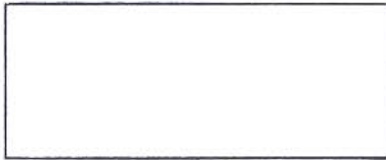


PROCON

**MODEL 900M
RESISTIVITY/TEMPERATURE
MONITOR**

1/13/00
Rev 1



M OHM-CM °C

-STATUS-

CHANNEL
1

CHANNEL
2

ALARM

SETUP

-INPUT-

DSPLY

CHAN

SETUP

RETRN
SIL

PROCON



RESISTIVITY MONITOR

**PROCON
MODEL 900M
TABLE OF CONTENTS**

DESCRIPTION	1
DISPLAYS	2
LED INDICATORS	3
KEYPAD	4
SETUP	6
ALARMS	8
OPERATION	9
ACCESS CODE	10
BACKDOOR CODE	11
WARRANTY	11
SPECIFICATIONS	12
<u>DRAWINGS</u>	
<u>WIRING</u>	
DRAWING #13-090010-20-00	14
<u>DIMENSIONAL</u>	
DRAWING #44-090040-10-00	15

***** NOTICE *****

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<p>PROCON MODEL 900M RESISTIVITY/TEMPERATURE MONITOR</p>

The Model 900M is a microprocessor based Resistivity Controller with outputs for Alarm and/or Control purposes. The following are highlights of some of the main features:

- * AUTO RANGING, 2 M OHMS-CM to 20 M OHMS-CM
- * TWO INDEPENDENT SENSOR INPUTS
- * BOTH CHANNELS SIMULTANEOUSLY MONITORED/CONTROLLED
- * FULL 3-D CURVE TEMPERATURE COMPENSATION
- * TWO PROGRAMMABLE ALARM/CONTROL RELAYS
- * TWO PROGRAMMABLE ALARM/CONTROL OUTPUT TRANSISTORS (OCT)
- * 0-100 DEGREES C. TEMPERATURE MEASUREMENT/COMPENSATION
- * COMPATIBLE WITH STANDARD RESISTIVITY CELLS
- * ACCESS CODE PARAMETER PROTECTION
- * EEPROM PARAMETER MEMORY
- * AUDIO ALARM/ANNUNCIATOR
- * SEPARATE ALARM AND RANGE SETTINGS FOR EACH SENSOR
- * ALL PARAMETERS SET IN SOFTWARE-NO POTS OR SWITCHES
- * WET STATION ENCLOSURE
- * BRIGHT FOUR DIGIT LED DISPLAY
- * SMOOTH FACE CONSTRUCTION
- * QUICK DISCONNECT REAR TERMINALS
- * HIGH RESOLUTION 20,000 COUNT A/D CONVERTOR
- * SPECIAL 'LOCKING' INPUT CIRCUITRY FOR MAXIMUM NOISE IMMUNITY

The following table lists the models that are available:

MODEL	VOLTAGE
900MA	24 VAC
900MB	120 VAC

The controller reads Resistivity from 2 independent input sensors each containing a temperature sensor. Each of the raw Resistivity readings is automatically compensated via the standard 3-D calibration curve and displayed as a standard 25 degrees C. compensated value.

Two Form C Relays are provided that may be programmed to act as either alarm or control relays. The relays are individually assignable to either channel for any function.

DISPLAYS

There is a 4 digit display on the face. During the normal mode, it displays either the Resistivity or the Temperature of Channel 1 or Channel 2, as selected by the face panel keys. During the setup mode, the display will indicate a combination of alpha numeric characters to aid the user in correctly setting up the system. During alarm modes, the display will indicate alarm codes that will allow the user to easily identify the alarm.

Normally, the display will show either the Resistivity or Temperature Reading for the selected channel. However, should the sensor go out of range or the meaning of the display become erroneous due to a sensor malfunction, one of the following displays will show:

-LO- - This display indicates that the Resistivity reading is below the system minimum. There is nothing wrong with the system, and the display will automatically pickup the Resistivity reading once the value has exceeded 2.0 M Ohms.

Err - This display indicates that the sensor reading is erroneous. In the Temperature Display, it would indicate a malfunction in the sensor. This could be caused by either an open sensor or some other out of range condition in the temperature sensing system.

In the Resistivity Display, this would indicate that the sensor has exceeded a reasonable value. This could be caused by something as simple as the probe being exposed to the air. It should also be noted that the Resistivity Value is set to this 'Error' condition should the Temperature Sensor be in the 'Error' condition. This is due to the temperature compensation requirements for the system. If the temperature value is invalid, the Resistivity Value is inherently incorrect.

It should be noted that when the displays are in the 'Error' condition, that all of the alarm and control relay functions are disabled.

LED INDICATORS

Six discrete LEDs are provided to indicate the current system status. They are labeled CHANNEL 1, CHANNEL 2, SETUP, ALARM, M OHM-CM & C:

CHANNEL 1 - This LED indicates that the display is showing either the Resistivity or Temperature reading for Channel 1.

CHANNEL 2 - This LED indicates that the display is showing either the Resistivity or Temperature reading for Channel 2.

SETUP - This LED indicates that the system is in the SETUP mode. In this mode, the system parameters are selected.

ALARM - This LED indicates that the system is in an ALARM mode. The seven segment display indicates the specific alarm that has occurred.

M OHM-CM - This LED indicates that the display is showing the resistivity value for the selected channel.

°C - This LED indicates that the display is showing the temperature for the selected channel.

KEYPAD

The four keys marked UP/DSPLY, DOWN/CHAN, SETUP & RETURN/SIL are used to operate and program the unit. All keys are accompanied by an audio 'click' to provide feedback for the operator when a key is depressed. The following is a listing of each of the keys and their functions:

UP/DSPLY - This is a multifunction key. Its function varies with the current system mode.

SETUP MODE - In the SETUP mode, depressing the UP key will cause the display to advance. Depressing the key once and releasing will allow the accurate setting of the least significant digit. Holding the key down will activate the automatic, rapid incrementing of the display.

NORMAL MODE - If the system is in the NORMAL mode, this key is utilized to toggle the DISPLAY between resistivity and temperature readings.

DOWN/CHAN - This is a multifunction key. Its function varies with the current system mode.

SETUP MODE - In the SETUP mode, depressing the DOWN key will cause the display to decrease. Depressing the key once and releasing will allow the accurate setting of the least significant digit. Holding the key down will activate the automatic, rapid decrementing of the display.

NORMAL MODE - In the NORMAL display mode, this key toggles the system back and forth between the viewing of channel 1 and channel 2. Note: If 'CC' is set equal to zero in the programming stack, this key function is disabled. The system will only display Channel 1.

SETUP - This key is used to put the system into the SETUP mode and advance through the parameters. Depressing the key once, will place the unit in the SETUP mode. (Note: If access code protection is selected, an additional step is required, see access code). Depressing the key after entering the SETUP mode, will allow the user to scroll through the SETUP parameters.

RETURN/SIL - This is a multifunction key. Its function varies with the current system mode.

SETUP MODE - In the SETUP mode, depressing this key will cause the system to exit the mode. During the process, the unit automatically enters a SAVE mode. This causes the parameters to be written into the EEPROM. This is a permanent (10 year minimum life) memory that does not require battery backup.

ALARM MODE - If an ALARM occurs, this key serves as an alarm silence key. Depressing the key once will cancel the audio annunciation and eliminate the alarm alpha numeric code from the seven segment display. Depressing the key a second time will allow the alpha numeric code to be reviewed by placing it back in the display.

Subsequently, the key may be used to toggle the viewing of the alarm for reference. In all cases, the ALARM LED continues to flash to indicate that the system is operating in an alarm mode.

SETUP

The controller may be configured to implement a variety of control and monitoring functions. The SETUP mode allows the user to both adjust and program the unit. The following is a listing of the code prompts that will appear in the display when in the SETUP mode. The code will alternately flash with the selected value to indicate to the user the parameter that is currently being viewed or set.

The UP and DOWN keys are used to increment or decrement the specific values. Note: these values are permanently saved in the system EEPROM memory when exiting this mode.

<u>CODE</u>	<u>DESCRIPTION</u>	<u>SETTING RANGE</u>
SP1	SETPOINT-PRIMARY-CHAN 1	.00 to 20.00 M OHMS-CM
SS1	SETPOINT-SECONDARY-CHAN 1	.00 to 20.00 M OHMS-CM
HI1	HIGH ALARM CHANNEL 1	.00 to 20.00 M OHMS-CM
LO1	LOW ALARM CHANNEL 1	.00 to 20.00 M OHMS-CM
CR1	CALIBRATION OFFSET RESISTIVITY 1	+ or - 1.00 M OHMS-CM
CT1	CALIBRATION OFFSET TEMPERATURE 1	+ or - 9.9 DEGREES C.
SP2	SETPOINT-PRIMARY-CHAN 2	.00 to 20.00 M OHMS-CM
SS2	SETPOINT-SECONDARY-CHAN 2	.00 to 20.00 M OHMS_CM
HI2	HIGH ALARM CHANNEL 2	.00 to 20.00 M OHMS-CM
LO2	LOW ALARM CHANNEL 2	.00 to 20.00 M OHMS-CM
CR2	CALIBRATION OFFSET RESISTIVITY 2	+ or - 1.00 M OHMS-CM
CT2	CALIBRATION OFFSET TEMPERATURE 2	+ or - 9.9 DEGREES C.
AC	ACCESS CODE	0 to 9999
CC	CHANNEL CODE	0=CHANNEL 1 ONLY 1=CHANNEL 1 & 2
RL1	RELAY LOGIC RELAY 1	0 to 8
RL2	RELAY LOGIC RELAY 2	0 to 8
AL1	AUXILIARY LOGIC 1	0 to 8
AL2	AUXILIARY LOGIC 2	0 to 8

The alarms may be eliminated by setting their values to zero.

The calibration parameters allow for the digital offset of the displayed reading. If an error is detected in the system that causes a variation between the actual value and the displayed value. This constant may be set for each of the displayed parameters to adjust that value.

The Relay Logic and Auxiliary Logic parameters utilize the selection of a code that varies from 0 to 8 to define the specific action of the output. The Relay Logic controls the output of the two relays. The Auxiliary Logic controls the output of the two Open Collector Transistor (OCT) Auxiliary outputs.

The outputs may be designated to function as a HIGH ALARM, LOW ALARM, CONTROL (based on primary setpoint) or CONTROL (based on secondary setpoint). All of the outputs could be assigned to one channel to perform different functions or assigned to independent channels in any combination.

The following codes are utilized in the assignment:

<u>CODE</u>	<u>DESCRIPTION</u>
0	Relay Off
1	High Alarm - Channel 1
2	Low Alarm - Channel 1
3	High Alarm - Channel 2
4	Low Alarm - Channel 2
5	Control Relay/OCT - (SP1) Channel 1
6	Control Relay/OCT - (SP2) Channel 2
7	Control Relay/OCT - (SS1) Channel 1
8	Control Relay/OCT - (SS2) Channel 2

The 'Channel Code' (CC) parameter allows the configuration of the unit as either a single channel or two channel device. The elimination of the second channel is not necessary, since both of the channels operate independently, but it does allow the elimination of erroneous alarms and unnecessary confusion in the displays, should the system only be configured with one sensor.

ALARMS

A number of alarms are available. When an alarm is activated, an audio tone will sound, the display will alternately flash an alpha numeric code to indicate the alarm and the 'ALARM' LED will light.

The alarm silence key may be utilized to terminate the audio portion of the alarm, as well as, toggle the alpha numeric display on and off. In this way, the user may recall the alarm that is active or eliminated while working with the system.

The following is a listing of each of the alarms and their mnemonic:

SYSTEM - This is a catch all indicator for the miscellaneous diagnostics. An example would be the malfunction of the EEPROM SAVE routine. This would simply indicate to the user that something has gone wrong and he should either repeat the command or reset the unit. The mnemonic 'SYS' will alternately flash in the display.

SENSOR - This indicates that one of the two sensors is either not connected or has malfunctioned. The mnemonic 'SNx' will alternately flash in the display, where 'x' indicates the sensor number.

HIGH - This alarm indicates that the resistivity has exceeded the High Alarm Setpoint. The mnemonic 'HR x' will alternately flash in the display, where x = 1 or 2 (Channel Number).

LO - This alarm indicates that the resistivity has exceeded the Low Alarm Setpoint. The mnemonic 'LR x' will alternately flash in the display, where x = 1 or 2 (Channel Number).

OPERATION

The unit monitors a raw resistivity value from a standard cell. This value to be meaningful must be compensated based on the temperature of the water. For this purpose, the temperature of the water is read through the temperature sensor that is provided in the individual cell.

Utilizing this information, the software computes the adjusted resistivity reading at 25 degrees C. This is the normally accepted standard for comparing resistivity. The compensation curves for this adjustment are complex and are commonly referred to as 3 dimensional.

The system uses a combination of a high resolution A/D converter and Auto Ranging to maximize the accuracy over the full temperature range.

The system continually monitors both channel 1 and channel 2 regardless of the display mode that is selected. In this way, the system is truly a dual sensor unit and not simply a manually selectable single sensor unit.

The 'CC' (Channel Code) parameter allows for the elimination of Channel 2 when the system is to be used with a single sensor.

The unit may be utilized as a control device by selecting a value in the 'SP' parameter (Setpoint-Primary) for either channel. Whenever the resistivity exceeds this value, and either the 'RL' or 'AL' parameters select an output to be attached to this parameter, that output will be activated.

Additionally, a second control point may be set for either channel by selecting a value in the 'SS' parameter (Setpoint-Secondary). Whenever the resistivity exceeds this value, and either the 'RL' or 'AL' parameters select an output to be attached to this parameter, that output will be activated.

Note: The two output relays may be assigned to any configuration utilizing the 'RL1' and 'RL2' parameters. The two Auxiliary output open collector transistors (OCT) may be assigned to any configuration utilizing the 'AL1' and 'AL2' parameters. However, to effectively utilize the 'SS' (Secondary Setpoint), two outputs need to be assigned to a single channel. This is a very effective technique for obtaining dual control on a single channel.

For monitoring purposes, the High and Low Resistivity Alarms may be selected. If their values are set to zero, the functions are eliminated. If a value is placed in these parameters, an alarm will be activated whenever the resistivity exceeds the HIGH setting or falls below the LOW setting. If an Output Relay/OTC has been selected to track any of these alarms, that relay will be activated when the alarm is sounded.

Note: If any of the alarms are set to 0.0, the alarm is eliminated.

ACCESS CODE

In some cases, it may be desirable to restrict the access to the tune and program functions. Thus an "Access Code" system is incorporated in the design. In the PROGRAM mode, AC may be set. If the code is set to 0000, the function is eliminated and the system operates as previously described.

The Access Code is simply any number from 0001 to 9999 as programmed into the system by the customer's authorized personnel. Once this code is entered, any attempt to use the SETUP key to gain access to the setup functions will cause "Code" to appear in the process display. The UP and DOWN keys are then used to set the proper code number. A second mode key entry is then required. Any other entry, the wrong code number, or no action for 30 seconds will return the unit to the normal operating mode.

BACKDOOR CODE

A special code has been incorporated into the software to insure factory access to all functions no matter what the customer has done with the access codes. This code is 500.

MANUAL REVISIONS

<u>Revision #</u>	<u>Program #</u>	<u>Eng #</u>	<u>Revisions Made</u>
Rev 0	DT501MS	DT900MA DT900MB	Origination

LIMITED WARRANTY

WARRANTY: JPC CONTROLS WARRANTS ITS NEW PRODUCTS TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP UNDER THE SERVICE FOR WHICH THEY ARE INTENDED. THIS WARRANTY IS EFFECTIVE FOR TWELVE MONTHS FROM THE DATE OF SHIPMENT.

EXCLUSIONS: THIS WARRANTY IS **IN LIEU OF** ANY OTHER WARRANTY EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF **MERCHANTABILITY** OR FITNESS FOR A PARTICULAR PURPOSE.

JPC CONTROLS IS NOT LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

NO PERSON OTHER THAN AN OFFICER IS AUTHORIZED TO GIVE ANY OTHER WARRANTY OR ASSUME ANY LIABILITY.

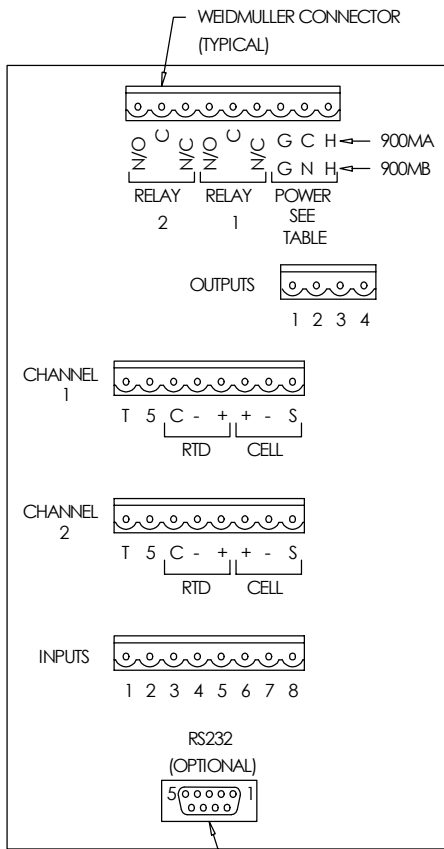
REMEDIES: THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY SHALL BE: (1) THE REPAIR OR REPLACEMENT OF DEFECTIVE PARTS OR PRODUCTS, WITHOUT CHARGE. (2) AT THE OPTION OF **JPC CONTROLS**, THE REFUND OF THE PURCHASE PRICE.

SPECIFICATIONS

**MODEL 900M
RESISTIVITY/TEMPERATURE MONITOR**

RANGE (Resistivity)	2.00 - 20.00 M OHMS-CM
RANGE (Temperature)	0.0 - 100.0 Degrees C.
RESOLUTION (Resistivity)	.01 M OHMS-CM
RESOLUTION (Temperature)	0.1 Degrees C.
NOISE REJECTION	NMR - 60 db @ 60 HZ CMR -120 db @ 60 HZ
MEASURING TIME	4 Conversions/Sec
DISPLAY	Four 0.56 Inch High, Seven Segment, LED Uniplanar numerals. Six Discrete LEDs (Red, Green, Amber).
ANNUNCIATOR	Audio Tone, ~ 2500 HZ
SETUP MEMORY	EEPROM, All Parameters
MEMORY RETENTION	10 Years w/o Power
SENSOR	Thornton type 208
CONTROL	On/Off Relay
OPERATING RANGE	0 to 50 Degrees C
STORAGE RANGE	-40 to 60 Degrees C
CONSTRUCTION	Enclosure - Kydex, Black Face - Lexan, Back Printed

SIZE	8.25 x 3 3/4 x 5.25 inches (HxWxD) 210 x 94 x 133mm
WEIGHT	≤ 3 Lbs. (1.8 kg)
CONNECTION	Rear, Weidmueller, .200 CC Communications - DB9 (Optional)
OUTPUT	Open Collector Transistor, 100 ma. max. External Audio - OTC, 100 ma. max. 12 VDC provided Relay - Optically isolated 5 amp, 120 VAC
POWER	900MA - 10 VA, 24 VAC ±10%, 50/60 HZ 900MB - 10 VA, 120 VAC ±10%, 50/60 HZ

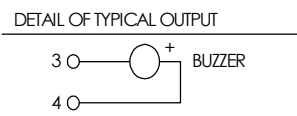


9 PIN FEMALE D-SUBMINATURE CONNECTOR

MATING CONNECTORS ARE WEIDMULLER TERMINAL TYPE BL
 BL4 - 4 PIN, CATALOG NO. 12593.6
 BL8 - 8 PIN, CATALOG NO. 12597.6
 BL9 - 9 PIN, CATALOG NO. 12598.6

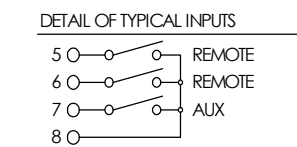
NOTE: WEIDMULLER MATING CONNECTORS ARE SIDE STACKABLE.

- OUTPUTS**
- 1 O - AUX 2
 - 2 O - AUX 1
 - 3 O - EXTERNAL AUDIO
 - 4 O - +



NOTE: + TERMINAL RATED 12 - 20 VDC UNREGULATED (100mA).

- INPUTS**
- 1 O - N/C
 - 2 O - N/C
 - 3 O - N/C
 - 4 O - N/C
 - 5 O - REMOTE (OPTIONAL)
 - 6 O - REMOTE (OPTIONAL)
 - 7 O - AUX
 - 8 O - COMMON

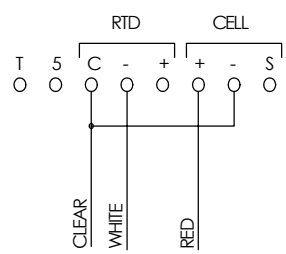
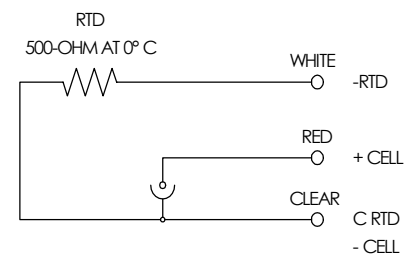


- RS232**
- 1 O - N/C
 - 2 O - Tx D
 - 3 O - Rx D
 - 4 O - N/C
 - 5 O - COMMON
 - 6 O - N/C
 - 7 O - N/C
 - 8 O - N/C
 - 9 O - N/C

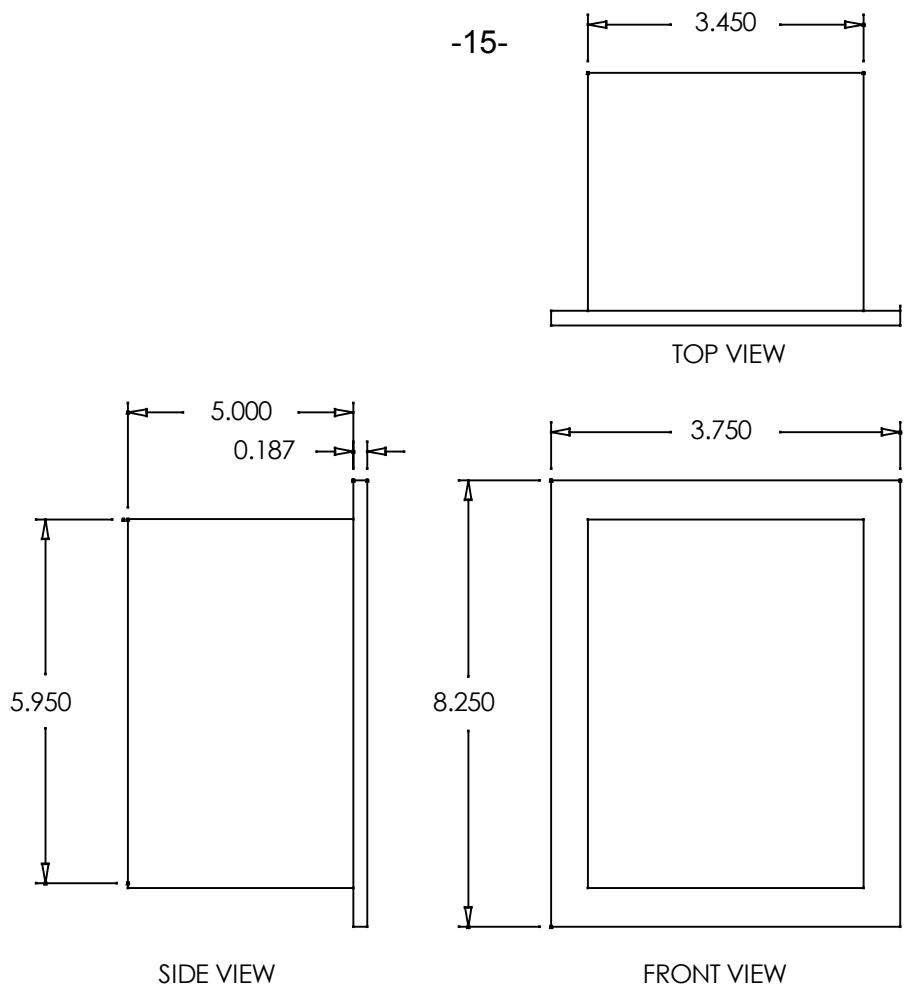
MODEL	VOLTAGE
900MA	24 VAC
900MB	120 VAC

- CHANNEL 1**
- T O - N/C
 - 5 O - N/C
 - CO - SEE BELOW
 - O - SEE BELOW
 - + O - N/C
 - + O - SEE BELOW
 - O - SEE BELOW
 - S O - N/C
- CHANNEL 2**
- T O - N/C
 - 5 O - N/C
 - CO - SEE BELOW
 - O - SEE BELOW
 - + O - N/C
 - + O - SEE BELOW
 - O - SEE BELOW
 - S O - N/C

THORNTON TYPE 208 CELL WIRE CONNECTIONS (TYPICAL FOR CHANNELS 1 AND 2)



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PROCON 900MA/900MB RESISTIVITY MONITOR REAR PANEL							
APPROVAL		DWN BY	M/PJ	DATE 02/18/02	SCALE	NONE	CHKD BY
ENG	DATE						
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TOLERANCES UNLESS OTHERWISE SPECIFIED	JPC CONTROLS								A DIVISION OF LLOYD INDUSTRIES, INC. <small>102 COMPASS PT. DR. STE. D ST. CHARLES, MO. 63301 (314) 946-3300</small>			
	PROCON 900MA/900MB RESISTIVITY MONITOR PHYSICAL DIMENSIONS											
	APPROVAL				DWN BY	MPJ	DATE	02/18/02	SCALE	NONE	CHKD BY	
ALL DIMENSIONS ARE IN INCHES				ENG	DATE	SHEET						
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