DEVAR Inc.

MODEL 3011

THERMOCOUPLE / MILLIVOLT INPUT
INDICATOR - CONTROLLER
Rev: 23 Jun 1999

DEVAR Inc.
706 Bostwick Ave. Bridgeport, CT. 06605
TEL: (203) 368-6751, (800) 566-6822
FAX: (203) 368-3747
http://www.devarinc.com

INTRODUCTION:

The 3000 series was designed to fulfill a need for an accurate, sophisticated, easy to configure, simple to operate, and highly visible indicator / controller.

FEATURES

- 6 character display with up to 5 character process indication.
- High efficiency red LED characters, 0.54" high.
- 15 segments per character provide real, easy to read letters for all prompts. “No more hieroglyphics!”
- Scrolling multi-word configuration prompts for clarity.
- Indicate process in true units of measure, ie. 4/20mA loop corresponding to 0/300GPM can indicate 0.00G/300.00G
- Peak and valley readings
- Up to four alarms with front panel lamp indication.
- Each alarm accommodates one relay.
- Each alarm has independently configured trip and reset points, so action (high or low alarm) and hysteresis (value between trip and reset points) are controlled by the user.
- Each alarm can be independently configured to latch.
- Alarms can independently activate a horn.
- Four separate, menu selectable, horn actions.
- Display can be set to flash when alarm trips.
- Security code lockout prevents unauthorized access.
- Isolated power supply for sensors and transmitters.

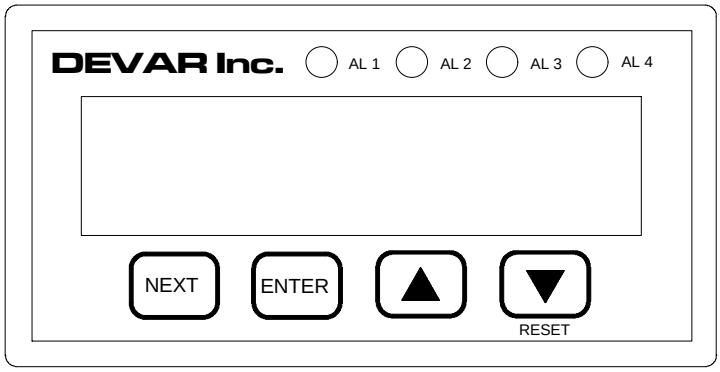


Figure 1: Front Bezel

GENERAL INFORMATION

PHYSICAL LAYOUT

Front Bezel

The six character front panel display provides a five digit process indication and one user selected character. Each character is 0.54" high, has 15 segments, and is made up of high efficiency red LEDs. One might choose to select a unit of measure, such as C, F, V, A, a dummy zero, etc. The available characters are the standard ASCII printable character set and several custom defined characters. Four lamps indicate the status of each alarm. Four buttons labeled NEXT, ENTER, <up arrow>, and <down arrow>/RESET enable user input. See figure 1 above.

Rear Panel

All electrical connections are made through a screw clamp terminal blocks that plug into headers attached to the printed circuit boards. A fifteen circuit connector is provided for AC power and relay contacts. A six circuit connector is provided for input signal and power out. Power out can be either 10VDC excitation or 24VDC loop power supply. A hole to the right of the six circuit connector provides access to the power out voltage fine adjustment potentiometer. The connectors accept 24 to 14 AWG wire.

Mounting

Intended for panel mounting, the unit includes two clamping brackets. These brackets attach to and slide in milled slots on either side of the case. The brackets are clamped by screws attached to the rear panel.

BASIC OPERATION

After applying or cycling the power the unit puts the relays in the power off fail safe mode, displays "DEVAR MODEL 3011 VOLUME <a number> <ZERO, TWO or FOUR> ALARM START", and proceeds to indicate a process quantity based on the input signal. The unit scans the front panel switches to detect any user input. At this point only ENTER and RESET are operational. Pressing ENTER causes the unit to enter the main menu of the menu system. RESET is used to silence the horn and clear latched alarms, if these options are enabled.

PROCESS INDICATION

For thermocouple input types, the user selects which type to use and the desired temperature scale to indicate. Five characters are used to display the temperature with 0.1° resolution. The scale is indicated with a F or C label. An open thermocouple is indicated as "+OVERF". For millivolt inputs, five characters indicate a process quantity in the range of -9999 to 99999, with a decimal point placed to the right of any digit. Placing the decimal point, defining the process value at the minimum and maximum input calibration points, and defining the label are discussed in the DIGITAL CALIBRATION FOR LINEAR INPUTS section below. If the input signal results in a process quantity outside of the indication range defined above, the unit displays "-OVERF" or "+OVERF", depending on the polarity of the input.

PEAK AND VALLEY

The 3011 keeps a record of the largest and smallest process value measured. These values are reset when the unit restarts. The peak and valley values can be observed or cleared in by using the front panel buttons.

ACCEPTABLE INPUTS

As shipped, the 3011 is ready to signal condition and indicate the temperature detected for thermocouple types T, J, E, K, N, R, S, and B in degrees Celsius or Fahrenheit. The ITS-90 thermocouple definitions were used to determine the detected temperature. Alternately, any sensor or signal source with a magnitude less than ±125mV can be used to provide a linear (straight line) process indication. The calibration process for millivolt inputs is detailed in the DIGITAL CALIBRATION FOR LINEAR INPUTS section below. The following are several examples of typical input signals that are acceptable for the 3011:

1) A 4mA to 20mA signal can be optimally detected by installing a 5Ω shunt across the input terminals. 125mV / 5Ω = 25mA, so an out of range condition, such as one caused by a faulty sensor, can be detected.

2) strain gage, at 3mV per volt excitation, generates 30mV at full scale.

3) 0/5V or 1/5V signal. Make a voltage divider from a 100KΩ and a 2KΩ resistor, placing the 2KΩ resistor across the input terminals of the 3011. The maximum input signal would be 5V/(1 + 100KΩ/2KΩ) = 98mV.

4) 0/10V signal. Make a voltage divider from a 100KΩ and a 1KΩ resistor, placing the 1KΩ resistor across the input terminals of the 3011. The maximum input signal would be 10V/(1 + 100KΩ/1KΩ) = 99mV.

DESIGN DETAILS

CONFIGURATION MENU SYSTEM

The menu system is used to set the parameters that define how the 3011 operates. The system parameters that can be configured are: selecting the input type, performing an input calibration (for mV inputs), offsetting the process indication (for tare weight), setting the alarm trip points, setting the alarm reset points, defining how and when the audible alarm operates, activating latching alarms, activating a flashing display on alarm, and defining a security code. The operator utilizes the four button front panel keypad to access and set these controls.

The buttons that control navigating through the menu system are ENTER, NEXT, and RESET. A diagram of the menu system can be found at the end of this document. The buttons used to move between different points on the diagram are clearly labeled. Press ENTER to start a submenu or entry routine. Press RESET to exit the current menu level. Press NEXT to move to the next available menu option. For example, if "ALARM1" is displayed and NEXT is pressed, "ALARM 2" is displayed. If "ALARM1" is displayed and ENTER is pressed, the sub menu starts and "TRIP 1" is displayed. If "ALARM1" is displayed and RESET is pressed, the unit returns to indicating the process. If the sub menu item "TRIP 1" is displayed and RESET is pressed the system resets to "ALARM1".

All of the buttons are used to control entering or selecting specific configuration parameters. ENTER will be used to start and complete the process of setting an option. The buttons <up arrow> and <down arrow> change the value of the currently selected item. The currently selected item is usually flashing. If one is selecting an item from a list, such as selecting an input type, NEXT is used to back out of the selection routine. For example, if “SELECT INPUT TYPE” is displayed, pressing ENTER starts the selection routine and the current setting is displayed. Pressing <up arrow> or <down arrow> changes the setting. Press ENTER to accept the setting displayed as the desired setting. Press RESET to return to “SELECT INPUT TYPE” without changing the setting. If one is entering some numeric value, such as the reset point for alarm 3, NEXT is used to select which digit to edit. For example, if "RESET 3" is displayed, pressing ENTER will start the entry routine. The current value that alarm 3 resets at is displayed with the first digit flashing. Pressing <up arrow> or <down arrow> changes the value of the flashing digit. Press NEXT to select which digit to edit. Press ENTER to accept the displayed value as the desired alarm 3 reset point.

Note that as a safety feature, the unit will only remain idle in the menu mode for a fixed length of time. While the unit is in the menu mode it is NOT measuring and reacting to the process, so time out action will prevent an accidental key press from permanently locking the unit out of a control loop. If no key is pressed after approximately 40 seconds the unit will return to indicating the process quantity.

ALARMS

The unit has four alarms. Each alarm can accommodate one relay. Each alarm has independently configured trip and reset points, so alarm action (high or low alarm) and hysteresis (value between trip and reset points) are precisely controlled. Setting the trip and reset points to the same value disables that alarm , which will be held in the reset condition. Setting the trip point to a value higher than the reset point configures that alarm as a high alarm. Setting the trip point to a value lower than the reset point configures the alarm as a low alarm. Alarms can be independently configured to latch. The latch is released when the process meets the latched alarm(s) reset condition and the RESET button is pressed. Alarm status is indicated in several ways: 1) front panel red lamps indicate the status of each alarm, 2) each alarm can be set to activate a horn, and 3) the display can be set to flash when any alarm is tripped.

HORN ACTUATION OPTIONS

To operate, the horn must be enabled by a DIP switch setting. This was done to provide a way to quickly silence the horn while bench testing the unit. The default setting when it leaves the factory will have the horn enabled. Refer to the internal switches section below to identify the appropriate switch. Once enabled, the action of the horn is controlled by the change in the status of an alarm. Which alarm(s) activate the horn is controlled by a setting in the alarm configuration submenu. Therefore, none, any, or all of the alarms can activate the horn. The way the horn acts can be set to any one of several different methods detailed below. Note that there is a RESET button on the front panel and a configuration setting called reset, which is the point at which an alarm condition is canceled. To avoid confusion (hopefully) in the discussion below, the button is always called RESET and the configuration setting is called clear. The options are:

Sound When In Alarm Until Clear

Menu prompt: SOUND WITH ALARM. The horn sounds continuously while any enabled alarm is tripped. For the horn to be silent, all enabled alarms must be clear. If any of the alarms latch, one must press RESET to unlatch those alarms that can be cleared.

Sound When In Alarm Until Clear Or Reset

Menu Prompt: SOUND UNTIL RESET. The horn sounds when any enabled alarm becomes tripped. The horn is silent when either all enabled alarms are cleared or RESET is pushed. If any of the alarms latch, pressing RESET a second time will unlatch those alarms that can be cleared.

Sound and Latch Horn When In Alarm Until Reset

Menu prompt: LATCH GOING ACTIVE. The horn sounds when any enabled alarm trips. The horn will continue to sound until an operator presses RESET, although the alarm may still be tripped. If any enabled alarm trips, the horn will reactivate. If any alarm latches, the first press of RESET will silence the horn and the second press will unlatch those alarms that can be cleared.

Sound and Latch Horn With Alarm Transition Until Reset

Menu prompt: LATCH WITH CHANGE. The horn sounds when any enabled

alarm changes alarm. This means the horn will sound when any enabled alarm trips or clears. Pressing RESET silences the horn. Any enabled alarm changing status will reactivate the horn. If any alarm latches, the first press of RESET will silence the horn and the second press will unlatch those alarms that can be cleared.

PROCESS OFFSET

The process indication can be adjusted by adding a fixed offset. This allows an indication that ignores a fixed, undesired part of the input signal. For instance, if one were using a strain gage, one could zero out the tare weight and get an indication based entirely on the material to be weighed. For a situation where one is indicating weight, determining the appropriate offset is a simple matter of direct measurement. Calibrate the 3011 to the scale of the strain gage(s). Enter the menu system to ADJUST OFFSET | CLEAR OFFSET and press ENTER. Wire the 3011 to the gages, then observe the indication when measuring with only tare weight on the scale. Enter the menu system to ADJUST OFFSET | NEW OFFSET, press ENTER, and change the displayed value to the negative value of the observed indication by using the front panel buttons. For example, if a tare weight of 3000 was observed, change the offset value to -3000. The 3011 could also be used to indicate a volume based on the detected weight of a container. The following example details how this can be done. A container is rated to hold 500 gallons. The container weights 350lbs empty. When a mystery liquid fills the container the total weight is 3750lbs. The strain gages measuring the container have been calibrated to indicate 0 to 5000lbs, but a gallon indication is desired. The weight of the liquid is the weight of the empty container subtracted from the weight of the full container, so the weight of the liquid is 3750lbs - 350lbs = 3400lbs. To determine how many gallons would be required to equal the weight of the calibration point, multiply the calibration point weight by the number of gallons measured and divide this result by the weight of the measured gallons. It is obvious that at the minimum range definition point, 0 gallons weight 0 pounds. For the maximum range definition point, observe that 5000lbs * 500gal / 3400lbs = 735.3gal. The number of gallons to offset the process to eliminate the dry weight of the container must now be determined. This offset is found by multiplying the dry weight of the container by the rated volume of the container and dividing this result by the measured weight of the liquid, so the offset is 350lbs * 500gal / 3400lbs = 51.5gal. Enter the menu system to CAL. SYSTEM | DEFINE RANGE and make these entries: SET DP = 0123.4, DEFINE MIN. RANGE = 0000.0, and DEFINE MAX. RANGE = 0735.3. Go to ADJUST OFFSET and enter NEW OFFSET = -051.5

FLASHING DISPLAY

This setting controls whether the display flashes when any of the alarms are tripped. If no alarms are tripped, the display is constant.

ACCESS CODE

The access code configuration lockout is enabled with a DIP switch setting. Refer to the internal switches section below to identify the appropriate switch. Once enabled, the correct access code must be entered to proceed to the menu configuration system. An access code consists of any six digit number from 000000 to 999999. The factory default code is 000000. Changing the access code is done at the "CHANGE ACCESS CODE" configuration menu item. The entry routine is identical to the alarm trip and reset entry

routines mentioned in the alarm section. If the access code check is enabled, and attempts to enter the configuration menu system are made, the prompt "ENTER ACCESS CODE" is displayed. Press enter and the entry routine is started with a default value of 000000. This entry routine is identical to the change access code routine. After pressing ENTER the entered code is compared to the stored code. If the codes match, the prompt "OKAY" is displayed for a few seconds before proceeding to the menu system. Otherwise, the prompt "DENIED" is displayed for a few seconds before returning to the process indication mode.

INTERNAL SWITCHES

The 3011 contains two internal switches. SW1 consists of two contact points that can easily be shorted with the edge of a flat blade screwdriver. Closing switch SW1 will cause the 3011 to restart, just as if the power was cycled off and on. SW2 is a four pole DIP switch whose functions are detailed below. These switches are not required for normal use.

DIP SWITCH SW2 FUNCTIONALITY

Various actions are enabled or taken when the appropriate pole of the internal DIP switch SW2 is activated at the appropriate time. Certain calibration aids are activated with poles 1 and 2, while product features are activated with poles 3 and 4. The positions of SW2 are identified as: 1) CAL_VREF, 2) CAL_AMBIENT, 3) HORN, and 4) SECURITY, with pole 4 located closest to the edge of the circuit board. The following documents the action of DIP switch SW2:

AUDIBLE ALARM

HORN set ON enables the software to sound the audible alarm.

SETUP PROTECTION

If SECURITY is set ON, a password is required to enter the menu system.

Note that the following modes are based entirely on the settings of CAL_AMBIENT and CAL_VREF.

INDICATE INPUT VOLTAGE

With CAL_VREF ON and CAL_AMBIENT OFF when the unit is started or restarted, the unit will enter a mode of operation where it will indicate the millivolt voltage applied to the input. The input range is -99.99/+125.00mV. If the CAL_AMBIENT pole is also turned ON, the input range is changed to -9999/+15625uV.

CALIBRATE THERMOCOUPLE SPAN

If the unit has cycled to the indicate process mode for a thermocouple input type, setting CAL_VREF ON with CAL_AMBIENT OFF, causes the unit to enter a mode that neglects the ambient sensor and produces an indication that is based on an ambient junction at 0°C. This allows calibration of the unit using thermocouple tables without the uncertainty of compensating for the ambient temperature. See the analog calibration section for the calibration process.

CALIBRATE AMBIENT SENSOR

If CAL_AMBIENT is ON and CAL_VREF is OFF when the unit goes through the start cycle, a mode will be entered that will produce an indication based on the detected temperature of the ambient sensor. The indication resolution is 0.01°C. See the analog calibration section for the calibration process.

INDICATE AMBIENT TEMPERATURE

If the unit has cycled to the indicate process mode for a thermocouple input type, setting CAL_AMBIENT ON with CAL_VREF OFF will cause the indication to be based entirely on the ambient sensor. The resolution of the indication matches the resolution of the selected thermocouple.

SYSTEM INITIALIZATION

If all poles of SW2 are ON, the RESET front panel button is pressed and held, and the unit is restarted by cycling the power, or with SW1, the user will be presented with a 'Cont' prompt. Pressing the NEXT front panel button causes the prompt to toggle between 'Cont' and 'Init'. Pressing ENTER while 'Cont' is displayed exits this routine. Pressing ENTER while 'Init' is displayed loads a predefined set of system settings as defined below.

Security code:	'000000' (six zeros)
Decimal point:	0123.4
Label:	m
Minimum input calibration point:	-125.00mV
Maximum input calibration point:	125.00mV
Minimum display range:	-125.0
Maximum display range:	125.0

Channel	trip	reset	horn	latch
1	4400	5500	silent	inert
2	8800	7700	silent	inert
3	13200	14100	silent	inert
4	17600	16500	silent	inert

The selection of these parameters was arbitrary, and provides a recognizable operation for a new unit.

DIGITAL CALIBRATION FOR LINEAR INPUTS

For linear inputs, no potentiometer adjustment is required. However, a method of simulating the input signal is required. For instance, to calibrate the 3011 for a 4/20 mA input, a DEVAR model 18-MSC mini source calibrator can be used to generate the necessary 4mA and 20mA signals. To perform the calibration, turn the unit on and allow the unit to cycle to the indicate process mode. The following steps illustrate the process in performing this calibration.

Activate the menu system

Press ENTER to start the main menu. Enter the security code if necessary.

Set the input type

If necessary, press NEXT until "SELECT INPUT TYPE" is displayed, then press ENTER. Use the <up arrow> and <down arrow> keys to display "mV", then press ENTER. "STORED" is displayed for a few seconds.

Define the input signal by sampling end points

Press NEXT until "CAL. SYSTEM" is displayed. Press ENTER , "CAL. INPUT" is displayed. Press ENTER, "INPUT MAX." is display. Apply the maximum input signal, ie: 20mA following the above example, and press ENTER. The unit displays "G=2^0", and changes to "G=2^1", "G=2^2", or "G=2^3" as it finds the appropriate gain to use for this input signal. The unit then displays "SAMPLE <a number>". This number represents the relative magnitude at one point in the sampling process, and is only included as a troubleshooting measure. For instance, a shorted input should produce "G=2^3" and a number approximately equal to 32768. A normal input could have any of the values obtainable, but should produce a number that doesn't vary by more than a few counts from display to display. When the sampling process is complete, "G=2^<a digit> <a number> ACCEPT" is displayed. The number now displayed represents the relative magnitude of the average of the input samples. Press ENTER to accept this data point, display "OKAY", and proceed to "INPUT MIN.", or press NEXT to reject this data point and return to "INPUT MAX.", or press RESET to end the calibration sequence and return to "CAL. SYSTEM".

After the maximum input signal sampling sequence has been completed and accepted, "INPUT MIN." is displayed. Apply the minimum input signal, ie: 4mA following the above example, and press ENTER. The unit proceeds through the sampling process in the same way as the previous step. When the sampling process is complete, "G=2^<a digit> <a number> ACCEPT" is displayed. Press ENTER to accept this data point and complete the calibration process, display "STORED" and proceed to "DEFINE RANGE", or press NEXT to reject this data point and return to "INPUT MIN.", or press RESET to end the calibration sequence and return to "CAL. SYSTEM". If a previous calibration had resulted in an unusual or erroneous process indication, observing the numbers displayed as part of the accept prompt will verify that the unit is responding to a functioning signal source. Observing that the magnitudes between the two numbers are significantly different and/or that the two gains are different demonstrates that the input is being read and has sufficient dynamic range.

Scale the display by entering the process quantities at the sample points

First, determine what the process indication should be. The 3011 can display 99999 to -9999 with a decimal point placed anywhere desired. A lot of grief and disappointment can be avoided by not trying to make the 3011 indicate a process quantity resolution beyond the ability of the attached sensor. For instance, assume a temperature transmitter that was scaled from 0°F to 150°F with a basic accuracy of ±0.1%. The 3011 has been set up to indicate 0.00F to 150.00F. Since the accuracy of the transmitter is ±0.15°F, the last digit in the process indication is ambiguous at best and a confusing nuisance at worst. A better choice would be to set the display range as either 0.0F to 150.0F or 0.F to 150.F.

When "DEFINE RANGE" is displayed, press ENTER and "SET DP" will be displayed. Press ENTER again to begin the input routine. The current decimal point selection is displayed. Use <up arrow> and <down arrow> to move the decimal point to the desired location. Press ENTER when done, "STORED" is displayed for a moment then "DEFINE MAX. RANGE" is displayed. Following the above example, set the decimal point as "0123.4" to indicate a full scale range of 150.0.

When "DEFINE MAX. RANGE" is displayed, press ENTER to activate the numeric entry routine. The current value is displayed with the first digit flashing. Pressing <up arrow> or <down arrow> increments or decrements the value of the flashing digit. Pressing NEXT selects the next digit. Pressing ENTER accepts the displayed value as the desired input. Enter the process quantity corresponding to the input signal sampled in the "INPUT MAX." step.

When "DEFINE MIN. RANGE" is displayed, press ENTER to begin the entry routine. Entry is identical to "DEFINE MAX. RANGE". Enter the process quantity corresponding to the input signal sampled in the "INPUT MIN." step.

When "PICK LABEL" is displayed, pressing ENTER activates the entry routine. The current setting will be displayed in the form of "PICK _", where the last character "_" is the current setting. Pressing <up arrow> or <down arrow> increments and decrements the value of the current setting. Most of the basic displayable ASCII character set is available, along with a few custom characters. Make a selection and press ENTER.

ANALOG CALIBRATION FOR NONLINEAR INPUTS

A defined non-linear input, such as thermocouple, depends on an analog calibration for indication accuracy. Internal DIP switch SW2 enables several different calibration modes. The following is the recommended method of performing an analog span calibration for a thermocouple input.

1) Remove power from the unit, remove unit from mounting and / or disassemble to facilitate access. BEWARE OF HIGH VOLTAGE AREAS!

2) Apply power to the unit and wait until unit cycles to process indication.

3) Press the NEXT key, SELECT INPUT TYPE scrolls on the screen.

4) Press the NEXT key again and the current selection is displayed.

5) Use the <up arrow> and <down arrow> keys to display TC-N.

6) Press ENTER and the current temperature scale is displayed.

7) Use the <up arrow> and <down arrow> keys to display °C.

8) Press ENTER, "STORED" is displayed, press RESET several times to return to process indication.

9) Set SW2 pole 1, CAL_VREF, ON and pole 2, CAL_AMBIENT, OFF.

10) Apply 43846.4uV to the input as accurately as possible. At this point the N thermocouple curve has a response of 37.2uV/°C, so being within ±4uV of this point allows calibration within ±0.1°C.

11) Adjust potentiometer P3 to change process indication to 1200.0C

12) Set SW2 pole 1, CAL_VREF, OFF and pole 2, CAL_AMBIENT, ON.

13) Press S1 RESTART switch and allow unit to cycle to indication.

14) Apply 84.92Ω to ambient sensor terminals and adjust P1 for an indication of -40.00°C. Apply 132.75Ω to ambient sensor terminals and adjust P2 for an indication of 85.00°C. Repeat until these two points read true without adjustment.

15) The process is complete, reassemble unit.

GENERAL SPECIFICATIONS

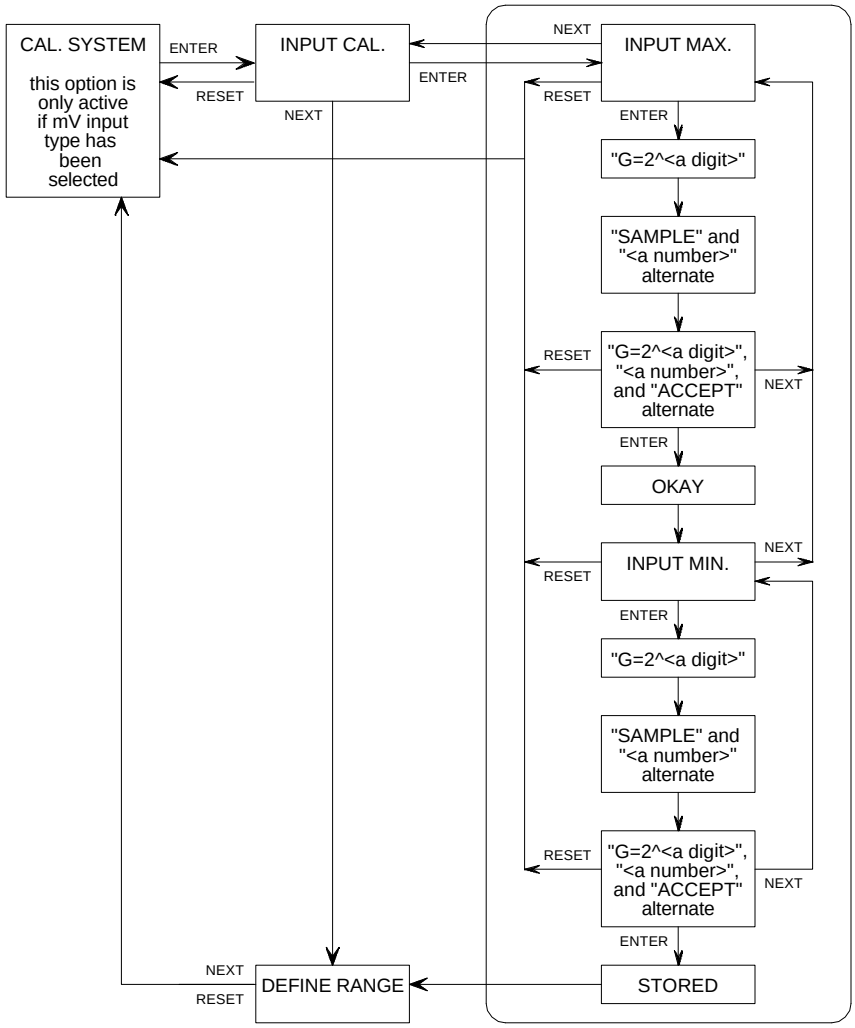
Power	90-140VAC 50/60Hz or 125 - 190VDC, 10VA max
Operating Temperature	0ºC to 70ºC
Dimensions	
Front Bezel	48mm H x 96mm W x 12mm D
Panel Cutout	45mm H x 91mm W
Overall	48mm H x 96mm W x 166mm D $1\text{-}^{15}/_{16}$"H x $3\text{-}^{3}/_{4}$"W x $6\text{-}^{1}/_{2}$" D polycarbonate NEMA 4X bezel Black anodized aluminum body
Weight	0.522Kg = 1.15lbs. = 18.4oz
Display	Six characters, 0.54" high, 15 segment, high efficiency red LED.
User Input	Four button integrated membrane switch front panel keypad
Relay Output	SPDT (form C) relays; 10 amp 240VAC, 1/2 HP, 240 VAC 8 amps, 250VAC, 24VDC
Relay Failsafe Operation	energized in non-alarm condition, de-energized on alarm or power failure
Power Output	
excitation	10V @ 120mA MAX, 150mA short circuit
or	
loop power	24V @ 100mA MAX, 150mA short circuit
stability	43 ppm per ºC typ., 250 ppm per ºC max.;
Isolation Strength	500VAC to input terminals or earth

INPUT SPECIFICATIONS

A/D converter	24 bit) -G type
Reference Voltage	2.5V ±15ppm / ^{o}C typical
Input Impedance	>10^{10} Ohms
-3dB frequency	12Hz.
Input types	
Thermocouple type, range	T, (-270/400^{o}C, -454/752^{o}F) J, (-210/1200^{o}C, -346/2192^{o}F) E, (-270/1000^{o}C, -454/1832^{o}F) K, (-270/1372^{o}C, -454/2502^{o}F) N, (-270/1300^{o}C, -454/2372^{o}F) R, (-50/1768^{o}C, -58/3215^{o}F) S, (-50/1768^{o}C, -58/3215^{o}F) B, (127/1820^{o}C, 260/3308 ^{o}F)
millivolts	in full scale ranges of: ±125mV, ±62.5mV, ±31.25mV, and ±15.625mV
milliamps, amps	add external shunt, 5S for 4/20mA otherwise keep maximum E = I * R < 100mV
strain gage	use 10V excitation supply
Accuracy	PRELIMINARY STATEMENT
temperature, overall	±3^{o}C { 1st 10% of defined span } ±0.5^{o}C { remaining 90% of defined span } for response defined by ITS 90
all others	input detected to better than ±0.05% of input range

USER AND NUMERIC INPUT KEYS

PROGRAM FLOW FOR INPUT CALIBRATION ROUTINE



Apply the appropriate calibration input signal before proceeding

The most appropriate gain for the applied input signal is being determined.
gain = 2 to the <a digit> power

The number represents the relative magnitude of the input signal at one point in the sampling process.

The gain is as selected above. The number represents the relative magnitude of the average of the input samples

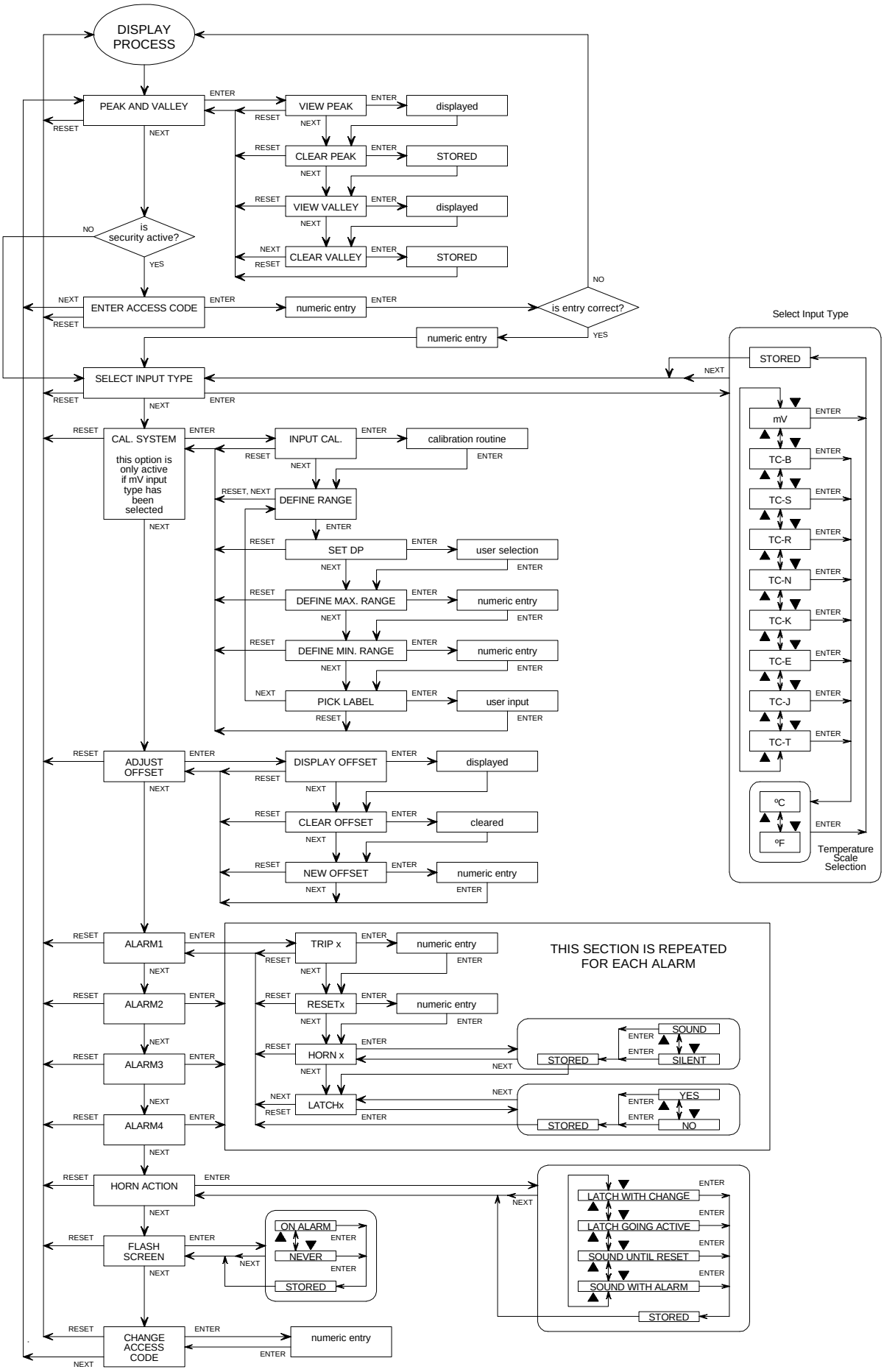
Apply the appropriate calibration input signal before proceeding

The most appropriate gain for the applied input signal is being determined.
gain = 2 to the <a digit> power

The number represents the relative magnitude of the input signal at one point in the sampling process.

The gain is as selected above. The number represents the relative magnitude of the average of the input samples

CONFIGURATION MENU FLOWCHART



DWG NO.	SH

REV	DESCRIPTION	DATE	APPROVED
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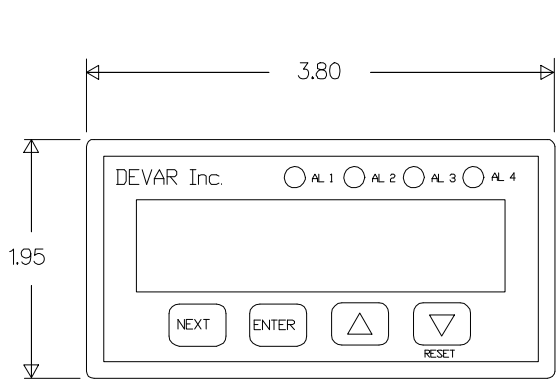
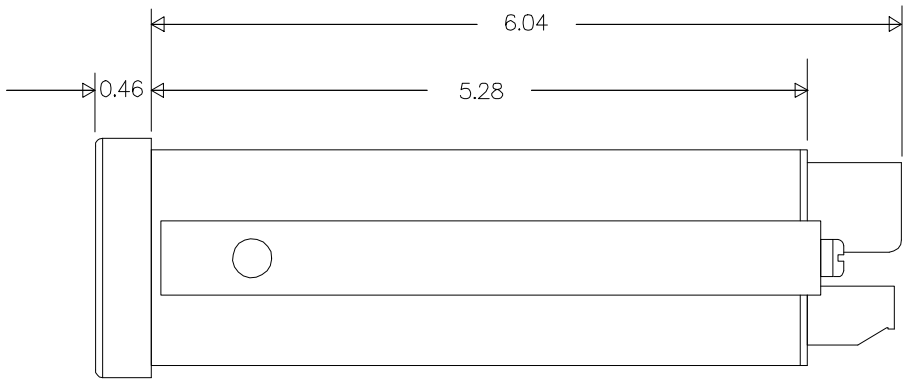
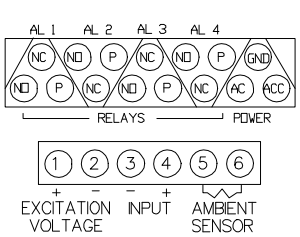




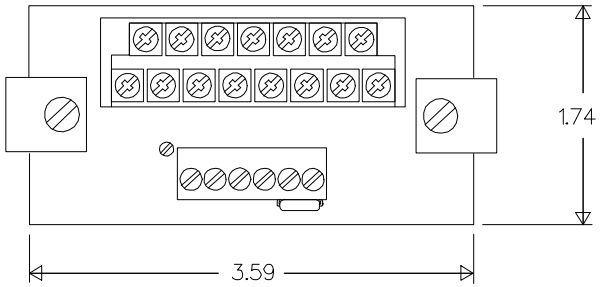
FIELD WIRING



POWER 90/140 V 50/60 Hz
OR 125/190 VDC

AC = AC LIVE OR ± DC (FUSED LINE)
ACC = AC NEUTRAL OR DC RETURN

REAR VIEW



PANEL CUTOUT
$^{+0.8}_{-0.5}$ 92 X $^{+0.8}_{-0.5}$ 45 mm
$^{+0.032}_{-0.019}$ 3.622 X $^{+0.032}_{-0.019}$ 1.772 INCHES

UNSPECIFIED DIMENSION TOLERANCE
DECIMAL +/− 0.005"
FRACTION +/− 1/64"
ANGLE +/− 1/2 DEGREE

MATERIAL

FINISH

NEXT ASS'Y NO. B/M 515932

CONTRACT NO.

PREPARED		
CHECKED		
MECH		
ELEC		
DESIGN		
APPROVED		
APPROVED		

DEVAR Inc. 706 Bostwick Avenue, Bridgeport, Conn. 06605 TEL: (203) 368-6751 FAX: (203) 368-3747

GENERAL DIMENSIONS
MODEL 3011

SIZE	DRAWING NO.	REV
B	515955	A

SCALE	WT	SHEET
FULL		1 OF 1