



## AETB 01 (Single phase)



**BOSCH**

en Operating instructions

Auto electrical test bench - F 002 H30 025



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# 1. Symbols used

## 1.1 In the documentation

### 1.1.1 Warning notices - Structure and meaning

Warning notices warn of dangers to the user or people in the vicinity. Warning notices also indicate the consequences of the hazard as well as preventive action. Warning notices have the following structure:

Warning symbol	<b>KEY WORD – Nature and source of hazard!</b> Consequences of hazard in the event of failure to observe action and information given. ➤ Hazard prevention action and information.
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The key word indicates the likelihood of occurrence and the severity of the hazard in the event of non-observance:

Key word	Probability of occurrence	Severity of danger if instructions not observed
<b>DANGER</b>	<b>Immediate</b> impending danger	<b>Death</b> or <b>severe</b> injury
<b>WARNING</b>	<b>Possible</b> impending danger	<b>Death</b> or <b>severe</b> injury
<b>CAUTION</b>	Possible <b>dangerous</b> situation	<b>Minor</b> injury

### 1.1.2 Symbols in this documentation

Symbol	Designation	Explanation
!	Attention	Warns about possible property damage.
i	Information	Practical hints and other useful information.
1. 2.	Multi-step operation	Instruction consisting of several steps.
➤	One-step operation	Instruction consisting of one step.
↪	Intermediate result	An instruction produces a visible intermediate result.
➔	Final result	There is a visible final result on completion of the instruction.

# 2. Specification

- Motor-2 HP, 1500 rpm 220V +/-10%, 50HZ/60HZ
- Digital DC voltmeter of 3.5 digit display with minimum reading upto 0.1 volts.
- Digital DC ammeter for load of 3.5 digit display with minimum readable up to 1 A.
- Alternator loading through wire-wound resistors of 0-170 A/12 V, 110 A/24 V capacity.
- Alternator loading through six rotary switches.
- Two-directional rugged mounting arrangement to suit various ranges of alternators.
- Provision for two speed check with one V/poly-V groove pulley and one small V-pulley with three belts.
- Starter free spin testing from battery with short circuit protection.
- Frame - Steel structure with mounting arrangements.
- Dimensions - 650 mm x 725mm x 550mm (L X B X H)

# 3. Features

- Digital voltmeter - The 0-99 V scale voltmeter is used to monitor output voltage alternator/starter voltage with or without load.
- Digital ammeters:
  - Ammeter 1 - The 0-200 A ammeter is used to monitor alternator output current and starter motor light running current (free spin current).

i Both voltmeter and ammeter must be monitored simultaneously while testing alternator or starter.

- Fuse - 1.5 A fuse is provided for field circuit protection (Alternator testing).
- MCB - 25 A MCB is provided for main power on. 25A MCB is provided for battery protection.
- Push buttons - Motor ON and motor OFF buttons provided for motor on and motor off controls. Starter ON button is provided for starter free run test.
- Cable harness - Two separate type of cables harness are supplied for easy and quick connection of terminals; One end to test bench and other end to subsequent terminal of the unit under test.
- Motor - Single Phase 2 HP –1440 rpm 220 V +/- 10% voltage variations at 50 Hz/60 Hz motor with built in two types of pulleys one with low speed and with high speed.
- Fixed resistance - Load can be increased by switching ON load rotary switches.
  - Two separate terminals (+ve and –ve) are provided where an appropriate wiring harness can be connected through this terminal to respective starter motor terminals to check light run (free spin).
  - To battery: Two separate terminals are provided (+ve and –ve) to charge a battery, externally by using an appropriate cable harness.
- Selector switch (starter/alternator) - This two-position switch is set to required mode of voltage that corresponds to unit under test.
- Selector switch (12 V/24 V) - This two-position switch is set to required mode of voltage that corresponds to unit under test.
- Selector switch power / battery switch - This switch is to select excitation of either PCB or battery.(In “Battery” mode, battery should be connected to the battery terminals +ve and –ve. For 12V, one battery should be connected and For 24 V, two batteries should be connected in series.)
- Alternator output terminals - Brass heavy-duty terminals are provided in the unit for quick and easy fitment of harness cable while checking alternator.

## 4. Installation and commissioning

1. Break open the wooden case carefully and remove the nuts at the base corners of the case. Remember to preserve the bolts at the corners for assembling mounting bushes.
2. Place the mounting frame over a table.
3. Mount the mounting bushes by screwing it on to the bolts provided at four corners of the test bench.
4. Remove the plastic cover from the test bench.
5. Check whether all the fuses are properly connected with the fuse wires.
6. Check for any damages and breakages and also for firm connections of all the components and wires.
7. Remove the spare cardboard box provided with all spares and check its contents with packing slip provided along with the box.
8. Check for operating manual and operate as per the instructions.
9. Connect the test bench to 15 A power socket with proper earthing.
10. Switch on the mains on MCB and ensure that the meters are on.
11. Switch on the motor. Ensure that the motor runs and the "motor on" indicator is on.
12. Select the power/battery switch to power mode and ensure that the voltmeter indicates approximately indicates 12 V and 24 V in 12 V/24 V mode.
13. Ensure, in starter mode the solenoid makes contact when the battery is connected and the starter push button is pressed.
14. Remove the mounting vice handle and mount it on the main vice rod for rotating.
15. Connect the test bench to 15 Amps power socket with proper earthing.
16. Switch on the mains on MCB and ensure the meters on.
17. Switch on the motor and ensure the motor runs.
18. Select the power/battery switch to power mode and ensure that the voltmeter approximately indicated 12V and 24V in 12V/24V mode.
19. Ensure that in starter mode, the solenoid makes contact when the battery is connected and the starter push button is pressed.
20. Check the alternator/starter as per procedure.

## 5. Alternator 12 V - Testing procedure

### 5.1 Mounting


1. Mount the alternator on the v bed and clamp it firmly by tightening the T rod from top.
2. Move the top vice left and right so that the alternator's pulley is aligned with the motor pulley. (for v pulley, align it with v-pulley. For poly v pulley align with poly v).
3. Move the vice to and fro to adjust the belt.

### 5.2 Belt tension



CHECK THE BELT TENSION UNDER THE THUMB PRESSURE

Adjust the vice in Y-axis and adjust the belt to 3/8" or 9.5 mm approximately under thumb pressure.

 To check alternator at low speed, align the alternator pulley to the small pulley provided on the motor with small V belt.

### 5.3 Connections



Alternator negative terminal to test bench  
alternator negative  
Alternator positive terminal to test bench  
alternator positive

Connect the alternator cable to the test bench as follows:

- Alternator positive: Marked red in the test bench. To be connected to the positive terminal of the alternator.
- Alternator negative: Marked black in the test bench. To be connected to the negative terminal of the alternator.
- Warning lamp terminal: Marked yellow in the test bench. To be connected to warning lamp terminal of the alternator.

## 5.4 Warning lamp ON procedure

### 5.4.1 Power mode

Select the switch to 12VLAMP



Select the switch to power mode  
Select the switch to ALT mode

1. Switch on the main supply MCB 2 pole provided on the top side.
  2. Select the selector switches provided on the front panel as follows:
    - Select the toggle switch (power/battery) to power mode.
    - Select the toggle switch (12 V/24 V) to 12 V mode.
    - Select the toggle switch (STR/ALT) to ALT mode.
- The voltmeter should indicate approximately 12 V. The warning lamp should glow.

### 5.4.2 Battery mode

Battery MCB in ON position  
Select the switch to BATTERY mode



Select the switch to 12 V LAMP  
Select the switch to ALT mode

1. Switch on the main supply MCB provided on the top side.
  2. Connect the 12 V battery to the terminal denoted as Battery.
  3. Switch on the battery MCB provided on the top.
  4. Select the selector switches provided on the front panel as follows:
    - Select the toggle switch (POWER/BAT) to BAT mode.
    - Select the toggle switch (12 V/24 V) to 12 V mode.
    - Select the toggle switch (STR/ALT) to ALT mode.
- The voltmeter should indicate approximately 12 V. The warning lamp should glow.

## 5.5 Warning lamp off procedure



Switch on the rotary load switches

1. Press the MOTOR ON push-button provided on the panel.
2. Switch on the 5 A/10 A load switch.
  - ⇒ The warning lamp goes off and the voltmeter reads OCV of 14.0 V -14.5 V. The ammeter reads 5 A in power mode and reads the battery charging current in battery mode.
3. Increase the load by switching on more load switches depending on the capacity of the alternator.
4. Load upto full load capacity of the alternator and observe the voltage which should be 13.5 V at full load for a alternator.

**I** If the voltage goes below the specified voltage then the alternator needs to be serviced.

5. Switch off all the load switches and switch off the motor.

## 6. Alternator 24 V - testing procedure

### 6.1 Mounting

1. Mount the alternator on the V bed and clamp it firmly by tightening the T rod from top.
2. Move the top vice left and right so that the alternator's pulley is aligned with the motor pulley (for V pulley, align it with V pulley. For poly V pulley, align with poly V).
3. Move the vice to and fro to adjust the belt.

### 6.2 Belt tension



**Check the belt tension 9.5mm approx under thumb pressure**

- Adjust the vice in Y-axis and adjust the belt to 3/8" or 9.5 mm under thumb pressure.

- ii To align the alternator at low speed, align the alternator pulley to the small pulley provided on the motor with small V belt.

### 6.3 Connections



**Alternator negative terminal to test bench  
alternator negative  
Alternator positive terminal to test bench  
alternator positive**

Connect the alternator cable to the test bench as follows:

- Alternator positive: Marked red in the test bench. To be connected to the positive terminal of the alternator.
- Alternator negative: Marked black in the test bench. To be connected to the negative terminal of the alternator.
- Warning lamp terminal: Marked yellow in the test bench. To be connected to warning lamp terminal of the alternator.

### 6.4 Warning lamp ON procedure

#### 6.4.1 Power mode

**Select the switch to 12V LAMP**



**Select the switch to ALT mode**

1. Switch on the main supply MCB 2 pole provided on the top side.
  2. Select the selector switches provided on the front panel as follows:
    - Select the toggle switch (power/battery) to power mode.
    - Select the toggle switch (12 V/24 V) to 24 V mode.
    - Select the toggle switch (STR/ALT) to ALT mode.
- ➔ The voltmeter should indicate approximately 22 V - 24 V. The warning lamp should glow.

#### 6.4.2 Battery mode

**Battery MCB in ON position  
Select the switch to BATTERY mode**



**Select the switch to 12 V LAMP  
Select the switch to ALT mode**

1. Switch on the main supply MCB 2-pole.
  2. Connect the 12 V battery to the terminals denoted as battery.
  3. Switch on the battery MCB provided at the top.
  4. Select the selector switches provided on the front panel as follows:
    - Select the toggle switch (POWER/BAT) to BAT mode.
    - Select the toggle switch (12 V/24 V) to 24 V mode.
    - Select the toggle switch (STR/ALT) to ALT mode.
- ➔ The voltmeter should indicate approximately 22 V -24 V. The warning lamp should glow.



## 6.5 Warning lamp off procedure



Switch on the rotary load switches

1. Press the MOTOR ON push button provided on the panel.
2. Switch on the 5 A/10 A load switch.
  - ⇒ The warning lamp goes off and the voltmeter reads OCV of 27.5 V - 28 V. The ammeter reads 10 A in power mode and reads the battery charging current in battery mode.
3. Increase the load by switching on more load switches depending on the capacity of the alternator.
4. Load upto full load capacity of the alternator and observe the voltage which should be 26.5 V at full load for an alternator.

**I** If the voltage goes below the specified voltage then the alternator needs to be serviced.

5. Switch off all the load switches and switch off the motor.

## 7. Starter 12 V/24 V - Light run only

### 7.1 Mounting



Starter mounted on the vice  
Connect the cables to starter terminal

1. Fix the starter on the V block properly and tighten it by rotating the screw rod.
2. Adjust the top vice so that the starter lies on the vice position accordingly.

### 7.2 Connections

- Connect the starter using starter spare cable as follows:
  - Positive terminal points of the starter marked red on the test bench to positive terminal of starter.
  - Negative terminal starter points of the test bench are connected to the negative terminal of the starter.



## 8. Starter 12 V/24 V - Testing procedure - Light run only

### 8.1 Switches selection



1. Switch on the main MCB (POWER) provided on the top.

 Ensure single phase supply is available.

2. Select the selector switches provided on the front panel as follows:
  - Select the toggle switch STR (12 V/24 V) to 12 V/24 V mode as required.
  - Select the switch (STR/ALT) to STR mode.
3. Connect 12 V/24 V battery as required to check starter. Ensure that the battery is fully charged.
4. Depending on the starter under test, select the 12 V/24 V toggle switch
5. Check all the connections properly.

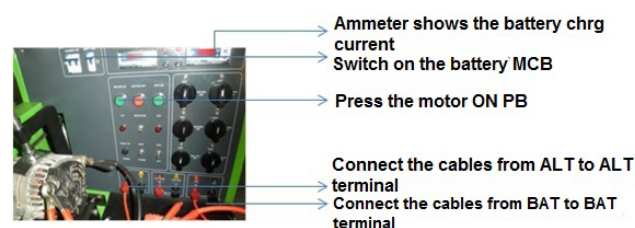
### 8.2 Operation

1. Press the push button and observe the voltmeter to read the initial OCV of the battery.
  2. Now press the starter push button and observe the voltmeter/ammeter light run.
- ➔ The ammeter reading should be according to the light run specification mentioned in the service manual. The voltmeter should show a drop of maximum of 2 V between the OCV and the light run cranking current for a good starter.

## 9. Starter short circuit test facility

When a burnt or short circuited starter is tested then the trip indicator immediately switches on and no further test is possible. To start the test again, press the "RESET" button and then test a good starter and ensure the readings.

## 10. Battery charging procedure for 12 V/24 V



1. Switch on the main supply MCB.
2. Switch on the battery MCB.
3. Select the selector switches provided on the front panel as follows:
  - Select the toggle switch (POWER/BAT) to BATT mode.
  - Select the toggle switch (12 V/24 V) to 12 V mode.
  - Select the toggle switch (STR/ALT) to ALT mode.

⇒ The voltmeter should indicate approximately 12 V/24 V. The warning lamp should glow.
4. Switch on the motor MCB.
  - ➔ The warning lamp goes off and the voltmeter reads OCV of 14.0 V - 14.5 V/27 V - 28 V. The battery ammeter reads the charging current. Once the battery is fully charged then the ammeter becomes zero (neutral) indicating that the battery is fully charged.

## 11. Troubleshooting

Sl. no.	Fault diagnosis	Parameters to check
1.	W/L NOT GLOWING	<ol style="list-style-type: none"> <li>1. Check the LEDs on the PCB. <ul style="list-style-type: none"> <li>• If both, red and green LEDs are glowing, the PCB is OK.</li> <li>• If the red LED glows, replace the PCB.</li> <li>• If both, red and green LEDs do not glow, check the fuses.</li> </ul> </li> <li>2. Check for switches selection</li> <li>3. Check the bulbs.</li> </ol>
2.	VOLTMETER NOT INDICATING	<ol style="list-style-type: none"> <li>1. Check switch selections.</li> <li>2. Check voltmeter.</li> </ol>
3.	AMMETER NOT INDICATING	<ol style="list-style-type: none"> <li>1. Check switch selections.</li> <li>2. Check shunts.</li> </ol>
4.	MOTOR PROBLEM	<ol style="list-style-type: none"> <li>1. Check the supply voltage.</li> <li>2. Check MCB, main fuses.</li> <li>3. Check 230 V L-N.</li> <li>4. Check motor.</li> </ol>
5.	LOADING IMPROPER	<ol style="list-style-type: none"> <li>1. Check the conditions of the load resistors.</li> <li>2. Check for the connections.</li> </ol>
6.	BATTERY CIRCUIT	Check battery fuse.
7.	STARTER CKT	<ol style="list-style-type: none"> <li>1. Ensure the switches selection.</li> <li>2. Check the starter fuse 4 A.</li> <li>3. Check the MCBs on the front panel as well as at the bottom.</li> <li>4. Check the 4ST switches.</li> <li>5. Check the push button switch.</li> <li>6. Check starter PCB.</li> <li>7. Check for trip LED.</li> </ol>

## 12. Circuit diagram

### CIRCUIT FOR B1

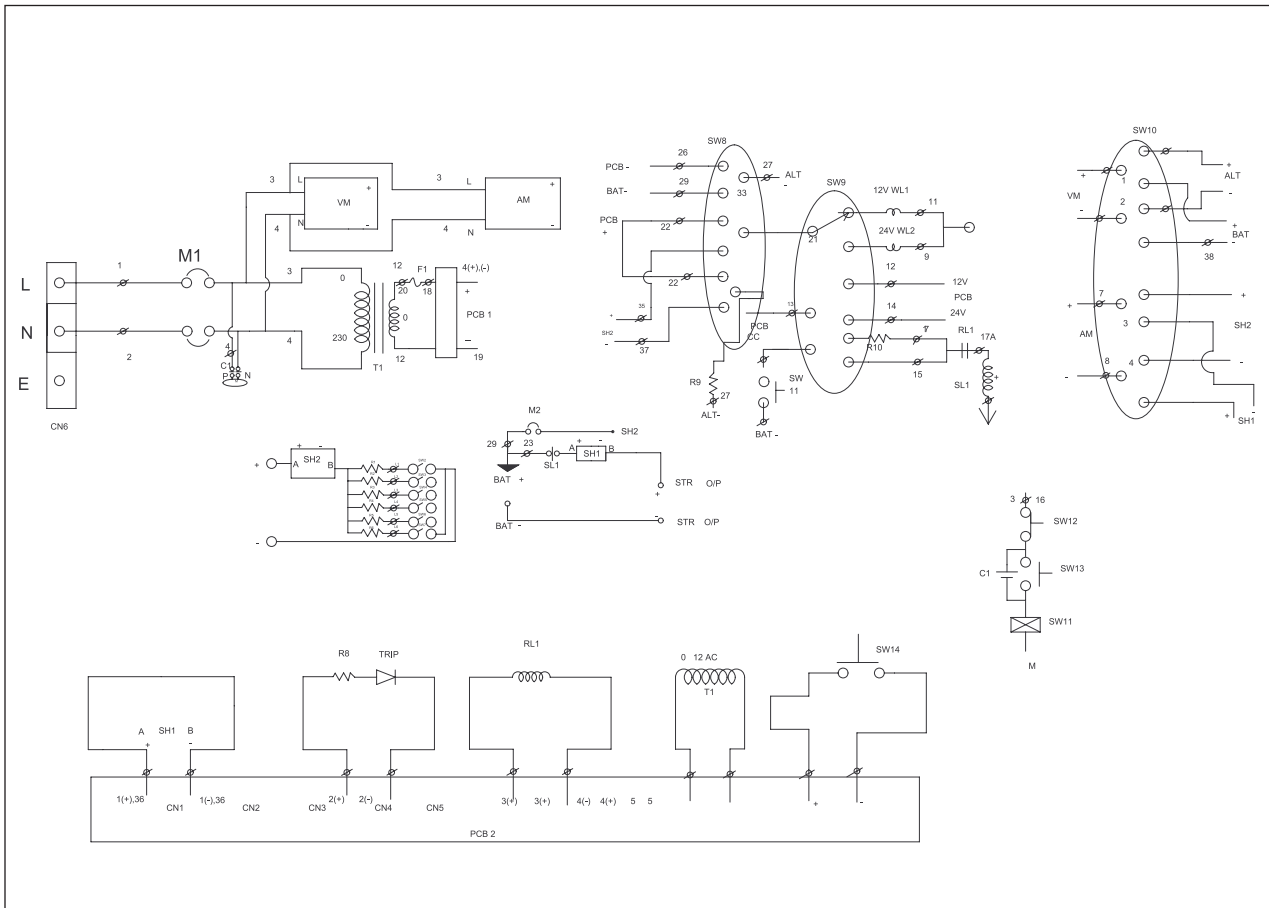


Fig. 1: Circuit diagram

CN6 - THREE WAY 30 A CONNECTOR

L, N, E - 50 Hz 220 V AC SUPPLY

M1 - 4 POLE 25 A MCB

M2 - 2 POLE 25 A MCB

P - PHASE

N - NEUTRAL

VM - VOLTMETER

AM - AMMETER

T1 - TRANSFORMER (12-0-12) V, (0-230) V

F1 - 1.5 A FUSE

BAT - BATTERY

ALT - ALTERNATOR

SH1, SH2 - 100 A STARTER SHUNT, 100 A ALTERNATOR SHUNT

WL1, WL2 - WARNING LAMP 12 V and 24 V

CN1-CN5 - CONNECTORS 1 TO 5

SL1 - 4ST COIL

M - MOTOR

PCB1 - POWER SUPPLY PCB

PCB2 - STARTER TRIP PCB 0 V - 12 V

RL1 - RELAY

R1, R2 - LOAD RESISTORS 0.6 OHM

R3, R4, R5, R6 - LOAD RESISTORS 1.4 OHM

R7, R8 - LOAD RESISTORS 2.7 OHM

R9 - 17 OHM

R10 - 2.7 OHM

SW1 - 4DPDT 6 A

SW2-SW7 - 15 A SP 4 WAY 5 A/10 A

SW8 - TPDT 15 A

SW9 - TPDT 10 A

SW10 - 4PDT 6 A

SW11 - PUSH BUTTON 4PDT STR ON

SW12 - PUSH BUTTON MOTOR OFF

SW13 - PUSH BUTTON MOTOR ON

SW14 - PUSH BUTTON RESET











**Bosch Limited**

P.B. No.3000, Hosur Road,  
Bangalore 560 030  
INDIA

**[www.boschindia.com](http://www.boschindia.com)**

[Mailbox.service2@in.bosch.com](mailto:Mailbox.service2@in.bosch.com)

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