

KUHLMAN INSTRUMENT COMPANY

ULTRA K3 USER'S MANUAL

WARRANTY

The ULTRA K3 is warranted for one year against defects in material or workmanship. This warranty does not cover water or physical damage, damage from over pressure or battery leakage. **THIS IS YOUR ONLY WARRANTY. NO OTHER WARRANTIES, SUCH AS FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSED OR IMPLIED. KUHLMAN INSTRUMENT COMPANY SHALL NOT BE LIABLE FOR ANY DAMAGES FROM USE OR MISUSE OF THIS INSTRUMENT.**

WARNINGS AND PRECAUTIONS

The ULTRA K3 is a precision instrument. Although rugged, it can be damaged by excessive pressure to either pressure port. **MAXIMUM PRESSURE TO THE LOW PRESSURE PORT MUST NOT EXCEED 5 PSIG OR THE INSTRUMENT MAY BE PERMANENTLY DAMAGED. MAXIMUM PRESSURE TO THE HIGH PRESSURE PORT MUST NOT EXCEED 299 PSIG.** The instrument can be damaged by over tightening the pressure fittings. Although splash resistant, the instrument is not waterproof. If immersed in water, it should be returned immediately to Kuhlman Instrument Company for repair. To assure continued accuracy of the ULTRA K3 over time, it should be returned to Kuhlman Instrument Company or a Kuhlman Instrument Company authorized calibration facility annually for recalibration.

The ULTRA K3 is certified as intrinsically safe for use in Class I, Division 1, Group D locations (methane or propane in air) to 104°F (40°C) only when used with Duracell Ultra MX 1500 alkaline batteries with the battery cover fastened by the 2-56 retaining screw and washer. **DO NOT USE OTHER BATTERY TYPES OR LITHIUM OR RECHARGEABLE CELLS. DO NOT USE THE OPTIONAL PRINTER OR PERSONAL COMPUTER CONNECTION IN HAZARDOUS LOCATIONS.**

Although the instrument case is well sealed and quite rugged, the ULTRA K3 is not waterproof and can be damaged if dropped or immersed in water. Treat the instrument as you would any other precision instrument such as a quality camera.

If the ULTRA K3 will not be used for more than a month, remove the batteries and store the unit in a cool, dry place. **THE UNIT HAS NO USER SERVICEABLE PARTS INSIDE. OPENING THE CASE VOIDS THE WARRANTY AND INTRINSIC SAFETY CERTIFICATION.** For customer service and support please contact:

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PRODUCT DESCRIPTION

The Kuhlman ULTRA K3 is a dual range state-of-the-art digital instrument for pressure testing natural gas and propane distribution mains, services, and house piping and setting service and appliance regulators. The ULTRA K3 has pressure ranges of 0 to 5 Psig and 0 to 299 Psig with a combined nonlinearity and hysteresis of less than + or - 0.25% of span at room temperature. The user may set the units of measurement to either American or metric units. To improve the instrument stability and ease of use, pressure measurements are averaged over one second. The unit also allows measurement of differential pressure by applying first one than the other pressure to the correct pressure port through a three-way valve and displaying the pressures and calculating the difference between the first and second applied pressure.

The ULTRA K3 has a built-in timer adjustable up to 25 hours for accurately timing leakage tests. The unit can store up to 99 measurements for later downloading to the optional ULTRA K3 portable printer or to a personal computer. Information stored includes a time/date stamp, an 8-digit test identification number, a 3-digit user personal identification number (PIN), test start and end pressures and test duration. The calibration due date is also displayed when the unit is powered up. The unit will automatically shut off 30 minutes after a test is complete unless a longer test time has been programmed. Pressing the "POWER" key restarts the instrument.

The ULTRA K3 has a backlit, high-contrast liquid crystal display(LCD) with adjustable contrast for easy viewing. The display and keyboard panels are covered with a tough polycarbonate film. **DO NOT USE ABRASIVE CLEANERS TO CLEAN THE PANEL.** Use only clean water with mild soap if needed.

Pressure connections to the ULTRA K3 are through two aluminum 1/8"NPT female threaded ports on the top of the case. **DO NOT OVER-TORQUE FITTINGS CONNECTED TO THE PRESSURE PORTS. USE ONLY TEFLON TAPE ON THE THREADS. DO NOT USE PIPE DOPE. USE OF PIPE DOPE WILL VOID THE WARRANTY.**

Connection to the optional Kuhlman ULTRA K3 thermal printer or to a personal computer is through the 9-pin connector located on the top of the case. When not in use, this connector should be kept covered with the cap supplied. Data may be displayed on a personal computer using optional Kuhlman supplied software.

BATTERY INSTALLATION

The ULTRA K3 uses four 1.5 volt AA alkaline cells. **USE ONLY DURACELL BRAND ULTRA MX 1500 ALKALINE BATTERIES. USE OF OTHER BRAND ALKALINE CELLS OR LITHIUM OR RECHARGEABLE BATTERIES IN THE ULTRA K3 WILL VOID THE INTRINSIC SAFETY CERTIFICATION.** To install batteries, remove the black vinyl boot covering the bottom of the case, remove the 2-56 x 1" Phillips head screw and washer then remove the battery compartment cover and insert four cells observing correct polarity. Replace the cover, washer and screw and replace the boot. **The cover, washer, 2-56 screw and boot must be in place for the intrinsic safety certification to be valid.** The instrument has a battery status indicator. Replace batteries when the indicator shows less than 25% capacity remaining. Under normal operation, battery life should exceed 50 hours when used 4 hours per day.

OPERATION

The ULTRA K3 is a menu driven instrument that uses seven front panel keys to select all operating functions. The keys are:

POWER	---	hold down to turn the instrument on and off
ENTER	---	executes the selected operational function
^ (up)	---	scrolls up between displayed functions and increases the value of flashing display digits
v (down)	---	scrolls down between displayed functions and decreases the value of flashing display digits
< (left)	---	scrolls left between flashing display digits
> (right)	---	scrolls right between flashing display digits
EXIT	---	returns to the previous screen without executing the operation displayed.

The keys are used to set up and operate the instrument. The “ENTER” key is used to enter functions and values into the instrument’s memory as well as to store test results. The “^” and “v” scroll keys are used to scroll between the various operational functions of the instrument and increase or decrease each digit value as test and PIN numbers are entered. The “<” and “>” keys are used to scroll between digits on the display when entering test and PIN numbers. The “EXIT” key returns the the previous function displayed without executing the function.

To turn the instrument power on, press and hold the “POWER” key until the display illuminates. The instrument will do a self test and the display will show:

KUHLMAN ULTRA K3
VERSION X.X.X.X

After a few seconds it will display:

BATTERY X.X Volts XX%
CAL DUE: XX/XX/XX

The instrument will then display “HIGH PRESSURE” indicating that the instrument is ready to measure high pressures up to 299 Psig. To turn the power off, press and hold the “POWER” key for at least 3 seconds until the unit shuts off.

The major functions of the instrument are:

HIGH PRESSURE measurement
LOW PRESSURE measurement
LOW PRESSURE DIFFERENTIAL TEST
HIGH PRESSURE DIFFERENTIAL TEST
START HIGH PRESSURE LEAKAGE TEST?
START LOW PRESSURE LEAKAGE TEST?
ENTER TEST ID#=
ENTER USER PIN
TRANSFER DATA
STORE TEST DATA
DELETE TEST DATA RECORDS

The following functions enable storage and retrieval of test data, test number and user PIN number:

- ENTER TEST ID # (up to an 8-digit number)
- ENTER USER PIN # (up to a 4- digit number)
- SET DATE/TIME
- SELECT UNITS
- CHANGE TEST TIME
- TRANSFER DATA
- PRINT DATA
- PRINT CURRENT TEST RECORD
- PRINT ALL TEST DATA RECORDS
- DELETE CURRENT RECORD
- DELETE ALL RECORDS

Use the “^” and “v” keys to select the desired function, then press “ENTER” to execute the function.

The display contrast can be changed to viewer preference by pressing and holding “ENTER” and using the “^” or “v” key to adjust it. Changes to contrast can only be made immediately following instrument power up.

PRESSURE MEASUREMENT

To measure pressure, power up the ULTRA K3 and select either “HIGH PRESSURE” for measuring pressures from 5 Psig to 299 Psig or “LOW PRESSURE” for pressures below 5 Psig. Use the left port as you face the instrument panel to measure pressures to 5 Psig and the right port for pressures greater than 5 Psig. The display will show the pressure applied to the port selected. If more than 5 Psig is applied to the low pressure port, the instrument will sound a warning tone. **APPLYING MORE THAN 5 PSIG TO THE LOW PRESSURE PORT MAY RESULT IN DAMAGE TO THE LOW PRESSURE SENSOR.** If unsure of the applied pressure, first use the high pressure port to measure it.

To change the units of pressure displayed from pounds per square inch (Psig) to inches of water column (“H2O), ounces per square inch (Osi), kilopascals (KPa), or megapascals(MPa), follow the instructions in the section CHANGING THE PRESSURE UNITS DISPLAYED below.

LEAKAGE TESTING

To begin a leakage test, select either “HIGH PRESSURE” or “LOW PRESSURE”, press the “ENTER” key and apply the test pressure to the appropriate pressure port. Select “LOW PRESSURE” for tests to 5 Psig and “HIGH PRESSURE ” for tests between 5 Psig and 299 Psig. Apply the test pressure to the pipeline under test and allow the system pressure to stabilize. When the correct test pressure is indicated on the display, press the “ENTER” key again to begin the leakage test. The instrument will display “START HIGH PRESSURE TEST?” or “START LOW PRESSURE TEST?” depending on the range selected. Press the “ENTER” key to begin the test. The display will show the initial test pressure (I:), the current pressure (C:), the pressure decrease (D:),

and the test time remaining (T:). When the test is complete, the alarm will sound for 30 seconds and the display will indicate the initial applied pressure (I:), the pressure decline, if any (D:), the final pressure (C:), and "T: COMPLETE". Pressing "EXIT" will exit the test without storing data. Pressing the "EXIT" key during a test will stop the test. If "EXIT" is pressed during a test, "ARE YOU SURE?" will display. Press "ENTER" to confirm.

To store data at the completion of the test, press the "ENTER" key to display "ENTER TEST ID#" and "ID#=XXXXXXXX". Use the scroll keys to enter the test number. Push "ENTER" again to display "ENTER USER PIN" and "PIN = XXX". Use the scroll keys to enter your PIN number. Then press the "ENTER" key to store data from the test. The instrument is now ready to perform another test.

When performing a leakage test, the instrument monitors pressure change during the test. If a leak of 10% or more of the applied pressure is detected during the test, the alarm will sound and "LEAK DETECTED! TEST TERMINATED" will be displayed. Press the "ENTER" key to stop the alarm. **THIS FUNCTION IS ONLY TO BE USED AS AN AID TO DETECT VERY LARGE LEAKS. IT MUST NOT BE DEPENDENT UPON TO DETECT ALL LEAKS! IT IS THE USER'S RESPONSIBILITY TO DETERMINE IF A LEAK IS DETECTED BASED ON THE PRESSURE DROP INDICATED DURING THE TEST. THE "LEAK DETECTED" FUNCTION WILL ONLY DETECT LARGE LEAKS.**

The ULTRA K3 is set at the factory for a test time of 10 minutes. To change the test time, scroll the display to show "CHANGE TEST TIME", push "ENTER" and, using the scroll keys, set the desired test time from one minute to 25 hours. Push "ENTER" again to confirm the time selected. Individual test times may be selected for low and high pressure tests.

DIFFERENTIAL PRESSURE MEASUREMENT

Using the optional three-way manifold available from Kuhlman Instrument Company, the ULTRA K3 can measure pressure drop across meters, separators, and filters. To measure differential pressure, connect the three-way valve to either the high or low pressure port of the ULTRA K3, depending on the pressure in the system under test. Connect the other two ports on the valve across the device under test, being sure not to apply more than 5 Psig to the low pressure port or 299 Psig to the high pressure port.

Use the "∧" and "∨" keys to select either "HIGH PRESSURE DIFFERENTIAL TEST" or "LOW PRESSURE DIFFERENTIAL TEST", depending on the pressure port used. Set the three-way valve to port the first pressure to the ULTRA K3 and press "ENTER". Then set the three-way valve to apply the second pressure to the instrument and again press "ENTER". The ULTRA K3 will display the first pressure (P1), the second pressure (P2), and the difference in pressure between P1 and P2. Press "EXIT" to end the test or press "ENTER" to save the data.

SETTING THE DISPLAY CONTRAST

Display contrast can only be changed when the ULTRA K3 is first powered up. To adjust the display contrast, press and hold the "ENTER" key and use the "∧" and "∨" scroll keys to change the contrast for optimum viewing. The unit remembers the contrast setting even when not powered up.

TRANSFERRING DATA TO THE PRINTER

An optional compact thermal printer is available from Kuhlman Instrument Company for printing stored test data. **THE PRINTER IS NOT APPROVED FOR USE IN HAZARDOUS LOCATIONS. IT MUST ONLY BE CONNECTED TO OR USED WITH THE ULTRA K3 IN NON-HAZARDOUS LOCATIONS.**

To use the printer, connect the cable from the printer to the 9-pin connector on the ULTRA K3, apply power to the printer and turn the ULTRA K3 and the printer on. Scroll to the screen "TRANSFER DATA", push "ENTER", then scroll to the screen "PRINT DATA" and push "ENTER". The last test record, its date, and the user's PIN number will be displayed. If it is desired to print only this test record, press "ENTER". "PRINT DATA" will be displayed. Press "ENTER" again to print the record. To print any previously stored data record, when the test ID# is displayed, use the "<" or ">" keys to scroll to the desired test to print. Then push "ENTER". "PRINT DATA" will be displayed. Push "ENTER" to print.

To print all test records stored in the Ultra K3, proceed as above, then scroll to the next screen, "PRINT ALL TEST DATA RECORDS?" and push "ENTER" to print all the records stored in the instrument.

TRANSFERRING DATA TO A COMPUTER

The ULTRA K3 has a standard 9-pin RS 232 connector to allow the transfer of test data to a personal computer. Transferring data to a computer is similar to transferring data to the printer except when in the "PRINT DATA" screen, scroll until "TRANSFER DATA TO PC?" is displayed. Connect the optional cable from the Ultra K3 to the serial data port on the PC. **THIS FUNCTION MUST NOT BE USED IN HAZARDOUS LOCATIONS. A COMPUTER MUST ONLY BE CONNECTED TO AND USED WITH THE ULTRA K3 IN NON HAZARDOUS LOCATIONS.** When the PC is set to receive data, push the "ENTER" key to download the data to the PC. Data is sent in serial comma delimited format. Kuhlman Instrument Company offers software to help manage data from the instrument. When the printer or PC data cable is not used, the RS 232 port should be covered using the plastic cover supplied.

DELETING TEST RECORDS

To delete either the current test record, individual records, or all test records, scroll until "UNIT CONFIGURATION" is displayed and push "ENTER". Scroll until "DELETE STORED DATA" is displayed and push the "ENTER" key again. Scroll until either "DELETE RECORD?" or "DELETE ALL TEST DATA RECORDS?" is displayed. Use "DELETE RECORD?" to delete individual records or "DELETE ALL TEST DATA RECORDS?" to delete all stored test records. Individual records can be deleted by using the "<" and ">" keys to select the record to be deleted then pressing "ENTER". To delete it, press "ENTER" again. "CONFIRM DELETE?" will be displayed. Press "ENTER" again to delete the record. To delete all test records, select "DELETE ALL TEST DATA RECORDS?" and press "ENTER". The unit will display "CONFIRM DELETE?". Press "ENTER" again to perform the deletion.

CHANGING TIME OF DAY

The instrument has an internal backup battery to keep its calendar and clock running even when the AA batteries are not installed. Should it be necessary to change the time (such as when changing time zones), scroll the display until "UNIT CONFIGURATION" is shown and press "ENTER". Scroll to the screen "SET TIME" and press "ENTER". Use the scroll keys to select and change the time as required. Press "ENTER" to confirm all changes. The unit uses a 24 hour clock beginning at midnight (00:00). The date is set at the factory and cannot be changed by the user. If the calendar becomes inoperative, the ULTRA K3 must be returned to the factory for backup battery replacement.

CHANGING TEST TIME

When shipped, the ULTRA K3 is set for a test time of 10 minutes. To change the test duration, scroll until "CHANGE TEST TIME", push "ENTER" and "EDIT TEST TIME" will be displayed. Push "ENTER" again then use the scroll keys to change the test time from 1 minute to 25 hours. When the desired test time is set, use the "ENTER" key to confirm the new time. Different times may be selected for the high and low pressure test functions.

CHANGING THE PRESSURE UNITS DISPLAYED

The ULTRA K3 can display pressure in the following units:

- Osi = ounces per square inch gauge (low pressure range only)
- Psi = pounds per square inch gauge (either pressure range)
- "H2O = inches of water column (low pressure range only)
- KPa = kilopascals (low pressure range only)
- MPa = megapascals (high pressure range only)

Different units may be selected for low and high pressure ranges. To change the displayed units, scroll until "SELECT UNITS" is displayed, push "ENTER", then use "^" or "v" to choose "LOW PRESSURE UNITS" or "HIGH PRESSURE UNITS". Use the "<" and ">" scroll keys to change the units. When the desired units are selected for both the high and low pressure ranges, press "ENTER" to save the changes.

SPECIFICATIONS

Low pressure port:

Input pressure range: 0-5 Psig to 1/8"-27 NPTF port
Maximum pressure without possible sensor damage: 10 Psig
Media compatible with 316L stainless steel and 6061T6 aluminum
Combined hysteresis and nonlinearity: <0.25% of span
One year long term stability: <0.1% of span
Temperature stability: <0.008% of span per degree F
Resolution: 0.1" H₂O = 0.0036 Psig

High pressure port:

Input pressure range: 0-299 Psig to 1/8"-27 NPTF port
Maximum pressure without possible sensor damage: 900 Psig
Media compatible with 316L stainless steel and 6061T6 aluminum
Combined hysteresis and nonlinearity: <0.25% of span
One year long term stability: <0.1% of span
Temperature stability: <0.004% of span per degree F
Resolution: 0.1 Psig

Printer/serial port:

RS232 format via 9-pin DSUB connector
comma delimited serial data format

Operator interface:

Two line 20 character backlit liquid crystal display
Seven key switches for operational control

Power supply:

Four 1.5 volt AA Duracell Ultra MX 1500 alkaline cells
Estimated battery life: in excess of 50 hours when used 4 hours per day.
Battery condition monitor and low battery warning

Certification:

The ULTRA K3 has been certified by the Canadian Standards Association (CSA) as intrinsically safe for use in Class I, Division 1, Group D locations (methane or propane in air) to 104°F (40°C) in the United States and Canada **ONLY** when used with Duracell Ultra MX 1500 alkaline AA cells and with the battery cover, washer, 2-56 retaining screw, and vinyl boot in place. **USE OF OTHER BRAND ALKALINE CELLS, LITHIUM OR RECHARGEABLE BATTERIES VOIDS THE CSA CERTIFICATION AND MANUFACTURER'S WARRANTY.**

Other features:

Pressure readings averaged over time for display stability
Real time clock and date with internal battery backup
High impact ABS splash-proof enclosure
Automatic power shutoff in 30 minutes or after test completion if longer
Pressure manifold tapped 1/4-20 for attachment of hook or strap