

INSTRUCTION MANUAL

Level Tek II
Model 5318B



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RECORD OF CHANGES

Revision	Design Engineer's Approval	Engineering Manager's Approval	Approval Date	COS Number	Brief Description
C	<i>P. Kronau</i>	<i>B. Evans</i>	4/20/07	96435	Corrected various typing errors.
D	<i>P. Kronau</i>	<i>B. Evans</i>	13AUG07	96469	Revised to include setpoint "tweaking" and new variants.

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SECTION I - DESCRIPTION

1.1 GENERAL

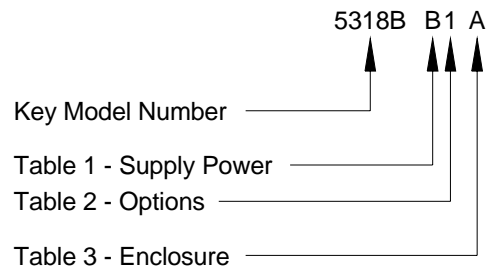
The Robertshaw Model 5318B Level-Tek is a RF capacitance point (On/Off) level switch that employs all solid state electronics for detecting predetermined product level changes in tanks, sumps, silos and other vessels or containers. The Model 5318B is capable of detecting a variety of products, including liquids, powders, granular, lump and flake materials. The product can be conductive or non-conductive, depending on the probe selection. Probes are sold separately.

The Model 5318B is self-contained and uses microprocessor based digital circuits to ensure long-term stability, reliability and reduced maintenance. Control signals are provided through the contacts of a DPDT relay. The instrument features adjustable time-delays that are individually adjustable for the "Alarm" and "Return-to-Normal" changes in state. There are both fixed and adjustable differential settings. The unit is available for either AC or DC supply voltages.

The Model 5318B allows for three (3) different control ranges: 250 pF, 500 pF and 1,000 pF. Setup and calibration can be done in either the raw measurement mode, or in the converted mode. The converted mode uses a measurement that is directly proportional to the sensed capacitance. Calibration is accomplished using an integral LCD display and four (4) pushbuttons.

1.2 MODEL IDENTIFICATION

Identify instrument models in accordance with the description and variations listed in each table below. Dashes are used in the model number only in those spaces as indicated in the example below:



Key Model Number

Designation	Description
5318B	Capacitance actuated On-Off Level Control. DPDT relay, fixed and adjustable differential (dead-band) and adjustable time delays. Explosion-proof, weather tight enclosure. Unit can be either probe, or remote, mounted. Probe not included.

Table 1 – Supply Power

Designation	Description
A	18-36 VDC
*B	100-240 VAC, 50/60Hz
C	9-18 VDC

Table 2 - Options

Designation	Description
*1	Standard
2	Special, Lower Measurement Frequency (Consult Factory)
3	Custom Calibration (Consult Factory)

Table 3 - Enclosure

Designation	Description
*A	½" NPT Probe Hub, Type 4, Nitro Blue
B	¾" NPT Probe Hub, Type 4, Nitro Blue
D	½" NPT Probe Hub, Type 4X, Gray Epoxy
E	¾" NPT Probe Hub, Type 4X, Gray Epoxy

* Denotes standard configuration.

SECTION II – SPECIFICATIONS

2.1 ENVIRONMENTAL

Storage Temperature Limits.....	-55°F to +225°F (-48°C to +107°C)
Operating Temperature Limits ...	-40°F to +160°F (-40°C to +70°C)
Vibration Limits.....	2 g's to 100 Hz
Operating Humidity Limits	0 to 95% RH (non-condensing)
Weight	3.5 lbs (1.6 kg)
Shipping Weight	5 lbs (2.3 kg)

2.2 PERFORMANCE

Temperature Coefficient.....	0.01pF/°C Control Point
Time Delay:	
On ALARM.....	Adjustable, 0 to 60 seconds
On Return	Adjustable, 0 to 60 seconds
Control Range	User Selectable 250, 500, 1,000 pF max

Differential (dead-band):

ON/OFF (Adjustable).....	0.2 pF to 100% of Control Range
ALARM + + (fixed).....	1.0 pF
ALARM + (fixed)	0.2 pF
ALARM - (fixed).....	0.2 pF
ALARM - - (fixed).....	1.0 pF
CONTROL (fixed).....	0.2 pF

2.3 ELECTRICAL

Supply Voltage:

Standard.....	100 to 240 VAC, 50/60 Hz
Optional	18 - 36 VDC 9 - 18 VDC

Supply Power..... 5 watts, 5 VA maximum

Control Relay:

Contacts	DPDT (Form C)
Rating	5 A @ 28 VDC; 5 A @ 120/240 VAC, non-inductive

2.4 ENCLOSURE

Standard	Explosion proof, cast aluminum painted with blue polyurethane enamel. Suitable for Class I, Division 1, Groups C & D, Class II, Division 1, Groups E, F, & G hazardous areas Dust tight CSA Enclosure 5. Meets Enclosure 4.
Optional.....	Same as above, except painted with gray epoxy enamel. Also meets Enclosure 4X

2.5 cETL_{us} APPROVALS

UL.....	Standard 61010-1
CAN/CSA.....	C22.1 NO. 61010-1
RoHS Compliance	EU Directive 2002/95/EC

SECTION III – INSTALLATION

3.1 GENERAL

Examine the instrument for possible shipping damages.

IMPORTANT: If for any reason it is determined that parts should be returned to the factory, please notify the nearest Robertshaw Industrial Products sales representative prior to shipment. Each unit must be properly packed to prevent damage. Robertshaw assumes no responsibility for equipment damage in shipment due to improper packaging.

Choose a location in accordance with good instrument practice, avoiding extremes of temperature, humidity, and vibration. (See “Specifications”, Section II)

3.2 PROBE MOUNTING

Robertshaw probes are purchased separately from the instruments and are available in a variety of sizes and types with numerous options for the materials and construction. Each probe should be selected for the specific application in order to insure the best and most reliable operation of the system.

Probes are available with, or without insulation. Insulated probes may be used for liquid, solid or interface detection and can also be used on conductive materials. Bare probes are normally used on non-conductive materials only.

Standard type probes are installed so that the face of the packing gland is flush (or nearly so) with the vessel wall. When installing a probe in a nozzle, recess or open end well, a sheathed probe should be used, with the sheath length equal to the nozzle, recess, or well length. This insures that the “active” portion of the probe is extended into the process area and eliminates potential problems due to build-up in the nozzle, recess, or well.

CAUTION: When installing an insulated probe, care should be taken not to accidentally puncture the probe insulation.

3.2.1 HORIZONTAL MOUNTING

Horizontally mounted rod-type probes must be installed in vessels at the desired point of level detection. Horizontally mounted probes provide the closest control (smallest deadband) in that a small change at, or near, the probe will produce a large capacitance change.

On applications involving viscous liquids, or materials, that have a tendency to “cling” or “build-up”, it is recommended that the probe be mounted on a slight downward angle to permit draining of the material from the probe.

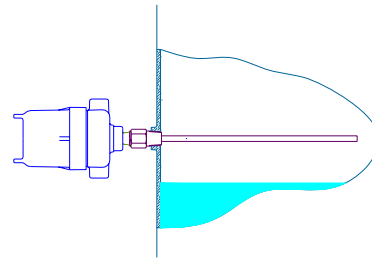


Figure 3-1 Horizontally Mounted Instrument

3.2.2 VERTICAL MOUNTING

Vertically mounted rod-type probes should be installed in either the top or bottom of the vessel with the midpoint on the probe corresponding to approximately the desired level detection point.

Vertically installed probes allow a variation in the level detection point up and down the length of the probe by means of the instrument calibration.

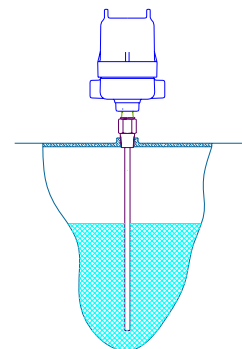


Figure 3-1 Vertically Mounted Instrument

3.3 INSTRUMENT MOUNTING

3.3.1 PROBE MOUNTED

The Model 5318B Level Tek II is designed to be mounted directly on the installed probe assembly as shown in Figure 3-1 and may be mounted or oriented in any position.

Prior to installing the instrument onto the probe, the probe electrical connection pin (included with the instrument) must be installed in the end of the probe as shown in Figure 3.1 to provide the electrical connection between the probe and the instrument. Do not over tighten the probe pin.

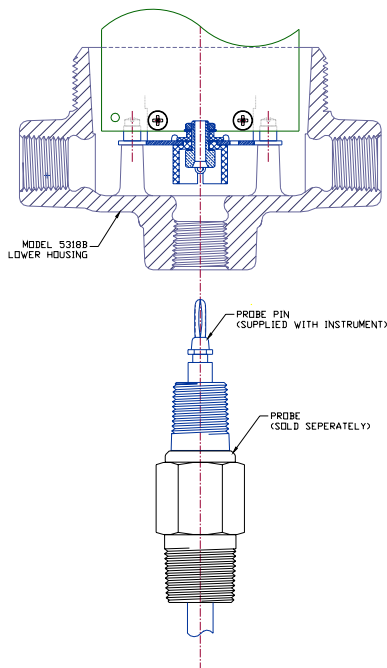


Figure 3-3 Probe Mounting

3.3.2 REMOTE MOUNTED

The Model 5318B Level Tek II may also be remotely mounted from the probe using a remote mount cable assembly (sold separately, see SECTION VII -- ACCESSORIES). This cable assembly allows the instrument to be mounted up to 15 feet from the probe. For longer distances consult the factory. Figure 3-2 shows the details of this mounting option.

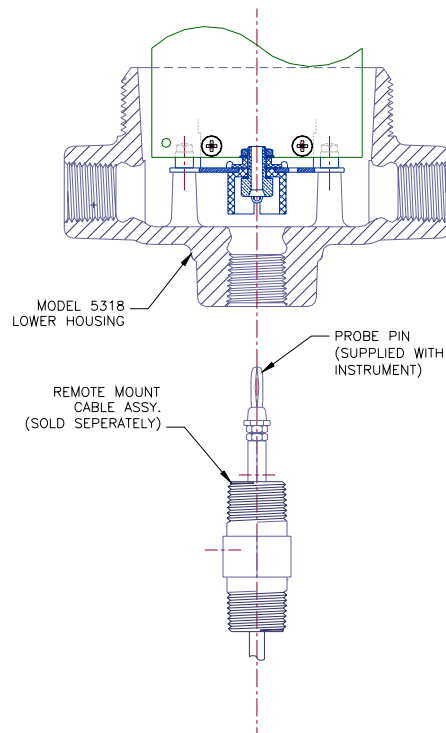
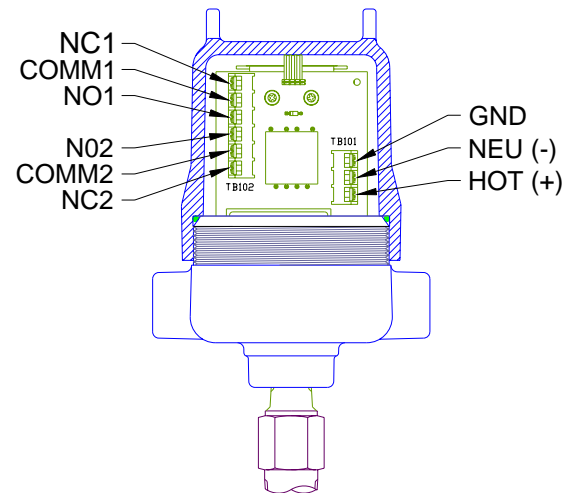


Figure 3-4 Remote Mounting

3.4 ELECTRICAL CONNECTIONS

The instrument chassis may be removed from the housing for wiring installation by loosening the three (3) captive mounting screws and withdrawing the chassis straight out. In re-installing the chassis assembly, make certain that the probe connection pin is engaged in the chassis receptacle.

All electrical connections should be made in accordance with Figure 3.3 and any applicable national, state and/or local codes. See Specifications (Section II) for control relay contact ratings.



NOTE: CONTROL RELAY CONTACT DESIGNATIONS ARE SHOWN WITH THE RELAY IN THE DE-ENERGIZED CONDITION. THE RELAY IS NORMALLY ENERGIZED AND BECOMES DE-ENERGIZED WHEN AN ALARM CONDITION IS DETECTED.

Figure 3-5 Electrical Connections

Table 3.1

Electrical Connections TB101 – Supply Power	
GND	Earth Ground
NEU (-)	AC Neutral/ DC Negative
HOT (+)	AC Hot/ DC Positive

Table 3.2

Electrical Connection TB102 – Relay Contacts	
NC1	Normally Closed #1
COMM1	Common #1
NO1	Normally Open #1
NO2	Normally Open #2
COMM2	Common #2
NC2	Normally Closed #2

NOTE – Refer to drawing number 909HB918, Certified Print, Installation Drawing, Model 5318B for complete installation and wiring requirements.

SECTION IV – OPERATION

4.1 GENERAL

All controls and indicators are located on the Measurement PCA. These controls and indicators are accessible by removing the cover of the Model 5318B.

CAUTION: UTILIZATION OF THESE CONTROLS REQUIRES THE REMOVAL OF THE COVER. REMOVING THE COVER VIOLATES THE EXPLOSION-PROOF RATING OF THE ENCLOSURE

4.2 DISPLAYS AND INDICATORS



Figure 4-1 User Controls

4.2.1 LED INDICATORS

There are two (2) LED indicators located above the LCD display on the Measurement PCA. The left hand LED (DS203) indicates the health of the Model 5318B. It flashes at a rate of approximately once every two seconds.

The other LED (DS202) indicates the current state of the instrument. It is illuminated when

the Model 5318B is in the ALARM condition, relay de-energized.

4.2.2 LCD DISPLAY

A 2-line by 8-character liquid crystal display, LCD, (DS201) is provided to aid in the setup and calibration of the Model 5318B. In normal operations the top line displays the current status and the bottom line displays the current input.

4.3 SWITCHES

There are four (4) navigation pushbutton switches located immediately below the LCD display. These switches are identified as follows:

- LEFT [LT] (S203)
- UP [UP] (S202)
- DOWN [DN] (S205)
- RIGHT [RT] (S204).

The function of these switches varies as the user navigates through the menus.

4.4 SETUP

The initial step in putting the Model 5318B into operation is to determine the proper configuration of the instrument. The unit is shipped from the factory with the following default setup values:

Table 4-1 Default Setup Values

Variable	Standard	Low Freq	Custom
High Setpoint	11400	1065	26250
Low Setpoint	14400	1490	26250
Setpoint Mode	Adj. Diff	Adj. Diff.	Control
Failsafe Mode	HLFS	HLFS	LLFS
Alarm Delay	5	5	0
Return Delay	3	3	0
Display Mode	RAW	RAW	RAW
Update Rate	4/sec.	4/sec.	4/sec.

4.4.1 DETERMINING THE CONTROL RANGE

The first item that must be selected is the control range. The Model 5318B offers three (3) control ranges, but the default value should be sufficient for most typical, horizontally mounted probe, installations.

Applications involving vertically mounted probes may require use of one of the other ranges. The signal range is a function of the probe and the media being sensed. The setpoint(s) must fall within the control range selected.

The control range is determined by selecting the appropriate update rate. The relationship between the control range and update range is as follows:

- 20* – 250 pF 4/second
- 20* – 500 pF 2/second
- 125* – 1,000 pF 1/second

* These values are 30 pF for the low frequency version.

EXAMPLE #1:

Consider a vertically mounted Model 740A-B048-N0 probe, 48 inches long used in a conductive liquid. This probe has a gland capacitance of 24 pF and the pF/Ft in air is 4.5.

Assuming that the material being sensed has a dielectric constant of 60 the pF/Ft of the length submerged in the material is 53.

With the product level below the end of the probe the capacitance input to the Model 5318B will be:

- A) Gland24 pF
- B) Probe (4 x 4.5).....18 pF
- C) Total42 pF

With all but 6 inches of the probe submerged in the material the capacitance input to the Model 5318B will be:

- A) Gland 24.00 pF
- B) Probe; In Air (0.5 x 4.5).....2.25 pF
- C) Probe; Immersed (3.5 x 53)..... 185.50 pF
- D) Total 211.75 pF

These calculations show that the input capacitance for this application will be 42 to 212 pF and the default sampling rate of 4/second (0-250 pF) will be acceptable.

EXAMPLE #2:

Consider a vertically mounted Model 740A-B120-N0 probe, 12 feet long used in water. This probe has a gland capacitance of 24 pF and the pF/Ft in air is 4.5.

Using a dielectric constant of 80 the pF/Ft of the length submerged in the material is 56.

With the product level below the end of the probe the capacitance input to the Model 5318B will be:

- A) Gland.....24 pF
- B) Probe (12 x 4.5)54 pF
- C) Total78 pF

With all but 1 foot of the probe submerged in the water the capacitance input to the Model 5318B will be:

- A) Gland.....24.00 pF
- B) Probe; Air (1 x 4.5)4.50 pF
- C) Probe; Immersed (11.5 x 56)644.00 pF
- D) Total672.50 pF

These calculations show that the capacitance input for this application will be 78 to 673 pF and the sampling rate of 1/second would be required.

4.4.2 CHOOSING THE DISPLAY FORMAT

During normal operation the results of the previous input conversion, measurement, are displayed on the right hand side of the bottom line of the LCD display. The user has the option of displaying this value either as the actual, **RAW**, measurement or as a converted, **CNVRTD**, value.

The actual measurement (RAW) is a non-linear function and the converted (CNVRTD) value is linear. Regardless of the display format selected the Model 5318 operates internally using the actual measurement value.

If the converted format is selected the change in displayed value is proportional to the sensed capacitance.

For Options 1 & 3 a sampling rate of 4/second the display will change ~50 units/1 pF change in the input capacitance. This gives a resolution of ~0.02 pF/unit. For the 2/second sampling rate the change in the display will be ~25 units/pF change or ~0.04 pF/unit. Lastly at the 1/second sampling rate the display change will be ~12.5 units/pF or 0.08 pF/unit.

For Option 2 a sampling rate of 4/second the display will change ~100 units/1 pF change in the input capacitance. This gives a resolution of ~0.01 pF/unit. For the 2/second sampling rate the change will be change in the display will be ~50 units/1 pF change or ~0.02 pF/unit. Lastly at the 1/second sampling rate the display change will be ~25 units/1 pF or ~0.04 pF/unit.

The selection of the display format is up to the user's preference and does not affect the operation of the instrument. It should be noted that setpoint values will be displayed in the same format as the measurement.

4.4.3 ADJUSTING THE SETUP VALUES

Once the sampling rate and display format has been determined the next step will be to adjust the instruments setup values. These values are accessible using the navigation switches located just below the LCD display.

CAUTION: UTILIZATION OF THESE CONTROLS REQUIRES THE REMOVABLE OF THE COVER. REMOVING THE COVER VIOLATES THE EXPLOSION-PROOF RATING OF THE ENCLOSURE

4.4.3.1. ACCESSING THE SETUP VALUES

To access the setup values press the [DN] pushbutton once followed by pressing the [RT] pushbutton once. The display should now show:

High SP
XXXXX

Where "XXXXX" represents the currently set High Setpoint value. It should be noted that this value is the result of calibrating the instrument.

This value can be changed, or tweaked, here. Adjusting the setpoint(s) is discussed later in this section.

4.4.3.1.1. SELECTING THE DISPLAY FORMAT

Pressing the [DN] pushbutton six (6) more times will bring the access to the display format variable. The LCD display will initially show:

Display
YYYYY

Where "YYYYY" represents the currently selected display format. After a short time the top line of the display will begin scrolling the message:

"Select RAW measured frequency or CONVERTED value proportional to level"

Pressing the [RT] pushbutton once will select this value for changing and the LCD will initially show:

Display
Press
RT

After a short time the bottom line of the display will begin scrolling the message:

"Press RT to change mode of displayed measurement"

Pressing the [RT] pushbutton once will open the value for change and the LCD will initially show:

Display
RAW

After a short time the top line of the display will begin to scroll the message:

"Select RAW measured frequency or CONVERTED value proportional to level"

The [UP] and [DN] pushbuttons can be used to scroll between the two possible value. The currently selected format is identified by an "*" appended to the end of the format. When the desired format is displayed press the [RT] pushbutton to select that format. The display will return to the previous level of the Setup menu.

4.4.3.1.2. SELECTING THE SAMPLING RATE

Changing the sampling rate can be accessed by pressing the [DN] pushbutton once from the "Display" variable. The display will initially show:

```
Sampling
X/sec
```

Where "X" represents the currently selected number of updates per second. After a short time the top line of the display will begin to scroll the message:

"Use lower sampling rate only for high capacitance probes"

Pressing the [RT] pushbutton once will select the value and the LCD will initially show:

```
Sampling
Press
RT
```

After a short time the bottom line of the display will begin scrolling the message:

"Press RT to change sampling rate"

Pressing the [RT] pushbutton once will open the value for change and the LCD will initially show:

```
Sampling
X/sec*
```

The [UP] and [DN] pushbuttons can be used to scroll among the three possible values. The current sampling rate is identified by an "*" appended to the end of the format. When the desired sampling rate is displayed press the [RT] pushbutton to select that rate. The display will return to the previous level of the Setup menu.

4.4.3.1.3. FAIL-SAFE MODE SELECTION

Once the sampling rate and display mode have been set the next logical item to be set is the Fail-Safe Mode. The Model 5318B provides two fail-safe modes; high level (HLFS) and low level (LLFS).

HLFS is the mode in which the "Alarm" condition exists when the sensed level is above the High Setpoint. The alarm then clears, returns to normal, when the level falls below the Low Setpoint.

Conversely, LLFS is the mode in which the "Alarm" condition exists when the sensed level is below the Low Setpoint. The alarm then clears when the level rises above the high Setpoint.

To select the required fail-safe mode enter the Setup Menu, from the normal operating mode by pressing the [DN] pushbutton, followed by pressing the [RT] pushbutton. This action will bring you to the first item in the Setup Menu, High SP.

Pressing the [DN] pushbutton three (3) times will bring you to the 'Alarm ON' variable. The display will initially show:

```
Alarm ON
XXXX
```

Where XXXX represents the currently selected fail-safe mode. After a short time the top line of the display will begin to scroll the following message:

"Enables alarm – above HIGH setpoint or below LOW setpoint"

Pressing the [RT] pushbutton once will select the value and the LCD will initially show:

```
Alarm ON
Press
RT
```

After a short time the bottom line of the display will begin scrolling the message:

"Press RT to change Alarm setpoint"

Pressing the [RT] pushbutton once will open the value for change and the LCD will initially show:

```
Alarm ON
XXXX*
```

Where XXXX represents the currently selected fail-safe mode. After a short time the top line of the display will begin to scroll the following message:

"Enables alarm – above HIGH setpoint or below LOW setpoint"

The [UP] and [DN] pushbuttons can be used to scroll among the two possible values. The current fail-safe mode is identified by an "*" appended to the end of the format. When the desired fail-safe mode is displayed press the [RT] pushbutton to select that rate. The display will return to the previous level of the Setup menu.

4.4.3.1.4. TIME DELAYS

Refer to the Figure 4 - 2 to see the organization of the Setup Menu. There are two (2) more variables that can be adjusted from the Setup Menu. These are the AlarmDly and Ret. Dly, which are the time delays associated with the detecting of an alarm and the clearing of an alarm.

These delays specify the time between the detection of a change in the alarm state and the operating of the relay. When an alarm is detected the time delay will be the time that the alarm condition must exist before the relay is deactivated. When a return-to-normal condition is detected the time delay will be the time the condition must exist before the relay is activated.

The delays can be turned "off" by setting the delay to "00" and the active delay times are 1 to 60 seconds. This allows either or both delays to be turned "Off" and the delay times to be adjusted independently.

4.4.3.1.4.1. TIME DELAY ON ALARM

To select the required time delay enter the Setup Menu, from the normal operating mode by pressing the [DN] pushbutton, followed by pressing the [RT] pushbutton. This action will bring you to the first item in the Setup Menu, High SP.

Pressing the [DN] pushbutton four (4) times will bring you to the "AlarmDly" variable. The display will initially show:

AlarmDly XX

Where XX represents the currently set time delay. After a short time the top line of the display will begin scrolling the message:

*"Relay delay when alarm goes ON
[seconds]"*

Pressing the [RT] pushbutton once will select the variable. The display will initially show:

AlarmDly Press RT

Pressing the [RT] pushbutton will open the variable for change. After a short time the bottom line of the display will begin to scroll the message:

"Press RT to change Alarm delay"

Pressing the [RT] pushbutton will allow the time delay to be changed. The display will initially show:

AlarmDly XX*

Where XX* represents the current time delay setting. After a short time the top line of the display will begin scrolling the message:

*"Relay delay when alarm goes ON
[seconds]"*

The [UP] and [DN] pushbuttons can be used to scroll among the possible values. The current time delay is identified by an "*" appended to the end of the format. When the desired time delay value is displayed press the [RT] pushbutton to select that value. The display will return to the previous level of the Setup menu.

4.4.3.1.4.2. TIME DELAY ON ALARM CLEAR

To select the required time delay enter the Setup Menu, from the normal operating mode by pressing the [DN] pushbutton, followed by pressing the [RT] pushbutton. This action will bring you to the first item in the Setup Menu, High SP.

Pressing the [DN] pushbutton five (5) times will bring you to the "Ret. Dly" variable. The display will initially show:

Ret. Dly XX

Where XX represents the currently set time delay. After a short time the top line of the display will begin scrolling the message:

*"Relay delay when alarm goes OFF
[seconds]"*

Pressing the [RT] pushbutton once will select the variable. The display will initially show:

Ret. Dly Press RT

Pressing the [RT] pushbutton will open the variable for change. After a short time the bottom line of the display will begin to scroll the message:

"Press RT to change return delay"

Pressing the [RT] pushbutton will allow the time delay to be changed. The display will initially show:

AlarmDly
XX*

Where XX* represents the current time delay setting. After a short time the top line of the display will begin scrolling the message:

*“Relay delay when alarm goes OFF
[seconds]”*

The [UP] and [DN] pushbuttons can be used to scroll among the possible values. The current time delay is identified by an “*” appended to the end of the format. When the desired time delay value is displayed press the [RT] pushbutton to select that value. The display will return to the previous level of the Setup menu.

4.5. Performing Instrument Calibration

Once the instrument has been setup the next step is calibrate the instrument to the vessel/process. The Model 5318B provides for several calibration procedures. Some of the procedures require varying the level in the vessel, while others do not. These calibration procedures are as follows:

- **Adjustable Differential** – this procedure is typically used when the level difference or deadband between the high and low setpoints on vertically mounted probe is desired. Typically used for applications involving motor or pump control.
- **Alarm ++** – Used to provide single point control. This procedure allows high setpoint calibration when the current level is below the desired setpoint. This procedure is typically used with high dielectric materials and a horizontally mounted probe.
- **Alarm +** – Same as the procedure above except for use with a low dielectric material.

- **Alarm -** – Used to provide single point control. This procedure allows low setpoint calibration when the current level is above the desired setpoint. This procedure is typically used with low dielectric materials and a horizontally mounted probe.
- **Alarm - -** – Same as the procedure above except for use with a High dielectric material.
- **Control** – Used to set a single setpoint on a probe. This procedure is typically used with a vertically mounted probe.

All of these procedures involve a fixed differential, except Adjustable Differential.

Once the applicable calibration procedure has been selected the calibration is performed using the appropriate description below.

4.5.1. ADJUSTABLE DIFFERENTIAL

This procedure requires physically varying the level in the vessel. This procedure is begun with the level in the vessel at any level.

CAUTION: UTILIZATION OF THESE CONTROLS REQUIRES THE REMOVAL OF THE COVER. REMOVING THE COVER VIOLATES THE EXPLOSION-PROOF RATING OF THE ENCLOSURE

To access this calibration procedure you must first be sure that the instrument’s LCD display is in the normal mode. This can be confirmed by pressing the [LT] pushbutton until the normal display is reached.

To reach the Calibration menu first press the [DN] pushbutton twice, followed by pressing the [RT] pushbutton once. The display will now show:

Step 1 RT

The bottom line will be scrolling the following message:

“Select method of setpoint calibration”

Press the [RT] pushbutton once to enter the methods submenu. The display will now show:

Exit

The bottom line will be scrolling the following message:

“Scroll down to select mode, then press RT to enter or LT to exit”

Pressing the [DN] pushbutton once will access the desired procedure and the display will show:

AdjDiff

If this is the last procedure used to calibrate the instrument, there will be an “*” at the end of the top line. The bottom line will be scrolling the message:

“Calibrate high and low setpoints separately”

Press the [RT] pushbutton to begin the procedure. The display will show:

First Sp
High RT

After a short period of time the top line of the display will scroll the following message:

“Select setpoint for first measurement”

Using the [UP] and [DN] pushbuttons, scroll between the two (2) possible setpoints. When the desired setpoint is displayed press the [RT] pushbutton. If the high setpoint is selected the display will show:

High SP
XXXXX

“XXXXX” represents the current measurement. After a short period of time the top line of the display will begin scrolling the message:

“Fill tank to HIGH setpoint, then press RT”

With the level is at the desired setpoint press [RT] to enter the save setpoint mode. The display will show:

Save Sp-?
YES RT

Press the [RT] pushbutton to store the value or the [LT] to abort.

After the [RT] pushbutton is pressed the display will show:

Low SP
XXXXX

“XXXXX” represents the current measurement. After a short period of time the top line of the display will begin scrolling the message:

“Fill tank to LOW setpoint, then press RT”

With the level is at the desired setpoint press [RT] to enter the save setpoint mode. The display will show:

Save Sp-?
YES RT

Press the [RT] pushbutton to store the value or the [LT] to abort.

When the value has been successfully stored the display will return to the normal mode.

4.5.2. ALARM + + AND ALARM +

These two modes are typically used with the level in the vessel is below the horizontally mounted probe. These procedures take the current measured level and subtract a predetermined offset to determine the setpoint. The same value is stored into both setpoints.

This procedure is entered from the normal mode by depressing the [DN] pushbutton twice, followed by pressing the [RT] pushbutton once. The display will show:

Step 1 RT

The bottom line will be scrolling the following message:

“Select method of setpoint calibration”

Press the [RT] pushbutton once to enter the methods submenu. The display will now show:

Exit

The bottom line will be scrolling the following message:

“Scroll down to select mode, then press RT to enter or LT to exit”

Pressing the [DN] pushbutton twice accesses the ALARM++ procedure. The display will show:

Alarm++
XXXXX

– or –

Pressing the [DN] pushbutton three times will access the Alarm+ procedure. The display will show:

Alarm+
XXXXX

“XXXXX” represents the current measurement. After a short period of time the bottom line of the display will begin scrolling the message:

“Calibrate horizontal probe in air for high dielectric materials”

– or –

“Calibrate horizontal probe in air for low dielectric materials”

Pressing the [RT] pushbutton will enter the save setpoint procedure. The display will show:

High SP
XXXXX

“XXXXX” represents the current measurement. After a short period of time the top line of the display will begin scrolling the message:

“Fill tank to HIGH setpoint, then press RT”

Since the level is already at the desired setpoint press [RT] to enter the save setpoint mode. The display will show:

Save Sp-?
YES RT

Press the [RT] pushbutton to store the value or the [LT] to abort. After pressing the [RT] pushbutton the setpoint will be stored and the display will return to the normal mode.

4.5.3. ALARM - - AND ALARM -

These two modes are typically used with the level in the vessel is above the horizontally mounted probe. These procedures take the current measured level and add a predetermined offset to determine the setpoint. The same value is stored into both setpoints.

This procedure is entered from the normal mode by depressing the [DN] pushbutton twice, followed by pressing the [RT] pushbutton once. The display will show:

Step 1 RT

The bottom line will be scrolling the following message:

“Select method of setpoint calibration”

Press the [RT] pushbutton once to enter the methods submenu. The display will now show:

Exit

The bottom line will be scrolling the following message:

“Scroll down to select mode, then press RT to enter or LT to exit”

Pressing the [DN] pushbutton four times accesses the ALARM - procedure. The display will show:

Alarm-
XXXXX

– or –

Pressing the [DN] pushbutton five times will access the Alarm - - procedure. The display will show:

Alarm - -
XXXXX

“XXXXX” represents the current measurement. After a short period of time the bottom line of the display will begin scrolling the message:

“Calibrate submerged horizontal probe for low dielectric materials”

– or –

“Calibrate submerged horizontal probe for high dielectric materials”

Pressing the [RT] pushbutton will enter the save setpoint procedure. The display will show:

Low SP
XXXXX

“XXXXX” represents the current measurement. After a short period of time the top line of the display will begin scrolling the message:

“Fill tank to LOW setpoint, then press RT”

Since the level is already at the desired setpoint press [RT] to enter the save setpoint mode. The display will show:

Save Sp-?
YES RT

Press the [RT] pushbutton to store the value or the [LT] to abort. After pressing the [RT] pushbutton the setpoint will be stored and the display will return to the normal mode.

4.5.4. CONTROL

This mode provides a fixed differential at a control point determined by the calibrated level. It is typically used with vertically mounted probes.

The procedure is entered from the normal mode by pressing the [DN] pushbutton twice, followed by the [RT] pushbutton once. The display will show:

Step 1 RT

The bottom line will be scrolling the following message:

“Select method of setpoint calibration”

Press the [RT] pushbutton once to enter the methods submenu. The display will now show:

Exit

The bottom line will be scrolling the following message:

“Scroll down to select mode, then press RT to enter or LT to exit”

Pressing the [DN] pushbutton six times will access the CONTROL procedure. The display will show:

Control

The bottom line of the display will be scrolling the message:

“Calibrate vertical probe with fixed differential”

Pressing the [RT] pushbutton will access the save setpoint procedure. The display will show:

Set SP
XXXXX

“XXXXX” represents the current measurement. After a short period of time the top line of the display will begin scrolling the message:

“Fill tank to setpoint, then press RT”

With the level at the desired setpoint, press the [RT] pushbutton. The display will show:

Save Sp-?
YES RT

After a short period of time the top line of the display will begin scrolling the message:

“Do you want to save measured setpoint?”

Press the [RT] pushbutton to store the value or the [LT] to abort. After pressing the [RT] pushbutton the setpoint will be stored and the display will return to the normal mode.

4.6. SETPOINT ADJUSTMENTS (TWEAKING)

It is sometimes desirable to make small adjustments to the setpoint(s) once the Model 5318B is in “normal” operation. Setpoint “tweaking” enables changing the setpoint by up to 10%, in 0.1% increments.

4.6.1. SELECTING THE SETPOINT TO BE ADJUSTED

The setpoints are adjusted from the setup menu. The adjustment procedure is entered from the normal mode by pressing the [DN] pushbutton once, followed by pressing the [RT] pushbutton once. The display will show:

High SP
XXXXX

“XXXXX” represents the current measurement. If the low setpoint is to be adjusted press the [DN] once. The display will show:

```
Low SP
XXXXX
```

“XXXXX” represents the current measurement.

4.6.2. ADJUSTING THE SETPOINT

Once the desired setpoint is displayed, the adjustment procedure is entered by pressing the [RT] pushbutton once. For these instructions we will assume the low setpoint is to be adjusted. After a short period of time the bottom line of the display will scroll the message:

“Press RT to adjust setpoint”

Pressing the [RT] pushbutton will begin the adjustment procedure. The display will show:

```
Low SP
DN 0.0%
```

After a short period of time the top line of the display will scroll the following message:

“Press RT to save or LT to quit”

At this point the [UP] and [DN] pushbuttons can be used to determine the amount the setpoint is to be changed. The amount of change will scroll in increments of 0.1%.

The lower line of the display will change to show the amount of change (YY X.X%). Where “YY” is the direction of the change, “DN” or “UP” and “X.X%” is the amount of change to be applied.

Pressing the [RT] pushbutton will apply the change and the display will return to the display of the adjusted setpoint value:

```
Low SP
XXXXX
```

“XXXXX” represents the adjusted setpoint value.

- Or -

Pressing the [LT] pushbutton will exit the adjustment procedure without making any

change and the display will return to the display of the setpoint value:

```
Low SP
XXXXX
```

“XXXXX” represents the unadjusted setpoint value.

4.6.3. RETURNING TO THE NORMAL DISPLAY MODE

Pressing the [LT] pushbutton twice will return the display to the normal operating mode.

4.7. RECOVERING THE FACTORY DEFAULT SETTINGS

Under certain conditions it may be desirable to restore the instrument to its factory default settings.

Care should be taken when executing this feature since it will erase all existing settings and calibration.

This function can be found at the end of the Setup Menu. It is accessed from the normal mode by pressing the [DN] pushbutton once, the [RT] pushbutton once and the [DN] pushbutton eight times. The display will show:

```
CalibCLR
NO
```

After a short period of time the top line of the display will scroll the message:

“Selecting RESET erase current settings and calibration”

Pressing the [RT] pushbutton will enter the function. The display will show:

```
CalibCLR
Press RT
```

After a short period of time the bottom line of the display will scroll the message:

“Press RT to erase calibration and set default setup”

Pressing the [RT] pushbutton will begin the procedure to recover the default settings. The display will show:

CalibCLR
NO*

Pressing the [DN] pushbutton will access the RESET feature. The display will show:

CalibCLR
RESET

After a short period of time the top line of the display will scroll the message:

“Selecting RESET erase current settings and calibration”

Pressing the [RT] pushbutton will complete the procedure. The instrument will respond by displaying:

CalibCLR
DONE

Pressing the [LT] pushbutton twice will return the instrument to the normal mode.

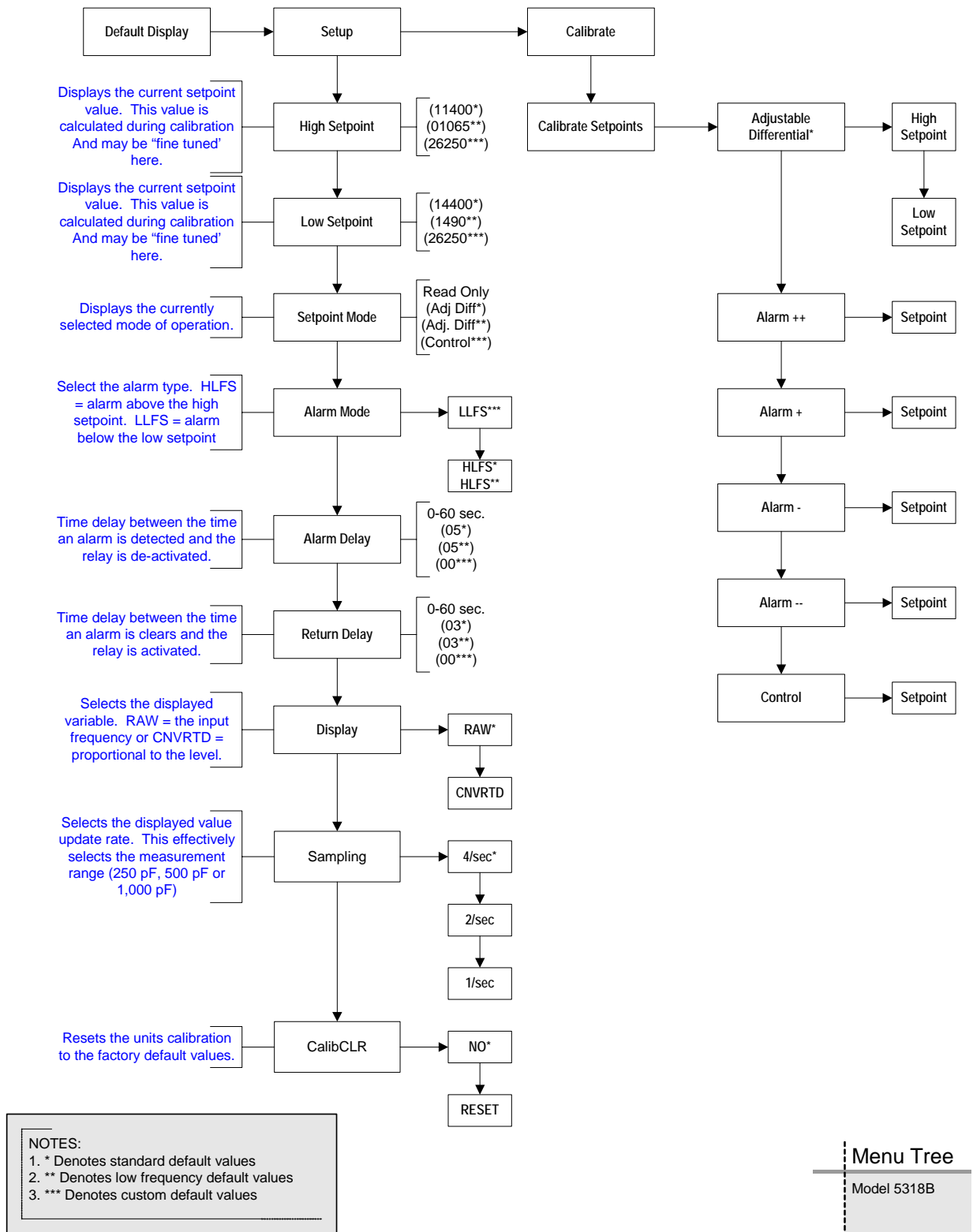


Figure 4-2 Menu Tree

SECTION V – TROUBLE SHOOTING

5.1 STATUS LED

The Model 5318B is constantly checking its status. The STATUS LED (DS203) will flash at the rate of approximately once every two (2) seconds to indicate that the electronics are functioning correctly.

If the LED is not flashing the instrument may be reset by removing power from the instrument for a minimum of 10 seconds. If the LED is still not flashing contact your nearest ROBERTSHAW Industrial Products Representative for replacement parts.

5.2 ERROR CODES

There are also a number of Error Codes that are displayed to indicate various detected out of range values.

5.2.1. ERROR 01 – Reserved

This error code is reserved for future use.

5.2.2. ERROR 02 – Measurement Too High

This error code alerts that the current raw measurement value is too high (the sensed capacitance is too low).

The most common cause of this error is an open circuit to the probe and the most common cause is a failure to install the probe pin.

If the probe pin is installed contact your nearest ROBERTSHAW Industrial Products Representative for assistance.

5.2.3. ERROR 03 – Measurement Too Low

This error code alerts that the current raw measurement is too low (the sensed capacitance is too high).

The most common cause of this error is improper control range selection. If this error occurs refer to paragraph 4.4.1.

Another cause of this error is a shorted probe. To check for a shorted probe follow the following procedure:

- Remove power from the instrument.
- Remove the cover from the instrument.
- Remove the electronics assembly from the base of the housing by loosening the three (3) captive screws and pulling it straight up, out of the base.
- With a Multi-Meter measure the resistance between the probe pin and the base. This value should be greater than 3 Megohms.

If changing the control range or a shorted probe is detected, contact your nearest ROBERTSHAW Industrial Products Representative for assistance.

5.2.4. ERROR 04 – Low Setpoint Too Close or Reversed.

This error code alerts that the low setpoint level being calibrated is higher than the high setpoint level.

5.2.5. ERROR 05 – High Setpoint Too Close or Reversed

This error code alerts that the high setpoint level being calibrated is lower than the low setpoint level.

SECTION VI – SPARE PARTS

PART NUMBER	DESCRIPTION	USED ON
044KX350-11	PCA, MEASUREMENT & HMI, STD	5318B-x1-x
044KX350-21	PCA, MEASUREMENT & HMI, LOW FREQUENCY	5318B-x2-x
044KX350-31	PCA, MEASUREMENT & HMI, CUSTOM CALIBRATION	5318B-x3-x
044KX353-01	PCA, POWER SUPPLY & RELAY, AC POWERED	5318B-Ax-x
044KX353-02	PCA, POWER SUPPLY & RELAY, 18-36 VDC	5318B-Bx-x
044KX353-03	PCA, POWER SUPPLY & RELAY, 9-18 VDC	5318B-Cx-x
044KX355-11	ELECTRONICS ASSY, AC POWERED , STD	5318B-B1-x
044KX355-12	ELECTRONICS ASSY, 18-36 VDC, STD	5318B-A1-x
044KX355-13	ELECTRONICS ASSY, 9-18 VDC POWERED, STD	5318B-C1-x
044KX355-21	ELECTRONICS ASSY, AC POWERED , SPECIAL	5318B-B2-x
044KX355-22	ELECTRONICS ASSY, 18-36 VDC, LOW FREQ	5318B-A2-x
044KX355-23	ELECTRONICS ASSY, 9-18 VDC, LOW FREQ	5318B-C2-x
044KX355-31	ELECTRONICS ASSY, AC POWERED, CUSTOM CAL.	5318B-B3-x
130KB051-02	FUSE, DC POWERED UNITS	5318B-Ax-x 5318B-Cx-X
130KB051-03	FUSE, AC POWERED UNITS	5318B-Bx-x
909GM168	KIT, PROBE TERMINATION (INCLUDES PROBE PIN & SCREWDRIVER)	ANY
909GM170	KIT, SUPPRESSION (FOR INDUCTIVE LOADS)	ANY
560KB051-57	O-RING, COVER	ALL

SECTION VII – ACCESSORIES

PART NUMBER	DESCRIPTION
032KX050-XX*	COAX EXTENSION CABLE WITH CONDUIT OUTLET BOX, MEETS TYPE 4 (NITRO BLUE POLYURETHANE FINISH)
032KX080-XX*	COAX EXTENSION CABLE WITH CONDUIT OUTLET BOX, MEETS TYPE 4X (GRAY EPOXY FINISH)

- * Replace XX with cable length in feet.
Maximum recommended length is 15 feet (4.5m)
Consult the factory for lengths over 15 feet.

FILE NO.	909HB918		NO MANUAL REVISIONS PERMITTED	
	REV.	CHANGE NO.	DESCRIPTION	REVISED
				DATE BY
	A	96284	RELEASE FOR PRODUCTION	18APR08 PDK 20APR08 PDK 17MAY08 PAJ
	B	96435	ADD POWER SUPPLY DESIGNATION C, ADD OPTIONS DESIGNATION 2 REMOVE ENCLOSURE OPTIONS B, C, E, F. ADD "*" DENOTES STANDARD CONFIGURATION* REMOVE FLANGE MOUNT VIEW FORM PAGE 2	27MAY07 PDK

ELECTRICAL CONNECTIONS

TB101 - SUPPLY POWER	
GND	EARTH GROUND
NEU(-)	SUPPLY POWER
HOT(+)	(SEE RATING PLATE)

TB102 - CONTACTS	
N.C. 1	NORMALLY CLOSED #1
C 1	COMMON #1
N.O. 1	NORMALLY OPEN #1
N.O. 2	NORMALLY OPEN #2
C 2	COMMON #2
N.C. 2	NORMALLY CLOSED #2

CONTROL RELAY CONTACT DESIGNATIONS ARE SHOWN WITH THE RELAY IN THE DE-ENERGIZED CONDITION. THE RELAY IS NORMALLY ENERGIZED AND BECOMES DE-ENERGISED WHEN THE LEVEL REACHES THE CONTROL POINT.

MODEL NUMBER IDENTIFICATION

5318B - B1 - A

KEY MODEL NUMBER ↑

SUPPLY POWER ↑

OPTIONS ↑

ENCLOSURE ↑

DESIGNATION	DESCRIPTION
5318B	CAPACITANCE INPUT POINT LEVEL SWITCH.

DESIGNATION	DESCRIPTION
1*	STANDARD
2	SPECIAL, LOWER MEASUREMENT FREQUENCY

DESIGNATION	DESCRIPTION
A	18 - 36 VDC
B*	100 - 240 VAC, 50/60 Hz
C	9 - 18 VDC

DESIGNATION	DESCRIPTION
A*	TYPE 4, NITRO BLUE
D	TYPE 4X, GRAY EPOXY

* DENOTES STANDARD CONFIGURATION

THIS CERTIFICATION APPLIES ONLY TO YOUR ORDER: _____

ITEM OR TAG: _____

ROBERTSHAW ORDER NO: _____

APPROVED: _____ DATE: _____

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DR. PDK	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	<p>INDUSTRIAL PRODUCTS MARYVILLE, TENNESSEE</p>
DATE 13JAN08	TOLERANCES UNLESS SPECIFIED	
DES. APPD. PDK	DECIMALS ±.005	
ENG. CHD. PAJ	ANGLES ± 1°	
REQUIRED CERTIFICATIONS	CAST SURFACES ±.002	CERTIFIED PRINT INSTALLATION DRAWING MODEL 5318B
SPECIFICATIONS: ANS1 Y14.5M-1982	REMOVE BURRS - BREAK CORNERS .015 MAX.	
SCALE _____	EXP. DRAWING NUMBER	909HB918
	PROD. ENG. NO.	REV. B

Figure A-1 Installation Drawing

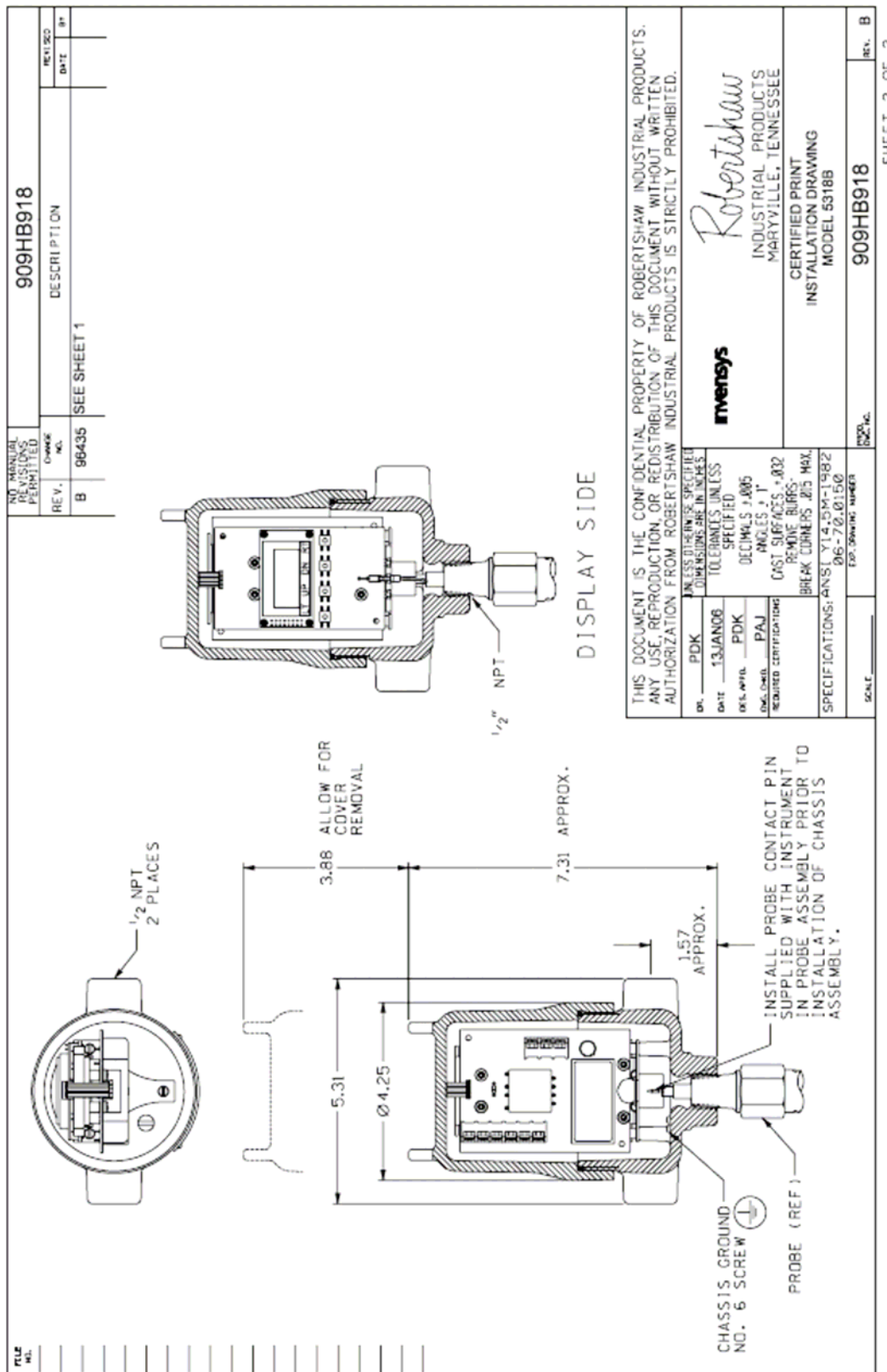


Figure A-1 Installation Drawing -Continued

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