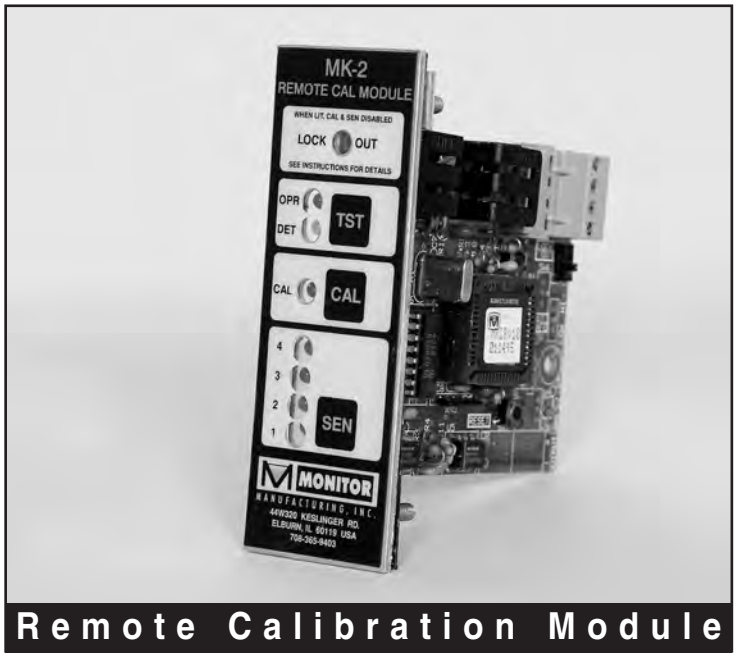
BULLETIN

434B

INSTALLATION & OPERATION

Remote Calibration Module For Model MK-2 RF Capacitance Level Sensor



Remote Calibration Module

Thank you for purchasing a quality product manufactured by Monitor Technologies LLC. We realize that you do have a choice of vendors and we sincerely appreciate your business!

Before discarding shipping container, please inspect it thoroughly and verify that all parts ordered are accounted for. Sometimes smaller parts become stuck under carton flaps and other packaging materials.

In the event that information contained herein does not completely satisfy your requirements or answer your questions, you may contact Technical Support on our website www.monitortech.com, by telephone at 800-766-6486 (630-365-9403), or by fax at 630-365-5646. If your Remote Calibration Module ever requires service either in or out of warranty, please contact us and obtain an RMA number prior to shipping the unit to us.

MONITOR®

The Remote Cal Module is designed to be used in conjunction with a the MK-2 RF Capacitance Level Sensor. The module has the capability to setup, test and display the various sensor functions from a remote location. This is especially beneficial in applications where the sensor's accessibility is limited or restricted, in cases where visual indication of the sensor's conditions are critical, or in hazardous location applications where it is unsafe to remove the sensor's cover with power applied. The ergonomic panel mounted package can be installed to a facility's control panel where all the functions required to operate the MK-2 Level Sensor can be performed with a push of a button. One Remote Cal Module is required for each MK-2 being controlled.

MECHANICAL INSTALLATION

The Remote Cal Module is packaged as a panel-mount device with a watertight faceplate. The exposed electronics must be given proper environmental, mechanical and electrostatic discharge (ESD) protection during handling and installation. Final installation of the module can be done in a variety of user supplied control panels.

Location

The module can be placed up to 1000 feet from the sensor. Select a location with moderate lighting so the indicators will brightly illuminate. The environmental conditions should be in accordance the specifications listed on page 4. Standard dust-tight or water-tight cabinets are acceptable depending on the application. Furthermore, it is recommended to locate the module away from electrical equipment which has the capability to generate electrical surges (i.e. motors, relays, pumps etc.).

DIMENSIONS ARE SHOWN IN INCHES WITH MILLIMETER EQUIVALENT IN BRACKETS

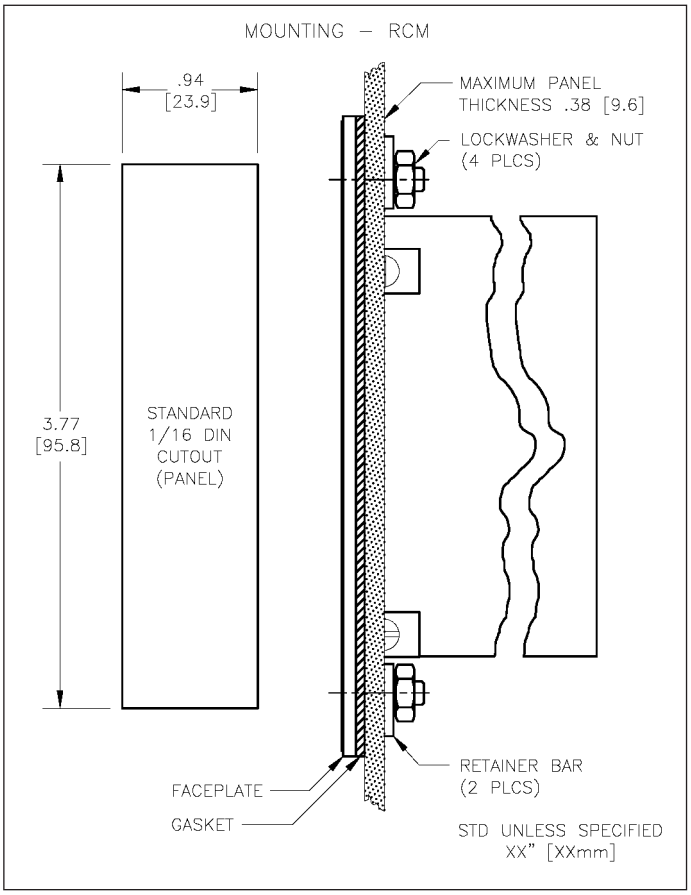


Figure 1

Mounting

The module is designed to fit in a standard 1/16 DIN cutout. Punch or cut hole in desired cabinet as depicted in Figure 1. Handle the module by the metallic faceplate to eliminate possibility of electrostatic discharge (ESD) to the circuit. Remove the retainer bars from the Remote Cal Module by removing the four corner nuts and lockwashers. Do not remove the gasket from the backside of the faceplate. Slip module through front side of hole with the four studs protruding through the cutout. From backside of hole, reattach retainer bars and tighten nuts and lockwashers evenly until gasket is roughly 50% compressed (final gasket thickness approximately 1/16").

ELECTRICAL INSTALLATION

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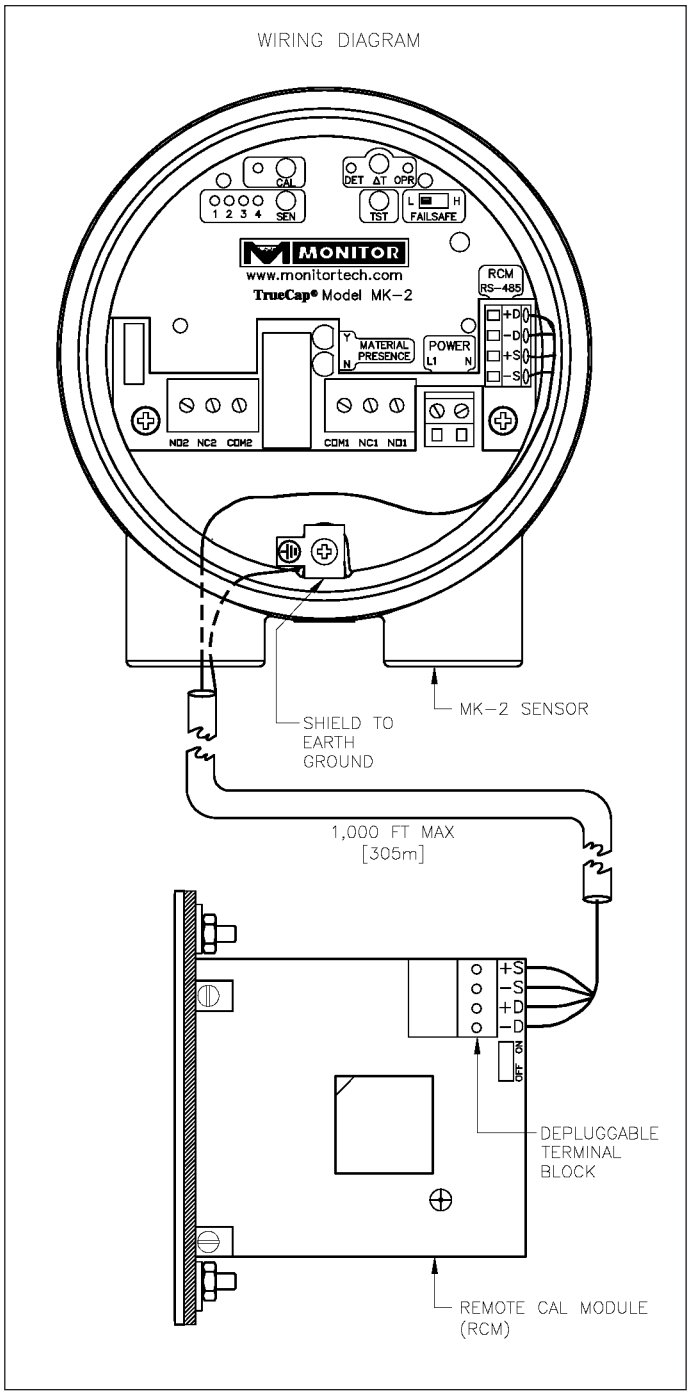

Figure 2

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The Remote Cal Module connects directly to the MK-2 sensor via a four conductor shielded cable. See Figure 2. Recommended cable type is Belden 9534 or equivalent. Remove power from the MK-2 which will connect to the Remote Cal Module. The cable may be routed through the same conduit as other MK-2 control wires. Located on the Remote Cal Module is a four-position connector which can be deplugged to simplify wire insertion. Interconnect the "+D", "-D", "+S" and "-S" on the module to the respective terminals in the sensor. Note that the sensor's terminal block is not depluggable but its labeling is identical to that of the Remote Cal Module. Complete the installation by connecting the shield's drain wire to earth ground at the sensor end only.

CALIBRATION

The operation of the primary functions on the Remote Cal Module (i.e. calibration, sensitivity, test and associated indicators) is identical to the operation of those found on the MK-2 RF Capacitance Sensor. Activation of the module's functions affect the sensor the same as if the push-button was pressed on the sensor itself. Status indicators on the module will emulate those on the sensor. See Figure 3.

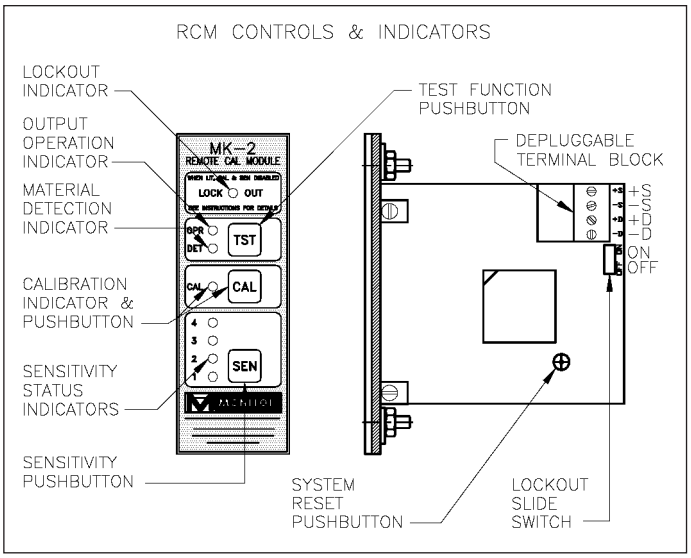


Figure 3

Calibration

The calibration of the unit is executed with the push-button designated "CAL". The purpose of the calibration is to null out or ignore any initial capacitance due to vessel configuration or extreme material build up on the probe and shield. When properly calibrate, the green "CAL" indicator will be illuminated. To initiate the calibration of the unit, first ensure that the probe is not submerged in product. Then press and release the "CAL" button. The "CAL" indicator will flash for a short period. If proper calibration occurs, the flashing will be followed by a continuously lit "CAL" indicator. The procedure can be done at anytime after installation providing the material level has not reached the probe in order to null out extreme conductive build-up or changes in the configuration of the probe or vessel.

Sensitivity

The sensitivity of the unit relates the amount of capacitance (in excess of the calibration value) required to place the sensor into the detect mode (product sensed). There are four sensitivity settings, "1" being the most sensitive, and "4" being the least sensitive. Therefore, materials with lower dielectric constants will require the unit to be set to a lower numbered sensitivity setting for maximum sensing capacity. Materials with higher dielectric constants can be set to a higher numbered sensitivity setting, so to provide an additional amount of build-up immunity. See Figure 4 for recommended settings. The sensitivity selection of the sensor is incremented by pressing and releasing the "SEN" push-button. The existing sensitivity setting of the MK-2 sensor is shown by the sensitivity indicators. If the unit does not sense product when the probe is covered with material, choose a lower numbered sensitivity setting. Conversely, if the sensor tends to false sense (sensing when the probe is not covered with product), increment to a higher numbered sensitivity setting.

SENSITIVITY SETTING OF THE MK-2

SENSITIVITY SETTING	DETECTION CAPACITANCE	MATERIAL DIELECTRIC	TYPICAL APPLICATIONS
1	0.5pf	1.5 - 2.0	PLASTICS, SOAP, CEMENT
2	2.6pf	2.0 - 4.0	SAND, RUBBER, OILS, COAL
3	8.3pf	4.0 - 7.0	GRAINS, FERTILIZERS, FEED
4	18.0pf	> 7.0	WASTEWATER, SLURRIES, ANY WATER BASED SOLUTIONS

Figure 4

Test Function

When initiated, the test function checks the MK-2 sensor's operation by effectively placing a capacitance value on the probe in accordance with the sensitivity setting selected. Having the capability to perform this function from the remote location is particularly important when the MK-2 is a high level sensor which is infrequently covered with material. Performance verification provides additional assurance that the sensor remains ready to sense product when present. To activate, first ensure that the unit is calibrated properly indicated by an illuminated "CAL" indicator, and that the probe is not submerged in product. Next, press and hold the "TST" push-button. Proper operation of the MK-2 is indicated by illumination of the "DET" indicator. If the "TST" push-button is continuously pressed longer than the time delay setting (adjustable on sensor only) the "OPR" indicator will be activated as well. (Note: The relay contacts at the sensor will change states whenever the "OPR" indicator status changes. Be sure the application can tolerate a temporary change in the output prior to activating the test function.) Improper operation is indicated by the failure of the "DET" indicator to illuminate.

Lockout

In some applications, it may be desirable to restrict access to the calibration and sensitivity functions after initial MK-2 setup. A lockout feature is provided on the module PCB which will disable the Remote Cal Module's "CAL" and "SEN" push-buttons. Select the desired mode by positioning the slide switch in at either "ON" (lockout activated) or "OFF" (lockout deactivated) as designated on the PCB. When lockout is activated, the "LOCKOUT" indicator will illuminate. Note that the test function "TST" push-button will remain active at all times so verification of operation can still be made as desired.

Communication Error

In the even of a communication error between the Remote Cal Module and MK-2 sensor, a visual "error message" will be displayed on the Remote Cal Modules sensitivity LEDs. For one second, the four LEDs will sequentially flash on and off indicating a communications error. If this occurs repeatedly, see "troubleshooting" section of this bulletin.

TROUBLESHOOTING

PROBLEM: No LEDs illuminate on the Remote Cal Module.

CAUSE/SOLUTION:

1) Verify polarity of power supply connections "+S" and "-S".

2) Insure that power is properly supplied to the MK-2 sensor which the Remote Cal Module is connected.

3) Press and release "RESET" switch located on the Remote Cal Module board. This reboots the internal software. Wait approximately 3 seconds for software to reset.

PROBLEM: The sensitivity LEDs repeatedly flash the communication error message.

CAUSE/SOLUTION:

1) Verify polarity of communication connections "+D" and "-D".

2) Insure that the "CAL" or "SEN" on the related MK-2 sensor is not being activated while "CAL", "SEN" or "TST" is activated at the Remote Cal Module.

3) Press and release "RESET" switch located on the Remote Cal Module board. This reboots the internal software. Wait approximately 3 seconds for software to reset.

4) Insure interconnection cable has shield grounded at the MK-2 sensor.

5) Press and release "RESET" switch located on the associated MK-2 sensor.

6) Locate and eliminate possible noise sources between sensor and module. Reroute cable if necessary.

PROBLEM: "CAL" and "SEN" functions do not operate at the Remote Cal Module.

CAUSE/SOLUTION:

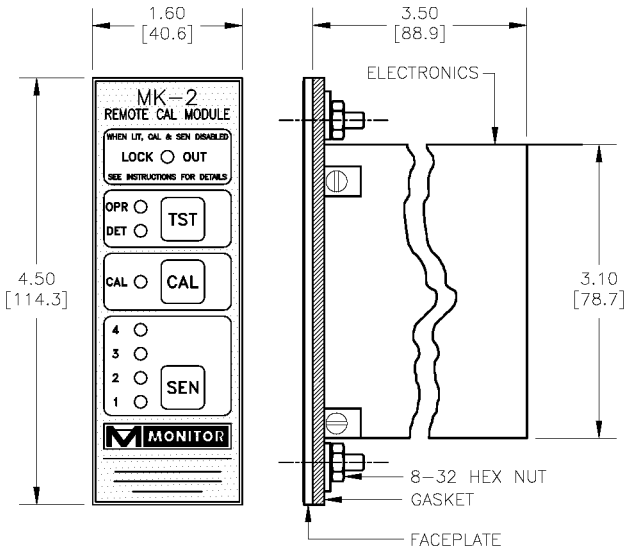
1) Insure the "LOCKOUT" selector switch located on the Remote Cal Module is in the "off" position.

WARRANTY

Monitor Technologies LLC warrants each Remote Calibration Module it manufactures to be free from defects in material and workmanship under normal use and service within two (2) years from the date of purchase. The purchaser must give notice of any defect to Monitor within the warranty period, return the product intact and prepay transportation charges. The obligation of Monitor Technologies LLC under this warranty is limited to repair or replacement at its factory. This warranty shall not apply to any product which is repaired or altered outside of the Monitor Technologies LLC factory, or which has been subject to misuse, negligence, accident, incorrect wiring by others or improper installation. Monitor Technologies LLC reserves the right to change the design and/or specifications without prior notice.

MECHANICALS

DIMENSIONS ARE SHOWN IN INCHES WITH MILLIMETER EQUIVALENT IN BRACKETS



SPECIFICATIONS

Operating Temperature:	-4˚ to 150˚ F (-20˚ to 65˚ C)
Communications Link:	RS-485
Protocol:	Proprietary
Power:	Supplied from MK-2 Sensor (24VDC @ 0.1A)
Interconnection Cable:	Four conductor, shielded, 24 AWG (Belden 9534 or equiv)
Interconnection Distance:	1000 ft max (305 m)
Mechanical (cutout):	1/16" DIN 0.94 X 3.77 in (24 X 96 mm)
Insertion Depth:	3.5 in (89 mm)
Faceplate:	Flush mount, water-tight/dust-tight with gasket, non-hazardous locations
Functions:	Calibration, sensitivity and test push-buttons
Lockout:	Internal slide switch-activate or deactivate lockout
Indicators:	"DET" yellow LED illuminates when material sensed "OPR" red LED illuminates to indicate output switching after selected time delay period "CAL" green LED illuminates to indicate that the unit is properly calibrated "SEN" bank of four red LEDs indicates the sensitivity setting of the unit "LOCKOUT" red LED illuminates when function is activated
Approvals:	CE Mark

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