# UT207A/208A/209A **Operating Manual**



### **Digital Clamp Multimeters**

#### Overview

This Operating Manual covers information on safety and cautions. Please read the relevant information carefully and observe all the Warnings and Notes strictly. A Warning

To avoid electric shock or personal injury, read the "Safety Information" carefully before using the Meter.

Model UT207A/UT208A/UT209A are 3 3/4 digit AC&DC digital clamp multimeters (hereinafter referred to as "the Meter") featuring stable performance, high reliability and unique structure. They are designed with large-scale integrated circuits and dual integral A/D converter as its core and offer full-range overload protection.

The Meter can measure AC/DC Voltage, AC/DC Current, Frequency, Duty Cycle Resistance, Diodes, Continuity and etc. UT208A has extra temperature and Capacitance features.

### Unpacking Inspection

Open the package case and take out the Meter. Check the following items carefully for any missing or damaged part:

Item	Description	Qty
1	English Operating Manual	1 pc
2	Test Lead	1 pair
3	Point Contact Temperature Probe (Only UT208A) (This included point contact temperature probe can only be used up to 230°C. For any measurement is higher than that, the rod type temperature probe must be used)	1 pair
4	Tool box	1 pc
5	9V Battery (NEDA1604A or 6LF22)	1 pc

In the event you find any missing or damaged part, please contact your dealer immediately

#### Safety Information

This Meter complies with IEC61010, Pollution Degree 2, Overvoltage Category (CAT. II 600V, CAT III 300V) and Double Insulation standards.

CAT II: Local level, appliance, PORTABLE EQUIPMENT etc., with smaller transient overvoltages than CAT III.

CAT III: Distribution level, fixed installation, with smaller transient overvoltages than CAT IV. Use the Meter only as specified in this operating manual, otherwise the protection provided by the Meter may be impaired

In this manual, a Warning identifies conditions and actions that pose hazards to the user, or may damage the Meter or the equipment under test.

A Note identifies the information that user should pay attention to.

### 

To avoid possible electric shock or personal injury, and to avoid possible damage to the Meter or to the equipment under test, adhere to the following rules:

- Before using the Meter inspect the case. Do not use the Meter if it is damaged or the case (or part of the case) is removed. Look for cracks or missing plastic. Pay attention to the insulation around the connectors.
- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads with identical
- Do not apply more than the rated voltage, as marked on the Meter.
  Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and grounding. If the value to be measured is unknown, use the maximum measurement position and reduce the range step by step until a satisfactory reading is obtained.

- When measurement has been completed disconnect the connection between the test leads and the circuit under test, remove the testing leads away from the input terminals of the Meter and turn the Meter power off. The rotary switch should be placed in the right position and no any
- changeover of range shall be made during measurement to prevent damage
- of the Meter.
  Do not carry out the measurement when the Meter's back case and battery compartment are not closed to avoid electric shock.
  Do not input higher than 1000V in DC or 750 V in AC between the two Meter's input terminal to avoid electric shock and damages to the Meter.
  When the Meter is working at an effective voltage over 70V in DC or 33V rms in AC, special care should be taken for there is danger of electric shock.
- Use the proper terminals, function, and range for your measurements.
  Do not use or store the Meter in an environment of high temperature,
- humidity, explosive, inflammable and strong magnetic field. The performance of the Meter may deteriorate after dampened.
- When using the test leads, keep your fingers behind the finger guards. To avoid electric shock, do not touch the bare wires, connectors, unused
- input terminals or the circuit under testing during measurement. Disconnect circuit power and discharge all high-voltage capacitors before
- Replace the battery as soon as the battery indicator Fig appears. With a low battery, the Meter might produce false readings that can lead to electric
- shock and personal injury.
  When servicing the Meter, use only the replacement parts with the same
- model or identical electrical specifications.
  The internal circuit of the Meter shall not be altered at will to avoid damage of the Meter and any accident.
- Soft cloth and mild detergent should be used to clean the surface of the Meter when servicing. No abrasive and solvent should be used to prevent the surface of the Meter from corrosion, damage and accident.
   The Meter is suitable for indoor use.
- Turn the Meter off when it is not in use and take out the battery when not using for a long time.
- Constantly check the battery as it may leak when it has been using for some time, replace the battery as soon as leaking appears. A leaking battery will damage the Meter

#### International Electrical Symbols

- Double Insulated Grounding ÷ Warning. Refer to the Operating Manual  $\wedge$ AC (Alternating Current)  $\sim$ = DC (Direct Current) Continuity Test Diode
- Ē Low Battery Indication
- ~ AC or DC
- Danger of High Voltage 5 Conforms to Standards of European Union Œ
- The Meter Structure (See Figure 1)
- (1) Hand Guards: to protect user's hand from
- touching the dangerous area. 2 Lever: press the lever to open the
- transformer jaws. When the lever is released, the jaws will close
- Functional Buttons
- Input Terminals
- LCD Display
- Rotary Switch
- Transformer Jaw: designed to pick up the AC and DC current flowing through the conductor. It could transfer current to voltage. The tested conductor must vertically go through the Jaw center.

#### Display Symbols (See Figure 2)

- Test of diode
- The continuity buzzer is on
- Indicator for zeroing
- Data hold is active
- 5. The Meter is in the auto range mode in which the Meter automatically selects
- the range with the best resolution.
- True RMS indicator
- Indicator for AC voltage or current
- Indicates negative reading Indicator for DC voltage
- Figure 2 11 12 13 14 1516 17 18 19 10. The battery is low. Warning: To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator appears.

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**9** -

10

2

RMS

AC 4

DC

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5

Figure 1

AUTO HOLD ZERO •>>> +>>

<sup>β</sup>C<sup>°</sup>FmFmVAMkΩHz%

- The unit of transistor hEF
- 12. The unit of temperature, °C: Centigrade temperature 13. The unit of temperature, °F: Fahrenheit temperature
- 14. The unit of capacitance (UT208A only) 15. Volts. The unit of voltage. mV: Millivolt.
- 16. Amperes (amps). The unit of current
- 17. The unit of resistance. (  $\Omega$  : Ohm, k  $\Omega$  :Kilohm, M  $\Omega$  :Megohm )

18. The unit of frequency. (Hz: Hertz, KHz: Kilohertz, MHz: Meghertz) 19. Dutv cvcle measuremen

#### Functional Buttons

Below table indicated for information about the functional button operations.			
Button	Operation Performed		
SELECT	Press SELECT button to select the alternate functions including V র, A র and ৬) <del>স.</del> ( ৬) न <b>। → Ω</b> UT208A only)		
RANGE	Range feature: Exit AUTO and enter MANUAL ranging. In MANUAL, select next input range. EXIT to return to AUTO. AUTO is default.		
☀	Press once to turn the display backlight on. Press again to turn the display backlight off, otherwise it will automatically off after 15 seconds.		
HOLD	<ul> <li>Press HOLD to enter the Hold mode in any mode (except %Hz), the Meter beeps.</li> <li>Press HOLD again to exit the Hold mode to return to measurement mode, the Meter beeps.</li> <li>Turn the rotary switch or press any button can also exit hold mode.</li> </ul>		
<del>Ü</del> Hz%	When the Meter is at t∂%Hz, V and Aa, press t∂%Hz to measure frequency and duty cycle.		
ZERO	Press ZERO to zeroing the display before measuring AC/DC voltage, AC/DC current, resistance and capacitance.		

#### Automatic Power Off

The display blanks and the Meter goes into a "sleep" mode if you have not changed the rotary switch position or pressed a button for 15 minutes. While in Sleep mode, pressing the any effective Functional button or turning the rotary switch, could turn the Meter on. To disable the sleep mode function, press SELECT button while turning on the meter

#### The Effectiveness of Functional Buttons

Not every functional buttons can be used on every rotary switch positions. Below table describe which functional buttons can be used on which rotary switch positions

Rotary Switch			Functio	nai Buttons		
Positions	SELECT	RANGE	×	HOLD	₩%Hz	ZERO
V∺	•	•	•	•	•	•
-») <del>-» </del> -	•	N/A	•	•	N/A	•
Ω	N/A	•	•	•	N/A	•
%Hz	N/A	N/A	•	N/A	•	N/A
40A ☵	•	N/A	•	•	•	•
400A 🏔	•	N/A	•	•	•	•
1000A ∺	•	N/A	•	•	•	•
°C	N/A	N/A	•	•	N/A	N/A

#### **Measurement Operation**

A. Measuring DC/AC Voltage (See Figure 3)

A Warning

To avoid harm to you or damage to the Meter from eletric shock, do not attempt to measure voltages higher than 750V AC or 1000V DC, although readings may be obtained.

To measure DC/AC voltages, connect the Meter as follows:

- 1. Insert the red test lead into the VΩHz terminal
- and black test lead into the COM terminal.
- 2. Set the rotary switch to V ... DC mesaurement mode is a default. Press SELECT to switch to AC measurement mode. Press RANGE to enter
- manual ranging.
- 3. Press #Hz% button to measure frequency or duty cycle, but the frequency or
- duty cycle readings obtained from this range is only for reference. 4. Connect the test leads across with the object being measured. The measured
- value shows on the display Note
- AC Millivolt is a manual ranging measurement mode.
   In each range, the Meter has an input impedance of 10MΩ. This loading effect can cause measurement errors in high impedance circuits. If the second second
- circuit impedance is less than or equal to 10kΩ, the error is negligible (0.1% or less).
   When DC/AC voltage measurement has been completed, disconnect the
- connection between the testing leads and the circuit under test and remove testing leads from the input terminals. B. Measuring Resistance (See Figure 4)

#### A Warning

2. Set the rotary switch to  $\Omega$ 

COM terminal

# To avoid damage to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring resistance To measure resistance, connect the Meter as follows: 1. Insert the red test lead into the $V\Omega Hz$ terminal and black test lead into the

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-lule

Figure 3

3. Connect the test leads across with the object being measured. The measured value shows on the display.

• To obtain a more precise reading, you could remove the objects being tested from the circuit during measurement.

The test leads can add 0.1Ω to 0.3Ω of error

to resistance measurement. To obtain precision readings in low-resistance measurement, short-circuit the input terminals beforehand, press **ZERO** to reset to "0" and this shorted value will be automatically subtracted from subsequent readings each time you perform a resistance measurement.
 For high-resistance measurement (>1MΩ), it

is normal to take several second to obtain a stable reading. To avoid harm to you or damages to the Meter from eletric shock, do not attempt to input voltages higher than 33V AC or 70V DC.

 When resistance measurement has been completed, disconnect the connection between the testing leads and the circuit under test and remove testing leads from the input terminals.

C. Testing for Continuity (See Figure 5)

#### A Warning

Note

#### To avoid damage to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring continu

To test for continuity, connect the Meter as follows: 1. Insert the red test lead into the VΩHz terminal and the black test lead into the COM terminal. 2. Set the rotary switch to →)→ , and press SELECT button to select ....) measurement mode

3. The buzzer sounds if the resistance of a circuit under test is less than 100 4. The buzzer may or may not sound if the resistance

of a circuit under test is between  $10\Omega$  to  $100\Omega$ . Figure 5 5. The buzzer does not sound if the resistance of a circuit under test is higher than 100Ω.

· To avoid harm to you or damage to the Meter from eletric shock, do not attempt to input voltages higher than 33V AC or 70V DC.

· When continuity testing has been completed, disconnect the connection between the testing leads and the circuit under test and remove testing leads from the input terminals

D. Testing Diodes (See Figure 6)

#### A Warning

Note

# To avoid damage to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before testing diodes.

Use the diode test to check diodes, transistors, and other semiconductor devices. The diode test sends a current through the semicondutor junction, then measures the voltage drop across the junction. A good silicon junction drops between 0.5V and 0.8V. To test the diode out of a circuit, connect the Meter as follows:

1. Insert the red test lead into the VQHz terminal and black test lead into the COM terminal.

 Set the rotary switch to → Press SELECT to switch to → measurement mode. 3. For forward voltage drop readings on any semiconductor component, place the red test lead on the component's anode and place the black test lead on the component's cathode

Note
The LCD will display OL indicating diode being tested is open or polarity error display. To obtain a more precise reading, you could remove the objects being tested from the circuit when measuring.

 To avoid harm to you or damage to the Meter from eletric shock, do not attempt to input voltages higher than 33V AC or 70V DC. · When diode testing has been completed,

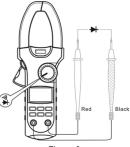
disconnect the connection between the testing leads and the circuit under test and remove testing leads from the input terminals

### E. Measuring Frequency and Duty Cycle (See Figure 7)

## A Warning To avoid harm to you or damage to the Meter from eletric shock, do not attempt to measure voltages higher than 750V AC or 1000V DC, although readings may be obtained.

To measure frequency/duty cycle, connect the Meter as follows: 1. Insert the red test lead into the  $V\Omega Hz$  terminal and the black test lead into the COM terminal.

2. Set the rotary switch to %Hz. Frequency measurement mode is a default or 2. Connect the test leads across with the object being measured. The measured value shows on the display.



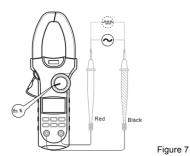






#### Note

When frequency/duty cycle measurement has been completed, disconnect the connection between the testing leads and the circuit under test, and remove the testing leads away from the input terminals of the Meter.



F. Measuring DC/AC Current (See Figure 8)

#### **∆** Warning

#### The operating temperature must be 0 $^\circ\!\mathrm{C}$ ~40 $^\circ\!\mathrm{C}$ when measuring current. To measure current, do the following:

- 1. Set the rotary switch to 40A ≈ ,400A ≈, or 1000A ≈ . DC measurement mode is
- a default. Press SELECT to switch to AC measurement mode.
- 2. Press the lever to open the transformer jaw. Hold it tight and don't release.
- 3. Center the conductor within the transformer jaw, then release the lever slowly until the transformer jaw is completely closed. Make sure the conductor to be tested is placed at the center of the transformer jaw, otherwise it will casse ±1.0 % additional reading error. The Meter can only measure one conductor at a time, to measure more than one condutor at a time will cause deviation
- Note ( DC Measurement ) :
- The built-in Hall components are very sensitive not only to the magnet but also to heat and machines reaction force. Any shock will cause change to the reading in the short time.
- When the Meter does not display 0 before measurement, press ZERO to zeroing. • When measuring DC current, if the reading is positive, then the current direction is from up to
- down (see Figure 8: the front case face up while the bottom case face down)

To obtain a more accurate DC current reading, follow the procedure as below:

- Turn off the current to the tested conductor.
- · Press the lever to open the transformer jaw.
- When the reading is stabled at the minimal, press ZERO to display zero
- Turn on the current to the tested conductor. read out the reading after the Meter is stable.

Note(AC Measurement):

- The meter will zero automatically.
- When the measuring current >1A, Pressing #Hz button can measure frequency/duty cycle(the reading for reference only)
- AC Conversion: UT207A/UT208A: AC-coupled and RMS responded. UT209A:AC-coupled and True RMS responded. Input the sinewave.
- Non-sine wave must follow the below data to adjust: Peak factor: 1.4~2.0, add 1.0% on the stated accuracy. Peak factor: 2.0~2.5, add 2.5% on the stated accuracy Peak factor: 2.5~3.0, add 4.0% on the stated accuracy.

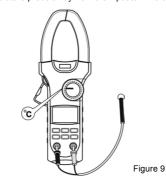
#### G. Measuring Temperature (UT208A Only, See Figure 9)

- To measure temperature measurement, connect the Meter as follows:
- 1. Insert the red temperature probe into the VOHz terminal and the black temperature probe into the COM terminal.
- 2. Set the rotary switch to °C measurement mode.
- 3. Place the temperature probe to the object being measured. The measured value shows on the display.

#### Note

- When the Meter is at °C range, display "OL" to remind user to insert temperature probe.
- The Meter automatically displays the room temperature when the temperature probe is inserted but without any input.
- The included point contact temperature probe can only be used up to 230 °C. For any measurement is higher than that, the rod type temperature probe must be used.

 When the temperature measurement has been completed, disconnect the connection between the temperature probe and the object under test, and remove the temperature probe away from the input terminals of the Meter



H. Measuring Capacitance (UT208A Only, See Figure 10)

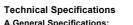
#### $\triangle$ To avoid harm to you or damage to the Meter from eletric shock, do not attempt to input voltages higher than 33V AC or 70V DC.

To measure capacitance, do the following:

- 1. Insert the red test lead into the  $V\Omega Hz$  input terminal and black test lead to the COM input terminal.
- 2. Set the rotary switch to →)-I+→ Ω measurement mode. Press the select button to switch to -I- measurement mode.
- 3. To improve the accuracy when measuring small capacitance, press ZERO with test leads open in order to subtract the residual capacitance of the meter before making connections to the test leads.

#### Note

- Disconnect circuit power and discharge all high-voltage capacitors before testing Capacitors
- · When capacitance measurement has been completed, disconnect the connection between the testing leads and the circuit under test and remove the test leads away from the input terminals of the Meter.



- Display: 3 3/4 digits LCD display, Maximum display 3999.
- Polarity: Auto

00

Figure 8

- Overloading: Display OL or -OL.
  Low Battery Indication: Display
- · Sampling: 3 times per second.
- Measurement Deviation: The conductor being meaured is not placed in the center of the jaw during AC/DC current measurement, it will cause extra ±1% deviation based on the stated accuracy.

Figure 10

0

- Drop Test: 1 meter drop test passed.
- Max. Jaw Opening: 55mm diameter.
- Max. Current conductor size: 45mm diameter. · Electro-Magnetic: When carrying out measurement near the electromagnetic, it may cause unstable or wrong reading.
- Power: 1 x 9V battery (6LF22 1604A)
- Dimensions: 285.3mm x 105mm x 44.5mm
- Weight: Approximate 533g (battery included)

#### **B. Environmental Requirements**

- The Meter is suitable for indoor use
- Altitude: Operating: 2000m; Storage: 10000m
- Safety/ Compliances: IEC 61010 CATII 600V, CATIII 300V, Double Insulation and Pollution Degree 2.
- Temperature and humidity: Operating: 0°C~30°C (≤85%R.H)
- 30°C~40°C (≤75%R.H) 40°C~50°C (≤45%R.H)
- Storage: -20°C~+60°C` (≤85%R.H)

#### Accuracy Specifications

Accuracy: ±(a% reading + b digits), guarantee for 1 year. Operating temperature: 23°C±5°C Relative humidity: ≤80%R.H Temperature coefficient: 0.1×(specified accuracy)/1°C

A. DC Voltag	je		
Range	Resolution	Accuracy	Overload protection
400mV	0.1mV	±(0.8%+3)	
4V	0.001mV		
40V	0.01V	±(0.8%+1)	DC1000V/AC750V
400V	0.1V	1	
1000V	1V	±(1.0%+3)	
Remark: Inp	ut Impedance: 10N	Ω.	

#### B AC Voltage

Range	Resolution	Accuracy	Overload protection
400mV	0.1mV	±(1.2%+20)	
4V	0.001V		
40V	0.01V	±(1.2%+3)	DC1000V/AC750V
400V	0.1V		
750V	1V	±(1.2%+5)	7

• Input Impedance: 10M Ω

- Frequency Response: 40Hz~400Hz
- AC Conversion UT207A/UT208A: AC-coupled and average-responded.
- UT209A:AC-coupled and True RMS-responded Input the sinewave.
- Non-sine wave must follow the below data to adjust: Peak factor: 1.4~2.0, add 1.0% on the stated accuracy Peak factor: 2.0~2.5, add 2.5% on the stated accuracy Peak factor: 2.5~3.0, add 4.0% on the stated accuracy.
- C. Resistance

Range	Resolution	Accuracy	Overload protection
<b>400</b> Ω	0.1 Ω	±(1.2%+2)	
<b>4k</b> Ω	0.001K Ω		7
40k Ω	0.01K Ω	±(1.0%+2)	DC1000V/AC750V
400k Ω	0.1K Ω	7	
4M Ω	0.001M Ω	±(1.2%+2)	7
40M Ω	0.01M Ω	±(1.5%+2)	1

#### D. Continuity Test

Range	Resolution	Accuracy	Overload Protection
-1))	0.1 Ω	Around $\leq 10 \Omega$ , the buzzer beeps. (Open circuit voltage approx 0.4V)	DC1000V /AC750V
Remark	s <sup>.</sup>		

- The buzzer beep when the resistance of a circuit under test is <10 Ω.
- The buzzer may or may not beeps when the resistance of a circuit > 10 Ω

F Diode Test

G.

0.

Range	Resolution	Accuracy	Overload Protection	
₩	1mV	0.5V~0.8V (Open circuit voltage approx. 1.5V)	DC1000V /AC750V	

F. Freque	ncy		
Range	Resolution	Accuracy	Overload Protection
400Hz	0.1Hz		
4kHz	0.001kHz	]	
40kHz	0.01kHz	1	
400kHz	0.1kHz	±(0.1%+3)	DC1000V/AC750V
4MHz	0.001MHz	]	
40MHz	0.01MHz	]	
Remarks:	Input Sensitivity as		

#### When $\leq 100 \text{kHz} \geq 300 \text{mV rms}$ When > 100kHz: ≥ 600mV rms

Input amplitude a: 300mV ≤ a ≤ 10V rms				
Duty Cycle				
Range	Resolution	Accuracy	Overload Protection	
.1%~99.9%	0.1%	For reference only	DC1000V/AC750V	

Range	Resolution	Accuracy	Overload protection
40A	0.01A	±(2.0%+5)	
400A	0.1A	±(2.0%+3)	1000A DC/AC
1000A	1A	±(1.5%+5)	

#### Range Resolution Accuracy Frequency Response Overload protection 0.01A ±(2.5%+8) 40A 400A 0.1A ±(2.5%+5) 50Hz ~ 60Hz 1000A DC/AC 1000A 1A ±(2.0%+2)

## J. Tempera

# Range

-40°C~100

## K. Capacita

Range 4nF 40nF 400nF 411F 40µF

### 100mF Maintenance

# ⚠ Warning

information

appears.



ature (UT208A only)					
;	Resolution	Accuracy	Overload Protection		
		-40°C~0°C: -(8%+5)			
<b>00°</b> ℃	1℃	0°C~400°C: ±(2.5%+3)	1K Ω		
		400°C~1000°C: ±(3%+3)			

ance(UTZUOA UNIY)	ance(U	T208A only)	
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ance(01200A only)					
	Resolution	Accuracy	Overload Protection		
	0.001nF	For reference only			
	0.01nF				
	0.1nF	±(4.0%+3)	DC1000V/AC750V		
	0.001µF				
	0.01µF				
	0.1µF	±(5.0%+10)			

This section provides basic maintenance information including battery replacement instruction.

### Do not attempt to repair or service your Meter unless you are qualified to do so and have the relevant calibration, performance test, and service

To avoid electrical shock or damage to the Meter, do not get water inside the case. A. General Service

· Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.

• To clean the terminals with cotton bar with detergent, as dirt or moisture in the terminals can affect readings.

• Turn the Meter power off when it is not in use Take out the battery when it is not using for a long time.

 Do not use or store the Meter in a place of humidity, high temperature, explosive, inflammable and strong magnetic field.

B. Replacing the Battery (See Figure 11)

#### ▲ Warning

To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator " 📇

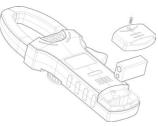


Figure 11

Make sure the transformer jaw and the tets leads are disconected from the circuit being tested before opening the case bottom To replace the battery:

1. Turn the Meter off and remove all the connections from the input terminals 2. Turn the Meter's front case down.

3. Remove the screw from the battery compartment, and separate the battery compartment from the case bottom.

4. Take out the old battery and replace with a new 9V battery (6LF22, 1604A). Rejoin the case bottom and the battery compartment, and reinstall the screw.



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\* FND \* This operating manual is subject to change without notice.