Model 1030A

1000V DC Voltage Standard/Calibrator

KROHN-HITE CORPORATION

Operating Manual

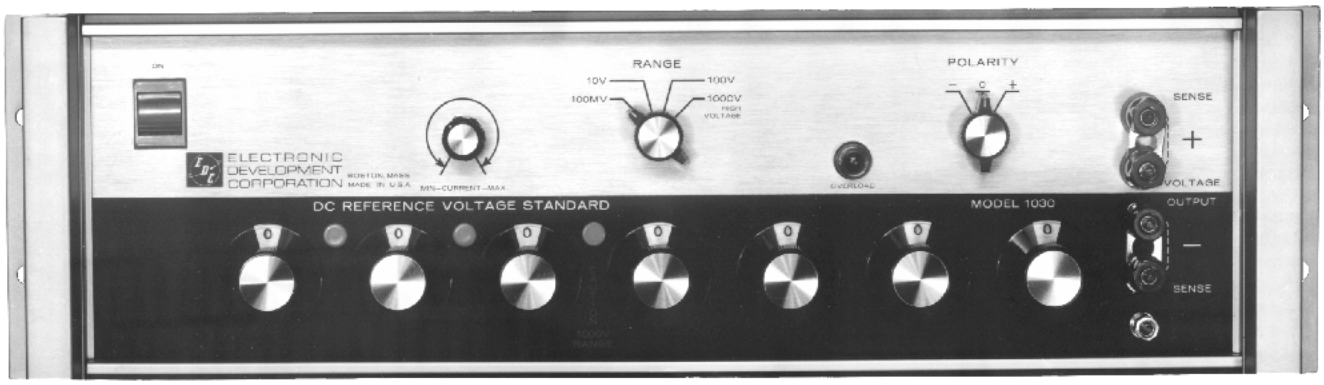
This page intentionally left blank.

Model 1030
OPERATORS
MANUAL

Serial No._____

This page intentionally left blank.

Model 1030
OPERATORS
MANUAL



Krohn-Hite Corporation
15 Jonathan Drive Unit 4
Brockton, Massachusetts 02301
E-mail: Info@krohn-hite.com
www.krohn-hite.com

Printed in U.S.A.
Version 2.20
Revised October 2000

TABLE OF CONTENTS

NOTE: Errata and addendum (if any) will appear in the back of this manual.

SCHEMATICS AND LAYOUTS

Schematic, Power Supply	B-3324D
Schematic, Main Board	B-3325K
Layout, 1030 Main Board	B-4879A
Layout, 1030 High Voltage Board	B-4880A
Layout, Calibration Adjustments	B-4881A
Reference Drawing	930727A

WARRANTY

The Krohn-Hite Corporation (K-H) warrants to the original purchaser each instrument manufactured by them to be free from defects in material and workmanship. This warranty is limited to servicing, repairing and/or replacing any instrument or part thereof returned to the K-H factory for that purpose in accordance with the instructions set forth below; and furthermore to repair or replace all materials, except tubes, fuses, transistors and other semiconductor devices which shall within one year of shipment to the original purchaser be returned to the K-H factory and upon examination be deemed defective.

K-H instruments may not be returned to the factory under the terms of this warranty without the prior authorization of the K-H Service Department. All instruments returned to K-H for service hereunder should be carefully packed and shipped. All transportation charges shall be paid by the purchaser.

K-H reserves the right to discontinue instruments without notice and to make changes to any instrument at any time without incurring any obligation to so modify instruments previously sold.

This warranty is expressly in lieu of all other obligations or liabilities on the part of K-H. No other person or persons is authorized to assume in the behalf of K-H any liability in the connection with the sale of its instruments.

> CAUTION: The instrument you have purchased is a precision instrument manufactured under exacting standards. Any attempts to repair, modify or otherwise tamper with the instrument by anyone other than an K-H employee or authorized representative may result in this warranty becoming void.

FACTORY SERVICE REQUEST
AND
AUTHORIZATION

WARRANTY SERVICE

Instruments may be returned only on prior authorization. Please obtain a RETURN AUTHORIZATION NUMBER either directly from the factory or from an authorized K-H Representative. (See General Information below.)

CHARGEABLE REPAIRS

If requested, an estimate of charges will be submitted prior to repairs. We suggest that you request a RETURN AUTHORIZATION NUMBER to facilitate handling.

GENERAL INFORMATION

A) Please provide the following information in order to expedite the repair:

   1) Indicate MODEL

   2) Serial Number

   3) Complete description of the trouble:

      Symptoms, measurements taken, equipment used, lash-up procedures, attempted repairs, suspected location of failure and any other pertinent information.

B) Freight Charges must be PREPAID.

C) The RETURN AUTHORIZATION NUMBER should be noted on your documentation.

D) See Packing Suggestions - next page.

PACKING SUGGESTION

Although your K-H instrument is built for laboratory, production environment and some field environment, it is NOT ruggedized. Therefore...

1. Be sure the carton is STRONG enough to carry the weight of the instrument, e.g. use double wall corrugation.

2. Be sure the carton is LARGE enough to allow for sufficient packing material, e.g., at least 2 inches all around the instrument. The packing material should be able to be compressed and then return to its approximate original volume.

3. For better handling, the shipment should always be by AIR FREIGHT (expect for short distances). You might use either UPS "blue label" or common air freight carrier, second day air.

   Please do not bounce it across the country in a truck. It may not hurt it, but it certainly is not going to do a laboratory instrument much good.

4. QUESTIONS? Just contact us. We will be pleased to help you.

SECTION I

1.0.0. DESCRIPTION AND SPECIFICATIONS

1.1.0 General Description

1.1.1 The Model 1030A is a multi-range, high accuracy DC voltage source and calibrator.

1.1.2 The unit is laboratory calibrated against a primary measuring system, having an absolute error of less than 10 ppm. The saturated standard cells used are certified, and are traceable to the U. S. National Institute of Standards & Technology, having a long history of documented stability.

1.1.3 Calibrator controls are obtained through front panel switches and decade switches.

No trims of adjustments required between calibration cycles. Adjustment settings are made at final calibration and are fully described under calibration procedure.

1.1.4 The circuitry is completely solid state packaged in discrete, hybrid and integrated circuit modules. These are proven circuits, using derated components to insure maximum reliability. Major discrete circuits are packaged on etched glass epoxy boards, so that the instrument can withstand abnormal environmental conditions. The instrument is also overload and short circuit protected.

1.2.0 Applications

1.2.1 One of the major applications of the instrument as a DC calibrator is a system reference for electronic analog computers, digital converters, strain gages, and other peripheral equipment. Telemetry, data acquisition, control, and test facilities or electronic data handling systems using analog voltage inputs, either throughout or in part, will find the calibrator useful as a standard for systems calibration and checkout.

1.2.2 Other applications include the use of the instrument as a sophisticated ultra-stable power supply providing an excellent source of bias current for operational amplifier and networks, semiconductor parameter tests, as well as for other experimental and breadboard circuitry.

1.2.3 Industrial checkout of power supplies, sensors, recorders, scopes as well as analog, differential and digital voltmeters using the instrument as a DC voltage reference are other primary application.

1.2.4 Colleges, universities and commercial research laboratories use the instrument in their physics and chemistry laboratories as a constant voltage source in calorimetric electrolytic and other applications.

1.3.0 Specifications

1.3.1 LINE REGULATIONS:
± 0.0005% for 10% line change

1.3.2 POWER REQUIREMENT:
115-230 Vac 50 - 400 Hz
Approximately 40 W

1.3.3 STABILITY:
1 hour 10 ppm
8 hours 20 ppm
1 month 40 ppm
6 months 50 ppm

1.3.4 TEMPERATURE:
Calibration Temperature 23ºC ±1ºC
Ambient Operating Temp. 20ºC ± 30ºC (68ºF to 86ºF)
Operating Limit -10ºC + 40ºC (14ºF to 104ºF)
Storage Temperature -40ºC + 70ºC (-40ºF to 158ºF)

1.3.5 ISOLATION:
The output terminals may be floated 1000 Vdc and the primary isolation is 2000 Vac rms.

1.3.6 OUTPUT TERMINALS:
Floating output with case ground terminal.

1.3.7 REMOTE SENSING:
2 additional terminals are provided for sensing the IR drop across the connecting leads. Local Sensing is attained by a front panel link that connects the bus between the "output" and "remote" terminals.

1.3.8 POLARITY SWITCHING:
plus (+), zero (0), minus (-). The input and output terminals (floating) can be reversed with respect to each other.

1.3.9 The zero (0) setting of the polarity switch short circuits the output and open-circuits the input terminals. In effect this is a "standby" control as well as a positive "zero".

1.3.10 ELECTRICAL SPECIFICATIONS

1.3.11 ACCURACY:
Line at nominal and with Sense at load or links closed at terminals.

1.3.12 CALIBRATION ACCURACY: 23ºC ±1ºC at 70% RH

1000 V range: ±(0.002% of setting +0.0005% of range +5 µV)
100 V range: ±(0.002% of setting +0.0005% of range +5 µV)
10 V range: ±(0.002% of setting +0.0005% of range +5 µV)
100 mV range: ±(0.005% of setting +3 µV)

*1.3.13 LIMIT OF ERROR ACCURACY:
±(0.003% of setting +0.001% or range +5 µV)

1.3.14 OUTPUT RANGES:

Full Scale	Resolution
1000 V	100µV
100 V	10µV
10 V	1µV
100 mV	0.01µV

1.3.15 OUTPUT CURRENT & IMPEDANCE:

Ranges	Output Impedances
1000 V @ 15 mA	30 milliohms
100 V @ 50 mA	30 milliohms
10 V @ 50 mA	30 milliohms
100 mV n/a	3 ohms

1.3.16 LOAD REGULATION:
±0.0005% +25µV
Not applicable on 100 mV range.

1.3.17 NOISE AND RIPPLE:
rms 0.8 Hz to 100 kHz Range
1000 V - 175 µV
100 V - 100 µV
10 V - 75 µV
100 mV - 10 µV

* 100 mV range limit of error accuracy: ±(0.005% of setting +5 µV)

1.3.18 General Specifications

1.3.19 TEMPERATURE COEFFICIENT:
Ambient 0.0002 % / ºC
Operating 0.001 % / ºC

1.3.20 PROTECTION:
Short-circuit and overload protection. Automatic recovery. Front panel indicator.

1.3.21 DIMENSIONS:
5 1/4 x 19 x 14 inches 133 x 483 x 355 mm

1.3.22 WEIGHT:
15 lbs. 7 kg
Shipping weight USA 19 lbs.

1.3.23 MOUNTING:
BENCH USE: Available with resilient feet, and folding tilt bale.

1.3.24 RACK MOUNTING: Supplied.

1.3.25 HUMIDITY:
0 to 70% relative humidity.

1.3.26 DOCUMENTATION:

1. Certificate of Compliance traceability to U.S. National Institute of Standards and Technology.

2. Maintenance Manual including block diagrams, mechanical layout, schematics, parts list.

3. WARRANTY: ONE YEAR including accuracy and stability.

SECTION II

2.0.0 INSTALLATION

2.1.0 Mounting

2.1.1 The instrument is available in rack version, designed for mounting in standard 19" racks. It is completely enclosed in dust covers and therefore suitable for bench top use. Resilient feet and a folding tilt bale are supplied.

2.1.2 The overall size is 5 1/4" high x 19" wide x 13" back of the panel. It weighs 22 pounds. A standard 3 prong polarized plug and power cable is attached, and the unit is ready for use.

2.1.3 POWER REQUIREMENT = 40 WATTS
LINE VOLTAGE RANGE: 115 - 230 50/60 Hz

2.1.4 The instrument has been designed to be easily transported from one location to another and will be in a stable and accurate operation condition in less than one minute from turn on time.

2.2.0 AC Power Input Considerations

2.2.1 All instruments are supplied with a standard three (3) prong polarized plug and power cable.

2.2.2 A two position slide switch is mounted on the rear panel which is used to set the line voltage requirements to 115 Vac or 230 Vac. Make sure this switch is in the proper position for your line power prior to turning the instrument on for the first time.

SECTION III

3.0.0 OPERATION OF INSTRUMENT

3.1.0 Front Panel Controls

3.1.1 Power Switch: Line power

3.1.2 Polarity Switch: This switch has 3 settings. With the polarity switch on "+" the red output terminal is positive with respect to the black terminal. On "-" the red output terminal is negative with respect to the black terminal. On "0" a short circuit exists between the red and black output terminal.

3.1.3 Output and Sense Terminals: Four terminals are provided for output and sense. The red terminals represent the polarity with respect to the black as the common terminals. The red terminals are indicated by the polarity switch.

NOTICE: THE SENSING CIRCUIT MUST BE COMPLETE!
Please refer to Drawing #930727, in the rear of this manual, for the two-wire and four-wire connections.

3.1.4 If a high impedance or a low current load is connected, the output and sense terminals may be shorted with the sense links (provided) e.g. plus output to plus sense.

3.1.5 If drawing current is desired, the remote sense capability should be used. The advantage of remote sense is that you have a 4 wire output and the sense lines are brought directly to the load, thus eliminating the IR drop of the output lines.

3.1.6. Decade Switches: The decade switches are used to select the desired output, and each switch is labeled with the multiple of the decimal it controls. The decimal lights facilitate the reading of resolution.

3.2.0 Operation of a Voltage Source

3.2.1 With power switch off, connect power cord to recommended power source, e.g. 115 Vac 230 Hz 50/60 Hz.

3.2.2 Connect the output terminals of the instrument to their respective loads as required.

CAUTION

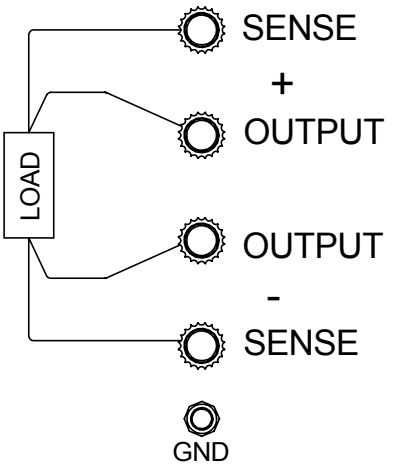
3.2.3 Do not place more than a 1000 V potential between the output terminals and chassis ground when using a floating output. In some applications it may be necessary to isolate chassis from line common. This practice is not recommended.

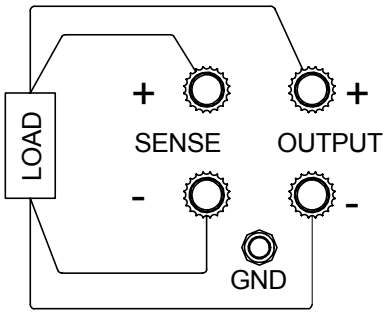
3.2.4 With polarity switch on "0" position, place power on switch to the "ON" position. This procedure will prevent any possible turn on transient from appearing across the output terminals.

3.2.5 Select the desired output voltage on the decade switches, set range switch to appropriate range, and switch the polarity switch to required polarity.

SENSE CONNECTIONS

HIGH CURRENT LOAD

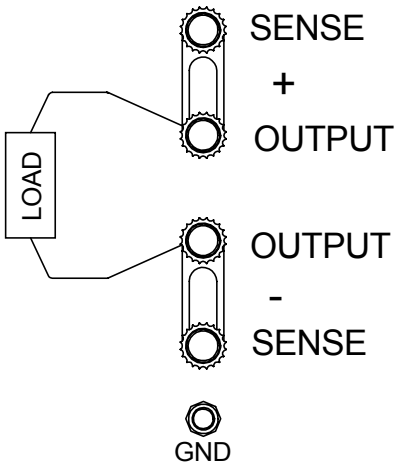


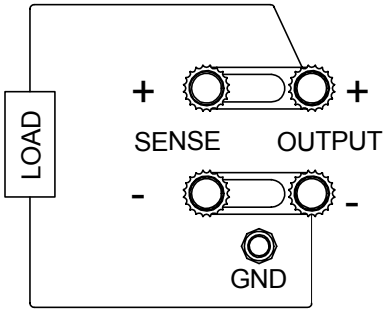


[Sense Links Removed]

FIG 1

LIGHT LOAD

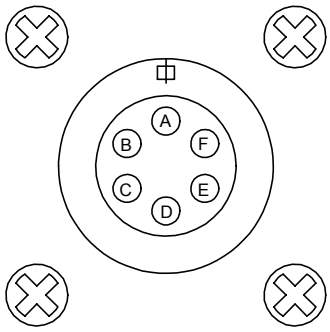




[Sense Links Installed]

FIG 2

OUTPUT CONNECTOR PIN FUNCTIONS



PIN A Chassis Ground
PIN B + Output
PIN C - Output
Pin D Not Used
Pin E - Sense
Pin F + Sense

FIG 3

Reference Drawing #930727-A