



6kA AFDD RCBO

1P+N Type A

Residual current circuit breaker with integral overcurrent and arcing fault protection

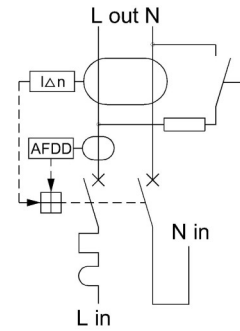
Lewden P4 series AFDD RCBO devices offer the ultimate protection for distribution circuits against the effects of overcurrent, overvoltage, short circuit, residual current, and arcing faults, all within one compact device.

These devices are fully interchangeable with the Lewden range of 6kA MCBs and single module RCBOs, and have been designed primarily for consumer unit application.

AFDD RCBOs feature 30mA Class A residual current

Rating (A)	Part Number
6A	P04-B06/30/1PNA
10A	P04-B10/30/1PNA
16A	P04-B16/30/1PNA
20A	P04-B20/30/1PNA
32A	P04-B32/30/1PNA
40A	P04-B40/30/1PNA

Technical Data	
Reference standards	IEC/BS EN61009-1 IEC/BS EN62606
Rated Voltage (Un) (+10% / -15%)	230/240V ac
Rated Current (In)	6-40A
Rated Frequency (Fn)	50/60Hz
Rated short circuit capacity	6000A
Rated residual making & breaking capacity I Δ m	4500A
Energy Limiting class	3
Rated impulse withstand (Uimp)	4kV
Overcurrent Tripping Characteristic	B Curve
Rated residual current	30mA Type A
Arc Fault Detection	Series Arc Fault Parallel Arc Fault
Neutral pole	Switched
Terminal capacity (line)	1-16mm ²
Terminal capacity (load)	1-10mm ²
Neutral conductor length	350mm (can be cut to suit)
Terminal tightening torque	Line 2.5Nm Load 1.2Nm
Dimension (mm)	w18 x h116
Ambient Operating Temperature	-25 to +40°C
Reference calibration temp.	+30°C



General Information

The Lewden range of circuit protection devices are designed and tested for use with Lewden branded distribution boards.

This device must be installed by a qualified electrician in accordance with the latest edition of the IET wiring regulations for electrical installations BS7671.

1P+N AFDD RCBOs are suitable for use in TN-S, TN-C-S, & TT network systems, and are considered suitable as a means of isolation.

The switched neutral pole is particularly appropriate for systems featuring a TT earthing arrangement, where it is necessary to disconnect all live conductors in order to achieve safe isolation of individual circuits. (BS7671:2018 Regulation 462).

The AFDD RCBO must be installed at the origin of each individual circuit to be protected.

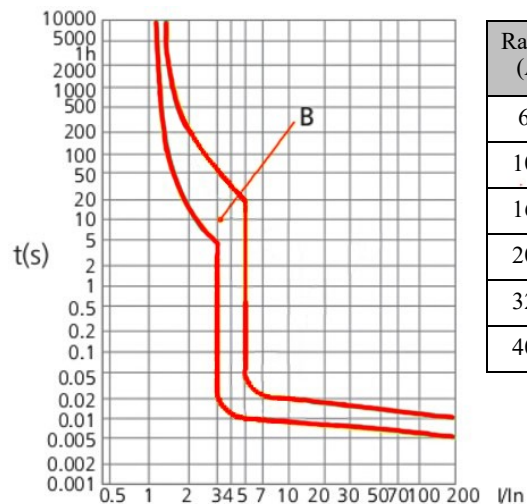
Load appliance manufacturer's instructions must be considered when selecting the appropriate AFDD RCBO rating for a particular item of equipment.

Residual Current Protection

Class	Residual Current Protection level
A	Provides protection against AC earth fault currents and pulsating DC currents, whether suddenly applied or slowly increasing. Tripping is achieved for residual pulsating DC currents superimposed on a smooth DC current up to 6mA. Particularly suited to single phase loads featuring electronic components. e.g. Lighting controls and LED drivers, induction hobs, power supplies for class II equipment, multimedia equipment, inverters etc. Type A devices are also suitable for type AC RCD applications such as immersion heaters, tungsten and halogen lighting, ovens, showers etc.

Overcurrent Protection

Type	Overcurrent tripping characteristic
B	Trips at fault currents between 3-5x the rated current of the device. Mainly used in residential applications where appliances have low level inrush currents.



Rating (A)	Max Zs (Ω)
6A	7.6 Ω
10A	4.6 Ω
16A	2.3 Ω
20A	1.85 Ω
32A	1.4 Ω
40A	1.14 Ω

Detecting arcing faults on Ring and Radial circuits

AFDD's offer protection against arc faults within ring and radial final circuits and flexible cables of load equipment connected to the circuit;

Parallel arc faults are detected and disconnected in all parts of a ring or radial circuit, and on flexible cables of all connected load equipment. A series arc fault will be detected within radial circuits and flexible cables of load equipment connected to a ring final circuit.

Series arc faults on a conductor in one leg of a ring final circuit are unlikely to be at a dangerous level so will not be detected due to the load current flowing around the other leg of the ring.

The P4 AFDD is calibrated to detect and disconnect arcing faults of the following magnitude and duration

Arcing Fault tripping characteristics

Series Arc Fault		Parallel Arc Fault	
Load Current (A)	Maximum Trip Time (s)	Test Current (A)	Max. permitted No. of arcing half waves within 0.5s (N)
2.5	1	75	12
5	0.5	100	10
10	0.25	150	8
16	0.15	200	8
32	0.12	300	8
40	0.12	500	8

Fault identification

Following clearance of a fault in the load circuit, upon re-closing of the device the red LED will signify the reason for the last break of circuit.

* Requires further investigation. Consult a qualified electrician

Red LED Status	Description
Constantly lit	Power On—Device active
1 flash per second for 10 seconds *	Series or Parallel Arcing fault
2 flash per second for 10 seconds *	Overvoltage fault >275V
5 flashes per second ongoing *	AFDD Self Test fault

Operation due to Overcurrent / Residual current fault

It will not be possible to reclose the device if an overcurrent / residual current fault remains in the load circuit.

If the fault is no longer present, the device can be reset and the LED will be constantly lit.

Operation due to Series / Parallel arcing fault

If tripping was caused due to a series/parallel arcing fault the led will indicate as shown in the table above.

If the fault is no longer present, the LED will revert to the constantly lit 'healthy' status after 10 seconds.

If the fault remains, the device will trip again within the times specified in the tables above (Arcing fault tripping characteristics).

Overvoltage Fault tripping characteristics

If tripping was caused due to a prolonged over voltage fault, the AFDD will disconnect within the times shown in the table below. Upon reset the fault condition will be indicated by the LED as detailed in the table above.

If the fault remains the device will disconnect again on reclosing.

Overvoltage Fault Condition				
Line Voltage (AC)	275V	300V	350V	400V
Maximum tripping time (s)	10	3	0.75	0.2
Minimum non actuation time (s)	3	1	0.25	0.1

Self-Check function

A self check is performed upon initial closing of the device and then every hour subsequently. The device will trip within 5 seconds following a self check failure. If for any reason the device cannot trip (e.g. due to failure of the integral pulse modulation tripping relay), the LED will continue to flash in the sequence described (AFDD self test fault), for as long as the device remains energised.

Diversity Factor

Adjacent thermal magnetic MCBs/RCBOs/ AFDD RCBOs should not be continuously loaded at their nominal rated currents when mounted within enclosures.

A rated diversity factor (RDF) should be applied to the nominal rated current of the device where it is intended to simultaneously load circuits continuously for several hours.

CU ways	RDF	CU ways	RDF	CU ways	RDF
1 way	1	2-3 ways	0.8	4-5 ways	0.7
6-9 ways	0.6	10 ways+	0.5		

Testing of the Installation

After completion of the installation, it is essential that it is tested in accordance with the latest edition of the IET wiring regulations for electrical installations (BS7671).

Insulation resistance test

Insulation resistance testing between Line and Neutral conductors must be performed on the load side of the device, with both live conductors disconnected.

Insulation resistance testing should not be carried out with the live conductors connected to the load terminals as this may produce false readings

Residual Current trip test EN61009-1

Residual Current Test Parameter			Result
'AC' setting	0.5x I Δ n		RCBO will not trip
	1.0x I Δ n	0 & 180°	RCBO must trip within 300ms
	5.0x I Δ n	0 & 180°	RCBO must trip within 40ms
'A' setting **	1.4x I Δ n		RCBO must trip within 300ms
	350mA		RCBO must trip within 40ms

**Test equipment manufacturers instructions should be referred to in order to establish the correct machine settings for testing type A devices.

Compliance to BS7671 is deemed to have been verified with an alternating current (AC) test at rated residual operating current 1.0x I Δ n

Maintenance

The AFDD RCBO should be tested on a regular basis (every six months) by pressing the TEST button (T) in accordance with the latest edition of the IET wiring regulations for electrical installations (BS7671).

With the AFDD RCBO in the ON position, the red LED will be continuously lit when the load circuit is healthy.

A flashing LED indicates a fault within the wiring circuit or connected appliance, requiring further investigation by a qualified electrician.

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