

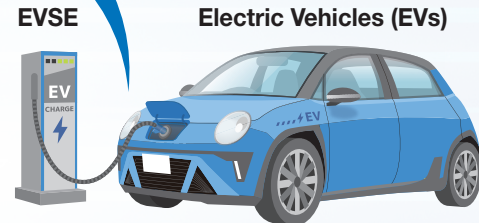
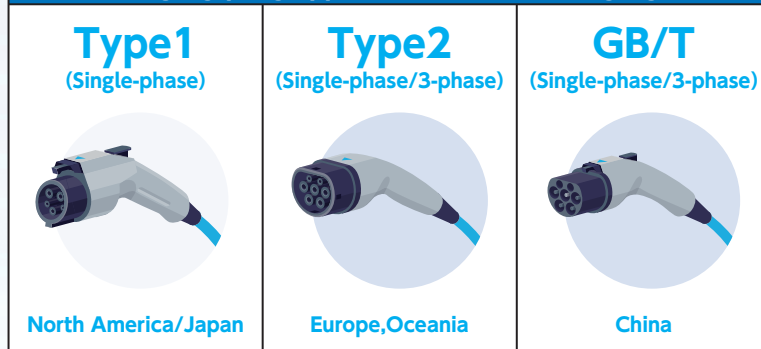
eMobility solutions: **Commissioning, smart maintenance and** **troubleshooting of Electrical Vehicle** **Supply Equipment (EVSE) in AC**



EVSE (EVSE = Electric Vehicle Supply Equipment, also called EV charge point)

The Electric Vehicles (EVs) are charged by connecting them to EVSE with dedicated charging connectors. The shape of this charging connector differs and depends on the charging method (normal charging in AC, fast charging in DC) and on the region / country. For normal charging in AC, that are the most common and spread EVSE, there are different types such as Type1, Type2 and GB/T.

EV charging plug types for normal charging (AC)



The charging process between EVs and EVSEs is controlled by a communication protocol called CP (Control Pilot) signal to ensure safe charging.

This CP signal is exchanged through the EV by the charging connector, and the CP signal changes depending on the state of the EV and EVSE. CP signal has three major charging states:

“A” indicates that EV and EVSE are not connected

“B” indicates that EV is connected, but not ready to charge

“C” or “D” indicates that EV is connected and ready for charging (the EVSE supplies voltage on its output)

* CP STATE “D”

EVs that use high-capacity lead-acid batteries, zinc air batteries, and other types of batteries produce hydrogen gas when charged. To prevent hydrogen gas from reaching dangerous concentrations that could cause an explosion, EVSE is required to operate an indoor ventilation system. CP STATE D is the state when an EV that generates this hydrogen gas is connected. However, commonly used EVs are equipped with lithium-ion batteries and do not generate flammable gases. Therefore, few EVSEs currently have a ventilation function. If an EVSE without ventilation function receives the CP STATE D condition from the EVSE adapter, it will not or may not go to charge state.

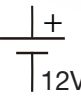
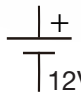
The figure shows the circuit configuration when EV and EVSE are connected. While the table shows the values of the resistance and voltage for each state of the CP signal. The specific connection sequence between EV and EVSE from A to B to C is as follows.

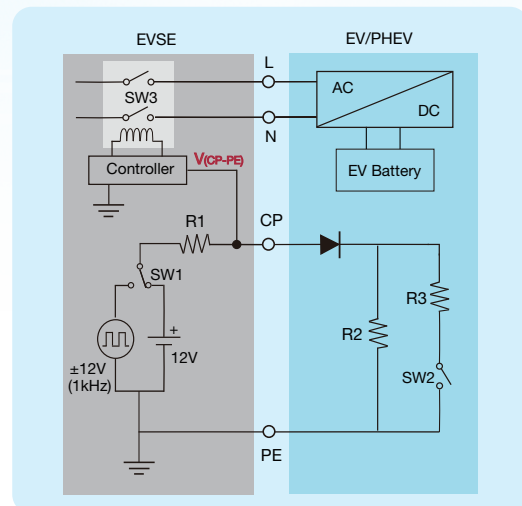
In state A with no EV connected, the voltage of CP signal is + 12V.

When EV is connected, the voltage of CP signal drops from +12V to +9V by adding R2 to the resistance of the circuit. When EVSE detects that the voltage changes to 9V (state B'), it switches SW1 to generate a square wave. Now EVSE recognizes the EV as connected (state B).

When the EV detects there is a square wave, the EV turns ON SW2. This will add R3 to the circuit, changing the voltage of CP signal to a square wave of +6V / -12V.

When the EVSE detects this change, turns ON SW3 giving power for charging (state C).

CP STATE	A	B'	B	C
R(Ω) : CP-PE	OPEN	R2	R2	$\frac{R2 \times R3}{R2 + R3}$
V : CP-PE	+12V	+9V	+9V / -12V (1kHz)	+6V / -12V (1kHz)
SW1 (EVSE)				
SW2 (EV)	OFF	OFF	OFF	ON
SW3 (EVSE)	OFF	OFF	OFF	ON



*EV/PHEV = Electric Vehicle / Plug-in Hybrid Electric Vehicle

EVs must limit the charging current so that EVSE does not deliver more current than its rated current. EVSE uses the DUTY ratio of the square wave indicated in the right figure below to convey the maximum possible output current to the EV side.

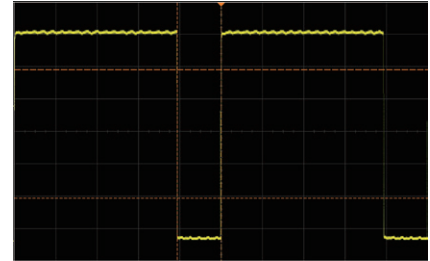
The table below shows the relationship between DUTY ratio and charging current. For example, if the DUTY ratio is 33% (1/3), then $33.3... \times 0.6A = 20A$ and the charging current is 20A.

The EV side determines the charging current calculated from this DUTY ratio and varies the charging current demanded on the EVSE side.

Today, some advanced EVSEs can also be used in conjunction with power meters to change the DUTY ratio when the overall power consumption is about to exceed the limit, thereby reducing the charging current for EVs.

CP duty cycle	Max. charging current
$8\% \leq \text{Duty cycle} < 10\%$	6A
$10\% \leq \text{Duty cycle} \leq 85\%$	$\text{Duty cycle} \times 0.6A$
$85\% < \text{Duty cycle} \leq 96\%$	$(\text{Duty cycle} - 64) \times 2.5A$

Correlation between duty cycle and max. charging current



CP signal waveform measured by oscilloscope

Need for EVSE ADAPTER

As the EVSE AC charging points supply ordinary mains power in AC (single phase or 3phase) to the EVs, the EVSE AC charge points must be considered ordinary electrical installations with just special sockets that, for safety reasons, they are energized only if the EV is connected.

Every electrical installation requires commissioning, testing, maintenance and troubleshooting, including the EVSE AC charge points. KYORITSU offers a comprehensive range of Multifunction Installation Testers on this regard.

Such tests are also required by IEC 60364 part 6 and part 7-772 Standard.

For some of these tests, the EVSE charging point must be energized, but it is difficult and dangerous to connect the Multifunction Installation Tester and carry out the tests while the EV is connected.

Therefore, KYORITSU has introduced EVSE ADAPTER, which can simulate the vehicle connection for Level 1 and Level 2 EVSE AC charging points.

The EVSE ADAPTER has test terminals for measurement, allowing various tests such as VOLT/LOOP/PSC/PFC/Insulation/Continuity/Polarity/RCD/ Phase Rotation to be performed with the support of a Multifunction Installation Tester.

KYORITSU offers two types of EVSE ADAPTERS:

KEW 8601 for Type1 connector and KEW 8602 for Type2 connector.

Please select the adapter that suits the EVSE and region where it will be used.

There is also a lineup of Multifunction Installation Testers equipped with testing functions for EVSE, which are useful in combination with EVSE ADAPTER. Each of them has different test functions, so please select the one that suits your application.

Model with advanced EVSE diagnostic functions and simplified LOOP/RCD testing functions



KEW 6514BT*

Model with full LOOP/PSC/PFC/RCD testing functions and EVSE test functions



KEW 6516/6516BT*

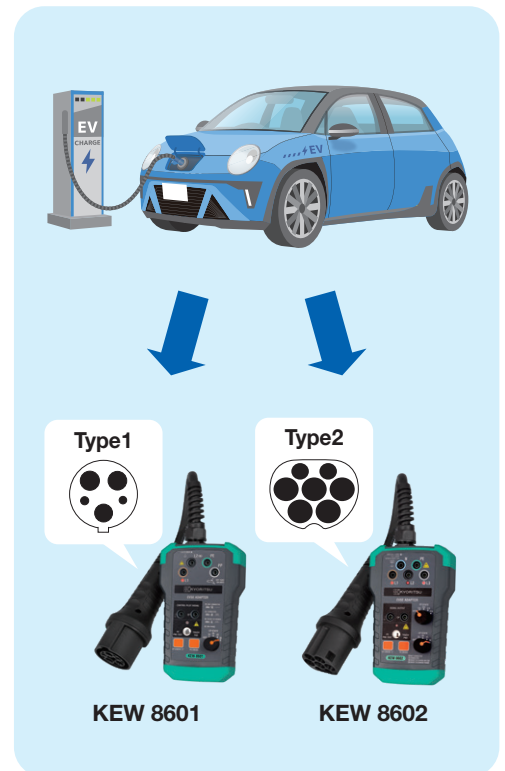


Photo of EVSE charge point testing by EVSE ADAPTER and MFT

* Models with BT in its model name are those with Bluetooth® communication capability.

Measuring terminals

Measuring terminals are intended to be connected by the Multifunction Installation Tester. The EVSE adapter simulates the EV so that the EVSE charge point will be energized, allowing to carry out various electrical safety and diagnostic tests.

Resistance measurement of latch switch circuit 8601 only

The PP (Proximity Pilot) terminal of Type1 EVSE charge point and the circuit for latch switch, designed to lock / unlock a charging cable, are connected together. Therefore, resistance value of the circuit varies when the latch switch is pressed. EV always monitors this resistance and immediately stops charging when the resistance varies in order to avoid the situation that the charging cable is disconnected while charging. SAE J1772 Standard defines that the circuit resistance (between PP-PE) should be 150Ω when the latch switch is locked, and 480Ω when it is unlocked.

KEW 6514BT has a special function to automatically identify the resistance value.



CP (Control Pilot) State simulation

KEW 8601/8602 can simulate A/B/C/D vehicle states respectively just by turning the CP state selector. By also combining the use of KEW 6514BT you can analyze the CP signal and checking if the CP STATE selector changes the vehicle connection state on the EVSE properly.



- A** Not connected
- B** Connected
- C** Ready to charge
- D** Ready to charge (Ventilation required)

CP signal output terminals

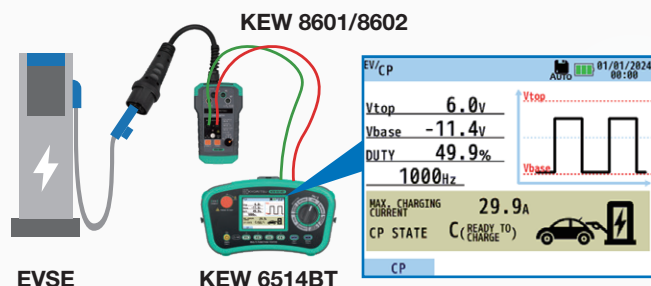
Some EVSEs can set the charging current and show some error states. For the operation check of these functions, CP signal analysis is required to check if DUTY cycle changes corresponding to the charging current value set and if CP STATE is properly shown in case of an error.

Analysis of CP signal between EV and EVSE is possible at CP signal output terminal by connecting MFT or oscilloscope.

CP signal analysis function

6514BT only

KEW 6514BT has this function. CP STATE and chargeable current are automatically calculated based on the voltage and DUTY ratio and displayed on the LCD.



KEW 8602(Type2)



PP(Proximity Pilot) State simulation

8602 only

EVSE uses the DUTY cycle to set the maximum possible output current to the EV side. If EVSE doesn't have charging cable, it needs to control the output current depending on the cable size of the user. In this case, EVSE should identify the rated current of such cable measuring the resistor value installed between PP and PE terminals of charging cable. For instance, when a charging cable rated to 13A is connected to an EVSE rated to 32A, EVSE changes DUTY cycle and communicates with EV so that EV can recognize the max chargeable current is 13A, avoiding to overload and damage the cable. **KEW 8602 can simulate the rated current of the cable just by turning its PP state selector.**

*This function isn't necessary for Type1 EVSE since it is always installed with charging cable kit.



Cable current rating	Resistance between PP and PE
No cable	OPEN
13A	1.5kΩ
20A	680Ω
32A	220Ω
63A	100Ω

Resistance between PP and PE depending on cable current rating

PE Pre-TEST

The PE conductor of EVSE is connected to the earth system and normally there is no voltage on earth system. A presence of unwanted voltage can be dangerous and cause electrical shock accident. **Touching the touch pad on KEW 8601/ 8602 you can safely check the presence of such dangerous voltage at PE terminal as a warning red LED lights up.**



Mains socket

8602 only

While CP STATE "C" is being selected, EVSE supplies voltage on its output. **External load up to 10A can be connected to the socket on the rear side of KEW 8602 just for easy operation check.**

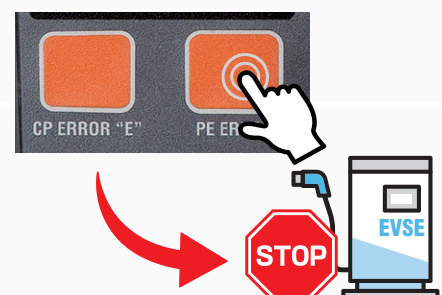


*EU, UK, and AU sockets are available. Please select the socket type when purchasing

Error simulation

In case of abnormalities at EV side or problems on charging cable, the immediate abort of charging process from EVSE is essential. **KEW 8601/ 8602 can simulate EV abnormal states such as break of earth conductor or interruption of CP signal just by pressing the following buttons:**

- CP error "E" simulation key button
Pressing this button, you can simulate a short circuit between CP / PE and the charging process should be aborted by EVSE.
- PE error simulation button
Pressing this button, you can simulate an interruption of the PE conductor and the charging process should be aborted by EVSE.



MFT (Multi Function Installation Tester) KEW 6514BT/6516/6516BT Features

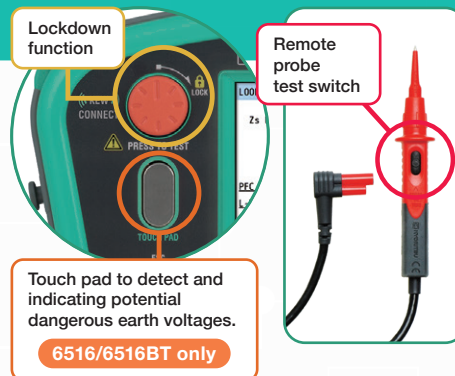
Hands free testing

Test switch

By remote probe or using the Lockdown function of the test switch.

Auto-memory function 6514BT only

Every time pressing the test switch and performs test, measured data is automatically saved in the internal memory (1000 data max). It can prevent forgetting saving data and is helpful to review the previous data.



Color LCD Display

- All the test data is shown in one large colored screen.
- HELP function will show how to connect the instrument according to the function selected.

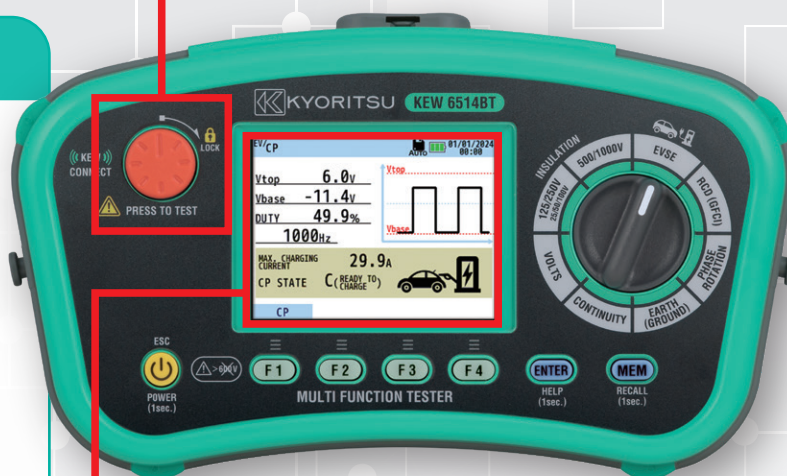
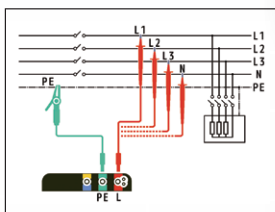


photo: KEW 6514BT

Anti-Trip Technology 6516/6516BT only

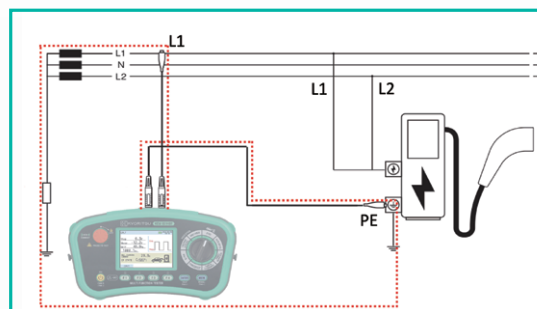


- For no trip LOOP L-PE testing on all RCDs.**
- With 3-wire (L, N, PE), to get the best accuracy readings.**
- With 2-wire only, very useful in case of no Neutral (i.e. 3-phase motor lines).**

Earth resistance check with LOOP 2-Wire method

Checking whether the EVSE is surely earthed or not is very difficult in case of concrete / asphalt (where the auxiliary earth spikes of earth tester cannot be stuck) or in case of 200V single-phase 3-wire system without neutral wire. Not to mention that some EVSEs don't work if they aren't earthed properly.

KYORITSU MFTs have an advanced measurement method called "Loop 2-wire": they can perform Loop impedance test by using 2-wires only instead of 3-wires that is usually required. The figure shows the flow of test current with Loop 2-wire method at Loop impedance test for EVSE, in a 200V single-phase 3-wire system without neutral wire. The earth resistance including resistances of the wires can be measured by connecting Line probe to L1 (or L2) and Earth probe to PE. KEW 6514BT can apply a small test current to avoid tripping 15mA RCDs. (30mA RCDs for 6516/6516BT)



EVSE test function 6514BT only



KEW 6514BT can perform all the necessary tests for AC type EVSE in just one function.

Including the following tests

Volts / Insulation / Latch switch circuit resistance / Earth / Loop 2-Wire / Checking CP signal / RCD

EVSE PROGRAMMABLE AUTOTEST function

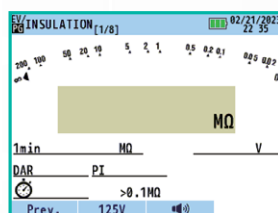
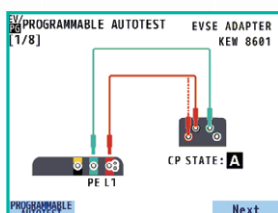
There is an EVSE dedicated function where you can carry out various tests. Combination and sequence of tests can be customized by using our special application. Repeating the same test multiple times is also possible. The instrument has a guide function that supports you to check the connection diagrams on its screen prior to test and also gives a step-by-step guide to carry out all the necessary tests.

EVSE installation test

Example 1: Type1 (6514BT + 8601)



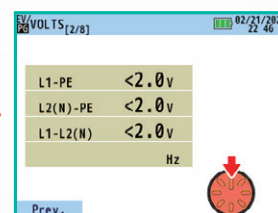
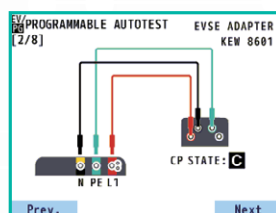
- 1 Insulation(L1-PE)
- 2 Insulation(L2(N)-PE)
- 3 Volts
- 4 Earth
- 5 Checking CP signal (CP STATE A to C)
- 6 Latch switch circuit resistance
- 7 RCD



Example 2: Type2 (6514BT + 8602)

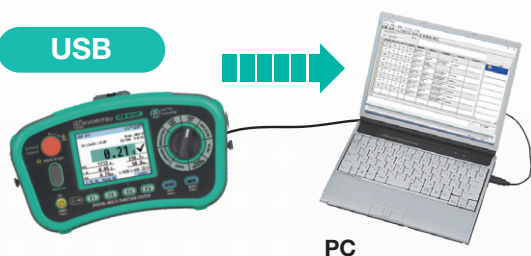


- 1 Insulation(L1-PE)
- 2 Insulation(L2/L3-PE)
- 3 Earth
- 4 Checking CP signal (CP STATE A to C)
- 5 RCD



Communication interface

USB



PC

Bluetooth®



KEW 6514BT/6516BT



MFTs can download the internal saved measured data by connecting the USB adapter and therefore it is possible to edit a complete Test Report on a PC. KEW 6514BT has an extra function named Auto-memory to automatically save the measured results. With this function, there is no need to press the save switch at every test. Our application "KEW Report 2" allows USB and Bluetooth® data communication.

* USB adapter is not supplied with KEW 6514BT/ 6516BT as it is an optional accessory.

KEW 6514BT/ 6516BT can transfer the measured data to tablet or smartphone via Bluetooth® and can save data by using our special application "KEW Smart Advanced". User template (xlsx format) can be uploaded to the device and the measured values are automatically entered. Using this application, KEW 6514BT allows to activate or not each function and easily change the settings such as comparator values for each function.

*Bluetooth® is a trademark or registered trademark of Bluetooth SIG, Inc.*Android™ is a trademark or registered trademark of Google LLC.
*iOS is a trademark or registered trademark of Cisco Technology, Inc. in the United States and other countries.

Test overview for EVSE using the MFT series

*Can be used with other insulation resistance testers, DMMs, etc

Connecting a Multifunction Installation Tester to the measuring terminals of EVSE ADAPTER you can carry out various installation tests as described below.



Dead Testing, when the EVSE is de-energized (CP STATE A)



Insulation test (for cable)

By connecting the test leads to the adapter terminal, the insulation resistance of cables can be measured for both single phase and three phase EVSE.

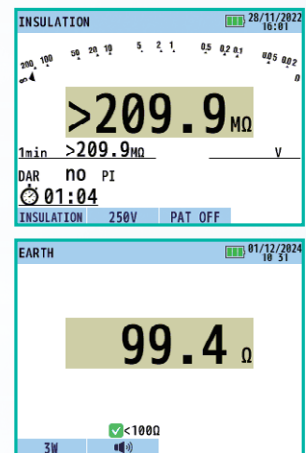
*Insulation measurement between wires other than PE is not possible.

Earth Continuity test (200mA)

It is possible to check continuity between the PE terminal of the EVSE adapter and the exposed conductive part of EVSE and the PE of the earthing system.

Earth test (2-wire & 3-wire)

The resistance of the earth system that is connected to the EVSE can be measured.



Live Testing, when the EVSE is energized and supplies voltage on its output (CP STATE C)



Voltage

Voltage/frequency between each terminal can be measured.

Phase rotation

Phase rotation of three phase power supply can be measured.

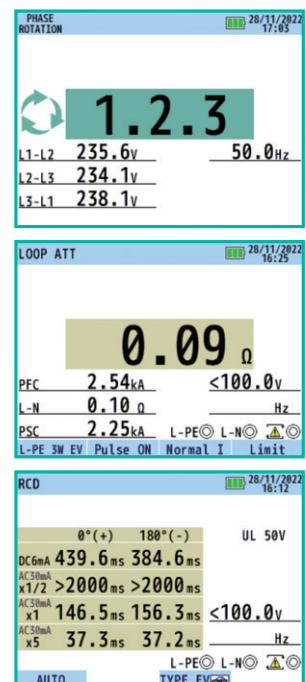
Loop Impedance (Loop ATT function)

Loop impedance between Line-Earth can be measured. Advanced MFTs are designed to make Loop impedance measurements even in presence of 30mA RCDs, without tripping them.

However, the 6mA DC RCDs built into the EVSE often trip, so the KEW 6516/6516BT have a dedicated EVSE Loop range that measures Loop impedance without tripping 6mA DC RCDs.

RCD test

IEC 60364-7-722 Standard states that EVSE shall be protected by RCD of type B, or A or F or a residual direct current detecting device (RDC-DD) complying with IEC 62955. KEW 6516/6516BT can test all above mentioned RCDs including AC, S types, and also the dedicated EV type RCD (30mA AC+6mA DC).





● List of tests that can be carry out using EVSE ADAPTER and MFT

	CP state selector position	8601 (Type1 adapter) 			8602 (Type2 adapter) 		
		Adapter only	 6516/6516BT (MFT)	 6514BT (MFT)	Adapter only	 6516/6516BT (MFT)	 6514BT (MFT)
CP state	A/B/C/D	✓					
PP state	C	-			OPEN, 13A, 20A, 32A, 63A		
Measurement Terminal	-	E, L1, L2(N), PP, CP			E, N, L1, L2, L3, CP		
Live LED	C	L1			L1, L2, L3		
PE PRE-TEST	A	✓					
CP Error	C	✓					
PE Error	C	✓					
Mains socket	C	-			10A/250V		
Checking CP signal	A/B/C/D	-	-	✓	-	-	✓
Insulation	A		✓ (between conductors and earth)			✓ (between conductors and earth)	
Earth	2W:C 3W:A		✓ (2-wire, 3-wire)			✓ (2-wire, 3-wire)	
Earth Continuity	A		✓ (200mA)			✓ (200mA)	
Loop impedance	C		✓ (2-wire, 3-wire)	✓ (2-wire)		✓ (2-wire, 3-wire)	✓ (2-wire)
Volts	C		✓			✓	
RCD	C		✓ (AC, A, B, F, 6mA DC)	✓ (AC)		✓ (AC, A, B, F, 6mA DC)	✓ (AC)
Phase rotation	C		-			✓	
Latch switch circuit resistance	A	-		✓			
EVSE Programable Autotest	-	-		✓			

● Kits

KIT 1

KEW 6516-EV2

KEW 6516×1, KEW 8602×1

KIT 2

KEW 6516BT-EV2

KEW 6516BT×1, KEW 8602×1



MULTI FUNCTION TESTER KEW 6514BT Specification

Insulation resistance								SPD(Varistor)	
Test voltage		25V	50V	100V	125V	250V	500V	1000V	1000V max.
Range		2.000/20.00MΩ (Auto-ranging)		2.000/20.00/200.0MΩ (Auto-ranging)			2.000/20.00/ 200.0/1000MΩ (Auto-ranging)	2.000/20.00/ 200.0/2000MΩ (Auto-ranging)	0 to 1000V (goes up by 1V)
Accuracy		-							±5%rdg±5dgt
First effective measurement range		0.100 to 10.00MΩ ±2%rdg±2dgt		0.100 to 25.0MΩ	0.100 to 50.0MΩ	0.100 to 100.0MΩ	0.100 to 1000MΩ	-	
Second effective measurement range		0.050 to 0.099MΩ ±2%rdg±4dgt							-
		10.01 to 18.00MΩ ±5%rdg							
		10.01 to 18.00MΩ	25.1 to 180.0MΩ	50.1 to 180.0MΩ	100.1 to 900MΩ	1001 to 1800MΩ			
Rated current		1.0 to 1.2mA @0.025MΩ(25V) @0.05MΩ(50V)		1.0 to 1.2mA @0.1MΩ(100V) @0.125MΩ(125V)	1.0 to 1.2mA @0.25MΩ	1.0 to 1.2mA @0.5MΩ	1.0 to 1.2mA @1MΩ	-	
Short circuit current		1.5mA max.							-
RCD					EVSE Function				
Rated voltage		85 to 440V(50/60Hz)			Measuring range	Vtop	2.0 to 15.0V		
Function		×1/2, ×1, Ramp 15/30/50/100/200/500mA				Vbase	-15.0 to -2.0V		
						Frequency	980 to 1020Hz		
						Duty	10.0 to 96.0%		
RCD type		AC(G)				Charging current	6.0 to 80.0A		
Accuracy	Trip current	x1/2	-8 to -2%		Accuracy	Vtop	±4dgt		
		x1	+2 to +8%			Vbase			
		Ramp	-4 to +4%			Frequency	±0.5%rdg±4dgt		
	Trip time	x1/2	±1%rdg±2ms			Duty	±10dgt		
x1				Charging current	Depends on the accuracy of the Duty cycle				
Continuity					Loop impedance(L-PE(2-wire))				
Range		20.00/200.0/2000Ω (Auto-ranging)			Rated voltage		85 to 260V(50/60Hz)		
Open circuit voltage (DC)		7 to 14V			Impedance range		200.0/2000Ω		
Measurement current		200mA or more(2Ω or less)			Accuracy		±3%rdg±10dgt		
Accuracy		±2.0%rdg±8dgt			Measurement current		L-PE:7mA		
Earth					Phase rotation				
Range		20.00/200.0/2000Ω(Auto-ranging)			Measuring range	Phase rotation	3 to 600V(45 to 65 Hz)		
Accuracy		±2%rdg±0.08Ω(20.00Ω) ±2%rdg±3dgt(200.0/2000Ω)				Motor rotation	0.1 to 2V(1 to 10 Hz)		
Volts					Indication	Clockwise direction: "1.2.3" and clockwise phase sequence icon Counterclockwise direction: "3.2.1" and counterclockwise phase sequence icon			
Range		300.0/600V(Auto-ranging)							
Measuring range	Volts	2 to 600V							
	Frequency	45 to 65Hz							
Accuracy	Volts	±2%rdg±4dgt							
	Frequency	±0.5%rdg±2dgt							
General									
Applicable standards		IEC 61010-1, IEC 61010-2-030 CAT IV 300V / CAT III 600V Pollution degree 2, IEC 61010-2-034 IEC 61557-1,2,3,4,5,6,7,10, IEC 60529(IP40)							
Communication interface		USB, Bluetooth® 5.0*1							
Power source		LR6(AA)(1.5V) × 8							
Dimension		136(L) × 235(W) × 114(D)mm							
Weight		Approx.1300g (including batteries)							
Accessories		7281(Test leads with remote control switch), 7247(Distribution board test lead) 7228A(Earth resistance test leads), 8041(Auxiliary earth spikes[2spikes/1set]) 8017B(Extension prod long), 8923(Fuse[0.5A/600V]) × 1 (included), 1 (spare), 9084(Soft case) 9142(Carrying case),9151(Shoulder strap), 9199(Shoulder pad), Batteries, Instruction manual							
Optional accessories		8259(Adapter for measurement terminal), 7272(Precision measurement cord set) 8212-USB (USB adapter), 8601(EVSE ADAPTER), 8602(EVSE ADAPTER)							

*1 Some countries regulate the compliance with their Radio Law of the products equipped with Bluetooth®.

Please confirm it with your distributor before purchasing our products equipped with Bluetooth®.

6514BT / 6516 / 6516BT Accessories



Main test lead
6516/6516BT only



Plug



MODEL 7281
Test leads with remote control switch



MODEL 7246
Distribution board test lead
6516/6516BT only



MODEL 7247
Distribution board test lead
6514BT only



MODEL 7228A
Earth resistance test leads



MODEL 8017B
Extension prod long
6514BT only



MODEL 8041
Auxiliary earth spikes (2spikes/1set)



MODEL 8212-USB
USB adapter
Standard accessory for 6516,
optional accessory for 6514BT/6516BT



MODEL 9151
Shoulder strap



MODEL 9199
Shoulder pad



MODEL 8923
Fuse[0.5A/600V]
6514BT only



MODEL 9084
Soft case



MODEL 9142
Carrying case

MULTI FUNCTION TESTER KEW 6516 / 6516BT Specification

Insulation resistance						SPD(Varistor)
Test voltage	100V		250V	500V	1000V	1000V max.
Measuring ranges	2.000/20.00/200.0MΩ (Auto-ranging)			20.00/200.0/1000MΩ (Auto-ranging)	20.00/200.0/2000MΩ (Auto-ranging)	0 to 1049V(goes up by 1V)
Accuracy	±2%rdg±6dgt (2.000/20.00MΩ) ±5%rdg±6dgt (200.0MΩ)			±2%rdg±6dgt (20.00/200.0MΩ) ±5%rdg±6dgt (1000MΩ)	±2%rdg±6dgt (20.00/200.0MΩ) ±5%rdg±6dgt (2000MΩ)	±5%rdg±5dgt
Rated current	1.0 to 1.2mA @0.1MΩ		1.0 to 1.2mA @0.25MΩ	1.0 to 1.2mA @0.5MΩ	1.0 to 1.2mA @1MΩ	—
Short circuit current	1.5mA max.					—
Loop impedance						
Function	LOOP ATT			LOOP HIGH		
	L-PE/L-N(3-wire)		L-PE(2-wire)	L-PE(0.01ΩRes)	L-PE(0.001ΩRes)	L-N/L-L
Rated voltage	100 to 260V(50/60Hz)		48 to 260V(50/60Hz)		100 to 260V(50/60Hz)	48 to 500V(50/60Hz)
Impedance range	20.00/200.0/2000Ω (Auto-ranging)				2.000Ω	20.00Ω
Accuracy	±3%rdg±6dgt		±3%rdg±10dgt	±3%rdg±4dgt	±3%rdg±25mΩ	±3%rdg±4dgt
Nominal test current at 0Ω external loop:	L-N:6A/60ms		L-PE:15mA	20Ω:6A/20ms	25A/20ms	6A/20ms
Magnitude/Duration at 230V	N-PE:10mA; EV mode*1 Normal I N-PE:6mA Low I N-PE:4mA			200Ω:0.5A/20ms 2000Ω:15mA/500ms		
PSC/PFC						
Range	2000A/20kA(L-N(PSC)/L-PE(PFC))			2000A/20kA(PFC)		2000A/50kA(PFC)
Accuracy	2000A/20kA(PSC)					
PSC/PFC accuracy is determined by measured loop impedance specification and measured voltage specification						
RCD						
Rated voltage	100 to 260V(50/60Hz)					
Function	x1/2, x1,x5,Ramp,Auto,Uc 6/10/30/100/300/500/1000mA/variable					
RCD type	AC(G/S)		A(G/S)	F(G/S)	B(G/S)	EV
Trip current setting	x1/2,x1,Uc	10/30/100/300/500/1000mA(G) 10/30/100/300/500mA(S)		10/30/100/300/500mA		6mA(×1 only)
	x5	10/30/100mA		10/30mA		—
	Ramp	10/30/100/300/500mA		10/30/100/300mA		6mA
Accuracy	Trip current	x1/2	-8 to -2%		-10 to 0%	
		x1	+2 to +8%		0 to +10%	
		x5	+2 to +8%		0 to +10%	
		Ramp	-4 to +4%		-10 to +10%	
	Trip time	x1/2	2000ms(G/S):±1%rdg±2ms			
		x1	550ms(G):±1%rdg±2ms,1000ms(S):±1%rdg±2ms			
		x5	410ms(G/S):±1%rdg±2ms			
Continuity				Volts		
Range	20.00/200.0/2000Ω (Auto-ranging)			Range	300.0/600V(Auto-ranging)	
Open circuit voltage (DC)	7 to 14V			Measuring ranges	Volts	2 to 600V
Measuring current	200mA	200mA or more(2Ω or less)			Frequency	45 to 65Hz
	15mA	15mA±3mA(short-circuit)		Accuracy	Volts	±2%rdg±4dgt
Accuracy	±2%rdg±8dgt				Frequency	±0.5%rdg±2dgt
Phase Rotation				Earth		
Rated voltage	48 to 600V(45 to 65Hz)			Range	20.00/200.0/2000Ω(Auto-ranging)	
Remarks	Correct phase sequence are displayed with "1,2,3" and arrow mark. Reverse phase sequence are displayed with "3,2,1" and arrow mark.			Accuracy	±2%rdg±0.08Ω(20.00Ω) ±2%rdg±3dgt(200.0/2000Ω)	
General						
Applicable standards	IEC 61010-1 CAT IV 300V / CAT III 600V Pollution degree 2, IEC 61010-2-034, IEC 61557-1,2,3,4,5,6,7,10, IEC 60529(IP40), IEC 61326(EMC)					
Communication interface	USB, Bluetooth® 5.0*2					
Power source	LR6(AA)(1.5V) × 8					
Dimension	136(L) × 235(W) × 114(D)mm					
Weight	1350g (including batteries)					
Accessories	Mains test lead*3, 7281(Test leads with remote control switch), 7246(Distribution board test lead), 7228A(Earth resistance test leads), 8041(Auxiliary earth spikes[2spikes/1set]) 8212-USB(USB adapter for 6516), 8923(Fuse[0.5A/600V]) × 1 (included), 1 (spare), 9084(Soft case), 9142(Carrying case), 9151(Shoulder strap), 9199(Shoulder pad), Batteries, Instruction manual					
Optional accessories	8212-USB(USB adapter for 6516BT), 8259(Adapter for measurement terminal), 7272(Precision measurement cord set), 8017A(Extension prod long) 8601(EVSE ADAPTER), 8602(EVSE ADAPTER)					

*1 This applies to firmware version 2.10 or later of KEW 6516/6516BT.

*2 6516BT only

Some countries regulate the compliance with their Radio Law of the products equipped with Bluetooth®.

Please confirm it with your distributor before purchasing our products equipped with Bluetooth®.

*3 7187A:British plug, 7218A:(EU)European SCHUKO plug, 7221A(SA) South african plug, 7222A:(AU)Australian plug.

6514BT / 6516 / 6516BT Optional accessories



MODEL 7272
Precision
measurement
cord set

2 cord reels with test leads, 2 spikes,
an earth test lead, a carrying case.



MODEL 8017A
Extension prod long
6516/6516BT only



MODEL 8259
Adapter for
measurement terminal



KEW 8601
EVSE ADAPTER
TYPE1 plug



KEW 8602
EVSE ADAPTER
TYPE2 plug

EVSE ADAPTER KEW 8601 / 8602 Specification

	8601	8602
Plug	SAE J1772 / IEC 62196-2 type1	IEC 62196-2 type2
Rated voltage	250V AC max.	250V AC max.(Single-phase) 430V AC max.(Three-phase)
Rated frequency	50/60Hz	
Rated voltage / current of mains socket	-	10A/250V AC *8602(EU):Type E socket, 8602(UK):Type BF socket 8602(AU):Type O socket
Fuse rating	-	AC 10A/250V $\phi 5 \times 20$ mm
Operating temperature and humidity range	0 to 40°C, relative humidity 80% or less (no condensation)	
Storage temperature and humidity range	-10 to 50°C, relative humidity 80% or less (no condensation)	
Applicable standards	IEC 61010-1 IEC 61010-2-030 CAT II 250V IEC 60529 (IP40)	IEC 61010-1 IEC 61010-2-030 CAT II 300V IEC 60529 (IP40)
Altitude	2000m or less	
Cable length	Approx. 250 mm	
Dimension	Unit: 172(L) × 105(W) × 57(D)mm Plug part: 175(L) × 60(W) × 53(D)mm	
Weight	Approx. 840g	
Accessories	9202 (Carrying case) Instruction manual	8930 (Fuse[10A/250V]) 9202 (Carrying case) Instruction manual
Optional accessories	-	8603 (TYPE1 to TYPE2 conversion adapter)

8601 / 8602 Accessories



8602 Optional accessories



MULTI FUNCTION TESTER Selection Guide

● MULTI FUNCTION TESTER Selection Guide			KEW 6514BT	KEW 6516	KEW 6516BT
VOLT			600V		
Continuity			✓		
Earth			2-wire / 3-wire		
RCD	Function		x1/2, x1, Ramp	x1/2, x1, x5, Ramp, Auto, Uc	
	RCD type		AC(G)	AC/A/F/B(G/S)	
	Test current		15/30/50/100/200/500mA	10/30/100/300/500/1000mA/variable	
PSC/PFC			-	✓	
EVSE Test	RCD (Compatible with RCD for EVSE)		-	✓(DC 6mA)	
	LOOP (Compatible with RCD for EVSE)		-	✓(N-PE:4mA)	
	Checking CP signal		✓	-	
	Latch switch circuit resistance		✓	-	
	Programmable Autotest		✓	-	
Insulation resistance		Test Voltage	25/50/100/125/ 250/500/1000V	100/250/500/1000V	
Loop Impedance	Loop ATT 2-wire		✓(L-PE:7mA)	✓(L-PE:15mA)	
	Loop ATT 3-wire		-	✓	
	Loop HIGH		-	✓	
Phase rotation			✓		
	Motor rotation check		✓	-	
Memory			✓(AUTO)	✓	
Communication interface	USB		✓		
	Bluetooth®		✓	-	✓

! Safety Warnings : Please read the "Safety Warnings" in the instruction manual supplied with the instrument thoroughly and completely for correct use. Failure to follow the safety rules can cause fire, trouble, electrical shock, etc. Therefore, make sure to operate the instrument on a correct power supply and voltage rating marked on each instrument.

For inquiries or orders :



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