



KNOWLEDGE BASE

Article Type: Instructions

Laser Analog Probe sensor for CPM models, 30, 40, 50 and 60.

Description:

Instructions on “How to” properly install and set-up a Laser Analog Sensor - Probe on a CPM machine.

WARNING

Never work on, clean or service this unit, control panel or any machine or open or remove any protective cover, guard, grate, door, or maintenance panel until the power or energy sources has been turned off, locked out / tagged out, and all moving parts have come to a complete stop and or blocked to prevent movement. Machinery is dangerous - avoid personal injury and or death by following manufacture, Local, and OSHA safety procedures. Contact Columbia Machine for safety decals, guards, horns and beacons.

Installation procedure of a CPM Laser Sensor

This section describes how to install and test a laser sensor (replacement or addition to an existing hopper probe – existing plants can switch between the two options at their will).

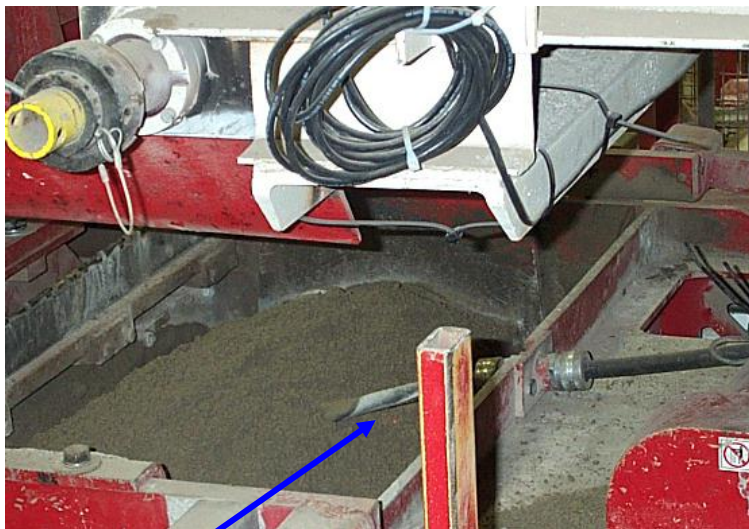
This procedure needs to be followed in conjunction with the drawings generated specifically for the machine in question.

A. Prerequisites for a retrofit to an existing CPM:

- a) A shielded cable needs to be installed from the CPM's hopper (location needs to be defined for all retrofit installations) to the CPM's Control Panel (preferably in conduit).

Example:

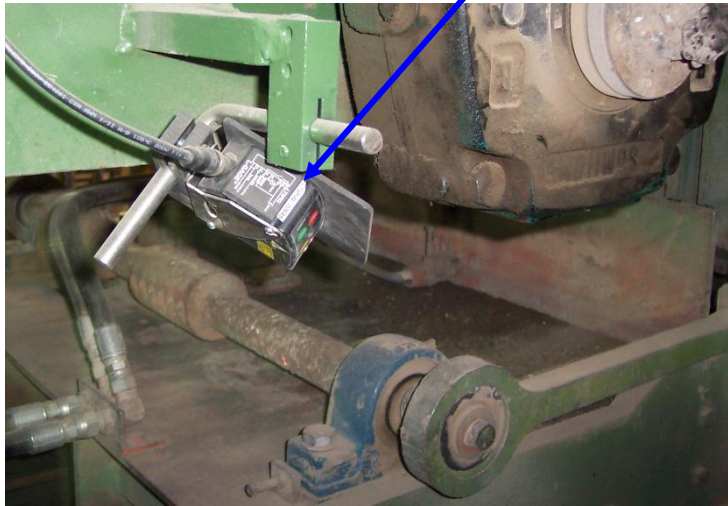
Sensor Location



Laser Beam reflected on the material

Example:

Sensor Location



Example:

Sensor Location



- b) An empty slot (CPM Control Panel) needs to be (or made) available for the analog card used to control the sensor
 - i. In case there are no slots available, an existing card (with the least used terminals) needs to be removed and its terminals redistributed
 - ii. If the above option is not applicable check if appropriate to change the entire rack
- c) Check if the existing Processor supports SCP instructions (older AB SLC 5/03 CPU's do not support this). If not, check for upgrade options.
- d) The PLC Ladder and PanelMate program, specific to the customer, needs to be updated to accommodate the "Laser" section.
- e) It is recommended to take in the field the drawings of the OLD and NEW Wiring Diagrams (or prepare in advance a list with the terminals that need to be moved from -> to location) (easier to reconfigure)

B. Tools required for the installation:

- a) Multi-purpose screwdriver (Flat and Philips Heads)
- b) 1/2 Ratchet Wrench
- c) Wire Stripper
- d) Ferrule Crimping Tool (for the extremities of Quick Disconnect Laser Cable)

C. Items required for the upgrade (for a complete list of items see BOM):

- a) Laser Sensor
- b) Sensor Bracket
- c) Sensor Protective Plate
- d) 30' Quick Disconnect Laser Cable (connector on one end)
- e) Analog Input Card (required one (1) Analog Input)
- f) DIN Rail
- g) 24 V Power supply (where applicable)
- h) 150' Belden cable (from Hopper to CPM Control Panel)
- i) 4x4x3 Junction Enclosure
- j) 20 Ft. #14 AWG (red, blue, green, white) wires (individual)
- k) Wire Connectors



D. Field Installation

a) Control Panel Section

- i. Prior to any work inside the panel make sure the power is turned OFF (check with a meter if this condition is true – at least for the section you are planning to work around – do not make any assumptions even after the breaker is OFF)
- ii. Identify an empty area (inside the panel) where it would be the best to install the power supply and terminal block
- iii. Drill holes (and tap) for the DIN rails if available
- iv. Place the Power Supply and Terminal Block on the rail
- v. Insert the Analog Card in the assigned slot on the PLC rack
- vi. Connect the wires according to provided drawings
- vii. Add or Modify PLC & PanelMate program for Laser sensor

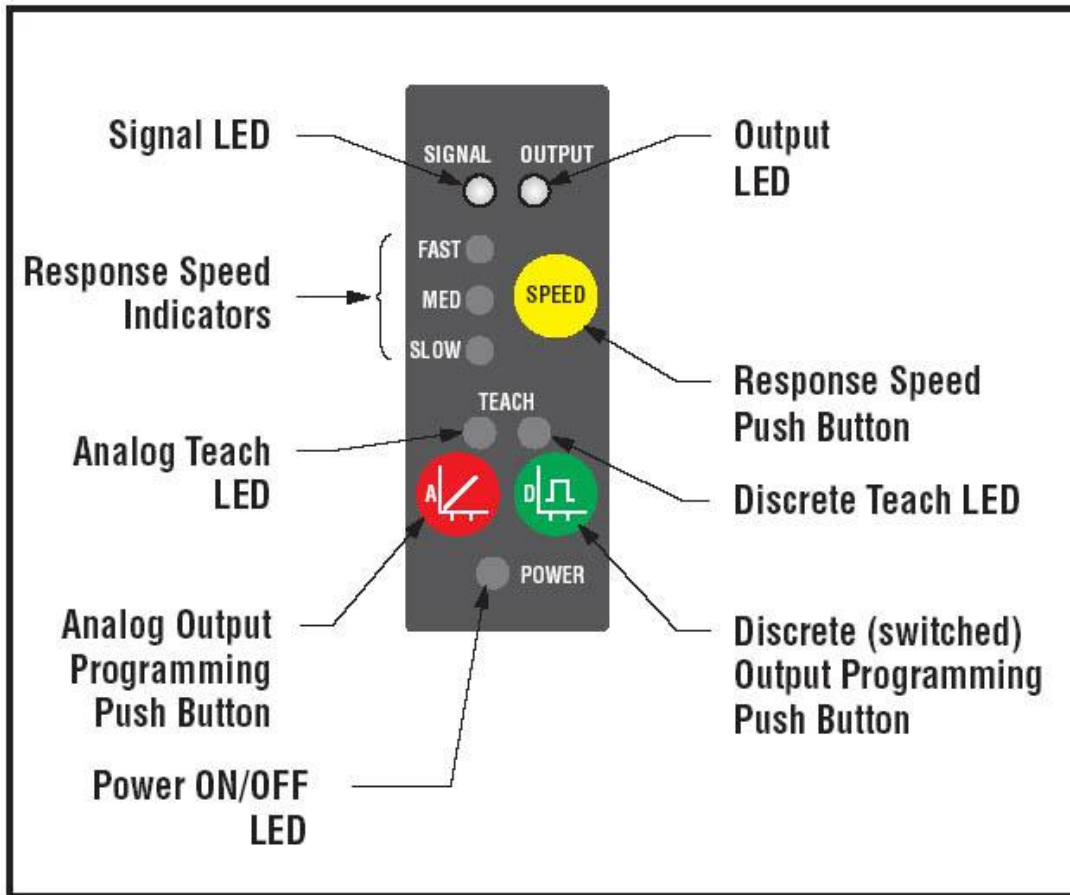
b) Hopper Section (assumptions: Junction Box and Laser Sensor mounting areas have already been chosen)

- i. Prior to any work around the Hopper make sure all the pumps have been turned OFF and station has been locked. (Must follow the Lockout/Tag out procedure)
- ii. Make the wire connections between the Laser and Belden Cables (inside the Junction Box)
- iii. Connect the cable to the Sensor
- iv. Attach the Laser Sensor to its mounting bracket and have it point to an area around the middle of aggregate cone (when material present)
- v. Turn the power ON for CPM Control Panel. At this point the “Power” ON/OFF, “Signal” (red) and “Output” (yellow) LED’s (on the Sensor) should be ON solid

WARNING:

LASER LIGHT
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT

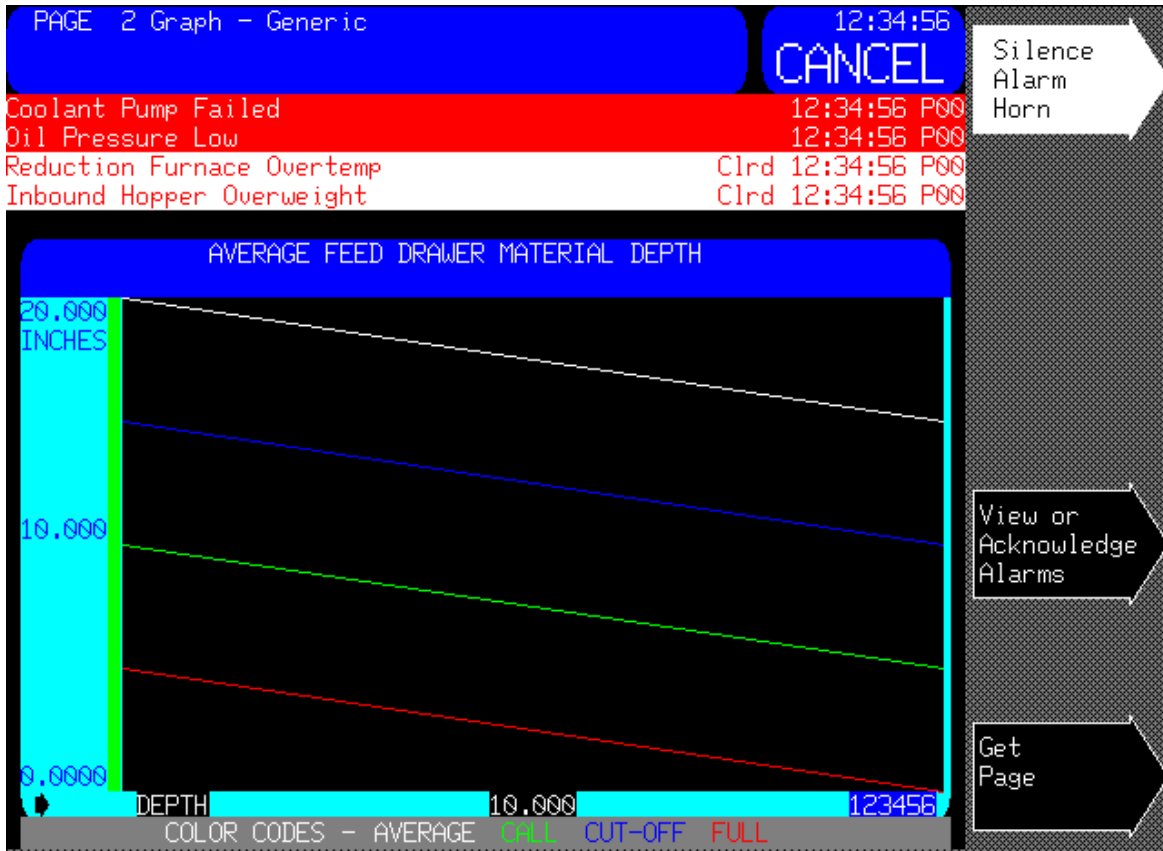




c) Sensor Calibration

- i. Press the "Analog Output Programming Button" until the "Analog Teach LED" turns ON solid
- ii. Sensor Calibration (with all the material removed from the hopper):
 - 1) Briefly click the "Analog Output Programming Button". By doing this you will set the first sensor limit. The "Analog TEACH LED" will flash to acknowledge the setting
 - 2) To set the second limit, extend a Tape Measure (and hold it into position) from the Sensor itself to the point where the Laser beam hits the bottom of the empty hopper. With the tape measure in position, block the beam at the **22 inch** mark and click the "Analog Output Programming Button" again. The "Analog Teach LED" turns OFF and the sensor is now in normal RUN mode. (Amount of inches will be depending on space available from the sensor to the feed drawer. This value will then be entered into the Scale instruction of the PLC program)
 - 3) For a more complete description of the sensor, see its documentation.
- iii. Press the "Speed" button to select the rate of measurements. Response speed should be set at **MED** (how fast the distance from the laser to aggregate should be updated)

d) Typical PanelMate Control Screen



E. Setting Call, Cutoff, Max Level for the Laser sensor using the PanelMate:

Once the Concrete Products Machine is in AUTOMATIC, we are going to set the aggregate limits using PanelMate:

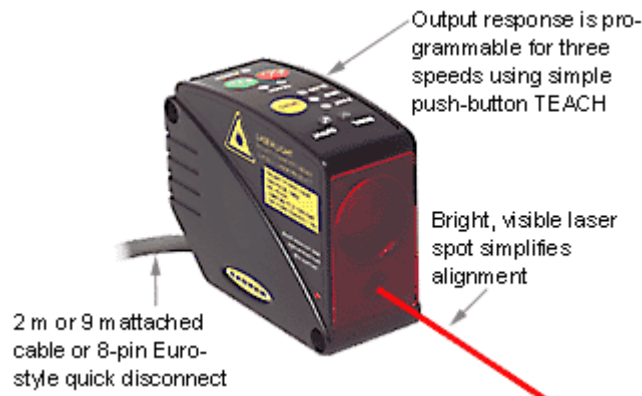
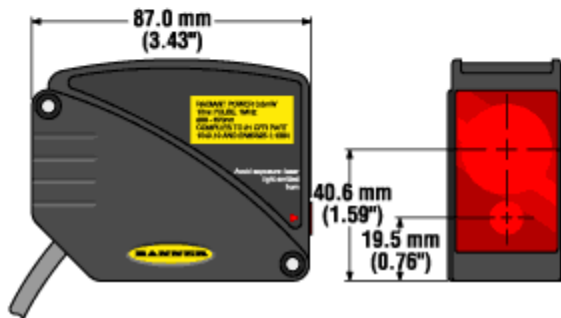
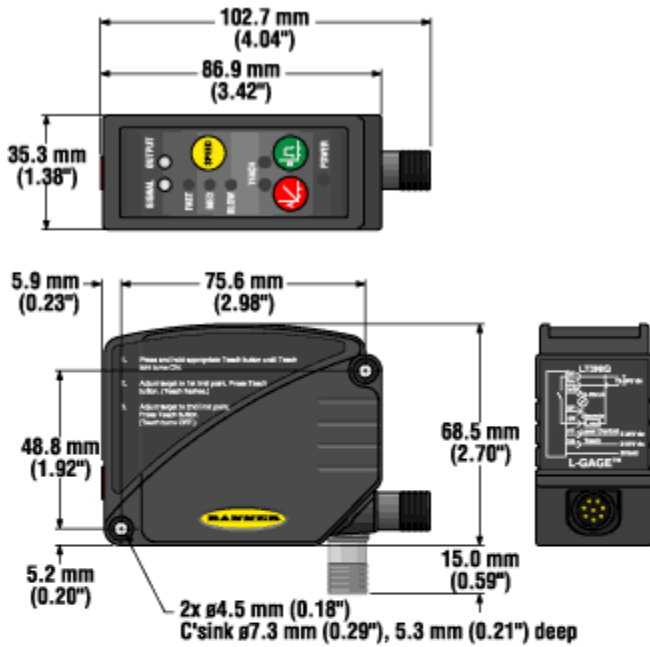
- a) Using the PanelMate we are going to set the following parameters:
 - i. “Laser Call Level”: the value in which the Mud or Metering Belt will fill the feed box until it reaches the cutoff value.
 - ii. “Laser Cutoff Level”: the value in which the PLC shut off the Mud or Metering Belt for a desired material depth.
 - iii. “Laser Max Level”: maximum material depth. If exceeded, the PLC shut off the Mud or Metering Belt and an alarm will occur.

Installation site:

Comments from customers:

- Run it with natural, red, buff, and charcoal colors experiencing no problems with any of these colors.
- Customer stated that he has watched the material level in the feed drawer on consecutive cycles and feels that the level in the feed drawer does not vary by more than 1/4".
- They have been able to run lower material levels in the feed drawer than possible with the mechanical probe. This is important when producing low height products like half high block or pavers.
- They have not had to stop the machine to clean out the feed drawer as often during production because there is not a mechanical probe to foul with concrete build-up. This reduces downtime in the plant and increases productivity.
- There is not a mechanical probe to remove and replace when changing agitator grates during a mold change. This reduces labor and time during a mold change.
- The desired material level is changed via control inputs rather than climbing on the machine and physically moving a probe. These settings could be added to the machine set-up menu making product changeover time quicker and machine settings more accurate and reliable.

Sensor Specification:



- Extremely long range: 5 m with white targets or 3 m with gray targets for diffuse mode sensors, up to 50 m for retro reflective models

- Each sensor has two outputs with independent window limits:
 - Analog and discrete output in each sensor
 - Two discrete outputs in each sensor
- Analog outputs available in a choice of 0 to 10Vdc or 4 to 20 mA sourcing
- Banner's unique scalable analog output automatically distributes the output signal over the width of the programmed sensing window
- Discrete outputs can be used for precision background suppression
- Rugged construction withstands demanding sensing environments; rated IEC IP67, NEMA6