INSTRUCTION MANUAL

CR4-KPP RECORDER FEATURES:

The CR4 is a precision multi-function recorder. With the KPP adapter the CR4-KPP becomes a dual pressure recorder with a digital display, two media compatible pressure sensors, an interface adapter, and a cable to connect the interface adapter to the recorder. The recorder was designed with the user in mind. No special knowledge is required to operate the CR4-KPP. The menu driven setup is logically simple and user friendly. All parameters are shown on a two line alphanumeric LCD display. The backlighting of the display enhances visibility under marginal lighting conditions.

The CR4-KPP uses two independent pens and records information on a six-inch circular chart. Each pen is uniquely colored to maximize chart readability. The rotation of the chart may be set to single turn or continuous.

In addition, a full function alarm feature is provided. The alarm of the CR4-KPP can be set to sound an audible signal when the pressure 1 and/or pressure 2 has exceeded an upper or lower limit. Each limit is individually set from the front panel. A delay time before the alarm is activated may be set by the user to prevent nuisance alarms. Low power normally open relay contacts are provided to allow activation of a remote alarm, phone dialer or annunciator.

Power is supplied through a 120 VAC 50/60 Hz plug-in adapter. External power may be supplied from any 12 VDC source such as automotive, marine, or other battery. Battery backup for 48 hours is featured to provide operation during temporary power loss.

All functions of the CR4-KPP are accessed through five pushbuttons located on the front panel. Selectable functions are retained in memory to avoid re-entering settings in the event of a power failure.

QUICK START

1. Connect power supply adapter to CR4-KPP through jack on right side of unit.
2. Plug power supply adapter into 120 VAC outlet.
3. Press the "**ON"** button.
4. Pens will move to the **"Home"** position (the outermost part of the chart).
5. Pens will then go to a position on the chart according to the display reading. This is called the **RUN** Mode. (Unit is always in the **RUN** mode when display is showing pressure readings.)

MENU OR RUN?

The CR4-KPP has two basic modes of operation:

MENU mode. To review or change settings.
RUN mode. To display present conditions and record them.

If **MENU** mode is selected the user can:
Set Chart Speed/Range.
Set Single or Continuous Chart Rotation.
Set Alarm Status (Alarm delay section of **MENU** will not show when the alarm is disabled.):
Alarm Delay = 0
Alarm Delay = 10 Minutes /20 Minutes /1 Hour /2 Hours

If the **ALARM** is Enabled the following Menu Selections will be available;
Set Pressure 1 High Limit
Set Pressure 2 Low Limit.
Set Pressure 1 High Limit.
Set Pressure 2 Low Limit.
After menu setting, unit will automatically go into the RUN Mode after 30 seconds.

If the **RUN** Mode is selected:
The display will show Pressure 1 and Pressure 2.
While in the **RUN** mode, the user can:
Home the Pens by pressing the **HOME** switch. (Allows for easy changing of charts and pens.)
Set Blue Pen position.
Set Red Pen position.
Advance the chart by pressing the **ADV** button. (To match present time with chart.)
Setting Pressure Sensors to 0 PSI.

How to Change the Chart.

1. Press the **HOME** button to move the pens to the outer edge of the chart.
2. Lift the pens with the lever. (Just enough to lift the pens from the chart.)
3. Remove the old chart.
4. Install the new chart onto the spindle.
5. Rotate the chart to the starting point with the **ADV** button.
6. Lower the pens.
7. Press the **MENU** button. This will put Recorder in the **RUN** Mode.
8. If the pen(s) position needs adjustment, see Pen Adjustment section below.

CHART SPEED AND RANGE

The CR4-KPP offers 24 combinations of Chart Ranges and Chart Speeds to match a wide variety of applications. All functions of Chart Speed and Chart Range have been combined in one menu to make the necessary selections as easy and as fast as possible. As a further aid to the user the Supco Chart number is shown on the display for any combination of Chart Range and Chart Speed.

Chart Speed is the term used to describe the time it takes for the recording chart to make one complete revolution. Different applications will require different chart speeds. For example, the 31 Day Chart would generally be used where long term monitoring is required and frequent changing of the charts would be undesirable. The main disadvantage of this is that short term variations in pressure will record as a single line or step on the chart. In applications that have wide or frequent pressure variations the user may prefer a faster chart speed for more accurate analysis.

The fastest chart completes one revolution in 1 1/2 hours. This allows the user to record short term variations in pressure in great detail.

Chart Range can be selected by the user for PSI or BAR. The recorder will retain this information even when the power is disconnected or the unit turned off.

If the measured pressure is out of range (for the chart selection), the display will read the actual pressure, but the pen will not go beyond limit of the chart.

How to Set the Chart Speed and Range.

1. While in the **RUN** mode, press the **MENU** button. This will show the Beeper is ON (OFF) message. Press the MENU button again and the display will present the setting for chart speed.

2. To select a longer chart speed, press the **A** button, for shorter chart speeds press the **B** button. Each time the **A** or **B** button is pressed, the speed will change.
   Whatever speed is on the display will become the chart speed
   The available chart speeds are listed below;

   31 Days 7 Days 12 Hrs. 3 Hrs.
   24 Hrs. 6 Hrs. 1.5 Hrs.

3. Press the MENU button again to go to the chart selection menu. To change the chart range and chart number, press the **A** or **B** button. Each time the **A** or **B** button is pressed, the range will change.
   Whatever range is on the display will become the chart range.
   Note that the chart number is displayed with the chart range for the users convenience.
   The available chart ranges are listed below;

Pressure 1	Pressure 2
0/50	0/50 PSI
0/50	0/150 PSI
0/50	0/500 PSI
0/150	0/150 PSI
0/150	0/500 PSI
0/500	0/500 PSI
0/3.5	0/3.5 BAR
0/3.5	0/10 BAR
0/3.5	0/35 BAR
0/10	0/10 BAR
0/10	0/35 BAR
0/35	0/35 BAR

4. Press **MENU** to Proceed in **MENU** Mode. If no button is pressed for 30 seconds the recorder will automatically return to the RUN Mode or to go to RUN Mode from here, press MENU once, then press B for RUN.

How to Set Single Turn or Continuous Rotation

The recorder can be set to rotate chart continuously or stop after one revolution.

1. Press **MENU** until "Single Turn or Continuous" message appears.
2. Press **A** to toggle between Single and Continuous.
3. Press **B** to go to **RUN** Mode.
4. Press **MENU** to continue in **MENU** Mode.

ALARM AND DELAY

When pressure 1, pressure 2 or both measurements pass above or below the thresholds set in the menu function, the CR4-KPP will execute a preset operation. This operation is described as an Alarm condition or a Delay condition and is referred to simply as Alarm or Delay.

Alarm indicates that one or both measurements are above or below the preset thresholds and the CR4-KPP is sounding the audible alarm and has closed the relay contacts. The display will also be flashing the parameter that has caused the Alarm condition.

Delay is a condition in which one or both thresholds have been passed, but the audible alarm and relay contacts are not activated for a preset delay time. Delay is used to prevent nuisance and false alarms.

For Example:

The CR4-KPP has been set up at a manufacturing facility to monitor air pressure and water pressure. In the normal course of operation short term drops in pressure will occur as a result of equipment placing demands on the system. Without a short Delay time nuisance alarms would occur at every machine cycle.

By selecting a Delay time of 10 minutes the user can ignore short term drops in pressure caused by machine operation but be alerted in the event of a real loss of air or water pressure.

The CR4-KPP allows the user to select one of five Delay times, zero Delay, 10 minutes, 20 minutes, 1 hour or 2 hours. The delay time selected will depend on the application and will vary from installation to installation

It is up to the judgment of the user to determine the best delay time for a given application. When a Delay time of zero is used the Delay function is disabled. When a pressure threshold is passed the audible alarm and relay contacts will close immediately. If a Delay time other than zero is selected the audible alarm and contacts will not activate until one or both pressure thresholds been exceeded continuously for the period of the Delay Time. The display will flash the parameter which has caused the Delay condition to alert the user that one or more thresholds have been passed. At the end of the Delay time the audible alarm will sound and the relay contacts will close.

HOW TO SILENCE THE ALARM: (Relay contacts remain closed.)

1. Press **MENU** and the display will show **"Beeper is ON"** message.
2. Press **A** to turn off alarm (only sound will be turned off, relay will be closed).
3. Press **B** to turn alarm (sound) on.
4. Press **MENU** to continue in **MENU** Mode.

How to Set the Alarm & Delay

1. Press **MENU** button until alarm status message appears.
2. Press button **A** to scroll through options:
   Alarm Disabled (If the alarm is disabled, you must enable the alarm to get the delay sections of the MENU.)
   Zero Delay
   10 Min. Delay
   20 Min. Delay
   1 Hour Delay
   2 Hour Delay

3. Press **B** to go to **RUN** Mode or **MENU** to continue in **MENU** Mode.

Pressure 1 AND Pressure 2 Limits

The Pressure 1 and Pressure 2 Upper and Lower limits allow the user to customize the alarm settings of the CR4-KPP to provide the greatest degree of protection while at the same time preventing unnecessary alarms. Since each application is unique, careful selection of the pressure thresholds are required to provide the maximum degree of protection. Both pressure high and low limits may be set. If the Alarm is enabled, and any of these limits are exceeded, the display will blink the reading that went out of limit. An audible alarm (Beeper) will sound and the relay contacts will close after the set delay time. This delay time can be set as follows:

0 Delay
10 Min. Delay
20 Min. Delay
1 Hr. Delay
2 Hr. Delay

If the Alarm is not disabled, any of the four limits could trip the alarm, therefore all four limits must be set or the alarm must be disabled if it is not being used.

SETTING THE LIMITS.
Pressure Limit part of MENU will not show if alarm is disabled.

How to Set the Pressure 1 High Limit

1. Press **MENU** until **"Pressure 1 High Limit"** appears.
2. Press **A** to increase limit, **B** to decrease limit, or **MENU** to go to Pressure 1 Low Limit. The A or B button can be held down if moving pressure limit several PSI (BAR).

How to Set the Pressure 1 Low Limit

1. Press **MENU** until **"Pressure 1 Low Limit"** appears.
2. Press **A** to increase limit, **B** to decrease limit or **MENU** to go to Pressure 2 High Limit.

How to Set the Pressure 2 High Limit

1. Press **MENU** until **"Pressure 2 High Limit"** appears.
2. Press **A** to increase limit, **B** to decrease limit or **MENU** to go to set Pressure 2 Low Limit.

How to Set the Pressure 2 Low Limit

1. Press **MENU** until **"Pressure 2 Low Limit"** appears.
   3. Press **A** to increase limit, or **B** to decrease limit. Press **MENU** to return to **RUN** mode.

Setting pressure sensors to 0 PSI

Under certain conditions and over a period of time the pressure sensors may drift slightly off 0 PSI.
To re-zero the pressure sensors press and hold "**MENU**" and "**A**" buttons simultaneously while in the **RUN** mode until the display indicates **Initial Zero Pressure**.
Release the buttons. The sensors have now been reset to zero.
Note that for this adjustment to maintain the accuracy of the pressure sensors the pressure at both sensors must actually be at 0 PSI when setting the zero point.

PEN POSITION ADJUSTMENT

NOTE: The blue pen has a longer arm to allow it to move over the red pen. Therefore one pen will record at real time and the other will lag or lead by 3/16".
In the normal course of operation charts and eventually, pens will have to be changed on the CR4-KPP. When this occurs it may be necessary to adjust the pen position to match the reading of the display. This is most likely to occur when changing a pen.

How to Adjust the Blue Pen Position on the chart (Pressure 2).

1. Press the **HOME** button until the display reads **"Homing the Pens Please Wait"**
2. Press button **A** to select the pen adjustment menu.
3. Press button **B** to move blue pen in (toward hub) and button **A** to move blue pen out (toward edge of chart).
4. Press **MENU** to select red pen adjustment menu.
   5. Press **MENU** again if no adjustment of the red pen is required otherwise go to the "Adjust Red Pen " instruction (next section).

How to Adjust the Red Pen Position on the chart (Pressure 1)

1. Press button **A** to move the red pen out (toward outer edge of the chart).
2. Press button **B** to move the red pen in (toward hub).
3. Press **MENU** to return to the **RUN** mode.

Pressure Probes

Each probe contains the sensor needed to convert Pressure to the electrical signal that the recorder uses to record and display.

Each probe will measure Pressure from 0 PSI (0 BAR) to 500 PSI (35 BAR)

The pressure sensor is media compatible and can be used with any gas or liquid that is compatible with 17-4 stainless steel.

Calibration by Supco to NIST traceable standards is available as an option.

BATTERY BACKUP OPERATION

Battery backup allows the CR4-KPP to continue operation in the event of a power loss. Actual operating time on battery will depend upon the condition of the batteries. With fresh alkaline batteries the typical operating time will be 48 hours (when operating on battery only). Alkaline batteries are essential for this type of application.
When the main power is lost the CR4-KPP will sense this and immediately turn off the backlight on the LCD Display. A "**B**" will be displayed in the upper right hand corner of the display to advise the operator the CR4-KPP is operating on battery power. No other indication will be visible. The pressure and chart recording will continue until the batteries have been exhausted or the AC power is restored.
The CR4-KPP will monitor the battery power and when the batteries are almost exhausted, a **"Low Battery"** message will appear on the display. The batteries should be replaced as soon as possible to avoid erroneous readings. This prevents possible damage due to battery leakage and also assures that the CR4-KPP will remain in operation in the event of another power failure.

The suggested battery backup consists of eight AA cells, however, a standard nine volt battery could be used to provide approximately one hour of backup.

The following chart shows the life expectancy of various types of batteries.

1. Eight Alkaline AA cells	48 Hours
2. Eight Rechargeable Nicad AA cells	24 Hours
3. Standard 9 Volt Alkaline Battery	1 Hour

The life expectancy of the batteries is based only on the time when the CR4-KPP is being operated on batteries only.
It is good practice to replace these batteries every year.
Do not keep batteries in the CR4-KPP when not in use.

RS-232 Port

The CR4-KPP provides an optional RS-232C port to allow the user to connect the recorder to a computer or network and allows continuous monitoring of the data being recorded. An adapter cable is supplied with this option to facilitate connection to an external computer.
Data is transmitted every time the pressure sensors are sampled and is only interrupted during an update of the pen position.
The data is delimited ASCII text and will transmitted as pressure 1 and pressure 2.
The port parameters are as follows;
4800 baud
8 Data Bits
No Parity
1 Stop Bit

CR4-KPP SPECIFICATIONS

Operating ambient temperature range	32°F to 120°F (0° to 50°C)
Storage temperature	0° to 120°F (-18° to 50°C)
Primary power	115 VAC, 50/60 Hz Adapter
	(220-240 VAC, 50 Hz. optional)
Backup power	8 AA alkaline batteries (not supplied)
Alternative power	12 Volt vehicle operation with optional adapter
Pressure Accuracy	+/- 1% FS
Probes	Supco Part # KPP (extended interface adapter cable length is available)
Chart	6" Circular chart (see following table)
Chart Rotation Speeds	7 Days, 24 Hrs, 12Hrs., 6Hrs., 3Hrs, and 1.5 Hrs.
Chart Rotation Mode	User Selectable Single Turn or Continuous
Chart Speed Accuracy	+/- 1 %
Display	Alphanumeric Backlit LCD 16 Characters 2 Line
Temperature Alarm Range	0 to 500 PSI (0 to 35 BAR)
Alarm Delay Range	No Delay, 1 0 Min., 30 Min., 1 Hr. or 2 Hr.
Remote Alarm Connection	Normally Open Contacts 48 VAC/DC, 0.1 Amp., Dry Contacts
Mounting	Vertical or Horizontal, Free Standing or Wall Mounted
Dimensions	9.25" x 7.25" x 2
Weight	2.5 lb.
Power Consumption	3.5 Watts Max.

CHART PRESSURE RANGES

Chart#	Chart speed	Range l	Range2
CRPP2-1	12 Hours	0/50 PSI	0/50 PSI
CRPP2-1		0/50 PSI	0/150 PSI
CRPP2-2		0/50 PSI	0/500 PSI
CRPP2-3		0/150 PSI	0/150 PSI
CRPP2-3		0/150 PSI	0/500 PSI
CRPP2-3		0/500 PSI	0/500 PSI
CRPP2-4		0/3.5 BAR	0/3.5 BAR
CRPP2-4		0/3.5 BAR	0/10 BAR
CRPP2-5		0/3.5 BAR	0/35 BAR
CRPP2-6		0/10 BAR	0/10 BAR
CRPP2-6		0/10 BAR	0/35 BAR
CRPP2-6		0/35 BAR	0/35 BAR
CRPP2-7	24 Hours	0/50 PSI	0/50 PSI
CRPP2-7		0/50 PSI	0/150 PSI
CRPP2-8		0/50 PSI	0/500 PSI
CRPP2-9		0/150 PSI	0/150 PSI
CRPP2-9		0/150 PSI	0/500 PSI
CRPP2-9		0/500 PSI	0/500 PSI
CRPP2-10		0/3.5 BAR	0/3.5 BAR
CRPP2-10		0/3.5 BAR	0/10 BAR
CRPP2-11		0/3.5 BAR	0/35 BAR
CRPP2-12		0/10 BAR	0/10 BAR
CRPP2-12		0/10 BAR	0/35 BAR
CRPP2-12		0/35 BAR	0/35 BAR
CRPP2-13	7 Days	0/50 PSI	0/50 PSI
CRPP2-13		0/50 PSI	0/150 PSI
CRPP2-14		0/50 PSI	0/500 PSI
CRPP2-15		0/150 PSI	0/150 PSI
CRPP2-15		0/150 PSI	0/500 PSI
CRPP2-15		0/500 PSI	0/500 PSI
CRPP2-16		0/3.5 BAR	0/3.5 BAR
CRPP2-16		0/3.5 BAR	0/10 BAR
CRPP2-17		0/3.5 BAR	0/35 BAR
CRPP2-18		0/10 BAR	0/10 BAR
CRPP2-18		0/10 BAR	0/35 BAR
CRPP2-18		0/35 BAR	0/35 BAR
CRPP2-19	31 Days	0/50 PSI	0/50 PSI
CRPP2-19		0/50 PSI	0/150 PSI
CRPP2-20		0/50 PSI	0/500 PSI
CRPP2-21		0/150 PSI	0/150 PSI
CRPP2-21		0/150 PSI	0/500 PSI
CRPP2-21		0/500 PSI	0/500 PSI
CRPP2-22		0/3.5 BAR	0/3.5 BAR
CRPP2-22		0/3.5 BAR	0/10 BAR
CRPP2-23		0/3.5 BAR	0/35 BAR
CRPP2-24		0/10 BAR	0/10 BAR
CRPP2-24		0/10 BAR	0/35 BAR
CRPP2-24		0/35 BAR	0/35 BAR

*For 1.5Hr., 3Hr. or 6Hr. readings use 12 hour charts.

CR4 SERIES RECORDER LIMITED WARRANTY

Sealed Unit Parts Co., Inc. hereby warrants that it will repair or replace, at its option, any part of the Elite Series recorder, which proves defective **by** reason of improper workmanship or material, free of charge for parts and labor, for a period of one year from the date of original purchase by the buyer. This warranty does not apply if, in the sole opinion of Sealed Unit Parts Co., Inc., the Elite Series has been intentionally damaged due to misuse, neglect, improper packing, shipping, modification of servicing **by** other than Sealed Unit Parts Co., Inc., or personnel authorized by Sealed Unit Parts Co., Inc.. For information on how to obtain service under this warranty contact the dealer where your Elite Series recorder was purchased, or Sealed Unit Parts Co., Inc. at the address printed below:

Sealed Unit Parts Co., Inc.
2230 Landmark Place
P.O. Box 21
Allenwood, NJ 08720 USA

Phone: (908) 223 - 6644
FAX: (908) 223 - 1617

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