The Importance of Arc Fault Protection

PT. CHINT INDONESIA

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FORUM PERUMAHSAKITAN 2022

Perencanaan dan Pengelolaan Sistem Kelistrikan Rumah Sakit

zoom

13.00 - 16.25 WIB

SABTU, 11 JUNI 2022

HEF 2022

ORGANIZED BY : KIC

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CURRICULUM VITAE

Current Designation: Technical Support Engineer
Education Background: Electrical Engineering
Work Experience :
PT. Unitama Sentosa Gemilang, 2001 ~ 2003
PT. Palm Semesta Engineering, 2003 ~ 2007
Danfoss Industries Pte. Ltd. 2007 ~ 2012
PT. Siemens Indonesia, 2012 ~ 2016
PT. Emerson Indonesia, 2016 ~ 2017
PT. Nidec Sankyu Precision Indonesia, 2017 ~ 2018
PT. Armasindo Global Sinergi , 2018 ~ 2020
PT. Chint Indonesia, 2020 ~ until now

OUTLINE

- Introduction
- Electrical Fault Caused
- AFDD Application
- NB3LE-AFD, NB4LE-AFD Highlight
- Conclusion


Empower the World
The Importance of Arc Fault Protection

01 Mar 2022, Jakarta, CNN Indonesia –
In **2021**
17,768 fire cases occurred in Indonesia
5,274 cases or about **45%** caused by **electricity.**

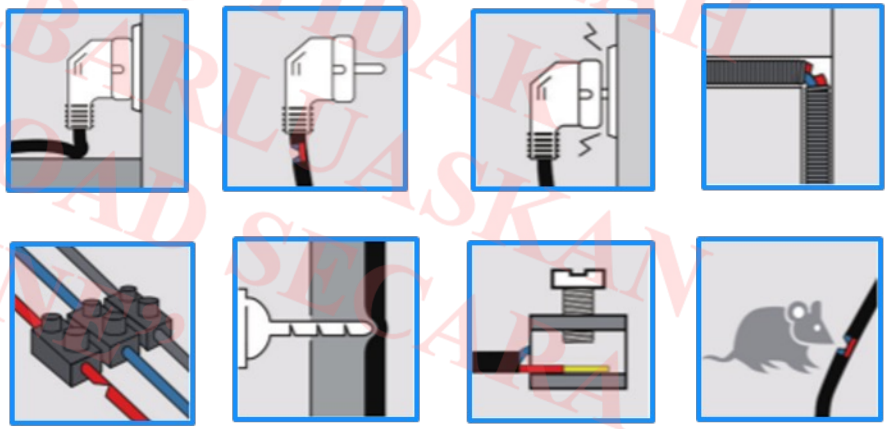
Arc fault introduction- Arc generation factors and hazards

Common causes of arc fault

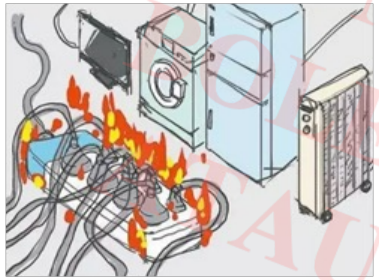
loose terminal, poor electrical connection, poor contact of plug and socket, damage of insulated conductor and aging of conductor.

Harm of arc fault

only **2-10A** arc current can produce local high temperature of **2000-4000 ℃**, and **0.5A arc current** is enough to cause fire!



What electrical faults caused the electrical fire?



Overloads

Earth leakage current

Over voltages

Short circuits

Lightning

Arc fault

MCB

Short circuits& Overloads

RCD

Earth leakage current

RCBO

Short circuits, Overloads, Earth leakage current

SPD

Lightning

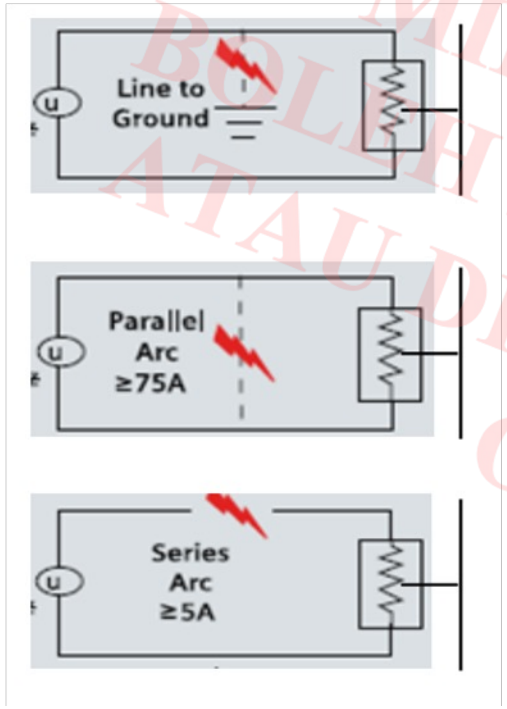
OUVT

Over voltage

?

Arc fault

Kind Arc fault



Earth arc fault

current is flowing from active conductor to the earth

Parallel arc fault

current is flowing between active conductors in parallel with the load of the circuit.

Series arc fault

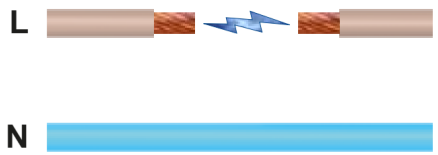
current is flowing within one conductor of the final circuit

RCD

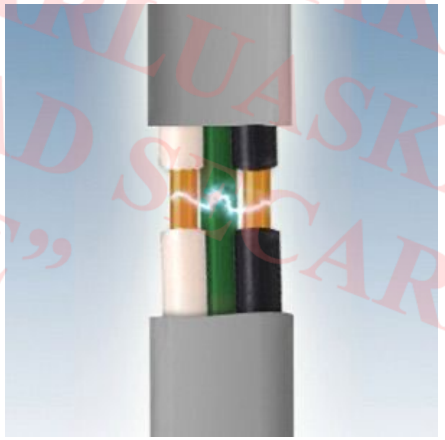
?

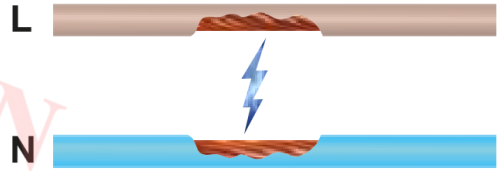
Kind Arc fault

Series arc fault - (for example, arc fault in series with load caused by loose terminal, poor electrical connection, poor contact of plug and socket, damage of insulated conductor by external force, etc.)



Parallel arc fault - (for example, arc fault in parallel with load caused by insulation damage between live conductors, carbonization channel caused by interphase insulation aging or pollution).





What AFDD can do? Arc fault protection

RCD residual current operated circuit breaker

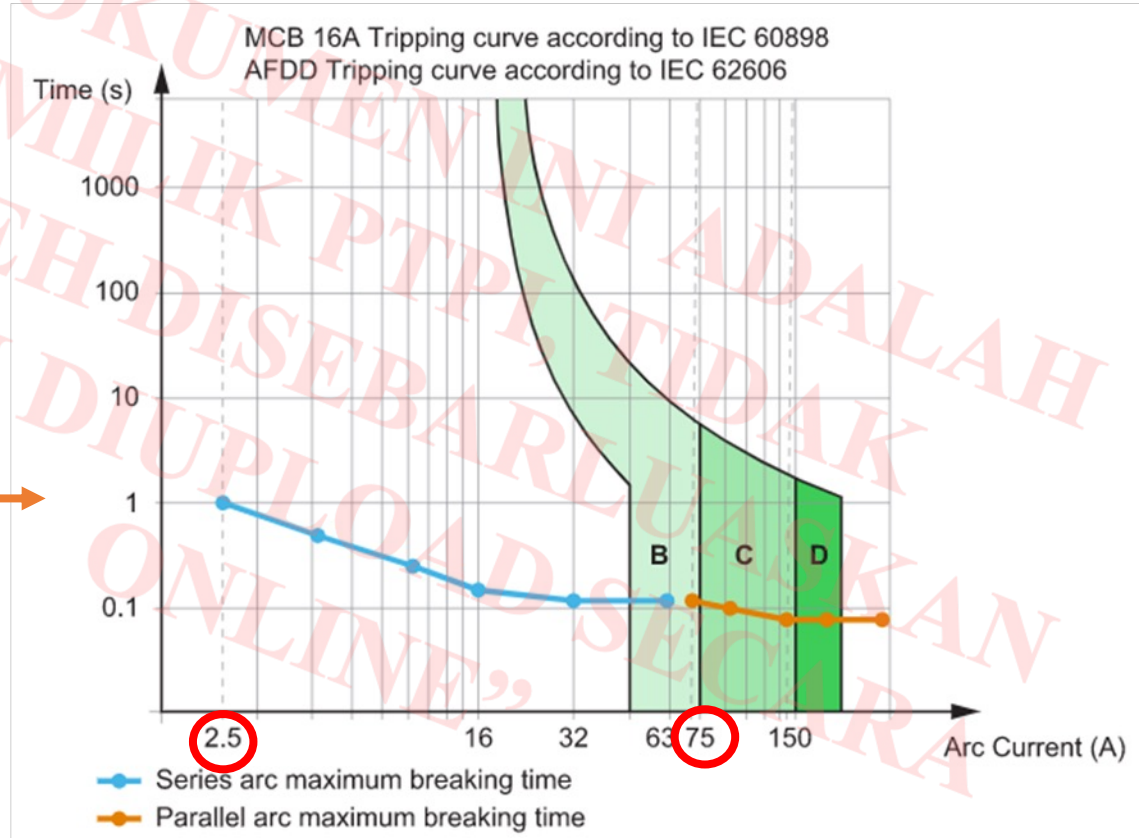
- RCD is considered to be an effective method to reduce fire risk by detecting leakage current to ground and arc. However, for series and parallel arc faults, RCD cannot detect such faults.
- RCD (with sensitivity ≤ 300 MA) can only detect grounding arc fault.

Miniature circuit breakers and fuses

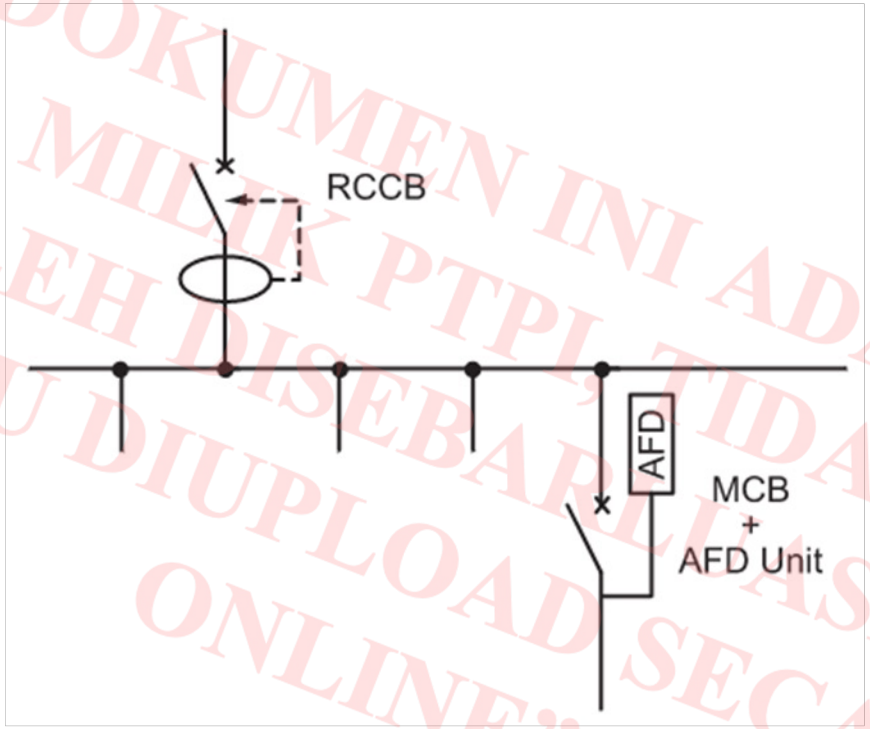
- In case of parallel and series arc fault, MCB and fuse will act only when their action time and current curve are consistent with the current value of arc fault.
- The MCB cannot detect the earth arc fault because the current value is usually very low.

AFDD is required to ensure complete protection against arc failure and thus fire risk

MCB vs AFDD tripping curve

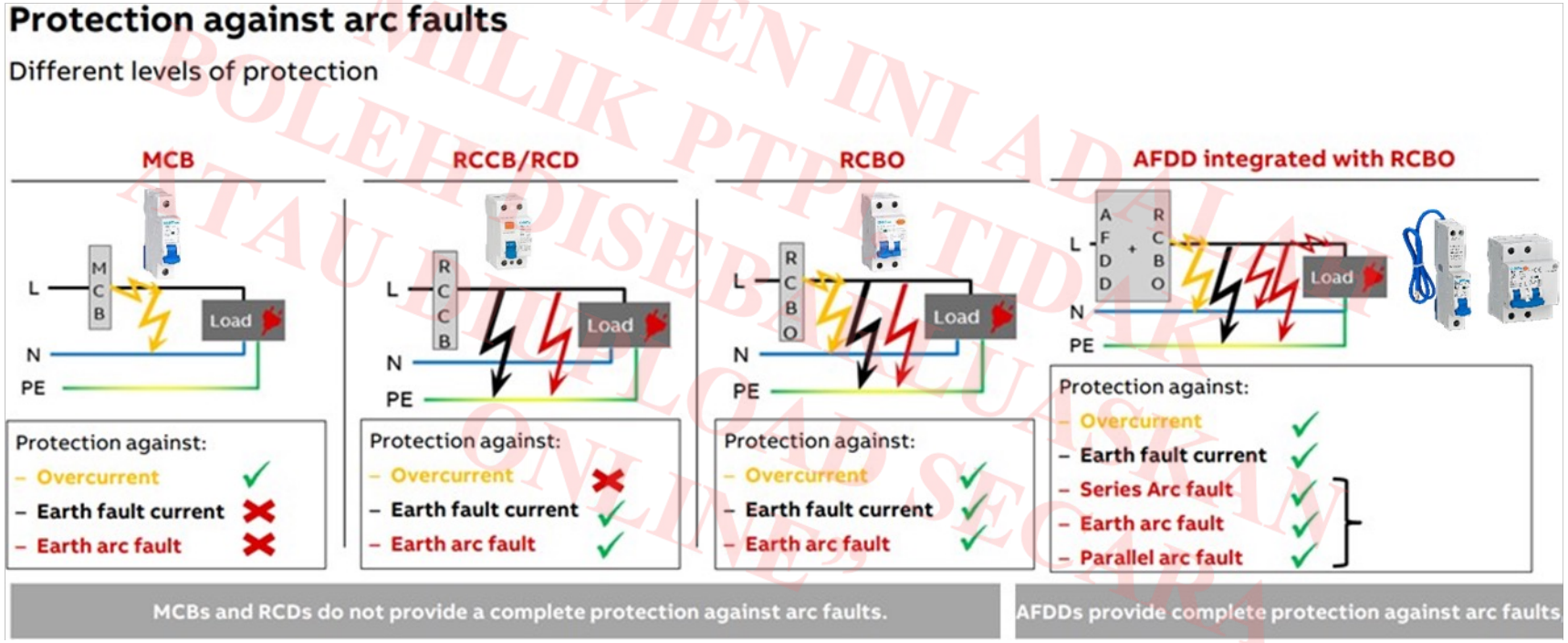


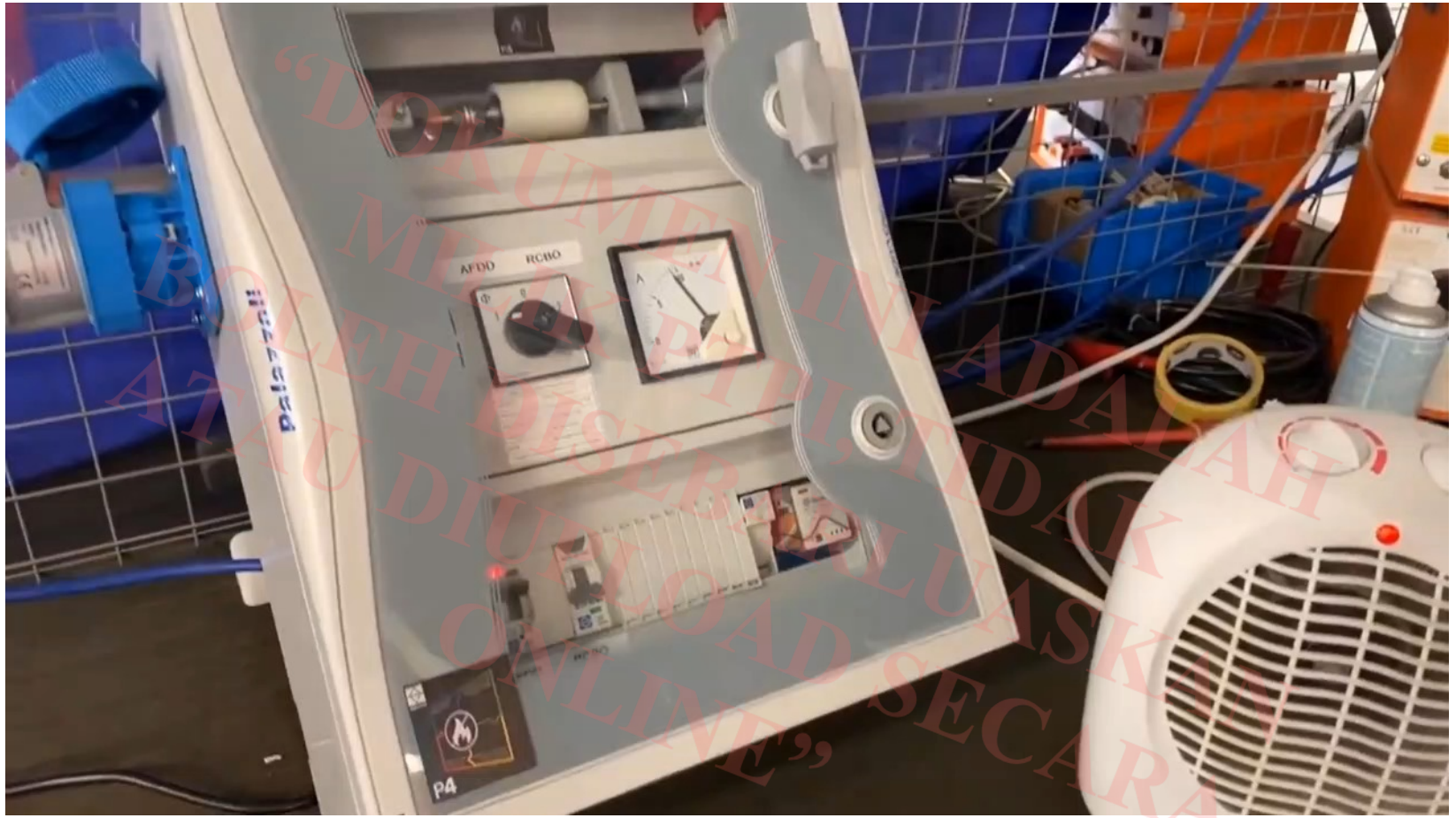
Connection Protection with AFDD or AFD



AFDD as one single device, including an arc fault detection unit and a protective device such as a MCB or RCBO

Arc fault introduction- Compare the arc protection of different devices





	Circuit protection	People protection	Circuit protection, people protection, fire protection		
	Short circuit and overload	Earth fault current	Earth arc fault	Series arc fault	Parallel arc fault
MCB	Yes	No	No	No	No
RCCB	No	Yes	Yes	No	No
RCBO	Yes	Yes	Yes	No	No
AFDD integrated with RCBO	Yes	Yes	Yes	Yes	Yes

Why AFDD?-AFDD application

Approved Based On
BS-EN 61009-1 & BS-EN 62606

According to UK and Norwegian regulations, AFDD need mandatory installation for all residential buildings in 2023

According to IEC60364-4-42, It is recommended to install in the following places








CE, CB, UKCA certified

According to **German** DIN VDE 0100-420, Mandatory installation in the following places

DIN VDE 0100-420
Mandatory application

The installation in final circuits in single phase AC system with less than 16 A **is mandatory** in locations such as:

- Rooms with sleeping and living accommodation in:
  - homes and day care centers (for children, disabled and elderly)
  - barrier-free apartments
- Locations with risk of fire due to
  - the processed or stored of materials
  - combustible constructional materials
- Locations that contain irreplaceable goods

It is generally **recommended** for locations such as

- Rooms with sleeping accommodation
- Locations with fire propagating structures
- Final circuits, that supply sockets used for appliances which need high loads

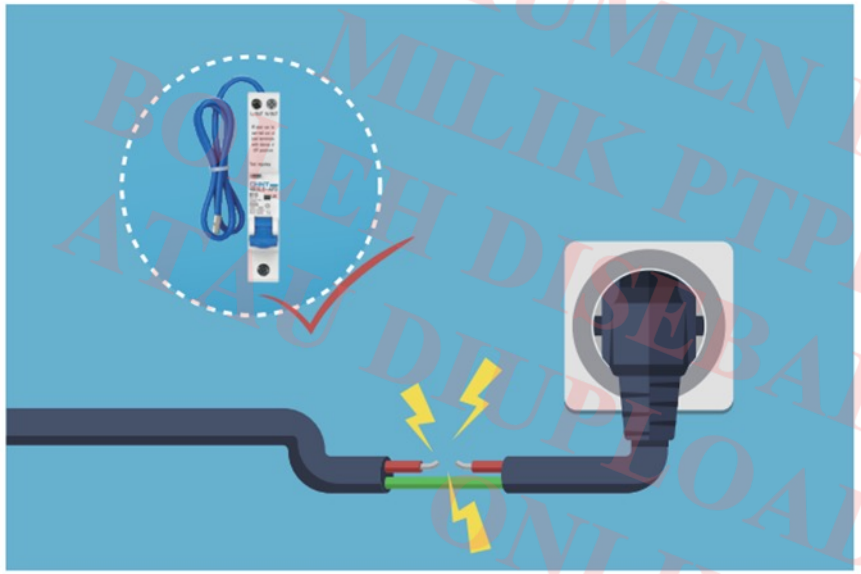
The arc fault detection circuit-breaker with residual current operated function

NB3LE-AFD

NB4LE-AFD

NB3LE-AFD, NB4LE-AFD Highlight

1. Unique arc fault protection function

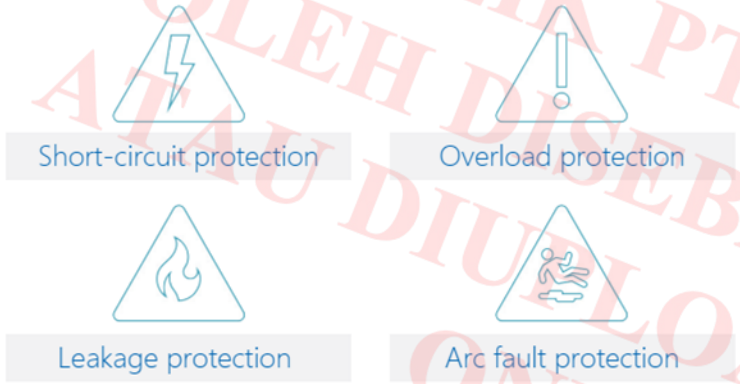


It can accurately detect the arc fault in the electrical circuit, cut off the circuit before causing the electrical fire, effectively prevent the electrical fire caused by the arc fault and realize the arc fault protection.

Much safer

NB3LE-AFD, NB4LE-AFD Highlight

2. It has Multiple security guarantees and more comprehensive protection.



In addition to arc fault protection, NB3LE-AFD have overload, short-circuit protection and leakage protection functions at the same time, which greatly improves the protection level of electrical fire and personal safety.

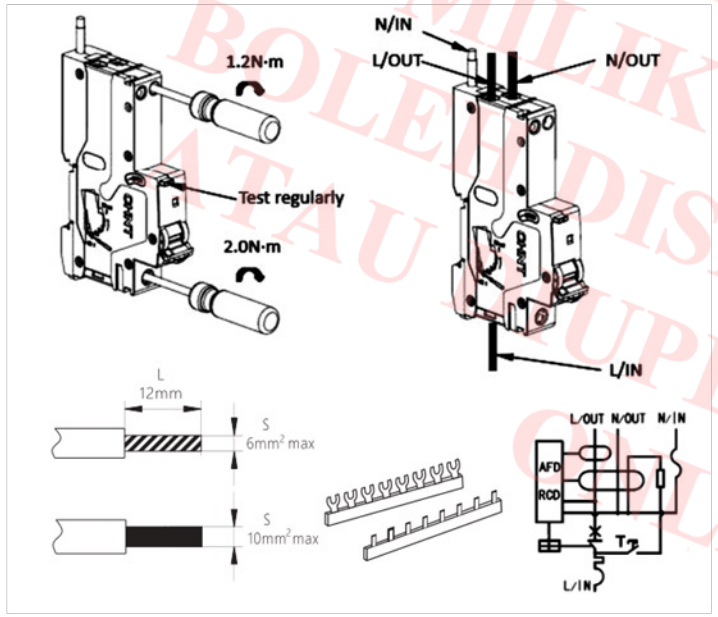
More reliable

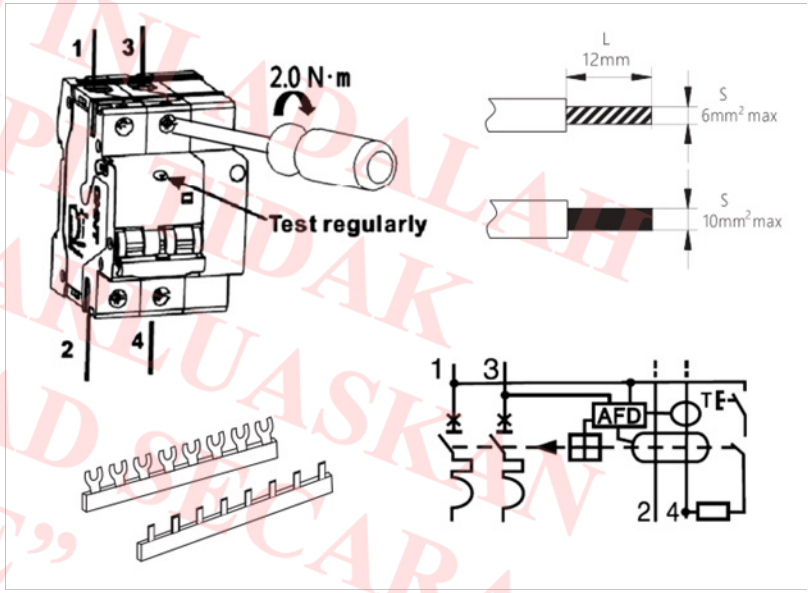
Product	NB3LE-AFD	NB4LE-AFD
Rated voltage	230/240V	230/240V
Width	18mm	54mm
Poles	1P+N	2P
Rated current	6A-32A	6A-32A
Tripping curve	B, C	B, C, K,
Type (wave form of the earth leakage sensed)	A	A
Rated sensitivity	10mA, 30mA	30mA
Breaking capacity	6kA	6kA
Certificate	UKCA/CB/CE	UKCA/CB/CE

NB3LE-AFD, NB4LE-AFD Highlight

3. Convenient installation

More convenient



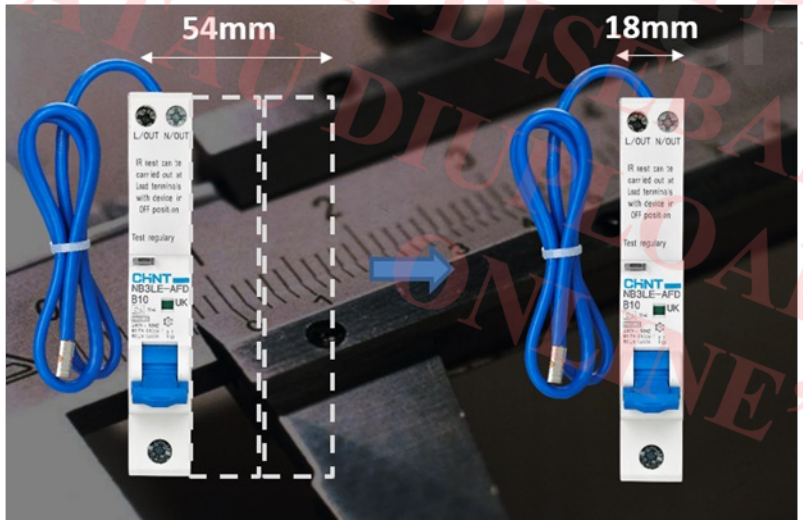


It can be easily mounted on the Din rail, just like the installation of MCB, it is very convenient for customer to operate.

NB3LE-AFD, NB4LE-AFD Highlight

4. Smaller product volume

With smaller product volume, the NB3LE-AFD is only 18mm, and multiple protections in one product, which greatly saves the space of the distribution box and is convenient for customers to replace.



Much smaller

Reduce 2/3 volume

NB3LE-AFD, NB4LE-AFD Highlight

5.Intelligent alarm system

More intelligent

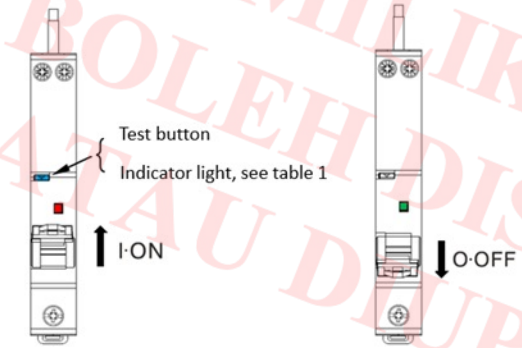
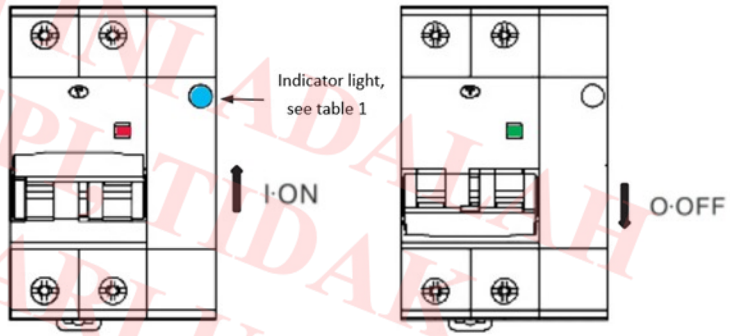


Table 1 Indicator light status display

Breaker status	Indicator light color	Instruction
'On' position	Blue always bright	Normal working
'On' after tripping	Red flashing 10s	Residual current fault
	Red and blue flashing alternately 10s	Arc fault



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When power on, the indicator alarms again to accurately alarm the fault caused by arc, remind the customer to check the damaged line and eliminate potential safety hazards

CONCLUSION

AFDD highly recommended to protect circuits with the highest risk of fire,

- Protruding cables (risk of knocks) / **Kabel menonjol (resiko terbentur)**
- Outside cables (greater risk of deterioration) / **Kabel luar (risiko kerusakan lebih besar)**
- Unprotected cables in secluded areas (like storage rooms) / **Kabel yang tidak terlindungi di area terpencil (seperti ruang penyimpanan)**
- Aging, deteriorating wiring, or wiring for which the connection boxes are inaccessible / **Kabel yang menua, memburuk, atau kabel yang kotak sambungannya tidak dapat diakses**.

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