sanwa

DLC460F

DIGITAL LEAKAGE CLAMP METER

CE

INSTRUCTION MANUAL

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- MEMO -

[1] SAFETY PRECAUTIONS

***Before use, read the following safety precautions.**
This instruction manual explains how to use your digital leakage clamp meter DLC460F. Before use, please read this manual thoroughly to ensure correct and safe use. After reading it, keep it together with the product for reference to it when necessary.
Using the product in a manner not specified in this manual may cause damage to the protection function of the product.
The instructions given under the headings of ⚠WARNING and ⚠ CAUTION must be followed to prevent accidental **burn** and **electric shock**.

1-1 Explanation of Warning Symbols

The meanings of the symbols used in this manual and attached to the product are as follows:

⚠ : Very important instructions for safe use.
The warning messages are intended to prevent accidents to operating personnel such as burn and electric shock.
The caution messages are intended to prevent incorrect handling which may damage the product.

: High voltage hazard : Ground
: Alternating current (AC)
: Direct current (DC)
Ω : Resistance : Buzzer
: Backlight
: Double insulation or reinforced insulation

1-2 Warning Messages for Safe Use

⚠WARNING

The following instructions are intended to prevent personal injury such as burn and electric shock. Be sure to follow them when using the meter.

1. Never use the meter for the power lines exceeding 600VAC to ground.
2. Voltages over 70VDC or 33Vrms AC (46.7V peak) are hazardous to human body. Take care so as not to touch them.
3. Never input signals exceeding the maximum rated input value (see 1-3).
4. Never use the meter near equipment which generates strong electromagnetic waves or is charged.
5. Never use the meter if the meter or test leads are damaged or broken.
6. Never use the meter with the case or battery lid removed.
7. During measurement, keep your fingers behind the finger guard of test leads and the meter of the test leads.
8. To start measurement, do not change the meter to another function or range nor replace the plugs to other terminals.
9. During measurement, do not change function switch of the meter nor replace the plugs to other terminals.
10. Before starting measurement, make sure that the function and range are properly set.
11. Never use the meter when it is wet or with wet hands.
12. Be sure to use the specified type of test leads.
13. Never attempt repair or modification, except for battery replacement.
14. Always conduct start-up inspection and check the meter at least once a year.
15. This meter is for indoor use only.

1-3 Overload Protection

The maximum rated input value and overload protection have been established for the input terminals of each function.

Function	Input Terminal	Max. Rated Input Value	Max. Overload Protection
DCV･ACV	− and +	DC/AC 600V	DC/AC 660 V
Ω		⚠ Do not input voltage	
ACmA	CT	AC600 m A	AC100 A
ACA		AC400 A	AC450 A

[2] APPLICATIONS AND FEATURES

2-1 Applications

This is a digital leakage clampmeter designed for measurement in the ranges of CAT. III 600V. This meter is useful for measuring leakage or load current on power lines and equipment instrument.

2-2 Features

Safety design in compliance with the IEC61010-1.
Leakage current measurement Resolution 0.01mA
Low Pass Filter function
MAX-MIN Hold Function
Backlight Function
Data Hold, Auto Power Save Functions

Classification of overvoltage measurement
Overvoltage measurement classification (CAT. I): Line on the secondary side on the inside of equipment via a transformer, etc. from the receptacle.

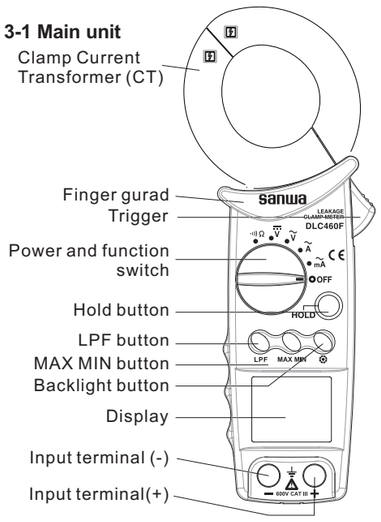
Overvoltage measurement classification (CAT. II): Line on the primary side of equipment with power cord to be connected to the receptacle.

Overvoltage measurement classification (CAT. III): Line from the primary side or branch of equipment which directly takes in electricity from a distribution board to the receptacle.

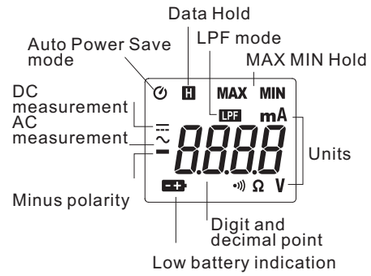
Overvoltage measurement classification (CAT. IV): Line from the service conductor to the distribution board.

[3] NAMES OF COMPONENT UNITS

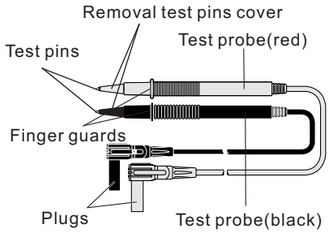
3-1 Main unit



3-2 Display



3-3 Test Lead



In case of test pins cover attached: CAT.III 600V
In case of test pins cover removed: CAT.II 1000V

[4] DESCRIPTION OF FUNCTION

4-1 Power Switch and function switch

Turn this switch to turn on and off the power and select a measuring function.

4-2 Date Hold function

When the HOLD button is pressed, the reading indicated will be held with H on the display. The indicated reading will not change if the input signal is changed. When this button is pressed again, the function will be disabled and the meter will return to the measurement mode without H on the display.

4-3 LPF function (mA/ACA)

When the LPF button is pressed, LPF turns on the display. This function cuts current value of high frequency. When this button is pressed again, the function will be disabled and the meter will return to the normal measurement mode without LPF on the display.

Remarks:
Cut-off frequency: -3 dB at 180 Hz

4-4 MAX/MIN function

When the MAX/MIN button is pressed, the meter enter MAX/MIN mode, fix a measuring range and turn **MAX MIN** on. Press the button, to read MAX, MIN, current reading sequence. Press the button for 1 sec. or more to exit the MAX/MIN mode.

Remarks:
Function changes or functional operations will cancel the function.

4-5 BACKLIGHT function

When the backlight button is pressed, the backlight will be turned on. To disable the function, the button is pressed again. The backlight will be automatically turned off about 30 seconds after it was turned on.

4-6 AUTO POWER SAVE function

The meter will go to AUTO POWER SAVE function to save battery life about 30 minutes after last function switch or button operation. To wake up the meter, press any button. To disable the function, press any button.
Remarks:
Even in the AUTO POWER SAVE mode, the tiny power is still consumed. When the meter is not going to be used for an extended period of time, be sure to turn off the power switch.
To disable the function, turn the function switch to position other than OFF while holding the HOLD button. on the display is turned off when Auto Power Save function is disabled.

4-7 Low Battery indication

When the built-in batteries have been discharged and the voltage has dropped to below about 2.2V, appears in the display. When the mark flickers or lights, replace both two batteries with new ones.

[5] MEASURING PROCEDURE

⚠WARNING

1. Do not apply an input signal exceeding the maximum rated input of each function.
2. During measurement, do not change the function switch.
3. During measurement, keep your finger behind finger guard of the test lead and the meter.
4. When measurement has been finished, remove the test leads and CT from the object measured and turn the function switch to OFF position.

5-1 Start-up Inspection

Always conduct the start-up inspection to ensure safety.

1. Be sure that when the meter is turned on, the low battery indication is not flickering or lit. If it is flickering or lit, replace the battery with a new ones.
2. Do not use the meter if the meter or test lead is damaged or broken.
3. Make sure the test leads are not cut.
4. Make sure the meter and your hand are not wet.

5-2 Current Measurement (mA)

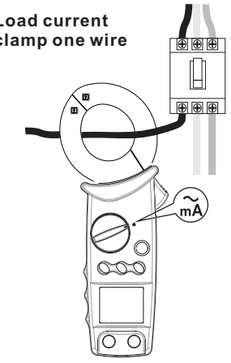
⚠WARNING

Remove the test leads from the measuring terminals to avoid electric shock.

Remarks:
Clamp the conductor (cable) to measure at the center of the trans core (CT).
To measure zero-phase current, clamp only earth wire or all of wires like 2-core or 3-core wire together.
The meter may malfunction in places where a strong magnetic field is present.
Do not apply voltage and current at the same time.

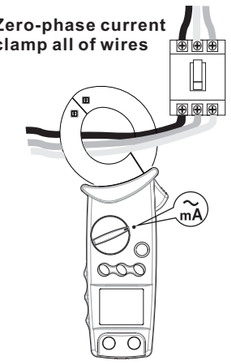
ACmA current measurement

Load current clamp one wire



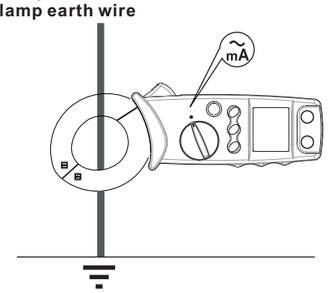
ACmA current measurement

Zero-phase current clamp all of wires



ACmA current measurement

Zero-phase current clamp earth wire

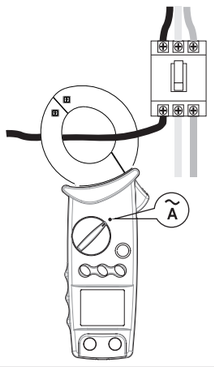


5-3 Current Measurement (ACA)

⚠WARNING

Remove the test leads from the measuring terminals to avoid electric shock.

AC current measurement



Remarks:

Clamp the conductor (cable) to measure at the center of the trans core (CT).

Clamp only one cable. If several cables are clamped together or 2-core or 3-core cords or cables are clamped, current cannot be measured accurately.

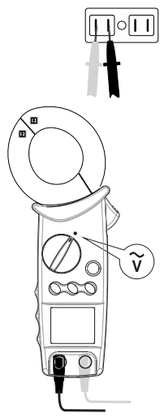
The meter may malfunction in places where a strong magnetic field is present.

5-4 Voltage Measurement (ACV DCV)

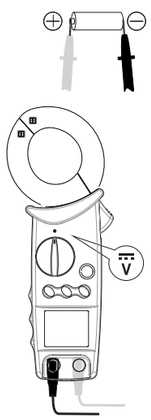
⚠WARNING

Never use the meter in power lines exceeding 600 V to ground.

AC voltage measurement



DC voltage measurement

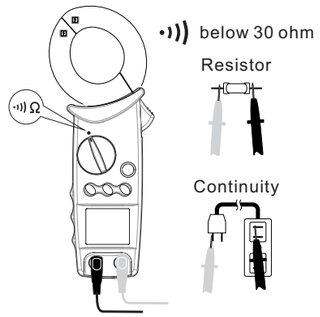


5-5 Resistance Measurement, Continuity Check

⚠WARNING

Never apply a voltage to the input terminals.

Resistance measurement
Continuity check



Remarks

Reading is 30 ohm or below, buzzer sounds.

Open voltage' approx. 0.9V

[6] MAINTENANCE

⚠WARNING

1. The following instructions are very important for safety. Read this manual thoroughly to ensure correct maintenance.
2. Calibrate and inspect the meter at least once a year to ensure safety and maintain its accuracy.

6-1 Maintenance and Inspection

1) Appearance: Is the meter not damaged due to falling or other cause?
2) Test leads:
   Are the core wires not exposed from the test leads?
   Is the plug when inserted to the input terminal not loose?

If any of the above problems exists, stop using the meter and request for repair.

6-2 Calibration and Inspection

For more information, please contact Sanwa ' s authorized agent / distributor service provider, listed in our website. See section 7-3.

6-3 Storage

⚠WARNING

1. The panel and case are not resistant to volatile solvent and must not be cleaned with thinner or alcohol.
2. The panel and case are not resistant to heat. Do not place the meter near heat-generating devices.
3. Do not store the meter in a place where it may be subjected to vibration or from where it may fall.
4. Do not store the meter in places under direct sunlight, or hot, cold or humid places or places where condensation is anticipated.
5. If the meter will not be used for a long time, remove the batteries.

6-4 Battery Replacement

Batteries when the meter is shipped:

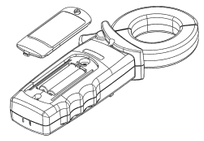
A battery for monitoring has been installed prior to shipment from the factory. It may be discharged before the expiration of the described battery life.

*The battery for monitoring is a battery used to check the functions and performance of the product.

⚠WARNING

To avoid electric shock, do not remove the battery door with an input being applied to the measuring terminals. Also, before starting replacement, make sure the power of the meter is OFF.

1. Remove the fixing screw of the battery lid with a minus screwdriver.
2. Replace both two batteries in the battery holder with new ones. (Pay attention to their polarity.)
3. Set and secure the battery door with the fixing screw as before.



[7] AFTER-SALE SERVICE

7-1 Warranty and Provision

Sanwa offers comprehensive warranty services to its end-users and to its product resellers. Under Sanwa's general warranty policy, each instrument is warranted to be free from defects in workmanship or material under normal use for the period of one (1) year from the date of purchase.

This warranty policy is valid within the country of purchase only, and applied only to the product purchased from Sanwa authorized agent or distributor.

Sanwa reserves the right to inspect all warranty claims to determine the extent to which the warranty policy shall apply. This warranty shall not apply to disposables batteries, or any product or parts, which have been subject to one of the following causes:

1. A failure due to improper handling or use that deviates from the instruction manual.
2. A failure due to inadequate repair or modification by people other than Sanwa service personnel.
3. A failure due to causes not attributable to this product such as fire, flood and other natural disaster.
4. Non-operation due to a discharged battery.
5. A failure or damage due to transportation, relocation or dropping after the purchase.

7-2 Repair

Customers are asked to provide the following information when requesting services:

1. Customer name, address, and contact information
2. Description of problem
3. Description of product configuration
4. Model Number
5. Product Serial Number
6. Proof of Date-of-Purchase
7. Where you purchased the product

Please contact Sanwa authorized agent / distributor / service provider, listed in our website, in your country with above information. An instrument sent to Sanwa / agent / distributor without above information will be returned to the customer.

Note:

1) Prior to requesting repair, please check the following: Capacity of the built-in battery, polarity of installation and discontinuity of the test leads.
2) Repair during the warranty period: The failed meter will be repaired in accordance with the conditions stipulated in 7-1 Warranty and Provision.
3) Repair after the warranty period has expired: In some cases, repair and transportation cost may become higher than the price of the product. Please contact Sanwa authorized agent / distributor / service provider in advance. The minimum retention period of service functional parts is 6 years after the discontinuation of manufacture. This retention period is the repair warranty period. Please note, however, if such functional parts become unavailable for reasons of discontinuation of manufacture, etc., the retention period may become shorter accordingly.
4) Precautions when sending the product to be repaired.
   To ensure the safety of the product during transportation, place the product in a box that is larger than the product 5 times or more in volume and fill cushion materials fully and then clearly mark " Repair Product Enclosed " on the box surface. The cost of sending and returning the product shall be borne by the customer.

7-3 SANWA web site

http://www.sanwa-meter.co.jp
E-mail: exp_sales@sanwa-meter.co.jp

[8] SPECIFICATIONS

8-1 General Specifications

Operation method:	Double integration
AC measuring method	Average sensing
Display:	6000count for A/V 9999counts for Resistance and Continuity check
Sampling rate:	Approx. 2 times/sec.
Over-range:	"OL" indication
Range selection:	Auto
Polarity switching:	Auto (- indication)
Low Battery indication:	lights when buit-in battery voltage is below 2.2 V or below.
Max. clamp conductor diameter:	ϕ40mm, 35mm(open CT size)
Environmental condition:	Altitude up to 2000 meters, indoor use pollution degree 2
Operating temperature:	5℃ to 40℃ in the humidity range as follows. No condensation allowed. 80%RH(max.) at 5℃ to 31℃, linearly dropping from 80%RH to 50%RH at 31℃ to 40℃.
Storage temperature:	-10℃ to 50℃, 80%RH max., no condensation.
Power supply:	LR03 x 2 pcs.
Auto Power Save:	Power save in about 30 mins. after last operation.
Power consumption:	Approx. 33 mW TYP
Battery life:	Approx 90 hours
Dimension:	*H*206 x *W83* x *D*38 mm
Weight:	Approx. 320 g (batteries included)
Safety standards:	IEC61010-1 CAT.III 600V, IEC61010-2-032, IEC61010-031
EMC Directive:	IEC61326
Standard	Instruction manual
Accessories:	Test leads (TL-23a)

8-2 Measuring Range and Accuracy

Temperature: 23 ± 5℃ , humidity: 80%RH max.(no condensation), supply voltage 2.2 V or above.
rdg(reading): Read value. dgt(digit): Number of counts of last digit.

AC mA current

Function	Range	Accuracy
mA	60.00 mA	50 Hz / 60 Hz ±(1.2 %rdg + 5 dgt) 40 Hz - 400 Hz ±(2.5 %rdg + 10 dgt)
	600.0 mA	

Remarks:
Accuracy is specified at center of CT.
LPF: Approx. -3 dB@180 Hz
Accuracy assurance frequency at LPF function: 50/60 Hz

AC current

Function	Range	Accuracy
ACA	60.00 A	0 A - 200 A 50 Hz / 60 Hz ±(1.2 %rdg + 5 dgt) 40 Hz - 400 Hz ±(2.5 %rdg + 10 dgt)
	400.0 A	200A - 400A 50 Hz / 60 Hz ±(2.0 %rdg + 5 dgt) 40 Hz - 400 Hz ±(5 %rdg + 10 dgt)

Remarks:
Accuracy is specified at center of CT.
LPF: Approx. -3dB@180Hz
Accuracy assurance frequency at LPF function: 50/60 Hz

AC voltage

Function	Range	Accuracy
ACV	600.0 V	±(1.2 %rdg + 5 dgt)

Remarks:
Input impedance: Approx 1M ohm.
Bandwidth: 40 Hz ~ 400 Hz (sine wave)

DC voltage

Function	Range	Accuracy
DCV	600.0 V	±(1.0 %rdg + 2 dgt)

Remarks:
Input impedance: Approx 1M ohm.

Resistance and Continuity check

Function	Range	Accuracy
·ıı) Ω	999.9 Ω	±(1.0 %rdg + 8 dgt)

Remarks:
Open voltage: Approx 0.9 V
Buzzer sounds : Less than 30 ohms