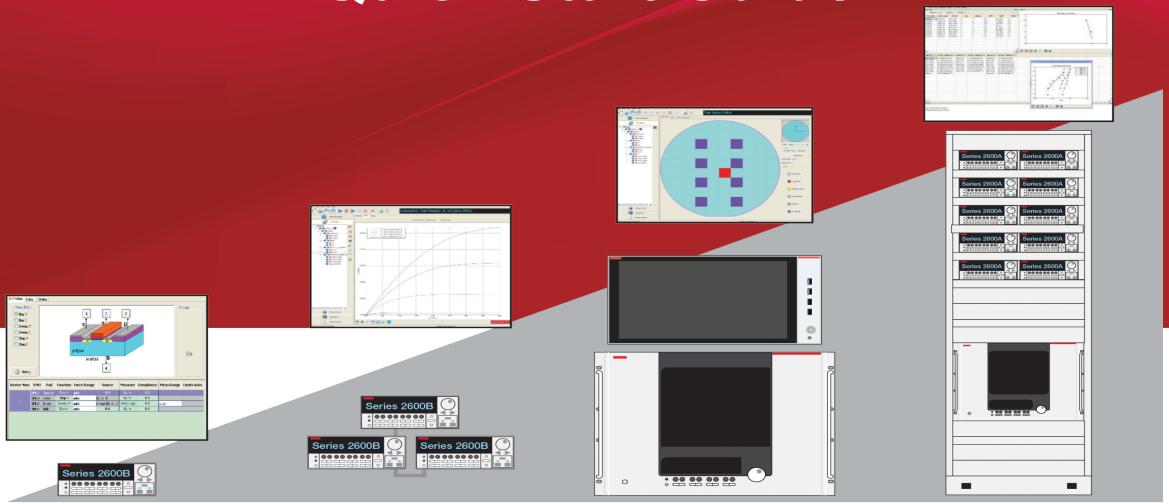
ACS Basic Software
Quick Start Guide



All Series 2400 and 2600
SourceMeter® SMU Instruments

All Series 4200
Parameter Analyzers

707B Switch Mainframe

S500
Integrated
Test System

KEITHLEY
A Tektronix Company

Safety precautions

The following safety precautions should be observed before using this product and any associated instrumentation. Although some instruments and accessories would normally be used with nonhazardous voltages, there are situations where hazardous conditions may be present.

This product is intended for use by personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product. Refer to the user documentation for complete product specifications.

If the product is used in a manner not specified, the protection provided by the product warranty may be impaired.

The types of product users are:

Responsible body is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring that operators are adequately trained.

Operators use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.

Maintenance personnel perform routine procedures on the product to keep it operating properly, for example, setting the line voltage or replacing consumable materials. Maintenance procedures are described in the user documentation. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.

Service personnel are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures.

Keithley products are designed for use with electrical signals that are measurement, control, and data I/O connections, with low transient overvoltages, and must not be directly connected to mains voltage or to voltage sources with high transient overvoltages. Measurement Category II (as referenced in IEC 60664) connections require protection for high transient overvoltages often associated with local AC mains connections. Certain Keithley measuring instruments may be connected to mains. These instruments will be marked as category II or higher.

Unless explicitly allowed in the specifications, operating manual, and instrument labels, do not connect any instrument to mains.

Exercise extreme caution when a shock hazard is present. Lethal voltage may be present on cable connector jacks or test fixtures. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30 V RMS, 42.4 V peak, or 60 VDC are present. A good safety practice is to expect that hazardous voltage is present in any unknown circuit before measuring.

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000 V, no conductive part of the circuit may be exposed.

Do not connect switching cards directly to unlimited power circuits. They are intended to be used with impedance-limited sources. NEVER connect switching cards directly to AC mains. When connecting sources to switching cards, install protective devices to limit fault current and voltage to the card.

Before operating an instrument, ensure that the line cord is connected to a properly-grounded power receptacle. Inspect the connecting cables, test leads, and jumpers for possible wear, cracks, or breaks before each use.

When installing equipment where access to the main power cord is restricted, such as rack mounting, a separate main input power disconnect device must be provided in close proximity to the equipment and within easy reach of the operator.

For maximum safety, do not touch the product, test cables, or any other instruments while power is applied to the circuit under test. ALWAYS remove power from the entire test system and discharge any capacitors before connecting or disconnecting cables or jumpers, installing or removing switching cards, or making internal changes, such as installing or removing jumpers.

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always make measurements with dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.
When fuses are used in a product, replace with the same type and rating for continued protection against fire hazard.
For safety, instruments and accessories must be used in accordance with the operating instructions. If the instruments or accessories are used in a manner not specified in the operating instructions, the protection provided by the equipment may be impaired.
Do not exceed the maximum signal levels of the instruments and accessories. Maximum signal levels are defined in the specifications and operating information and shown on the instrument panels, test fixture panels, and switching cards.
Chassis connections must only be used as shield connections for measuring circuits, NOT as protective earth (safety ground) connections.
If you are using a test fixture, keep the lid closed while power is applied to the device under test. Safe operation requires the use of a lid interlock.
If a ⏚ screw is present, connect it to protective earth (safety ground) using the wire recommended in the user documentation.
The ⚠ symbol on an instrument means caution, risk of hazard. The user must refer to the operating instructions located in the user documentation in all cases where the symbol is marked on the instrument.
The ⚠ symbol on an instrument means warning, risk of electric shock. Use standard safety precautions to avoid personal contact with these voltages.
The ⚠ symbol on an instrument shows that the surface may be hot. Avoid personal contact to prevent burns.
The ⏚ symbol indicates a connection terminal to the equipment frame.
If this Hg symbol is on a product, it indicates that mercury is present in the display lamp. Please note that the lamp must be properly disposed of according to federal, state, and local laws.
The **WARNING** heading in the user documentation explains hazards that might result in personal injury or death. Always read the associated information very carefully before performing the indicated procedure.
The **CAUTION** heading in the user documentation explains hazards that could damage the instrument. Such damage may invalidate the warranty.
The **CAUTION** heading with the ⚠ symbol in the user documentation explains hazards that could result in moderate or minor injury or damage the instrument. Always read the associated information very carefully before performing the indicated procedure. Damage to the instrument may invalidate the warranty.
Instrumentation and accessories shall not be connected to humans.
Before performing any maintenance, disconnect the line cord and all test cables.
To maintain protection from electric shock and fire, replacement components in mains circuits — including the power transformer, test leads, and input jacks — must be purchased from Keithley. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. The detachable mains power cord provided with the instrument may only be replaced with a similarly rated power cord. Other components that are not safety-related may be purchased from other suppliers as long as they are equivalent to the original component (note that selected parts should be purchased only through Keithley to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call a Keithley office for information.
Unless otherwise noted in product-specific literature, Keithley instruments are designed to operate indoors only, in the following environment: Altitude at or below 2,000 m (6,562 ft); temperature 0 °C to 50 °C (32 °F to 122 °F); and pollution degree 1 or 2.
To clean an instrument, use a cloth dampened with deionized water or mild, water-based cleaner. Clean the exterior of the instrument only. Do not apply cleaner directly to the instrument or allow liquids to enter or spill on the instrument. Products that consist of a circuit board with no case or chassis (e.g., a data acquisition board for installation into a computer) should never require cleaning if handled according to instructions. If the board becomes contaminated and operation is affected, the board should be returned to the factory for proper cleaning/servicing.
Safety precautions as of June 2018.

Safety

Introduction to ACS Basic software

ACS Basic is optimized for parametric testing of component and discrete (packaged) semiconductor devices. The software maximizes the productivity of technicians and engineers in research and development. The versatile architecture of this software allows it to meet the wide-ranging and changing requirements of semiconductor device testing. It supports all of Keithley's source and measure instrument products, including Series 2600B, Series 2400, and Series 2400 Touchscreen SourceMeter® (SMU) instruments, 2651A and 2657A SourceMeter (SMU) instruments, and Model 4200A-SCS SMUs and capacitance-voltage units (CVUs).

The Models DMM6500 and DMM7510 are also supported, as well as the Series 662x and Model 2182A instruments.

This powerful, yet cost-effective, solution includes Keithley's rich set of proven parametric libraries. Choose a test and run it to start gathering and analyzing data.

To perform specific calculations on raw data, use the mathematical Formulator tool to create customized parameter calculations. Save your data easily in graphical or tabular formats. Customize any test using the embedded script editor.

The built-in data analysis tools allow you to analyze the parametric data. For example, you can place device curves developed from newly collected data over "golden" curves for fast comparisons.

ACS Basic offers three modes of operation:

- **Single-test mode**: Perform a single test on a single device. You can select a test from one of three libraries based on the device and instruments available. You can also create your own test or modify available tests.
- **Multi-test mode**: Perform multiple tests on a single device (target application) or multiple tests on multiple devices. It is easier to use external instruments, such as DMMs and switches, in multi-mode.
- **Trace-mode:** Perform interactive operations with a SourceMeter. You can adjust the maximum sweep value and maximum power to the device. You can also transition between dc and pulse forcing modes.

ACS Basic software includes product documentation to assist with using the software. For additional support information, see tek.com/keithley.

NOTE

After you have installed the software, but before you begin to set up any projects or run tests, review the Release Notes. The Release Notes contain valuable information about known issues and provide guidance on how to handle issues that you may encounter. The Release Notes are available at Windows® Start > ACS Basic 3.x > Release Notes.

Documentation includes:

- **Quick Start Guide:** This document. Shows how to install the software, connect hardware, and set up an instrument.
- **Reference Manual**: Comprehensive information about ACS Basic software and hardware.
- **Libraries Reference Manual**: Contains LPT library programming methods, commands, and device library commands.
- **ACS Basic Release Notes**: Describes the features added to the software, the supported operating systems, supported test configurations, and supported models you can use with ACS.

Connect instruments to a computer

You must select and configure a communication interface to use the software. When the hardware is configured properly, the software automatically scans and finds the hardware.

Supported communication interfaces

The software supports the following communication interfaces:

- GPIB (general purpose interface bus)
- LAN (auto scan)
- USB (universal serial bus)
- TSP-Link™ (subordinate)
- RS-232 (serial port)

NOTE

The software can also control multiple instruments as a group connected to a single GPIB or ethernet interface. Each group uses TSP-Link to connect instruments together.

The following table indicates how instruments communicate with the software.

Instrument	Platform	Communication interface
2010, 2400	Desktop, laptop computer, or 4200A	GPIB
2600, 2600B		GPIB, ethernet, USB, TSP subordinate
2400 Graphical Series SMUs		GPIB, ethernet, USB, TSP subordinate
3700		GPIB, ethernet, USB, TSP subordinate
4200A		Internal
622x		GPIB, ethernet
DMM6500, DMM7510		GPIB, USB, ethernet, TSP subordinate
Other external instruments		GPIB, USB, ethernet, RS-232

Select an interface

Make sure the interface is consistent with your instrument's connection, either GPIB, ethernet, or USB. Some instruments allow multiple communication interfaces to be enabled.

NOTE

See the instrument documentation for more information on the GPIB and ethernet communication interfaces.

Configure the interface through GPIB

The software automatically scans the GPIB instruments during start and supports the following GPIB interfaces:

- Keithley cards: KUSB-488B, KI-488 v3.13.1 or higher version supported with Windows® 11, Windows® 10 and Windows® 7
- National instruments: GPIB-USB-HS, GPIB-USB-HS+, PCI-GPIB supported with Windows® 11, Windows® 10, and Windows® 7

GPIB card installation

Install the GPIB card and its associated driver before installing the software. Make sure to enable KI-mode on Keithley Instrument cards for the GPIB driver when you install the card.

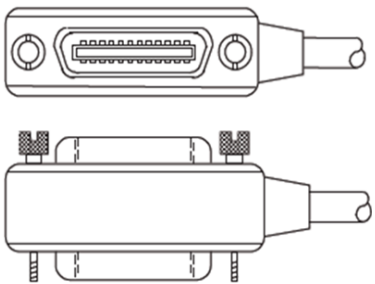
NOTE

For more information on the installation of a GPIB card driver, refer to the GPIB manufacturer's interface documentation for installation instructions.

Check the GPIB communication

Before starting the software, verify that the GPIB card and driver are installed and functioning properly. For the Keithley/CEC GPIB interfaces, you can use the following diagnostic utilities:

- KI-488 Configuration Utility
- KI-488 Diagnostic Tool



Establish the GPIB address of the instrument and make sure that any additional instruments are configured for a GPIB connection and that they have a valid unique address. For example, the Series 2600B ships from the factory with a GPIB primary address of 26.

If the GPIB interface is enabled, the instrument momentarily displays the primary address on power-up. You can set the address to a value from 0 to 30, but do not assign the same address to another instrument or to a controller on the same GPIB bus.

NOTE

ACS Basic can also control multiple instruments as a group connected to a single GPIB or ethernet interface. Each group uses TSP-Link to connect instruments together.

ACS Basic V3.3 or newer system requirements

Minimum computer configuration

- Operating system (OS): Windows® 7 x 86 (32 bit); Windows® 7 x 64 (64 bit)
- CPU: 2 cores or higher; 1 gigahertz (GHz) or faster processor; or System on a chip (SoC)
- System memory (RAM): 8 gigabyte (GB) for 32 bit; 16 GB for 64 bit
- Hard disk: 16 GB for 32-bit OS; 32 GB for 64-bit OS
- Graphics card: DirectX 9 or later with WDDM 1.0 driver
- Screen: 1024 x 768, 32-bit true-color display

Recommended computer configuration

- Operating system (OS): Windows® 11 x 64 (64 bit), Windows® 10 x 86 (32 bit), or Windows® 10 x 64 (64 bit)
- CPU: 4 cores or higher; at least 2 GHz or faster processor
- System memory (RAM): 8 GB for 32 bit; 16 GB for 64 bit
- Hard disk: 32 GB for 32-bit OS; 64 GB for 64-bit OS
- Graphics card: DirectX 9 or later with WDDM 1.0 driver
- Screen: 1280 x 1024, 32-bit true-color display

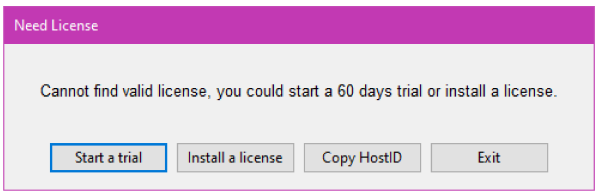
Software installation

To install the software:

1. Restart your computer.
2. Log in as an Administrator.
3. Select the installation file `ACS Basic 3.x` to start the process.
4. Once the wizard opens, follow the instructions to specify how to install the software on your system.

Install license

The first time you use the software without a license, you can start a 60-day trial. To start the trial, select **Start a trial**, as shown in the following figure.



Generate a license file

To generate a license file, you must submit your Host ID to the Tektronix Asset Management System (TEKAMS).

To get your Host ID in ACS Basic, first select **Help** from the toolbar, then **License**. In the License Manage dialog, copy the HostID and go to tek.com/products/product-license.

You will obtain your software license and download it to the computer that will run ACS Basic software.

Floating license

To move the license to a different computer, go to **Help** > **License** and open **License Manage**. Select **Remove**. Save the **Exit Key** file.

On the computer that needs the floating license:

1. Obtain the Host ID.
2. Go to tek.com/products/product-license.
3. Upload the exit key file and Host ID.
4. Register for a floating license.
5. You will receive a floating license for your computer.

Hardware Management Tool

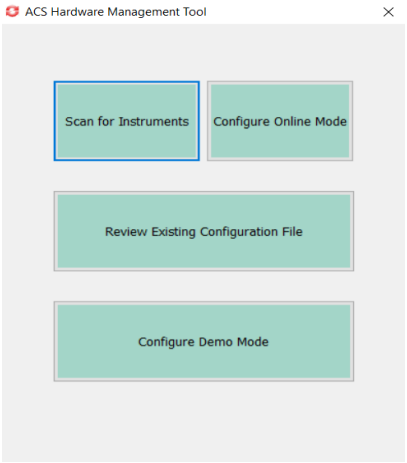
The Hardware Management Tool allows you to manage the instrument configuration and the Keithley configuration file (`.kcf`) of the hardware system instruments for ACS Basic.

Once the software is installed on your computer, the Hardware Management Tool icon is on your desktop.

Before you begin using the software, open the Hardware Management Tool to scan the hardware connected to your system.

This generates a `hardware_config_online.kcf` file or a `hardware_config_demo.kcf` file if you are in Demo mode.

The Hardware Management Tool interface contains four options. You can scan the connected instruments, configure online mode, review the existing configuration file, and configure a demo mode test. For more information about the Hardware Management Tool, refer to the *ACS Basic Reference Manual* from the Help menu in ACS Basic.



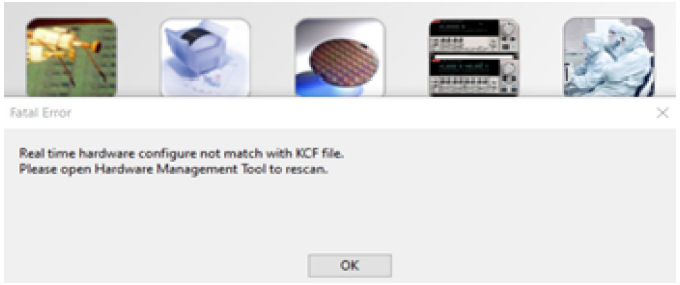
The configuration navigator, shown in the following figure, provides a tree view of the connected instruments and equipment. The tree branches can be expanded and minimized by selecting the arrows to the left of each branch.

The work area shows each instrument in the system configuration and its associated properties. Select an instrument in the configuration navigator to display the properties associated with the instrument in the work area.

Once you have the hardware configuration established from the Hardware Management Tool, make sure that the configuration is saved. If you make any changes to your hardware, make sure that you have saved the changes.

NOTE

If the hardware configuration has changed and the configuration has not been updated, the Hardware Management Tool indicates a Fatal Error, as shown in the following figure.



When the configuration is saved, close the Hardware Management Tool and open tsoftware. The saved hardware configuration is now available in the software.

For more information about setting up hardware and a test, refer to the *ACS Basic Reference Manual*.

Start ACS Basic

Make sure the instruments are connected with a GPIB, LAN, or USB cable. If more than one Series 2600B or 2400 SourceMeter® is used, make sure the TSP-Link connection has been made correctly.

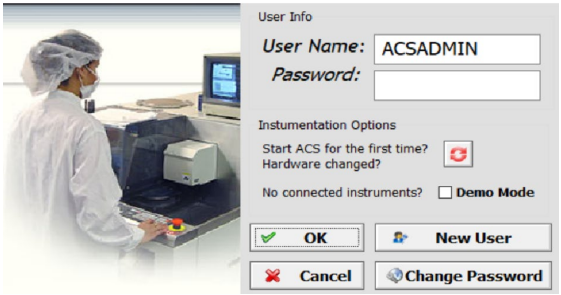
Assign GPIB addresses and node numbers. Make sure all the instruments are turned on and self-testing is completed on all the instruments, then start the software.

CAUTION

To avoid errors to instruments, never start the software until all instruments have started and completed self-testing.

Select the ACS Basic icon (either the desktop icon or the quick Launch icon). The User Info dialog opens. The default User Name is ACSADMIN. There is no default password. Select **OK** to log in (either a 60-day trial or license is required).

You may see a caution message. This may indicate that instrument connections have changed or that you are logging in for the first time.



FAQs

I just connected an instrument to my computer, but I cannot select the instrument in ACS Basic.

If you make changes to the hardware, do the following:

1. Select the Hardware Management Tool icon to create a new `.kcf` (Keithley configuration file) for the updated hardware.
2. In the configuration navigator, you see the connected instruments and equipment.
3. Expand an item in the configuration navigator to see more detail in the work area.
4. Start ACS Basic.

Next steps

Refer to the ACS Basic Manuals:

ACS Fundamentals Reference Manual: Comprehensive information about ACS Basic software and hardware.

ACS Basic Libraries Reference Manual: Programming methods, LPT, and device library commands.

ACS Basic Release Notes: Valuable information about known issues and guidance on how to handle issues you may encounter.

See tek.com/keithley for support and additional information about ACS Basic software and licenses.

Contact information: 1-800-833-9200
For additional contacts, see **tek.com/contact-tek**

Find more valuable resources at TEK.COM.

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ACSBASIC-903-01 Rev. F November 2023