

# F200 Series Residual Current Devices



## Residual current devices

F200 Series

UL 1053



### Description

The F200 Series residual current devices offer a wide range of product for all of your fault protection needs.

### A & AC

A large offering for standard instantaneous and selective AC and A types.

All sizes up to 63 mA with sensitivity thresholds up to 1 A are offered in all possible pole configurations.

ABB RCDs carry many marks and approvals for the worldwide market.

### Features

RCDs assure protection to equipment against current leakage to earth.

	F200A	F200AC
Type	AC	A
Amperage	16, 25, 40, 63, 80, 100, 125	16, 25, 40, 63, 80, 100, 125
Voltage	480Y/277 VAC	480Y/277 VAC
Sensitivity	0.01-0.03 / 0.1-0.3-0.5	0.01-0.03 / 0.1-0.3-0.5

# F200AC

## F200 Series

### AC Type

# AC



F202AC



F204AC

No. of poles	Rated residual current mA	Rated current A	Catalog number	List price	
2	10	16	F202AC-16/0.01	\$ 670	
		25	F202AC-25/0.03	230	
		40	F202AC-40/0.03	340	
	30	63	F202AC-63/0.03	470	
		80	F202AC-80/0.03	940	
		100	F202AC-100/0.03	1050	
		100	25	F202AC-25/0.1	300
			40	F202AC-40/0.1	340
	63		F202AC-63/0.1	510	
	80		F202AC-80/0.1	840	
	300	100	F202AC-100/0.1	950	
		25	F202AC-25/0.3	280	
		40	F202AC-40/0.3	310	
		63	F202AC-63/0.3	460	
		80	F202AC-80/0.3	630	
	500	100	F202AC-100/0.3	1700	
		25	F202AC-25/0.5	330	
		40	F202AC-40/0.5	460	
63		F202AC-63/0.5	440		
80		F202AC-80/0.5	630		
	100	F202AC-100/0.5	750		

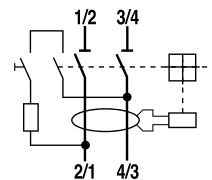
No. of poles	Rated residual current mA	Rated current A	Catalog number	List price
4	30	25	F204AC-25/0.03	\$ 310
		40	F204AC-40/0.03	400
		63	F204AC-63/0.03	540
		80	F204AC-80/0.03	1850
		100	F204AC-100/0.03	2100
		125	F204AC-125/0.03	2300
	100	25	F204AC-25/0.1	310
		40	F204AC-40/0.1	430
		63	F204AC-63/0.1	530
		80	F204AC-80/0.1	1650
		100	F204AC-100/0.1	1900
		125	F204AC-125/0.1	2050
	300	25	F204AC-25/0.3	290
		40	F204AC-40/0.3	330
		63	F204AC-63/0.3	480
		80	F204AC-80/0.3	1450
		100	F204AC-100/0.3	1450
		125	F204AC-125/0.3	1700
500	25	F204AC-25/0.5	350	
	40	F204AC-40/0.5	400	
	63	F204AC-63/0.5	570	
	80	F204AC-80/0.5	1300	
	100	F204AC-100/0.5	1400	
	125	F204AC-125/0.5	1700	

#### Type AC

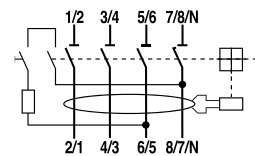
- Suitable for alternating current
- 2 & 4 poles
- 16-125 A range
- Can be used as a main device providing ground fault protection against earth leakage for several MCB branch devices

#### Technical data

Technical data – See page 15.90



F202AC



F204AC

# F200A

## F200 Series

### A Type

# A



F202A



F204A

No. of poles	Rated residual current mA	Rated current A	Catalog number	List price
2	10	16	F202A-16/0.01	\$ 450
		25	F202A-25/0.03	390
	30	40	F202A-40/0.03	440
		63	F202A-63/0.03	640
		80	F202A-80/0.03	1500
		100	F202A-100/0.03	2300
100	25	40	F202A-25/0.1	400
		40	F202A-40/0.1	450
	63	63	F202A-63/0.1	620
		80	F202A-80/0.1	1400
		100	F202A-100/0.1	1800
		300	25	F202A-25/0.3
40	F202A-40/0.3		430	
63	F202A-63/0.3		680	
80	F202A-80/0.3		1300	
500	100	F202A-100/0.3	1500	
	25	F202A-25/0.5	340	
	40	F202A-40/0.5	350	
	63	F202A-63/0.5	600	
	80	F202A-80/0.5	1300	
	100	F202A-100/0.5	1500	

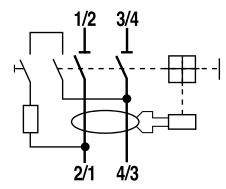
No. of poles	Rated residual current mA	Rated current A	Catalog number	List price
4	30	25	F204A-25/0.03	\$ 400
		40	F204A-40/0.03	460
		63	F204A-63/0.03	680
		80	F204A-80/0.03	1400
		100	F204A-100/0.03	2000
		125	F204A-125/0.03	2200
	100	25	F204A-25/0.1	410
		40	F204A-40/0.1	460
		63	F204A-63/0.1	700
		80	F204A-80/0.1	1200
		100	F204A-100/0.1	1400
		125	F204A-125/0.1	1600
300	25	F204A-25/0.3	390	
	40	F204A-40/0.3	430	
	63	F204A-63/0.3	630	
	80	F204A-80/0.3	1350	
	100	F204A-100/0.3	1700	
	125	F204A-125/0.3	1800	
500	25	F204A-25/0.5	390	
	40	F204A-40/0.5	530	
	63	F204A-63/0.5	1290	
	80	F204A-80/0.5	1400	
	100	F204A-100/0.5	1600	
	125	F204A-125/0.5	1800	

#### Type A

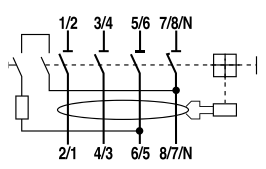
- Suitable for alternating and pulsating DC current
- 2 & 4 poles
- 16-125 A range
- Can be used as a main device providing ground fault protection against earth leakage for several MCB branch devices

#### Technical data

Technical data – See page 15.90



F202A



F204A

## Technical data

### Functions and classification criteria

### RCDs

#### Power loss of RCDs

##### RCCBs F200 series

Rated Current in [A]	Power loss [W]	
	2P	4P
16	1.5	-
25	2.0	4.8
40	4.8	8.4
63	7.2	13.2

#### Performance in altitude of RCDs

Up to the height of 2000 m, ABB RCDs do not undergo any alterations in their rated performances. Over this height the properties of the atmosphere change in terms of composition, dielectric capacity, cooling capacity and pressure, therefore the performances of the RCDs undergo derating, which can basically be measured in terms of variations in significant parameters, such as the maximum operating voltage and the rated current.

#### F200

Altitude [m]	2000	3000	4000
Rated service voltage $U_e$ [V]	400	380	380
Rated current in	$I_n$	$0.96 \times I_n$	$0.93 \times I_n$

### Introduction

Residual current devices (RCD) have always played an important role in circuit protection by detecting leakage to ground for equipment in many installations. RCD's are used in unison with a circuit protective device in industrial applications in the United States. The following guide will give an insight to the construction, mechanical operation, and applications of RCD's.

### RCD Definitions

Important definitions:

#### Earth leakage current

Current that flows between line to line or line to earth.

#### Residual current

The sum of the values of the electric currents in all live conductors

#### Fault current

Current that flows between line to line or line to earth.

#### Earth fault

When a conductive path is accidentally induced between a line and the earth

### RCD Definition

RCD's provide ground fault protection to equipment by monitoring the leakage of current to ground. An RCD will trip when a ground fault is detected in excess of the trip rating of the device. An RCD is designed to disconnect a circuit whenever it detects that the electrical current is unbalanced between the phase conductor and the neutral conductor. An imbalance may be caused by phase leaking to ground.

### Difference between type A and AC

Types of RCD's

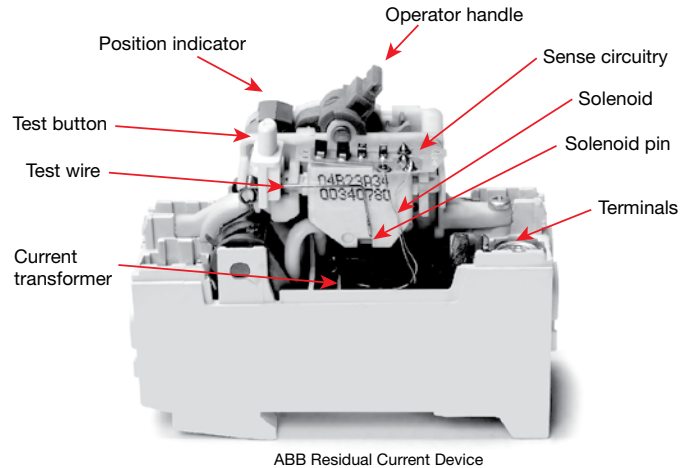
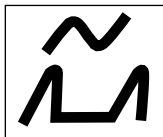
#### Type AC

Must be used for protection against AC earth leakage current.



#### Type A

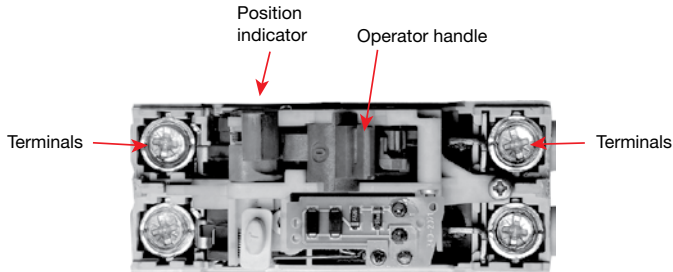
Must be used for protection against AC and pulsating DC (rectified AC) earth leakage current. The type A RCD must be installed in any circuit where the main supply is likely to be rectified. Some examples of applications where this would apply are motor speed controllers (drives) and power tools.



### RCD Mechanical operation

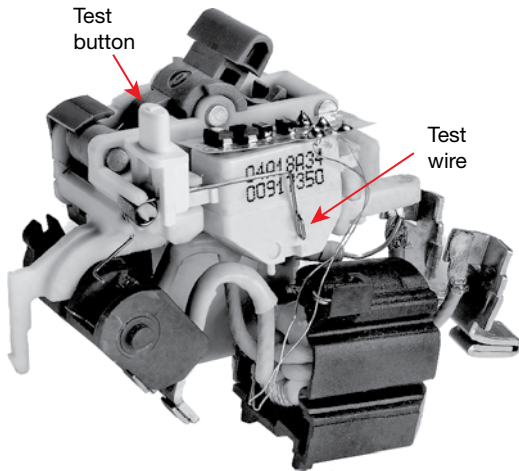
#### Main Incoming Supply and Terminals

The main incoming and the grounded neutrals are connected to the terminals. The operator handle places the RCD in the on and off position as the position indicator shows.



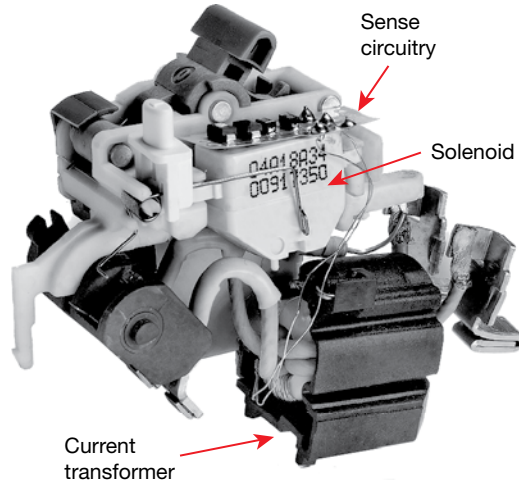
#### Test button and Test Wire

When the test button is pressed it allows the correct operation of the device to be verified by passing a small current through the test wire. This simulates a leakage to ground by creating an imbalance in the current transformer (CT).



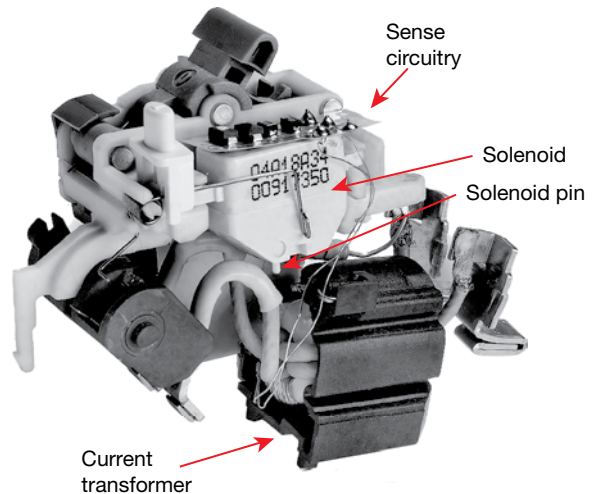
#### Current Transformer and Sense Circuitry

The current transformer surrounds the neutral and L1 conductors. During normal operation, all of the current being carried through the L1 conductor returns up through the neutral conductor. Therefore the currents in the two conductors are equal and opposite. When a leakage to ground occurs it causes some of the current to take a path to ground and creates an imbalance in the current between the two conductors. This imbalance in current induces a current in the current transformer (CT) which is then picked up by the sense circuitry. The sense circuitry then actuates the solenoid and the contacts are forced apart by a spring, terminating the electricity supply to the device.

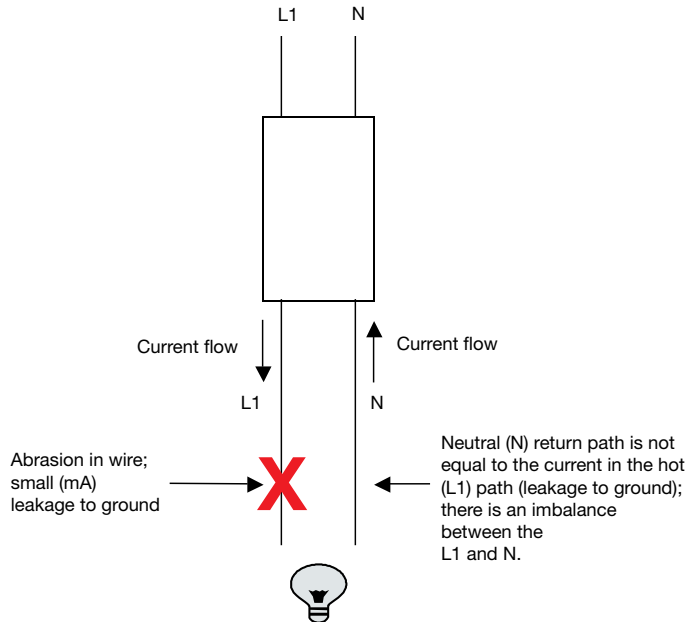


#### Solenoid

Once an imbalance has been detected by the CT, there is voltage induced on the CT. The voltage travels through the connected copper wires to the sense circuitry and the solenoid is actuated. The plunger at the bottom of the solenoid is then pushed out to trip the breaker.



### Example of current leakage to ground



### Difference between RCD and MCB

#### Miniature Circuit Breaker (MCB)

A miniature circuit breaker (MCB) is a device designed to isolate a circuit during an overcurrent event without the use of a fusible element. A breaker is a resettable protective device that protects against two types of overcurrent situations; overload and short circuit.

#### Residual Current Device (RCD)

A residual current device (RCD) is a device designed to provide protection against voltage leakage to ground. *RCD's are sensitive to a 30-300mA. RCD's are mechanical devices that contain a CT and a solenoid.* RCD's are designed to protect equipment, not wires against overload and short circuit situations. For this reason, an RCD should always be used in conjunction with an MCB in order to provide full protection from overload and leakage to ground.

#### Ground Fault Interrupter (GFI)

**GFI Definition (NEC):** A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device.

A ground fault interrupter (GFI) is a device designed to measure the current between the hot wire and neutral wire. Like the RCD, the GFI will open the closed contacts in order to protect against damage. A GFI is sensitive to 5mA and higher and is designed to protect people, not equipment.

A GFI is an electric device that contains a printed circuit board (PCB). GFI's have a "pigtail" wire at the end that carries a signal to the PCB that tells the contacts to open when a current imbalance is detected between the two conductors.

## Technical data

### F200AC, F200A

Item	F200AC	F200A
Approvals:		
UL	1053	1053
CSA	-	-
VDE	-	-
IEC	-	-
Number of Poles:	2,4	2,4
Rated Currents:	16,25,40,63,80,100,125	16,25,40,63,80,100,125
Operating Voltage:	480Y/277 VAC	480Y/277 VAC
Production Category:	IP20	IP20
Depth of Unit Per DIN 43880:	68mm/ 2.68 in.	68mm/ 2.68 in.
Mounting Position:	vertical, horizontal	vertical, horizontal
Standard Mounting:	35mm DIN rail	35mm DIN rail
Main and Shunt Trip Terminals:		
Wire Size	18-4 AWG/.82-21.2mm <sup>2</sup>	18-4 AWG/.82-21.2mm <sup>2</sup>
Torque	17.5 in-lbs./1.978 nm	17.5 in-lbs./1.978 nm
Tool	#2 Posidrive	#2 Posidrive
Accessory Terminals		
Wire Size	18-16 AWG/.82-1.3mm <sup>2</sup>	18-16 AWG/.82-1.3mm <sup>2</sup>
Torque	4.5 in-lbs./51nm	4.5 in-lbs./51nm
Tool	# 1 Posidrive	# 1 Posidrive
Service Life at Rated Load:	No Load 20,000 operations Full Load 10,000 operations	No Load 20,000 operations Full Load 10,000 operations
Shock Resistance:	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms
Vibration Resistance:	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ 1n	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ 1n