QUICK START GUIDE

Level Tek II
Model 5318B

Robertshaw
INDUSTRIAL PRODUCTS

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Record of Changes

Rev	Design Engineer's Approval	Engineering Manager's Approval	Approval Date	COS Number	Brief Description
A	*P. Kronau*			96469	Release for Production

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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

5 $_{c}$ETL$_{us}$ APPROVALS

Conforms to UL..... Standard 61010-1

Conforms to CAN/CSA ..... C22.1 NO. 61010-1

6 RoHS Compliance

Conforms to ..... EU Directive 2002/95/EC

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SECTION 4 – SPECIFICATIONS

1 ENVIRONMENTAL

Storage Temperature Limits ..... -55ºF to +225ºF (-48ºC to +107ºC)

Operating Temperature Limits ..... -40ºF to +160ºF (-40ºC to +70ºC)

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 PERFORMANCE

Temperature Coefficient ..... 0.01pF/ºC 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

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

pushbutton and then scrolling down to the end of the menu. The top line of the LCD will display “CalibCLR” and the bottom line will display “NO”. Pressing the [RT] pushbutton twice followed by pressing the [DN] pushbutton once will change the bottom line to display “RESET”. Pressing the [RT] pushbutton once will cause the setting to be restored and “DONE” will be momentarily displayed on the bottom line.

The instrument will then return to normal operation.

SECTION 1 – DESCRIPTION

1 General

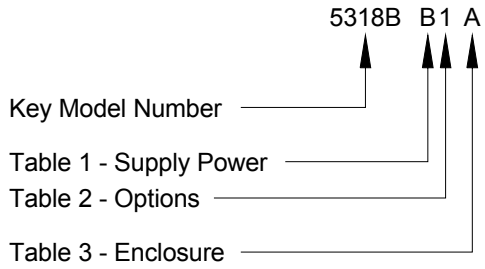
The Model 5318B Level Tek II is an RF capacitance based level switch. It can be used with a variety of Robertshaw probes which are sold separately. The Model 5318B is capable of detecting a variety of products, including liquids, powders, granular, lump and flake materials. The product may be either conductive, or non-conductive, depending on the probe selection.

The Model 5318B is self-contained and uses microcontroller based digital electronics to insure long term stability, reliability and reduced maintenance. The output is provided by a DPDT, 5A, relay. This relay is fail-safe since it is normally energized when no alarm exist and de-energizes when an alarm condition is detected. The Model 5318B is available for both AC and DC operation.

The Model 5318B is easily configured and calibrated thru the use of pushbutton switches and an LCD display. There are three control ranges: 250 pF, 500 pF and 1000 pF. Data displayed on the LCD display can be either the raw measurement or a converted value.

2 Model Identification

The instrument can be identified using the model number that can be found on the nameplate and the following tables:



Key Model Number

Designation	Description
5318B	Capacitance actuated ON-OFF Level Control. DPDT relay, fixed and adjustable differential, and adjustable time delays. Explosion-proof, weather tight enclosure, that can be either probe or remote mounted.

Table 1 – Supply Power

Designation	Description
A	18 – 36 VDC
***B**	100 – 240 VAC, 50/60 Hz
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	18 – 36 VDC
***B**	100 – 240 VAC, 50/60 Hz
D	
E	9 – 18 VDC

*Denotes standard configuration

converted displays a value proportional to the measured capacitance (level). The raw value decreases nonlinearly as the level increases. The converted value increases linearly as the level increases. The displayed mode does not affect the operation of the Model 5318B. The mode selected is a matter of personal preference.

With "Display" displayed on the top line of the LCD the bottom line will display the currently selected mode.

Pressing the [RT] pushbutton twice will enter the change mode. The current mode will be displayed on the bottom line of the LCD followed by an "*". The [UP] or [DN] pushbutton is then used to scroll to the other version. Pressing [RT] will store the current select and return to the previous level of the menu. Pressing [LT] will return without making a change.

5.4 Sampling Rate

The sampling rate determines the control range of the instrument. The instrument always makes measurements at the rate of once every ¼ second. The two other rates are sliding totals of the last two, or the last four, measurements. This keeps the working measurement in a reasonable range.

Table 1 -- Sample Rate vs. Control Range

Sample Rate	Control Range
4/second	20 – 250 pF
2/second	20 – 500 pF
1/second	125 – 1,000 pF

With "Sampling" displayed on the top line of the LCD the bottom line of the display the current setting.

Pressing the [RT] pushbutton twice will enter the change mode. The current update rate will be displayed on the bottom line of the LCD followed by an "*". The [UP] or [DN] pushbutton is then used to scroll to the other rates. Pressing [RT] will store the current select and return to the previous level of the menu. Pressing [LT] will return without making a change.

6 Restoring the Factory Default Calibration & Setup

Under some circumstances it may be desirable to restore the factory settings. The provision to do this is located at the end of the Setup Menu. This feature can be accessed from the "normal" operating mode by pressing the [DN] pushbutton followed by pressing the [RT]

5 Setup

When the Application Worksheet was filled out there were several items that were included that did not apply to calibration. These items are set in the Setup Menu. The menu is accessed by pressing the [DN] pushbutton followed by pressing the [RT] pushbutton. The [UP] and [DN] pushbuttons are then used to slew to the desired item.

5.1 ALARM MODE

This entry is also known as the failsafe mode and determines the state of the relay in relation to the setpoint(s). With “Alarm ON” displayed on the top line of the LCD display, the current failsafe mode will be displayed on the bottom line of the display.

Pressing the [RT] pushbutton twice will enter the change mode. The current mode will be displayed on the bottom line of the LCD followed by an “*”. The [UP] or [DN] pushbutton is then used to scroll to the other version. Pressing [RT] will store the current select and return to the previous level of the menu. Pressing [LT] will return without making a change.

5.2 Time Delays

There are two time delay functions. One is the delay from the time the alarm condition is detected until the relay is deactivated. The other is the delay from the time the return to normal is detected until the relay is activated.

5.2.1. Alarm Delay

With “AlarmDly” displayed on the top line of the LCD, the bottom line will display the current setting in seconds.

Pressing the [RT] pushbutton twice will enter the change mode. The current value will be displayed on the bottom line of the LCD followed by an “*”. The [UP] or [DN] pushbuttons are used to slew through the allowable values (0-60 seconds). Pressing [RT] will store the current value and return to the previous level of the menu. Pressing [LT] will return without making a change.

5.2.2. Return Delay

With “Ret. Dly” displayed on the top line of the LCD, the bottom line will display the current setting in seconds.

Pressing the [RT] pushbutton twice will enter the change mode. The current value will be displayed on the bottom line of the LCD followed by an “*”. The [UP] or [DN] pushbuttons are used to slew through the allowable values (0-60 seconds). Pressing [RT] will store the current value and return to the previous level of the menu. Pressing [LT] will return without making a change.

5.3 Display Mode

There are two different display formats available. One is ‘RAW” and the other is “CNVRTD”. Raw displays the unmodified measurement and

SECTION 2 – INSTALLATION

1 General

Examine the instrument for possible shipping damages before destroying any packaging materials. If for any reason it is determined that the instrument should be returned to the factory please notify the nearest Robertshaw industrial Products sale representative to obtain an RMA number. Item received at the factory without an RMA number will not be accepted. The unit should be returned in its original packaging. Robertshaw assumes no responsibility for equipment damaged in shipment due to improper packaging.

Choose a mounting location in accordance with good instrument practice. Avoid extremes of temperature, humidity and vibration. (Refer to the specifications in Section 6)

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 both conductive and non-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 accidental puncture the probe insulation.

Care must be taken not to use TEFLON tape on the threaded connections of the probe gland. The gland grounds the instrument to the process.

Probes may be mounted either horizontally, or vertically. Horizontally mounted probes offer the closest control, but vertically mounted probes offer more options for calibration.

2.1 Horizontal Mounting

Only rod type probes are suitable for horizontal mounting and they must be mounted at the desired point of level detection. Horizontally mounted probes provide the closest control (smallest deadband) in that a small change in level at, or near, the probe will produce the largest capacitance change.

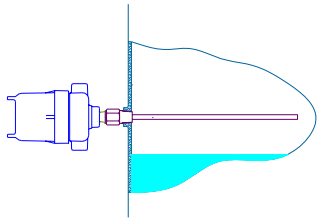


Figure1
Horizontally Mounted Probe

On applications that involve viscous liquids, or materials, that have a tendency to “cling” to, or “buildup”, it is recommended that the probe be mounted at a slight downward angle. This will promote draining of the material from the tip of the probe.

2.2 Vertical Mounting

Both rod type and flexible probes are suitable for vertical mounting. Rod type probes can be mounted in either the top or bottom of the vessel, but flexible probes must be mounted in the top. The probe length should be selected so that the control range is approximately centered on the probe.

Vertically mounted probes allow for flexibility in the control point up ad down the length of the probe. They are also suitable for applications requiring a large differential, such as fill or sump control. The control point and differential are set through instrument calibration.

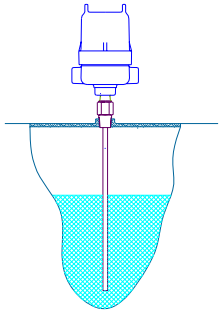


Figure 2
Vertically Mounted Probe

3 Instrument Mounting

The Model 5318B is typically mounted directly on the top of the probe, but it can also be remotely mounted using a Robertshaw remote mounting cable assembly. It is not recommended that the instrument be remote mounted by more than 15 ft.

5. Press the [RT] pushbutton three times to store the setpoint.
6. Drain the vessel until the level is at the desired Low Setpoint.
7. Press the [RT] pushbutton twice to store the setpoint and return to normal operation.

The calibration is now complete.

4.6 CONTROL

This mode is used for applications where it is impractical to install a horizontally mounted probe at the desired level, or the setpoint level may change. This mode requires adjusting the level in the vessel to the desired setpoint level. The sequence for doing the calibration is as follows:

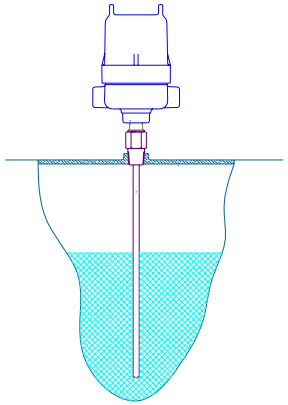


Figure 14 -- CONTROL Calibration

1. Enter into the calibration sequence by pressing the [DN] pushbutton twice.
2. Press the [RT] pushbutton twice to enter the calibration sequence.
3. Select Control by scrolling down through the selection using the [DN] pushbutton.
4. Select the calibration type by pressing the [RT] pushbutton.
5. Fill, drain, the vessel until the level is at the desired setpoint.
6. Press the [RT] pushbutton twice to store the setpoint and return to normal operation.

The calibration is now complete.

4.7 Setpoint Tweaking

In some instances it is desirable to fine tune the calibration once the instrument is in service. This can be done in the Setup Menu at the point where the current setpoint values are displayed. The setpoint values are displayed as the first two values in this menu. The Setup Menu is accessed by pressing the [DN] pushbutton, followed by pressing the [RT] pushbutton. This will result in displaying of the High Setpoint. Pressing the [DN] pushbutton will access the Low Setpoint.

While the setpoint is displayed the “tweaking” function can be entered by pressing the [RT] pushbutton twice. Once in this mode the setpoint can be moved up or down in 0.1% increments to a maximum of 10.0%. Pressing the [RT] pushbutton once will return to the display of the current value of the selected setpoint.

The setpoint is calculated as an offset from the current level. Alarm + + is intended for use with high dielectric materials and ALARM + is for use with lower dielectric materials.

4.3 ALARM -

4.4 ALARM - -

These two modes require that the level in the vessel be at, or above, the probe. Once it has been verified that the level is correct press the [RT] pushbutton three (3) times to verify and store the new setpoint.

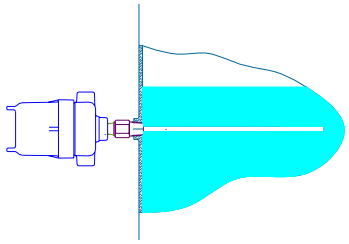


Figure 12 ALARM - & ALARM - - Calibration

The setpoint is calculated as an offset from the current level. Alarm - - is intended for use with high dielectric materials and ALARM - is for use with lower dielectric materials.

4.5 ADJUSTABLE DIFFERENTIAL

This mode is used in applications where the differential needs to be specified during calibration. A typical application is filling a tank where a valve is opened to allow material to flow into a tank when the level drops to a predetermined level and then the valve is closed when the level reaches the Full level. Another typical application would be sump control where a pump is started when the level reaches a maximum level and it runs until the level drops to a predetermined point.

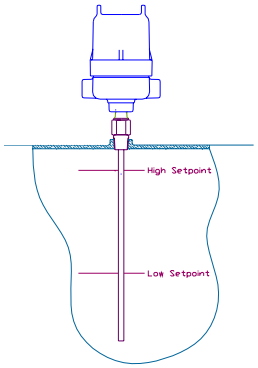


Figure 13 -- Adjustable Differential Calibration

Unlike the ALARM modes this mode requires adjusting the level to the desired setpoint levels. The setpoints can be set in any order, but it is usually easier to do the High Setpoint first, followed by the Low Setpoint. The sequence for doing the calibration is shown below:

1. Enter into the calibration sequence by pressing the [DN] pushbutton twice.
2. Press the [RT] pushbutton twice to enter the calibration sequence.
3. Select AdjDiff by pressing the [RT] pushbutton once.
4. Fill, or drain, the vessel until the level is at the desired High Setpoint.

3.1 Probe Mounting

Prior to installing the instrument on the probe remove the cover from the instrument and remove the electronics assembly from the cover base. The electronics assembly is mounted in the base with three captive screws.

Install the probe pin supplied with the instrument into the end of the probe prior to screwing the housing base onto the probe. Do not use TEFLON tape on the threads. Reinstall the electronic assembly into the instrument base.

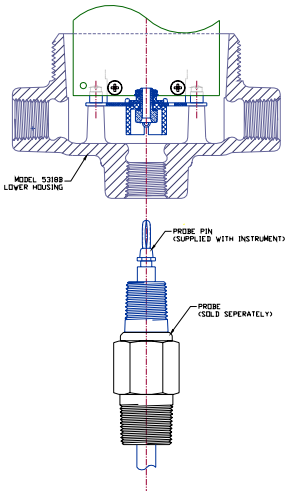


Figure 3 -- Probe Mounting

3.2 Remote Mounting

Prior to installing the instrument onto the remote cable assembly remove the cover from the instrument and remove the electronic assembly from the cover base. The electronics assembly is mounted in the base with three captive screws.

Install the probe pin supplied with the instrument into the end of the remote cable assembly prior to screwing the housing base onto the cable assembly. Do not use TEFLON tape on the threads. Reinstall the electronic assembly into the instrument base.

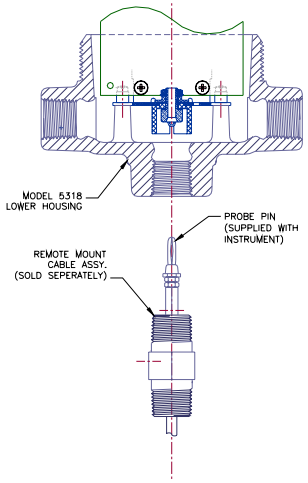


Figure 4 -- Remote Mounting

4 Electrical Connections

The electronic assembly may be removed from the instrument housing to facilitate wiring. The electronic assembly is removed by loosening the three captive screws and withdrawing the assembly straight out of the base. When reinstalling the assembly, make certain that the probe pin engages the socket in the base of the assembly

All connects must be made in accordance with the applicable national, state and/or local codes.

Refer to drawing number 909HB919, Certified Print, for complete installation and wiring requirements.

4.1 Supply Power

CAUTION – Be sure that electrical power has been disconnected from the wiring, at the source, before making, or breaking, any electrical connections.

Follow the following steps when connecting the supply power wiring to the Model 5318B:

1 Insure that all power to the wiring is **off**.

2 Remove the cover.

3 The supply power is connected to the instrument through the terminals of TB101 using 12 – 22 AWG wire.

4 Insure that the power source matches the rating of the instrument.

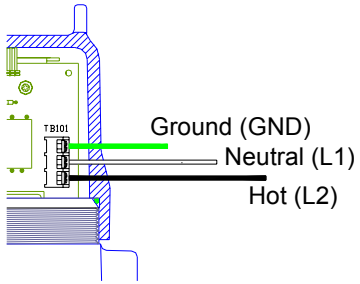


Figure 5 -- AC Power Connections
(100 – 240 VAC)

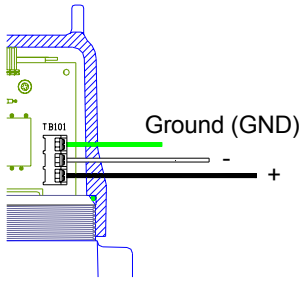


Figure 6 -- DC Power Connections
(9 – 18 VDC or 18 – 36 VDC)

3.1 Displays

Two displays located on the measurement circuit board. The Alarm LED and the LCD display.

3.1.1. Alarm LED

This red LED indicates the current alarm status. The LED is illuminated when the alarm condition exists, the relay is de-energized.

3.1.2. LCD Display

The information displayed on the LCD varies with the current operating mode. In the normal mode the top line shows the current alarm status, either NORMAL or ALARM, and the bottom line displays the current measurement. In either the calibration or setup modes the top line initially displays the name of the variable being accessed and the bottom line displays its current value with an "*" appended to it. After a short period of time the top line will begin scrolling a help string for adjusting the value. When adjusting a value the bottom line will show the adjusted value.

3.2 Navigation Switches

There are four (4) pushbutton switches located immediately below the LCD. These switches are used to negotiate through the menus and adjust values. These switches are labeled on the lower edge of the LCD.

4 Calibration

Either the Calibration or the Setup may be done first, but it is more logical to do the Calibration as the initial step. It should be noted that some modes require changing the level in the vessel while the others do not. Let's take a look at those that do not first.

Accessing the calibration menu requires pushing the down [DN] pushbutton twice followed by pressing the right [RT] pushbutton menu twice. The down [DN] and up [UP] can then be used to scroll through the available modes.

4.1 ALARM + +

4.2 ALARM +

These two modes require that the level in the vessel be below the probe. Once it has been verified that the level is correct press the [RT] pushbutton three (3) times to verify and store the new setpoint.

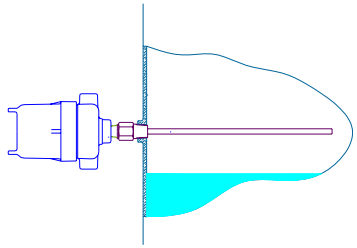


Figure 11 -- ALARM + + & ALARM + Calibration

Display Mode

- □ Raw – Unconverted measurement is displayed.
- □ Converted – A converted measurement is displayed. This value is proportional to the level and is most helpful when using a vertically mounted probe.

Sampling Rate

- □ 4/Second – This is the most sensitive mode, but it limits the sensing range to 250 pF.
- □ 2/Second – This mode extends the sensing range to 500 pF.
- □ 1/Second – This is the least sensitive mode an extends the sensing range to 1,000 pF.

3 User Controls & Displays

To access the user controls that are necessary calibrate and setup the Model 5318B it is necessary to remove the cover and operate the instrument with the power applied.

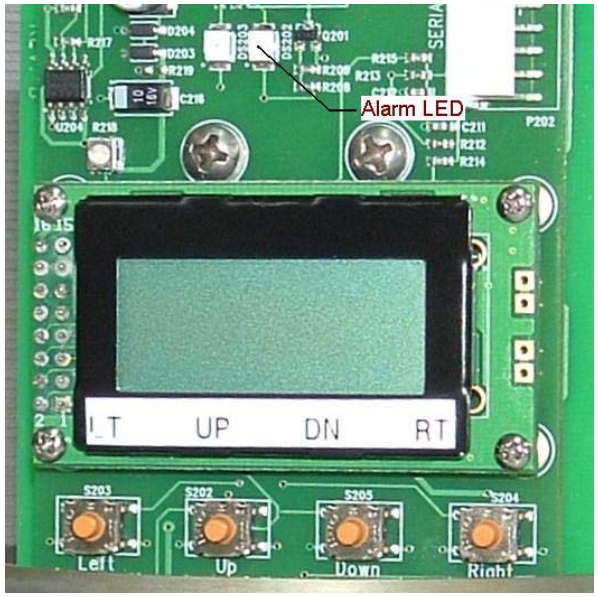


Figure 10 -- User Controls & Displays

Please note that the side of the instrument where the controls and displays are located contains only low voltages, +5 VDC max.

4.2 Relay Connections

The relay output of the Model 5318B provides a DPDT failsafe output. These are 5A rated dry contacts (they do not supply power).

Follow the following steps when connecting the supply power wiring to the Model 5318B:

1 Insure that the power supply to the instrument is turned **off** at the source.

2 Insure that all power to the relay wiring is o**ff**.

3 Remove the cover.

4 The supply power is connected to the instrument through the terminals of TB102 using 12 – 22 AWG wire.

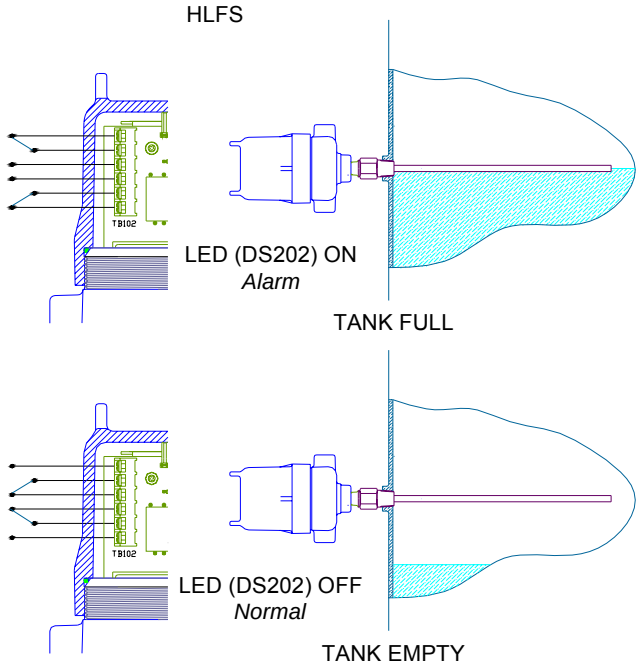


Figure 7 -- High Level Fail-Safe (HLFS)

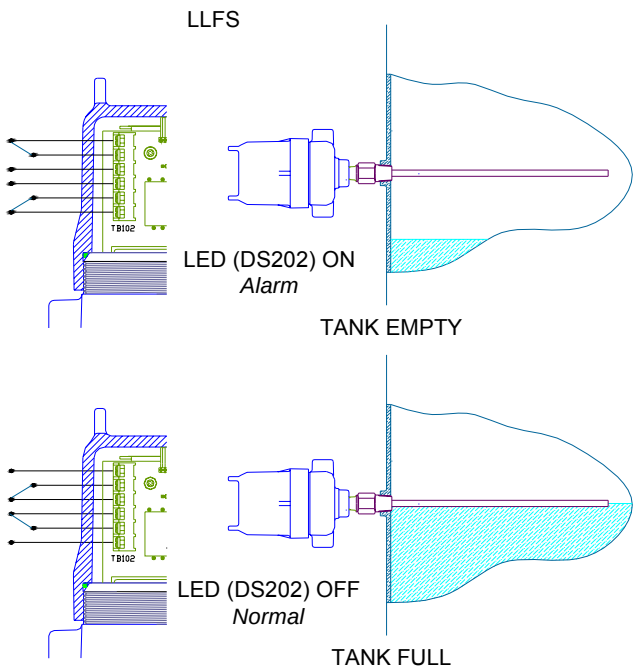


Figure 8 -- Low Level Fail-Safe

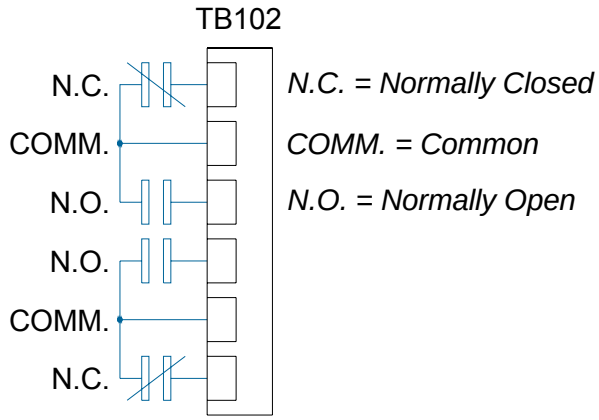


Figure 9 -- Relay Contacts
(Shown in the Deenergized, Normal State)

SECTION 3 – OPERATION

1 General

The standard Model 5318B is shipped from the factory pre-calibrated for adjustable differential, HLFS, minimum span and measurement displayed in the "RAW" mode. This represents a "typical" application for a vertically mounted probe.

2 Application Worksheet

Before placing the unit into service the settings should be reviewed and any necessary changes determined. The following worksheet will aid in determining the proper settings.

Control Mode

Horizontally Mounted Probes

Probe is not cover by the material being sensed

□ Alarm + + (Material has a high dielectric constant)

□ Alarm + (Material has a low dielectric constant)

Probe is covered by the material being sensed

□ Alarm – (Material has a low dielectric constant)

□ Alarm - - (Material has a high dielectric constant)

Vertically Mounted Probes

□ Adjustable Differential – Alarm and return points are separated by some distance. A typical application would be fill control where a fill valve is opened when the level drops to a low level and the valve stays open until the vessel is filled to a high level.

□ Control (Fixed Differential) – The alarm and return points are both at a single point. This is similar to the "Alarm" modes, but uses a vertical probe.

Alarm Mode

□ High Level Alarm (HLFS) – The alarm occurs when the level rises above the high setpoint.

□ Low Level Alarm (LLFS) – The alarm occurs when the level falls below the low setpoint.

Time Delays

_____ Alarm Delay (0 to 60 seconds) – This is the time that the alarm condition must exist before the relay is deactivated.

_____ Return Delay (0 to 60 seconds) – This is the alarm condition must not exist before the relay is activated.