Quick Reference Guide
BOCR 2.0 Motor Protection Relay

Thank you for purchasing the BCH BOCR 2.0 Relay
This product is for product user & maintenance person

SAFETY PRECAUTIONS

Be sure to read the instruction manual and safety precautions before use products.

⚠ Warning : Offending against the message will result in death or serious injury.

⚠ Caution : Incorrect handling of the device may result in minor injury or physical damage.

⚠ Caution

- Change in setting is possible only in motor stop state and there should not be any fault with appropriate password. Default password is 1004.
- Keep the product in the place where is no humidity and dust.
- Please check the phase & polarity while inserting the CT wire.
- Wrong polarity or phase can cause the wrong result (may cause Phase Reversal / Unbalance / Earth Fault).
- The product which is different from order is may cause a malfunction or a fire.
- Installation, maintenance and inspection of the product should be performed by the qualified Engineers.
- In case of Single phase motor, Disable the function Phase Loss, Phase unbalance and Reverse Phase. Under current will not work.
- After every Trip acknowledge the relay with front RESET button.
- Wire the terminal after confirming the terminal number, It may cause the damage or fire.
- Recommended to use BCH supplied CBCT only.

⚠ Warning

- Do not change the setting during motor running.
- Turn off the upstream breaker before installing or service to prevent electric shocks & burn due to short circuit.

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Overview
The quick reference guide (QRG) takes you through the installation and setup of BOCR 2.0 series motor protection relays and helps user to get setup and running as quickly as possible. This guide contains only basic information to operate the relay.

General Description
BOCR 2.0 series motor protection relay is a micro controller based relay designed for protection of LV & MV motors. It is equipped with 3 output relays for trip and alarm. Following are the brief description:-

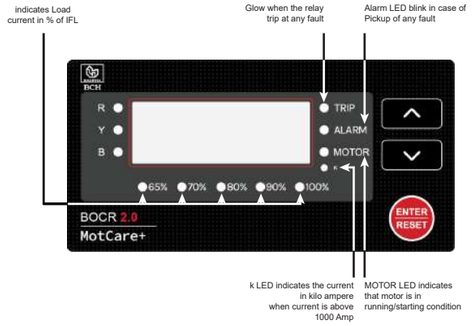
Parameter	Description
Operational Current	0.8 - 8.0 x IFL / .06-10 x IFL
Frequency Range	50 / 60 Hz
Phase Current Measurement	Accuracy : + 5% [0.2 - 6.0 x IFL (60A model) / 0.5 - 8.0 x IFL (5A model)]
Protection	Over-Load, Under-Current, Short Circuit, Lock Rotor, Stall, Unbalance, Phase Loss, Phase Reversal, Earth Fault, CB Failure
Accuracy	
Trip Time	± 5% (or + 100 mSec) (which ever is higher)
Trip Current (Phase)	± 5% (or + 0.020 Amp) (which ever is higher)
Trip Current (Earth)	± 5% (or + 0.020 Amp) (which ever is higher) - (CBCT model)
Display	
7 Segment	Metering and Fault information
Bar Graph	65 - 100 % of IFL setting
LED	RUN: Flashing for Motor Start/ Steady for Motor Run TRIP: Flashing for Fault Pick up/ Steady for Trip K: kiloAmp, LED glows for Current > 999 Amp
Auxiliary Supply (Refer Ordering Information)	L: 110V AC (100-160V) / H: 220V AC (190-260V) / W: 85-450V AC
Power Consumption	Approx. 6W
Contact Rating	
DO Contact	1 C/O Contact - N/O contact, 5A / 250V AC or 24V DC; N/C contact, 2A / 250V AC or 24V DC 2 N/O Contact with 1 common, 5A / 250V AC or 24V DC
CBCT Input	30 mA to 2 Amp: CT Ratio 1:1500 *Different ID available based on Ordering Information (Refer Catalog)
Relay Reset	Trip Relay (DO1) Reset: Manual/Auto Alarm Relay (DO2 & DO3) Reset: Manual / Automatic
Thermal Reset	Enable (ON): Thermal memory <50% & Reset key pressed Disable (OFF): Thermal memory 0% & Reset key pressed
Mounting	35 mm Din-rail
Temperature	
Operation	0ºC to 70ºC
Storage	-10ºC to 85ºC
Wiring Connection	
For current	Penetration / Tunnel Type
For Others (Aux supply, Relay contact etc.)	Screwed Terminal

Model Information

BOCR - □ - X - X - X

- **Product Series: 2.0**
- **Current Range**
  - 05 : 0.25 to 5A
  - 60 : 2.5 to 60A
- **Leakage Detection**
  - 0 : No ZCT/CBCT
  - Z : with ZCT/CBCT
- **Auxiliary Supply**
  - A : 85V - 270V AC/DC
  - D : 18 - 60VDC

Front Interface

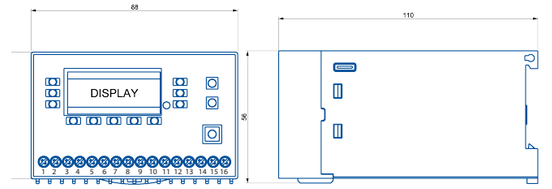


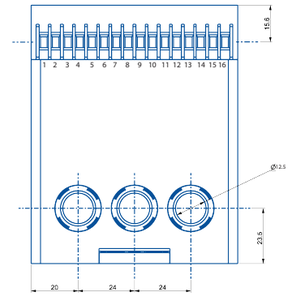
It comprises of 7 Segment display :-

- Three Push buttons for setting and other operations for local access. one push button for fault acknowledgment/Reset.
- 1 LED for PICKUP/TRIP on fault, which require Manual reset through RESET key. 1 RUN LED for motor Start/Run indication.
- Motor State Indicator: Flashing of RUN LED for Motor Start & glowing steady of RUN LED for run condition.

Keys	Description
ENTER RESET	used as ENTER key in Edit / Setting / View menu
ENTER RESET	Long Press for Fault Reset
^	used as scroll key / increment key
v	used as scroll key / decrement key

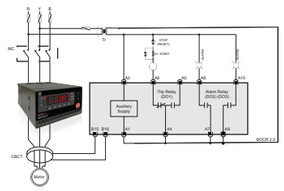
Terminal Connection Details



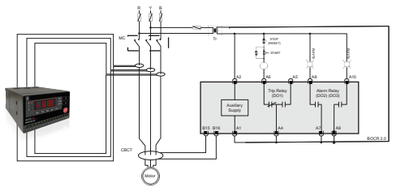


EOCR Terminal Function		
	Term No.	Function
A	1	AC-L(240VAC)
	2	AC-N
	3	-
	4	Relay1- Common
	5	Relay1-NO
	6	Relay1-NC
	7	Relay2-Common
	8	Relay2-NO
	9	Relay3-Common
	10	Relay3-NO
B	11	-
	12	External-RS485-A
	13	External-RS485-B
	14	-
	15	External-CBCT-H
	16	External-CBCT-L

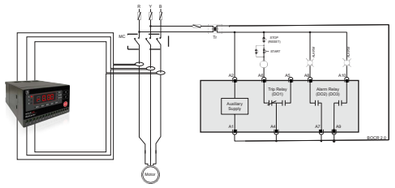
BOCR 2.0 with external CBCT for Earth fault detection



BOCR 2.0 with external Phase CT and external CBCT



BOCR 2.0 with External Phase CT & without CBCT



Setting Parameters
Common Setting Parameters

Parameter	Display	Setting Range Min.	Setting Range Max.	Step Size	Unit	Default Setting
Full Load Current (IFL)	IFL	2.50[2]/0.25[1]	60.00[2]/5.00[1]	0.01	Amp	60.00/5.00
Motor Start Time	Stt	1.0	200.0	1	Sec	8
CT Ratio	Ctt	1	999	1	---	1
Auto IFL Detection[3]	ADI	-	-	-	-	-

NOTE :
- [2] 5A model.
- [1] 60A model.
- [3] User can set the Full Load current setting though HMI, as per his application requirement. However for the ease of installation, user can use this feature during installation to detect the Full load current itself by the BOCR 2.0. (Refer Page No. 12)

Protection Setting Parameters

Parameter	Display	Setting Range Min.	Setting Range Max.	Step Size	Unit	Default Setting
Over-load Pickup	OLd	50	150	5	% IFL (Amp)	110
Over-load Characteristics	OLC	definite	thermal	-	-	thermal
Trip Class	tcL	5	30	5	% IFL (Amp)	10
Short Circuit Pickup	SCP	200	1000[1]	5	% IFL (Amp)	OFF
Under-load Pick up	UCP	20	90	5	% IFL (Amp)	OFF
Locked Rotor Pick up	LrP	200	1000[1]	10	% IFL (Amp)	OFF
Phase Unbalance Pickup	PUC	5	100	5	% IFL (Amp)	OFF
Stall Rotor Pick up	StL	150	800	5	% IFL (Amp)	OFF
Earth Fault Pickup	EFP	0.030	2.000	0.005	Amp	OFF

NOTE :
- All above protection are available with disable option (OFF).
- BOCR 2.0 will allow change in IFL setting only if motor is in stop condition and there is no fault pickup
- [2] Earth Fault calculation using externally connected CBCT.
- Model dependent.
  60A Model - 800%
  5A Model - 1000%

Advanced Setting Parameter

Parameter	Display	Setting Range Min.	Setting Range Max.	Step Size	Unit	Default Setting
Phase loss detection time	tPL	0.50	5.00	0.01	sec	OFF
Phase Unbalance detection time	tPU	1.00	30.00	0.01	sec	30.00
Locked Rotor detection time	tLR	0.10	5.00	0.01	sec	5.00
Stall detection time	tST	0.50	10.00	0.01	sec	10.00
Under-load detection time	tUC	1.00	30.00	0.01	sec	30.00
Short circuit detection time	tSC	0.05	1.00	0.01	sec	1.00
Phase reversal time	tPR	OFF	ON	-	-	OFF
Earth fault detection time	tEF	0.05	10.00	0.05	sec	10.00
Contactor failure detection time	tCF	0.10	10.00	0.10	sec	OFF
Overload definite time	tOL	0.10	30.00	0.10	sec	30.00
Motor type(1Ph or 3 Ph)	PHt	1	3	-	-	3
"Auto Scroll" (Enable:ON /Disable:OFF)	AUS	OFF	ON	-	-	OFF
"Thermal Memory Reset" (Enable:ON /Disable:OFF)	rtH	OFF	ON	-	-	ON
"Trip Relay Fail Safe" (Enable:ON /Disable:OFF)	FSF	OFF	ON	-	-	OFF
"Alarm Relay Reset Option" (Enable:ON /Disable:OFF)	ALr	Ato	nul	-	-	nul

NOTE :
- Selecting motor type to 1 Ph then Phase loss, Unbalance, Under-load & Reversal function will not work.

Current Range Selection

Model 1 (60 Amp)		Model 2 (5 Amp)		No.of times wire passes through Built-in CT
Phase CT selection	Rated Current Range	Phase CT selection	Rated Current Range	
nonE	2.5 - 60 Amp	nonE	0.25 to 5 Amp	Once
Ext CT	5 Amp	Ext CT	5 Amp	Once

BOCR 2.0 supports motor current above 60 Amp with external CT with rated secondary current of 5 Amp.

NOTE: BCH recommend to use Model-2, when using External CT.

Human Machine Interface
Navigation and editing of the HMI are performed by using the Scroll, Reset, and Enter keys to switch between screens

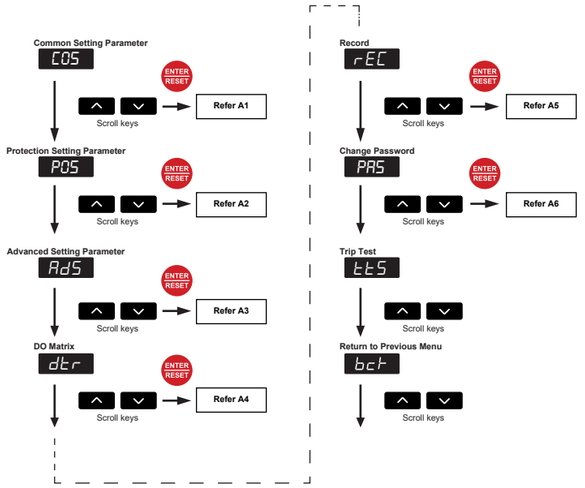
Main Screens

Scroll keys

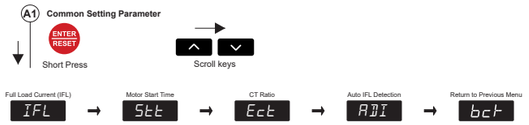
R Phase current | Y Phase current | B Phase current | Leakage Current | Thermal memory (%) | Current Balance | Fault type * See Annexure-A

Short Press

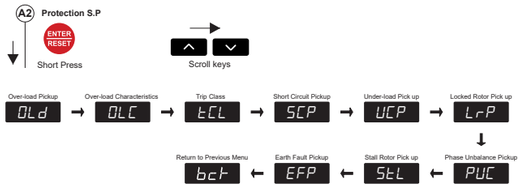
Menu Screens



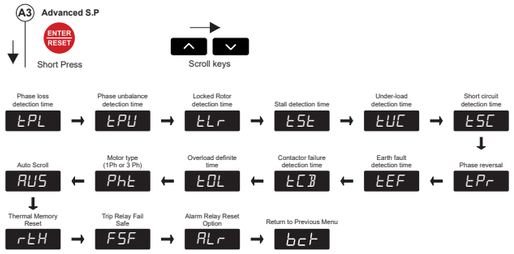
Sub Menu Screens for A1



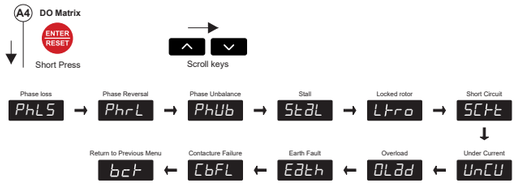
Sub Menu Screens for A2



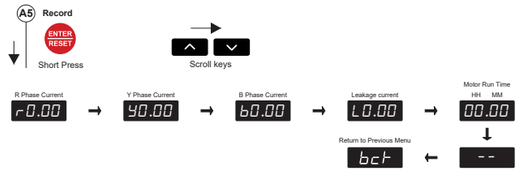
Sub Menu Screens for A3



Sub Menu Screens for A4



Sub Menu Screens for A5

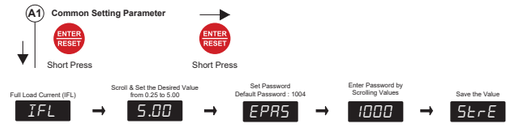


Sub Menu Screens for A6

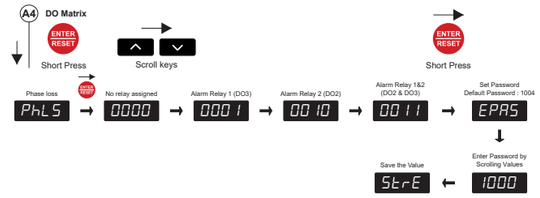
Annexure - A

Fault Info	Description	Fault Info	Description
PhLS	Phase Loss	UnCU	Under Current
PhrL	Phase Reversal	OLad	Overload
PhUb	Phase Unbalance	Eath	Earth Fault
StaL	Stall	CbFL	Contacture Failure
Lkro	Locked Motor	SCkt	Short Circuit

Configuration of Setting Parameter



Configuration of DO Matrix



Trip Test

In the case of a trip test, which is performed when the motor is in the stop condition, all the segments of the 7-segment display will start glowing one by one, all the LEDs will light up one by one, and all the relays will turn on and off sequentially.

Full Load Current Auto Detection

User can set the Full Load current setting though HMI, as per his application requirement. However for the ease of installation, user can use this feature during installation to detect the Full load current itself by the BOCR. The steps are as below.

Step 1	Set the Full Load current approximate to actual Full Load Current from Display Module in Powered up state.
Step 2	Start the motor in Full load condition.
Step 3	Access the Auto IFL detection option from HMI.

Press Enter for Parameter setting Mode → Edit/View → Settings → Set IFL

- Auto Full Load detection can lead to three states: Wait state, Success State or Fail State. . User Can see the Status message on the Home screen bottom page.
- Waiting State: If the Motor is in Start State, BOCR will display inject current at the screen. It will detect the IFL automatically when the motor change it states to Running state from Starting Phase.
- Auto IFL Detection Fail: If the current detected is not between 70% to 130% of the existing IFL (or the default IFL for the first use) then Auto IFL detection may end up with Failure return. It also show failure if there is any pickup or fault state.
- Auto IFL Detection Successful: If the full load current detected is within the range of 70% to 130% of the previously set Current and The motor is in Run condition (Motor LED is glowing steady, not blinking) and there is no pickup or fault detected then only the Auto IFL will be accepted successfully by the relay.

Trouble Shooting Points

Problem	Cause of Problem	Remedy
Wrong Measurement / Display	Wrong connection	• Check the no. of wires passed through the CT opening • Check the CT selection in common setting menu
Wrong Measurement / Display	Relay is inTrip/pickup state Motor is running	• Relay will not allow to change any of its setting unless it is in healthy state and motor is stopped • There should not be any pickup & last fault should be acknowledged before editing any setting parameter. Short press RESET for acknowledge the last fault
Protection not getting pickup	Protection is blocked from protection setting menu	Check that the particular protection setting is activated or not.
Output contact not operating	Protection Pickup is Disabled (OFF) Annunciation DO is not assigned Aux Supply not in range	• Check that protection setting for pickup level • Check DO matrix assignment • Verify the output contact operation via "TRIP TEST" • Check aux supply range within specified band only

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