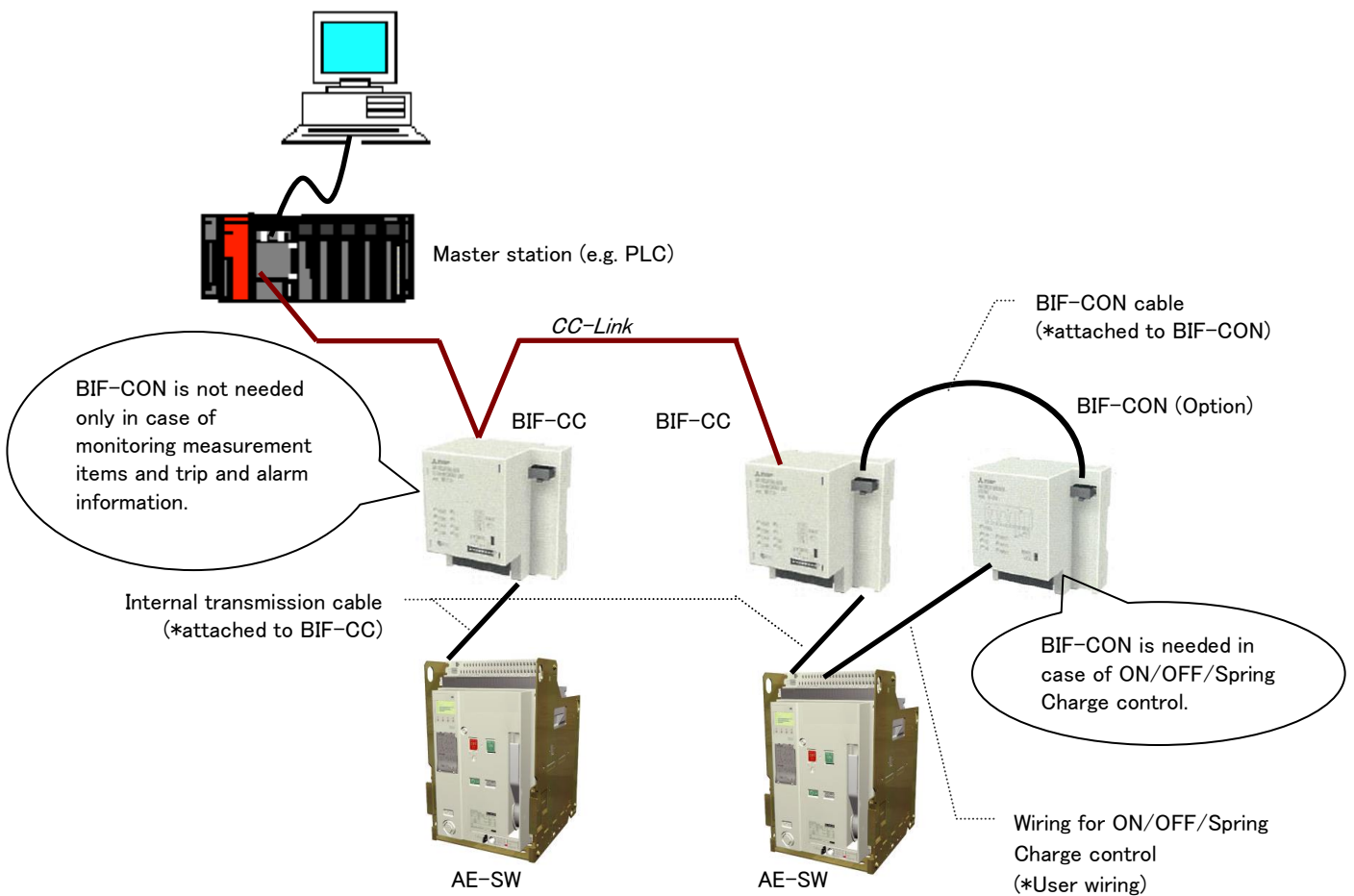


Fig 1.1 System Overview

2. Specifications

2.1 BIF-CC

The general specifications of BIF-CC are shown in table 2.1.

Table 2.1 General specification of BIF-CC

Item	Specifications
Type name	BIF-CC
Power supply	100-240V AC+DC (50/60Hz)
Power consumption	3VA (not including BIF-CON) 5VA (including BIF-CON)
External dimensions	100(H) x 90(W) x 65(D)
Operating ambient temperature	-5 to +40°C (However, the average of temperature per 24hours must not exceed +35°C)
Storage ambient temperature	-20 to +60°C (However, the average of temperature per 24hours must not exceed +35°C)
Operating/Storage ambient humidity	max. 85%RH (no condensation) at the max. +40°C in the clean air conditions.
Operating/Storage ambience	Do not use and store in atmospheres with sulfide gas, ammonia gas, etc. ($H_2S \leq 0.01\text{ppm}$, $SO_2 \leq 0.1\text{ppm}$, $NH_3 \leq 0.25\text{ppm}$)
Operating altitude	max. 2000m (6600ft.)
Installation	35mm IEC rail/Bracket

The functional specifications of BIF-CC are shown in table 2.2.

Table 2.2 specifications of BIF-CC

Item	Specifications
Number of occupied station	1 station
Station type	Remote device station
CC-Link version	CC-Link Ver. 1.10
Communication method	Broadcast polling method
Communication speed	10Mbps/5Mbps/2.5Mbps/625kbps/156kbps (*selectable)
Transmission path format	Bus format (EIA RS-485 conformance)
Maximum transmission distance ¹⁾	100m (at 10Mbps) 160m (at 5Mbps) 400m (at 2.5Mbps) 900m (at 625kbps) 1200m (at 156kbps)
Number of units connected ²⁾	Number of units that satisfies following 2 conditions. ● Condition 1: $\{(1 \times a) + (2 \times b) + (3 \times c) + (4 \times d)\} \leq 64$ a: Number of units that occupies 1 station (*BIF-CC corresponds to this type) b: Number of units that occupies 2 stations c: Number of units that occupies 3 stations d: Number of units that occupies 4 stations ● Condition 2: $\{(16 \times A) + (54 \times B) + (88 \times C)\} \leq 2304$ A: Number of remote I/O station units B: Number of remote device station units (*BIF-CC corresponds to this type) C: Number of local station, standby master station and intelligent device station units
Available remote station number	1 to 64 (*selectable)
Connection cable ³⁾	CC-Link dedicated cable/CC-Link dedicated high-performance cable/ Ver. 1.10 compatible CC-Link dedicated cable

■ 1): The above data indicates the case that the Ver. 1.10 compatible CC-Link dedicated cable (110 ohm type) is used.
Maximum transmission distance depends on communication speed and/or kinds of CC-Link cable.

As for details, please refer to "CC-Link Cable Wiring Manual" published by CC-Link Partner Association (CLPA).

■ 2): If the system is configured by only BIF-CC, up to 42 units can be connected.

■ 3): CC-Link dedicated high-performance cables cannot be used with other cables such as CC-Link dedicated cables or Ver. 1.10 compatible CC-Link dedicated cables. As for details, refer to "CC-Link Cable Wiring Manual" published by CC-Link Partner Association (CLPA).

2.2 BIF-CON (Option)

The general specifications of BIF-CON are shown in table 2.3.

Table 2.3 General specifications of BIF-CON

Item		Specifications
Type name		BIF-CON
Power supply		Supplied from BIF-CC
Digital input	Number of channel	3 channels (INPUT1, INPUT2, INPUT3 general use)
	Isolation	Photo coupler isolation
	Signal level	12VDC, 30mA
Digital output	Number of channel	3 channels (*SHT ¹⁾ /CC/MD exclusive use)
	Isolation	Relay isolation
	Contact capacity	8A at 250V AC·DC (resistive load) ¹⁾
External dimensions		100(H) x 90(W) x 65(D)
Operating ambient temperature		-5 to +40°C (However, the average of temperature per 24hours must not exceed +35°C)
Storage ambient temperature		-20 to +60°C (However, the average of temperature per 24hours must not exceed +35°C)
Operating/Storage ambient humidity		max. 85%RH (no condensation) at the max. +40°C in the clean air conditions.
Operating/Storage ambience		Do not use and store in atmospheres with sulfide gas, ammonia gas, etc. (H ₂ S ≤ 0.01ppm, SO ₂ ≤ 0.1ppm, NH ₃ ≤ 0.25ppm)
Operating altitude		max. 2000m (6600ft.)
Installation		35mm IEC rail/Bracket

■ 1): SHT (AC380-500V) cannot be used.

3. Part Names and Settings

3.1 BIF-CC

The unit overview is shown as below.

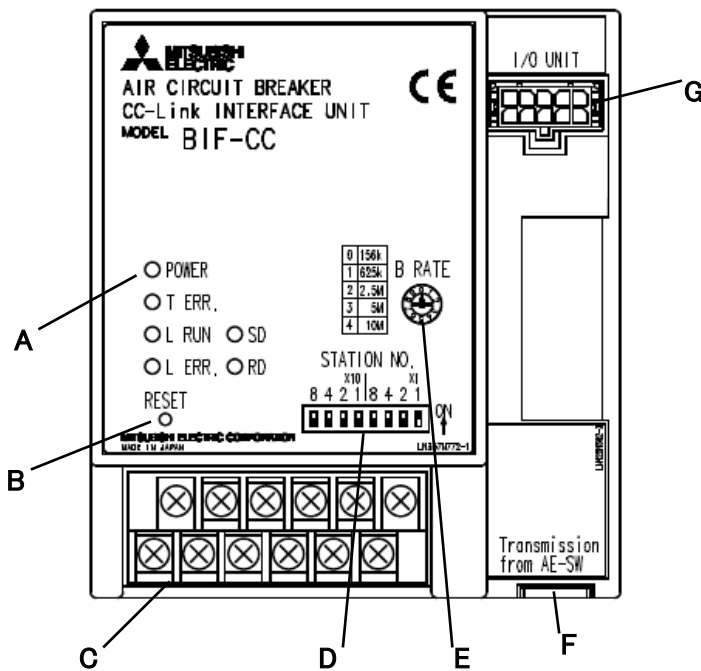


Fig 3.1: Front view

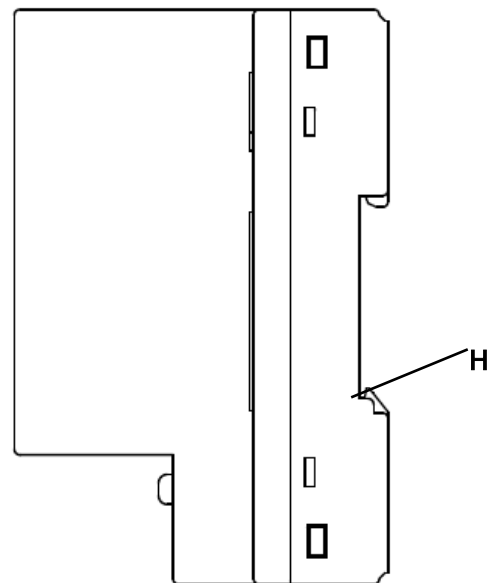


Fig 3.2: Side view

●(A) LED

Name	Indication	Description
POWER	ON	Power is supplied correctly
	OFF	Power is not supplied
T ERR.	Flashing	Internal transmission error ¹⁾ has occurred
	OFF	Normal operating state
L RUN	ON	Normal operating state
	OFF	CC-Link error ¹⁾ has occurred
L ERR.	ON	Invalid baud rate or station number setting
	Flashing	CC-Link error ¹⁾ has occurred
SD	OFF	Normal operating state
	Flashing	Data sending state
RD	ON	There is no data sent to the master station, or CC-Link error ¹⁾ has occurred
	OFF	Data receiving state
	ON	Data receiving state
	OFF	CC-Link error ¹⁾ has occurred

■ 1): To check the cause of these errors, see "6 Troubleshooting".

●(B) RESET Switch

RESET Switch is used to reset the BIF-CC without power supply off.

After changing the STATION NO. switch or B RATE switch while power supply is on, push this switch.

●(C) Terminals

Name ¹⁾	Description	Screw ²⁾ (Tighten torque)	Notes
P1, P2	100-240V AC·DC	M3 (0.5 to 0.6N.m)	1. Fuse or Circuit Breaker shall be installed in power supply line. 2. Do not connect to main circuit of breaker directly.
FG	Frame ground		1. This terminal has to be grounded to the protective ground conductor by a thick wire of low impedance (*ground resistance: 100 ohm or less). 2. Connect the FG terminal of each BIF-CC independently. If not use ground independently, use common ground according to the figure 3.3.
DA ³⁾	CC-Link DA		CC-Link cable (CC-Link dedicated cable, CC-Link dedicated high-performance cable or Ver. 1.10 compatible CC-Link dedicated cable) should be used. Also, in wiring, satisfy the requirements of maximum transmission distance and station distance according to communication rate and/or kinds of CC-Link cable. As for details, refer to "CC-Link Cable Wiring Manual" published by CC-Link Partner Association (CLPA).
DB ³⁾	CC-Link DB		
DG ³⁾	CC-Link DG		
SLD ³⁾	CC-Link SLD		

■ 1): Terminal assignment is shown in "7. Outline dimensions".

■ 2): These terminals should be connected with wire using crimp-type terminal. The available crimp-type terminal is shown in figure 3.4.

■ 3): When BIF-CC is at the ends of the CC-Link line, the terminal resistor (*attached to CC-Link master unit) should be connected between "DA" and "DB" shown in figure 3.5. The terminal resistor varies depending on the types of cables used in the CC-Link system. As for details about CC-Link cable or terminal resistor, refer to "CC-Link System Master/Local Module User's Manual" or "CC-Link Cable Wiring Manual" published by CC-Link Partner Association (CLPA).

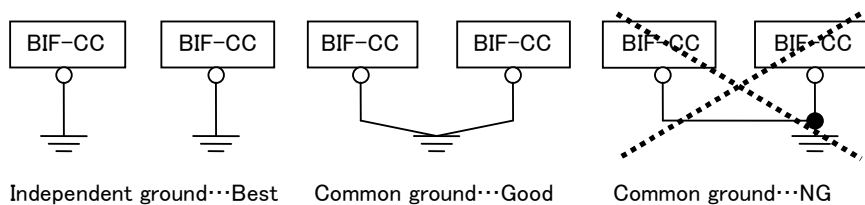


Fig 3.3: Ground connection

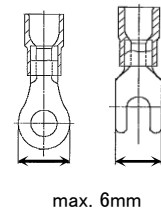
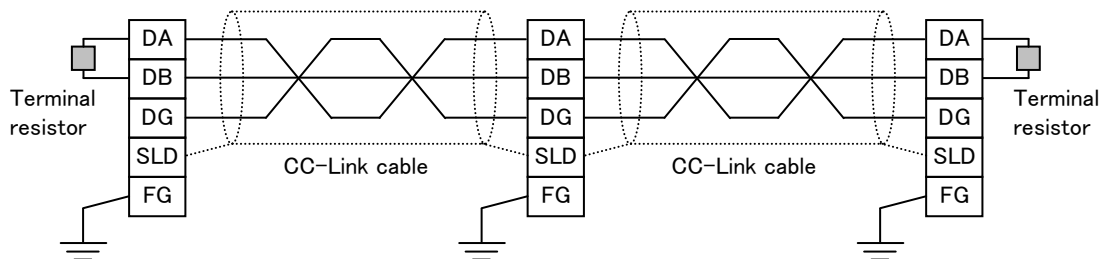


Fig 3.4: Crimp-type terminal



! Keep distance more than 100mm from the power distribution circuit.

⊘ CC-Link dedicated high-performance cables cannot be used with other cables such as CC-Link dedicated cables or Ver. 1.10 compatible CC-Link dedicated cables. If used together, correct data transmission will not be guaranteed.

Fig 3.5: Connection of terminal resistor

●(D) STATION NO. Switch

The BIF-CC supports the station number range from 1 through 64.

The station number is set in binary form shown as below sample.

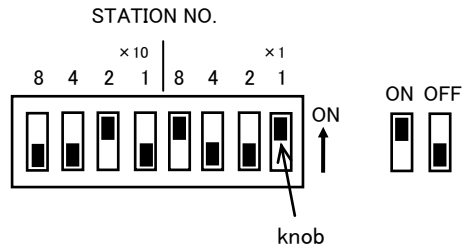
The setting of switches is effective when power supply is turned ON.


After changing the switch while power supply is on, push RESET switch (see also “(B) RESET switch”).

Sample setting:

ON: 20, 8, 1

Station number: $20 + 8 + 1 = 29$



 Do not change the knobs with mechanical pencil. It may cause malfunction by carbon dust.

●(E) B RATE Switch

This switch is used for baud rate setting.

Number	Baud rate	Notes
0	156kbps	Factory setting
1	625kbps	
2	2.5Mbps	
3	5Mbps	
4	10Mbps	
5 to 9	Unusable	If the switch is set in these position, the “L ERR.” LED lights up.



■ 1): If the switch is changed during operation, it should be pushed RESET switch after changing the switch settings (see also “(B) RESET switch”).

●(F) Connector for AE-SW internal transmission

This connector is used for internal transmission with AE-SW.

Wiring connection is shown as below.

■ Note: Only one BIF-CC can be connected to AE-SW.

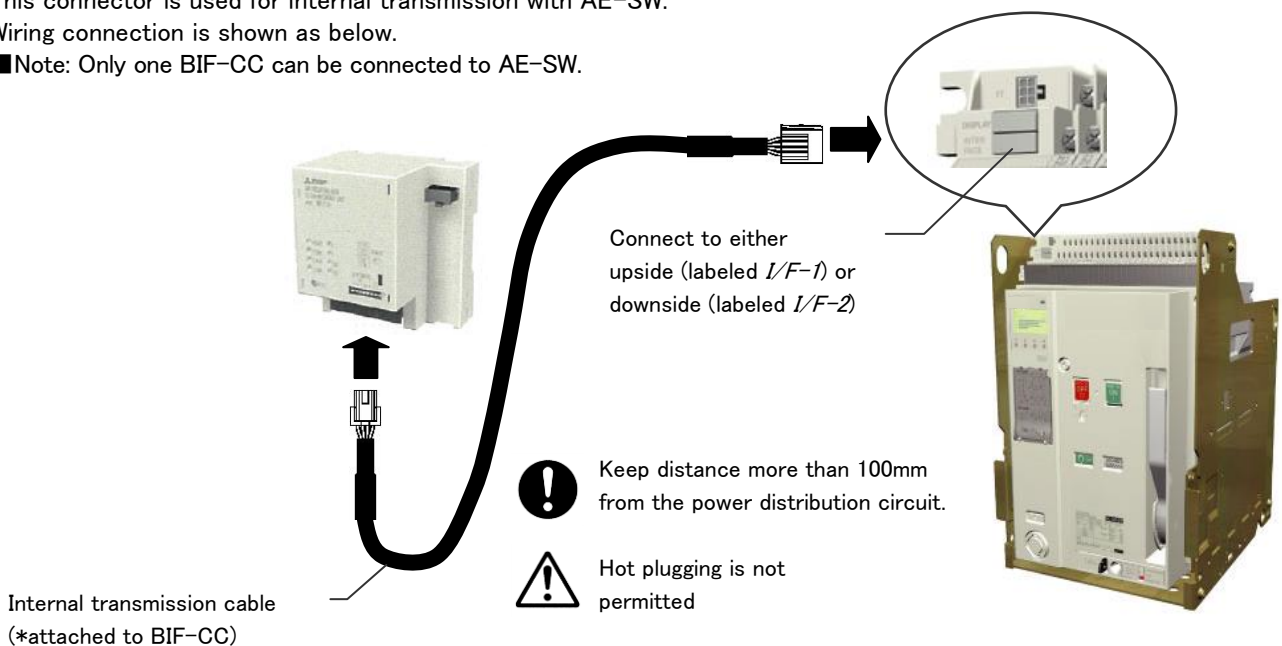


Fig 3.6: Wiring Connection

●(G) Connector for I/O unit (BIF-CON) connection

This connector is used for connection to I/O unit (BIF-CON).
Wiring connection is shown as below.

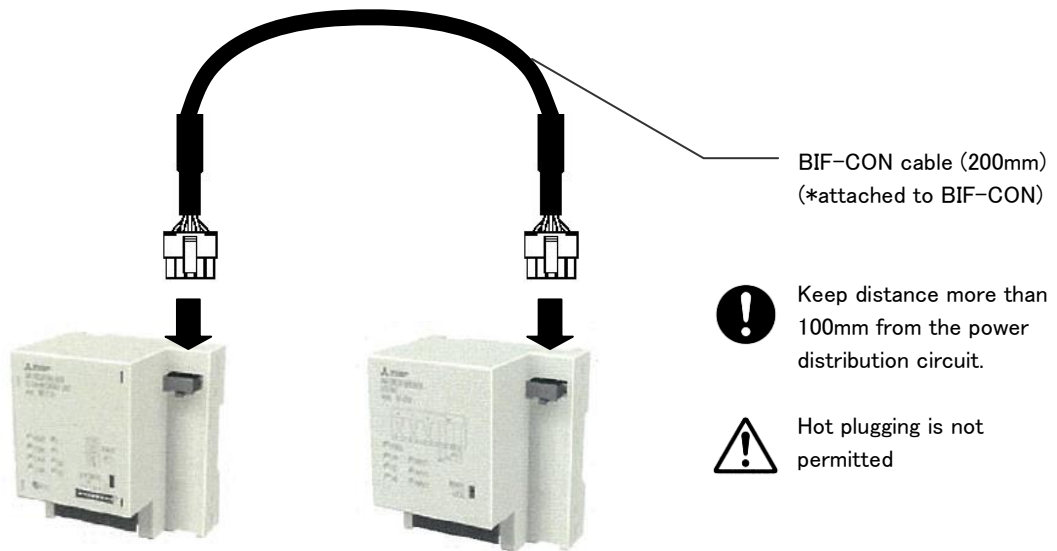


Fig 3.7: Wiring Connection

●(H) IEC rail latch

This is used to attach the BIF-CC to a IEC mounting rail.
IEC rail installation is shown in "4.1 IEC rail installation".

3.2 BIF-CON (Option)

The unit overview is shown as below.

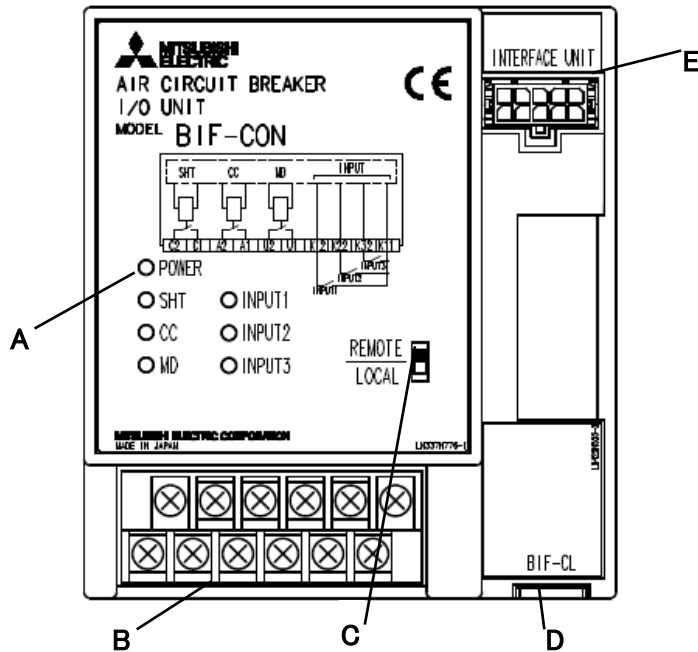


Fig 3.7: Front view

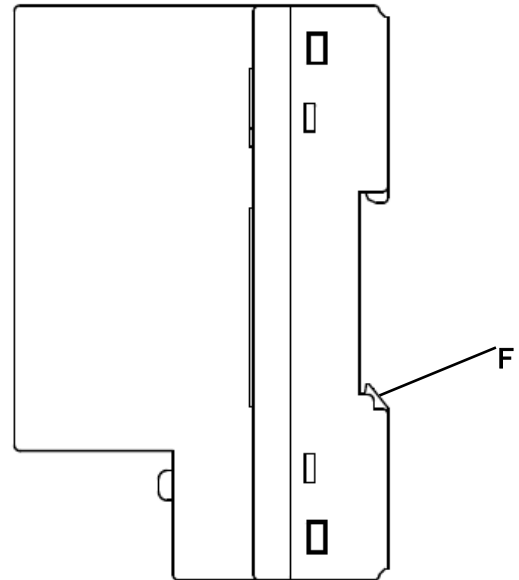


Fig 3.8: Side view

●(A) LEDs

Name	Indication	Description
POWER	ON	Power is supplied from BIF-CC correctly
	OFF	Power is not supplied
SHT	ON	1a contact for SHT ¹⁾ is closed (500ms)
	OFF	1a contact for SHT ¹⁾ is open
CC	ON	1a contact for CC ²⁾ is closed (500ms)
	OFF	1a contact for CC ²⁾ is open
MD	ON	1a contact for MD ³⁾ is closed (5s)
	OFF	1a contact for MD ³⁾ is open
INPUT1	ON	INPUT1 signal is ON
	OFF	No INPUT1 signal
INPUT2	ON	INPUT2 signal is ON
	OFF	No INPUT2 signal
INPUT3	ON	INPUT3 signal is ON
	OFF	No INPUT3 signal

■ 1): SHT is a type name of *AE-SW Shunt trip device* which open the main contact via remote control.
For details about SHT, please see “*AE-SW INSTRUCTION MANUAL*”.

■ 2): CC is a type name of *AE-SW Closing coil* which close the main contact via remote control.
For details about CC, please see “*AE-SW INSTRUCTION MANUAL*”.

■ 3): MD is a type name of *AE-SW Motor charging device* which charges the closing spring for motor operating.
For details about MD, please see “*AE-SW INSTRUCTION MANUAL*”.

●(B) Terminals

Name ¹⁾	Description	Screw ²⁾ (Tighten torque)
C1, C2 ³⁾	Output terminals for SHT	M3 (0.5 to 0.6N.m)
A1, A2 ³⁾	Output terminals for CC	
U1, U2 ³⁾	Output terminals for MD	
K12	Digital input1 terminal	
K22	Digital input2 terminal	
K32	Digital input3 terminal	
K11	Input common	

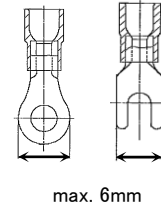
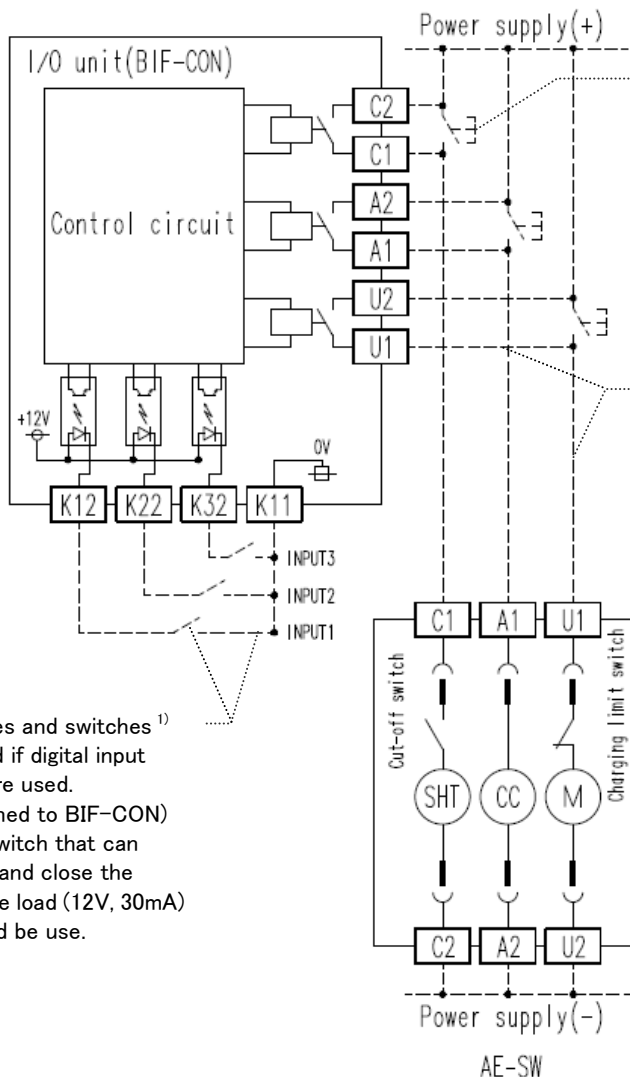


Fig 3.10: Crimp-type terminal

- 1): Terminal assignment is shown in "7. Outline dimensions".
- 2): These terminals should be connected with wire using crimp-type terminal.
The available crimp-type terminal is shown in figure 3.10.
- 3): These output terminals are exclusive to SHT/CC/MD.
- 4): About the remote control via the CC-Link network, or local control with pushbuttons, the sample of user's wiring with BIF-CON and AE-SW is shown in figure 3.11.



Pushbuttons ¹⁾ are required only if SHT/CC/MD are driven by local operation ²⁾.

- 1): Pushbuttons are not attached to BIF-CON.
Therefore, these should be prepared by the user.
- 2): In case of local operation by pushbuttons, REMOTE/LOCAL switch placed on the BIF-CON should be in LOCAL position for safety.
(see also "(C) REMOTE/LOCAL switch").


These connection cables ¹⁾ are required if SHT/CC/MD are driven by remote control ²⁾.

- 1): These cables are not attached to BIF-CON.
Therefore, these should be prepared by the user.
- 2): In case of remote control, REMOTE/LOCAL switch placed on the BIF-CON should be in REMOTE position. (see also "(C) REMOTE/LOCAL switch").

These cables and switches ¹⁾ are required if digital input functions are used.

(*not attached to BIF-CON)

- 1): The switch that can open and close the minute load (12V, 30mA) should be use.

 SHT and CC cannot be driven simultaneously.

Description




	Shunt tripping device
	Closing coil
	Motor(Motor charging device)
-----	User's wiring
—C—	Control circuit connector (drawout type)

Fig 3.11: Sample of user's wiring

●(C) REMOTE/LOCAL switch

The REMOTE/LOCAL switch is used for change over of remote/local control of AE-SW.

When this switch is in REMOTE position, the remote control (ACB ON/OFF and charging the spring) are available via CC-Link network.

When this switch is in LOCAL position, the remote control cannot be operated.

●(D) Connector for AE-SW Drawout position switch (BIF-CL) connection

This connector is used for connection to BIF-CL (*Option).

For details about BIF-CL, see “*Instruction Manual for AE-SW Drawout position switch*”.

Wiring connection is shown as below.

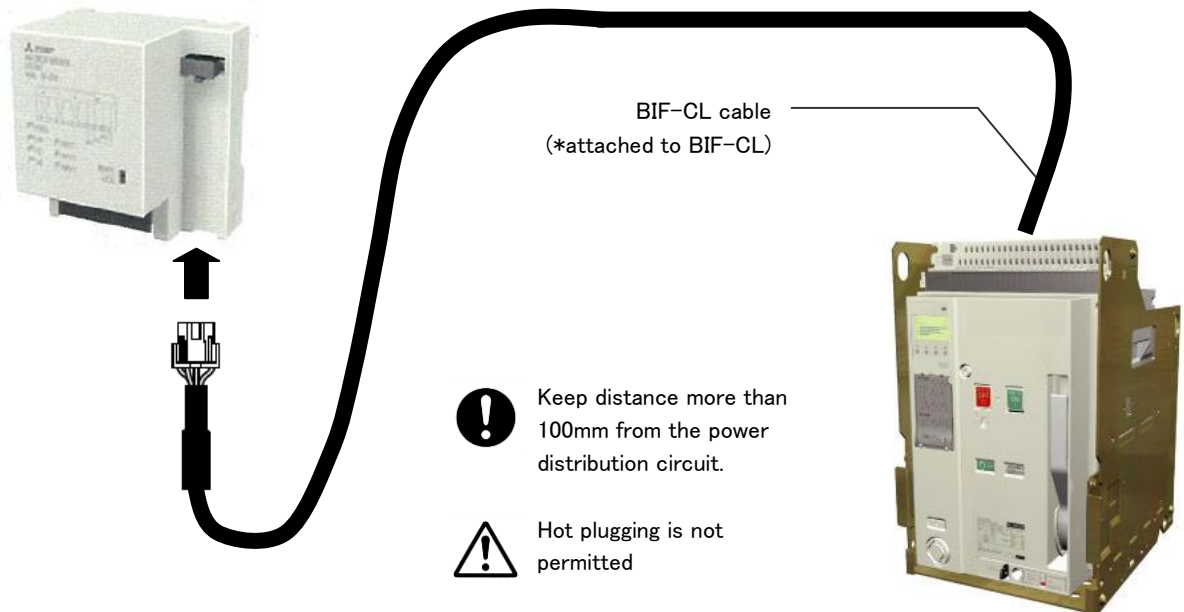


Fig 3.12: Wiring Connection

●(E) Connector for BIF-CC connection

This connector is used for connection to BIF-CC.
Wiring connection is shown as below.

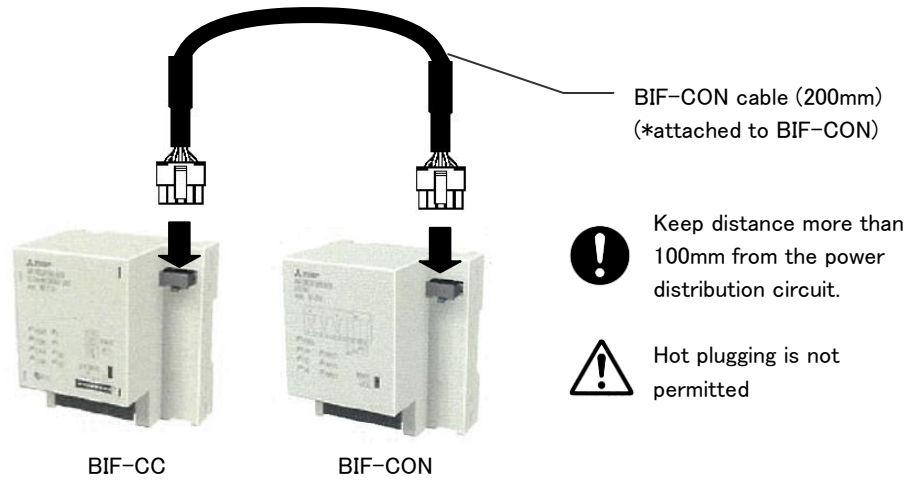


Fig 3.13 Wiring Connection

●(F) IEC rail latch

This is used to attach the BIF-CON to a IEC mounting rail.
IEC rail installation is shown in "4.1 IEC rail installation".

4. Installation

4.1 IEC rail installation

The 35mm IEC rail (DIN rail) installing and removing procedure of BIF-CC and BIF-CON are shown as below.

The applicable IEC rail is shown in figure 4.1.

(A) Installing

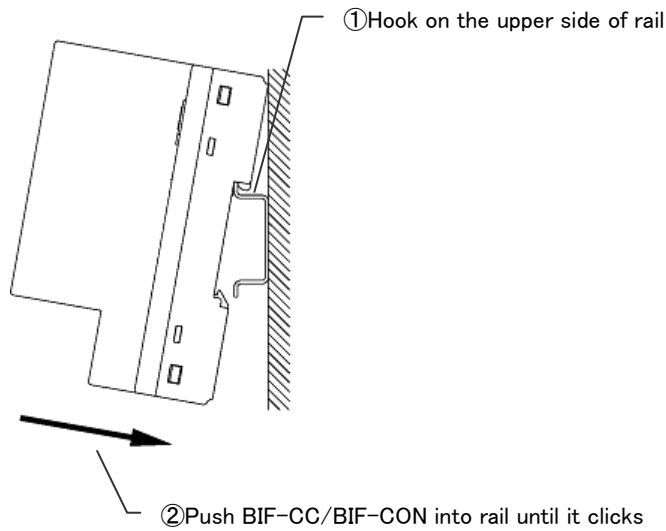


Fig 4.2: Installing

(B) Removing

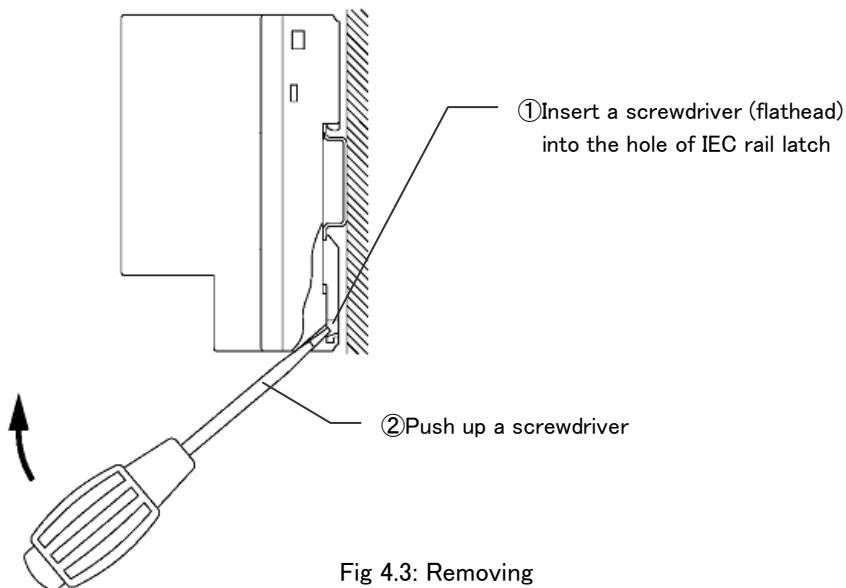


Fig 4.3: Removing

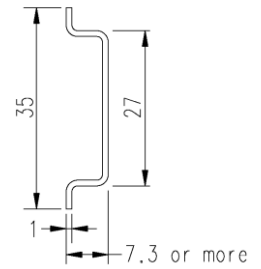


Fig 4.1: 35mm IEC rail

4.2 Bracket installation

The mounting bracket installation of BIF-CC and BIF-CON are shown as below.

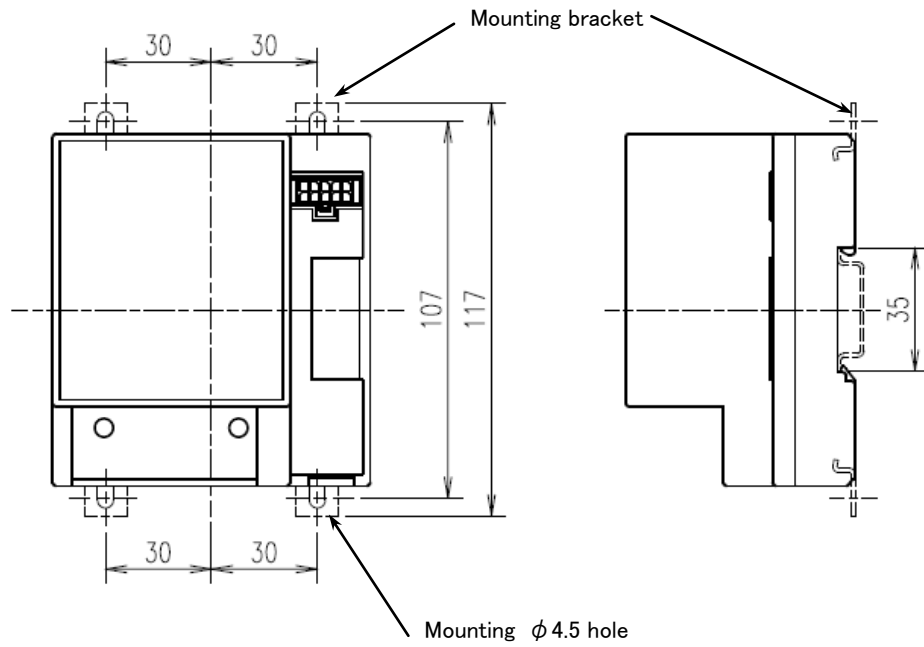


Fig 4.5: Mounting bracket Installation of BIF-CC/BIF-CON

5. Communication items

5.1 Communication items

In the table 5.1 shown below, the available communication items using BIF-CC are presented. Especially, the details of a measuring and setting items are described in "5.2 Measurement items (detail)" and "5.3 Setting items (detail)", respectively.

As for programming by using MITSUBISHI PLC, refer to "Programming manual for AE-SW CC-Link interface unit (BIF-CC)"

Table 5.1: Communication items (1/3)

Communication items		Required option ¹⁾	Descriptions
<p>■ Items for measurement (*For details, see "5.2 Measurement items (detail)").</p>			
Load current	each phase	instantaneous	<p>■ The meaning of terms used in left column are as follows.</p> <ul style="list-style-type: none"> ● each phase: phase 1/phase 2/phase 3/pole N (*except for voltage) phase 1-N/phase 2-N/phase 3-N (*in case of voltage) ● each line: line 1-2/line 2-3/line 3-1 ● max. phase/line: the maximum value of the each phase/line values ● demand: approximately average of instantaneous value during a demand time ● max. instantaneous/demand: max. instantaneous/demand value since last reset ● total harmonic rms (THR): total value from 2nd to 20th order harmonic rms ● total harmonic distortion (THD): This value is calculated as follows. THD=THR/(fundamental harmonic rms) ● nth order harmonic ratio: This value is calculated by (nth order harmonic rms)/(fundamental harmonic rms) <p>■ The all min./max. values are stored in the EEPROM of Extension module (EX1) every 2 hours.</p> <p>■ The active and reactive energy are stored in the EEPROM of Extension module (EX1) when the power supply form Power supply module (P1-P5) is cut off.</p>
		max. instantaneous	
		demand	
	max. phase	demand	
		max. demand	
Leakage current		instantaneous	
		max. instantaneous	
		demand	
		max. demand	
Voltage	each line	instantaneous	
		max. instantaneous	
	each phase	instantaneous	
		max. instantaneous	
	max. line	instantaneous	
		max. instantaneous	
	max. phase	instantaneous	
		max. instantaneous	
Active power	total	instantaneous	
		max. instantaneous	
		demand	
		max. demand	
Reactive power	total	instantaneous	
		max. instantaneous	
		demand	
		max. demand	
Apparent power	total	instantaneous	
		max. instantaneous	
		demand	
		max. demand	
Power factor		instantaneous	
		min. instantaneous	
		max. instantaneous	
Active energy			
Reactive energy		lag	
		lead	
Frequency		instantaneous	
Harmonic rms current (total/fundamental/3 rd /5 th /.../19 th)	each phase	instantaneous	
	max. phase	max. instantaneous	
Harmonic distortion/ratio current (total/3 rd /5 th /.../19 th)	each phase	instantaneous	
Trip current	LTD/STD/INST	-	
	GFR	G1	
	ER	E1 and ZCT	

Table 5.1: Communication items (2/3)

Communication items		Required option ¹⁾	Descriptions
■ Items for ETR			
Trip cause	LTD	-	Transmitted the cause using bit data when trip has occurred.
	STD		
	INST		
	GFR	G1	
	ER	E1 and ZCT	
	UVT	UVT	
Trip history	fault cause	-	The trip information (last 10 trips) are stored in the EEPROM. However, when Power supply module (P1-P5) is off, any trip information are not stored. Also, when the trip cause is UVT, current data is set to 0.
	current		
	date and time of occurrence		
Alarm cause	PAL1 P.U.	-	Transmitted the cause using bit data when alarm has occurred.
	PAL1 OUT		
	PAL2 P.U.	AP	
	PAL2 OUT		
	OVER	-	
	GFR	G1	
	EPAL	E1 and ZCT	
	ER		
	TAL	TAL SENSOR	
Alarm history	alarm cause	-	When a setting of alarm holding method is "Self-Holding", the alarm information (last 10 alarms) except for PAL1 P.U., PAL2 P.U. and OVER can be stored in the EEPROM. On the other hand, when a setting of alarm holding method is "Auto Reset", any alarm information are not stored. Also, when Power supply module (P1-P5) is off, any alarm information are not stored.
	date and time of occurrence		
Module info.	main setting module	-	Transmitted the kinds of module attached to the ETR.
	optional setting module		
	NP (Neutral pole protection level)		
Characteristics	In (CT rating)	-	Transmitted the setting of adjustable switches on the face of the ETR. As for Iep and Tep settings, it is able to change from BIF-CC.
	Ir (current setting)		
	Ip (pre-alarm pickup current)		
	Ip2 (2 nd additional pre-alarm pickup current)	AP	
	Tp2 (2 nd additional pre-alarm delay time)		
	Iu/IL (uninterrupted/LTD pickup current)	-	
	TL (LTD delay time)		
	Isd (STD pickup current)		
	Tsd (STD delay time)		
	Ii (INST pickup current)		
	Ig (GFR pickup current)	G1	
	Tg (GFR delay time)		
	Iep (EPAL pickup current)	E1 and ZCT	
	Tep (EPAL delay time)		
	IΔn (ER pickup current)		
Te (ER delay time)			
Self diagnosis	A/D converter error	-	Transmitted the error information detected by ETR. If these error happens, please contact your nearest MITSUBISHI representative.
	EEPROM error		
	clock IC (RTC) error		
	main setting module error		
	option setting module error		
	CT Connector error		
	MCR switch error		
	TAL sensor error	TAL SENSOR	
■ Items for breaker			
State of breaker	ACB ON	-	Transmitted the state of breaker.
	ACB OFF		
Position of breaker	connected	BIF-CON and BIF-CL	Transmitted the position of breaker in the cradle using BIF-CON and BIF-CL. These information can be monitored even if internal transmission error has occurred.
	test		
	disconnected		

Table 5.1: Communication items (3/3)

Communication items		Required option ¹⁾	Descriptions
■ Items for setting (*For details, see "5.3 Setting items (detail)").			
Date and time	year/month/day/hour/minute/second	-	Monitoring and setting of date and time are available.
Demand time	load current	-	Set the demand time used for demand measuring values.
	leakage current	E1 and ZCT	
	power (active/reactive/apparent)	VT	
Alarm holding method		-	Set the alarm holding method. When a setting of alarm holding method is "auto reset", the active alarm status will return to normal state automatically if load current falls below the pickup level. On the other hand, when a setting of alarm holding method is "self-holding", the alarm status will remain until it is reset by reset order even if load current falls below the pickup level. However, PAL1 P.U., PAL2 P.U., OVER and TAL are always returned to normal state automatically whether "auto reset" or "self-holding".
EPAL	Iep	E1 and ZCT	Sets the EPAL setting values.
	Tep		
■ Items for resetting			
Trip and alarm status		-	Reset the active trip and alarm status.
Trip and alarm history			Reset the trip and alarm history. In this case, the active trip and alarm status are also reset.
All max./min. measuring values			Reset all max./min. measuring values. However, the energy values are not reset.
Energy values			Reset energy values (Wh and varh values).
All items			All items that can be reset (all items described above) are reset
■ Items for input/output contacts			
Inputs	digital input (*3 channels)	BIF-CON	These information can be monitored even if internal transmission error has occurred.
Outputs	for SHT drive	BIF-CON and SHT	By using BIF-CON, it is able to drive the SHT/CC/MD via CC-Link network.
	for CC drive	BIF-CON and CC	
	for MD drive	BIF-CON and MD	In case that the internal transmission error has occurred, these orders are not available.

■ 1): For details about these accessories, please see "AE-SW CATALOG" or "AE-SW INSTRUCTION MANUAL".

5.2 Measurement items (detail)

The detailed specifications for measurement items are shown in table 5.2.

Table 5.2: Detailed specifications for measurement items

Items (Accuracy)	Unit	Measurement range	Phase-Wire ¹⁾		Cut off	
			3 φ 3W	3 φ 4W		
Load current (±2.5% ⁵⁾)	[0.1A] (*In< 500A)	0 to 2×In [A]	△	○	2.0% ⁵⁾	
	[A] (*In≥ 500A)					
Earth leakage ^{2), 4)} (±15% ⁵⁾)	[mA]	0 to 2×IΔn,max [A]	○	○	3.0% ⁵⁾	
Voltage ⁴⁾ (±2.5% ⁵⁾)	line [V]	0 to 725 [V]	○	○	10V	
	phase [V]	0 to 420 [V]	×	○	10V	
Power ⁴⁾ (±2.5% ⁵⁾)	active	[0.1kW] (*In< 1000A)	-√3×(2×In[A])×725[V] to +√3×(2×In[A])×725[V]	○	○	2.0% ⁵⁾
		[kW] (*In≥ 1000A)				
	reactive	[0.1kvar] (*In< 1000A)	-√3×(2×In[A])×725[V] to +√3×(2×In[A])×725[V]	○	○	2.0% ⁵⁾
		[kvar] (*In≥ 1000A)				
	apparent ³⁾	[0.1kVA] (*In< 1000A)	0 to +√3×(2×In[A])×725[V]	○	○	2.0% ⁵⁾
		[kVA] (*In≥ 1000A)				
Power factor ^{4), 7)} (±5.0% ⁵⁾)	[0.1%]	-50[%] to 100[%] to +50[%]	○	○	-	
Energy ⁴⁾ (±2.5% ⁶⁾)	active [kWh]	0 to 99999999 [kWh]	○	○	0.4% ⁵⁾	
	reactive [kvarh]	0 to 99999999 [kvarh]	○	○	0.4% ⁵⁾	
Harmonic current (±2.5% ⁵⁾)	rms	[0.1A] (*In< 500A) [A] (*In≥ 500A)	△	○	2.0% ⁵⁾	
	distortion/ratio	[0.1%]				△
Frequency (±2.5% ⁶⁾)	[Hz]	45 to 65 [Hz]	○	○	-	
Trip current (±20% ⁶⁾)	[A] (*cause=LTD/STD/INST/GFR)	0 to 20×In [A]	○	○	-	
	[mA] (*cause=ER)	0 to 2×IΔn,max [A]				

■1): “○”, “×” and “△” represents “available”, “not available” and “available on phase 1 to phase 3”, respectively.

■2): Including the accuracy of ZCT.

■3): When using at 3 φ 3W system, the apparent power is calculated by $(\sqrt{3}/2) \times (I1 \times V12 + I3 \times V23)$.

Therefore, the accuracy may not be ensured in the unbalanced circuit.

■4): Rated voltage of measurement is 440V. Rated power and energy of measurement is $\sqrt{3} \times In \times 440V$.

Rated earth leakage current of measurement is $I\Delta n,max (=10A)$. Rated power factor is 90 degrees.

■5): Accuracy and cut off are defined as percentage of rated value.

■6): Accuracy is defined as percentage of true value.

■7): Power factor is measured for only fundamental wave. A waveform distortion is not included for power factor calculation.

5.3 Setting items (detail)

The detailed specifications for setting items are shown in table 5.3.

Table 5.3: Detailed specifications for setting items

Items	Setting range	Setting for shipment	
Date and time	Year	00(2000) to 99(2099)	04(2004)
	Month	01 to 12	01
	Day	01 to 31	01
	Hour	00 to 23	00
	Minute	00 to 59	00
	Second	00 to 59	00
Demand time	Load current	0s to 50s (*step: 10s)/	2min
	Leakage current	1min to 15min (*step: 1min)/	2min
	Power	20min/30min	2min
Alarm holding method	Auto reset/Self-holding	Auto reset	
EPAL	Iep	0 ¹⁾ /500mA/600mA/700mA/.../IΔn ²⁾ (*step: 100mA)	0 (=OFF)
	TeP	100ms/200ms/.../3000ms (*step: 100ms)	3000ms

■1): When Iep is set to 0, the EPAL function is disabled (*default setting).

■2): Iep must be set to IΔn or less.

6. Troubleshooting

In this chapter, the causes and corrective actions for errors that may occur when using BIF-CC are described. Please take action appropriately according to the following when the error occurs. If the error is not canceled by the following actions, please contact your nearest MITSUBISHI representative.

6.1 Errors detected by BIF-CC

The errors detected by BIF-CC (LED indication) are shown in table 6.1.

Table 6.1: Causes and corrective actions for errors

Division	LED indication ¹⁾					Cause	Corrective action
	T ERR.	L RUN	L ERR.	SD	RD		
Internal transmission	◎◎	-	-	-	-	Internal transmission error has occurred	<input type="checkbox"/> Check the power supply of Power supply module (P1-P5). <input type="checkbox"/> Check that there is no wire breakage in the internal transmission cable. <input type="checkbox"/> Check that the internal transmission cable is wired properly.
CC-Link	-	○	○	○	○	CRC error has occurred	<input type="checkbox"/> Check that the kinds of CC-Link cable, overall distance, station-to-station distance and terminal resistor are within the specified range. <input type="checkbox"/> Check for wire breakage, a short, reversed connection of CC-Link cable. <input type="checkbox"/> Earth the FG terminal of BIF-CC without fail.
	-	○	◎	○	●		
	-	●	◎◎	◎	●	Invalid baud rate or station number setting	<input type="checkbox"/> Check that the STATION NO. or B RATE switch is not outside the setting range.
		○	●	○	●		
-	○	○	◎	●	Hardware fault	<input type="checkbox"/> Switch power on again.	

■ 1): “◎◎”, “◎”, “●”, “△” and “-” represents “flashing at fixed intervals”, “flashing at unfixed intervals”, “on”, “off” and “arbitrary”, respectively.

6.2 Errors detected by CC-Link master station

The errors detected by CC-Link master station (detected by the reply data from BIF-CC) are shown in table 6.2.

Table 6.2: Causes and corrective actions for errors

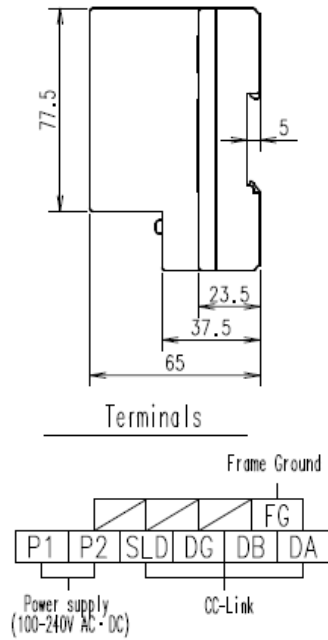
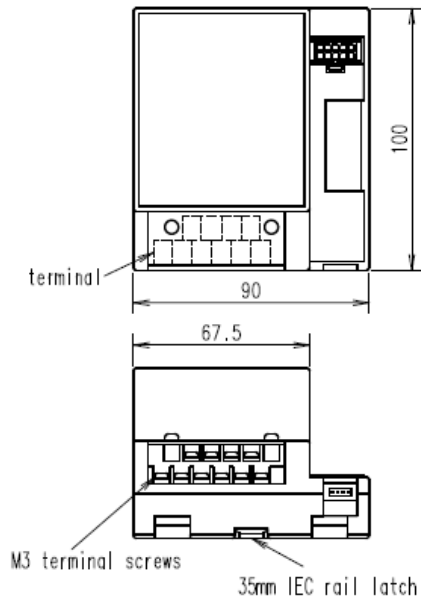
Error code ¹⁾		Cause	Corrective action
Decimal	Hexadecimal		
16	10h	Hardware error has occurred.	<input type="checkbox"/> Check whether the internal transmission error ²⁾ occurs. If it occurs, check the following: <input type="checkbox"/> Power supply of Power supply module (P1-P5). <input type="checkbox"/> There is no wire breakage in the internal transmission cable. <input type="checkbox"/> The internal transmission cable is wired properly.
64	40h	The command number is outside the range.	<input type="checkbox"/> After correcting the command number, send data again.
65	41h	The data group number is outside the range.	<input type="checkbox"/> After correcting the data group number, send data again.
66	42h	The data channel number is outside the range.	<input type="checkbox"/> Correct the data channel number and send data again, if it has mistaken. <input type="checkbox"/> Check the power supply of Power supply module (P1-P5). <input type="checkbox"/> Check that there is no wire breakage in the internal transmission cable. <input type="checkbox"/> Check that the internal transmission cable is wired properly.
69	45h	The unit number is outside the range.	<input type="checkbox"/> After correcting the unit number, send data again.
81	51h	The setting data set by setting command is outside the range.	<input type="checkbox"/> After correcting the setting data, send data again.

■ 1): About the errors other than described above, refer to manual of master station.

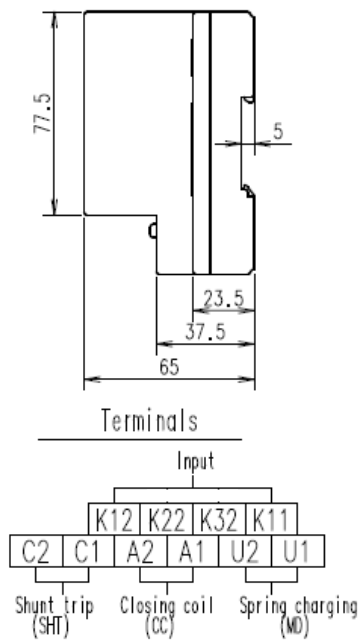
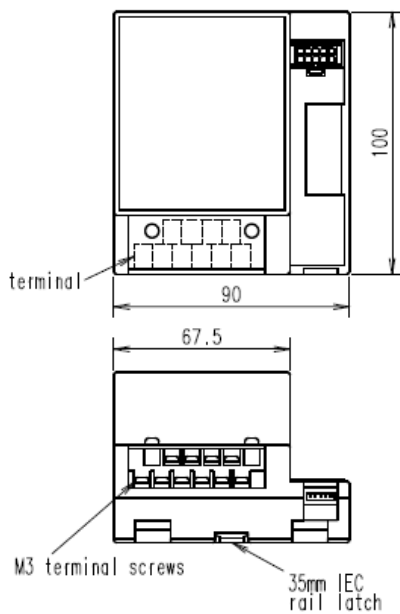
■ 2): When the power supply of BIF-CC is turned on under the state that the power supply is not supplied to ETR, the CC-Link communication is not started for 1 minute. After 1 minute, CC-Link communication will start, but internal transmission error will occur (T ERR. LED blinks).

7. Outline dimensions

● BIF-CC



● BIF-CON



8. SERVICE NETWORK

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Belarus	Tehnikon	Oktyabrskaya 19, Off. 705, BY-220030 Minsk, Belarus	+375(0)17210 46 26
Belgium	Koning & Hartman B.V.	Woluwelaan 31, BE-1800 Vilvoorde, Belgium	+32(0)2/2570240
Cambodia	DHINIMEX CO.,LTD	#245, St. Tep Phan, Phnom Penh, Cambodia	+855-23-997-725
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三菱低圧気中遮断器 AE 形

MITSUBISHI Low-Voltage Air Circuit Breakers type AE

三菱低圧空気断路器

CC-Link インタフェースユニット (BIF-CC)

CC-Link Interface unit (BIF-CC)

CC-Link 接口模块 (BIF-CC)

MITSUBISHI ELECTRIC CORPORATION

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