



Royle Systems Group

Color-O-Meter



A Royle Color-O-Meter is designed for proportioning resin and one additive. The system comes complete with two hoppers and two rotating feed plates. The feed plates under each hopper rotate to meter the material from the hopper. The mixture ratio is controlled from a single calibration point.

A capacitance/ timer relay-type level control assembly actuates the drive motor for accurate process hopper level control. The complete machine assembly is designed for direct mounting above the process feed hopper and comes with all connection/ power cables.

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Specifications

Model	106	107	126	127
Power Supply	115/1/60	115/1/60	115/1/60	115/1/60
Additive	.5% - 5%	1.5% - 25%	2% - 20%	.5% - 7.5%
Accuracy Ratio	Less than +/- 1%	Less than +/- 1%	Less than +/- 1%	Less than +/- 1%
Maximum Output	1200 lbs / hr	1200 lbs / hr	1000 lbs / hr	1000 lbs / hr

Introduction

There are two basic models of the Royle Color-O-Meter. Model 106 is a machine designed to handle two components, one of which is color concentrate, and the other is uncolored compound. Model 126 is designed to handle three components consisting of color concentrate, uncolored compound, and granulated color rework material of the same color as the color concentrate being used. The design of the base, housing the drive and electrical circuitry, is the same for both models. The difference in the design of the two models is all in the super-structure.

The basic model 106 is designed to proportion up to 5% of color concentrate to uncolored compound. This same model offers a compound output of approximately 1200 pounds per hour. This output rate can be substantially increased by the changing of pulleys and belt between the motor and gearbox, still maintaining the same proportion of color concentrate to compound.

Other variations of the basic two-hopper model will deliver up to 25% of Royle color concentrate to uncolored compound.

The basic three-hopper model will proportion up to 20% of color concentrate and up to 125% of reground scrap to uncolored compound. These Color-O-Meters are designed for mounting directly over an extruder hopper. They are usually supported on channels or other rigid supports spanning the width of the extruder hopper.

Aside from the differences shown in motor characteristics for some of the models, the main difference between models 106 and 107 in the two-hopped model and Models 126 and 127 in the three-hopper model, is that one size cam is used on the 106 and the 127 models and a larger cam is used on the 107 and 126 models. The larger cam gives a heavier feed of color concentrate.

Two feed sections are provided by on Model 106 to feed the stock and color in the proper ratio in quantities in excess of the demand by the extruder. Automatic control is provided to maintain the level of compound in the process hopper at any high, low, or intermediate point desired. The timer level control permits the Color-O-Meter to run as often as required to maintain a predetermined level of compound in the process hopper. Frequent, unnecessary start/stop cycles are prevented by the unique construction

of the level control unit which maintains a maximum and minimum level within a predetermined range in the process hopper.

In Model 126, three feed sections are provided to feed color concentrate, uncolored stock, and granulated rework colored compound. The same automatic level control is used in the three-component machine as is used in the two-component machine. Model 126 utilizes the same proportioning device to control proportion of color concentrate as is used in Model 106. In addition to this color concentrate control, there is a second proportioning device on Model 126 that controls the proportion of virgin material to rework material.

Principal of Operation

The worm-gear-driven stock feed table beneath the large stock hopper withdraws stock at a predetermined rate. This stock is removed by a scraper which directs the stock into the discharge funnel. Super-imposed, and to the left, is a smaller color feed table, driven by a cam and clutch dogs deriving its motion from the stock table. The length of stroke of the ratchet for each pulse is governed by the manually set position of the color control lever, clamped by the knob at the center of the color scale. This stroke is infinitely adjustable from a zero position to a motion of 1-1/8" per stroke. Three movements of the color table occur per one revolution of the stock table.

Model 126 uses the same general design as Model 106 for the color feed table, but varies in that the color feed table is larger and the maximum movement of the color table per stroke of the ratchet is considerably greater than the length of the stroke on the 106 model. This permits heavier feed of color concentrate than is possible with Model 106.

Calibration of Color-O-Meter Delivery Rates

The methods of calibrating the delivery rates of the Model 106 and Model 126 Color-O-Meters are very similar. The calibration of the color concentrate side of the Color-O-Meters is identical for both models. There is a difference in calibrating the compound side of the Color-O-Meters since the rate of delivery of compound by the 106 model is constant, whereas Model 126 is designed to deliver vary-

ing quantities of two different materials on the compound side of the Color-O-Meter. The calibration of the Model 106 machine will be described first.

The uncolored compound hopper of the Model 106 Royle Color-O-Meter delivers compound to a circular feed table running at a constant rate delivering material to the hopper of the extruder. The color concentrate hopper of the Color-O-Meter supplies color concentrate to a circular feed table which operates at a predetermined intermittent rate depending upon the amount of color desired in the uncolored compound. To calibrate the 126 machine, each feed table should be calibrated independently.

To calibrate the feed of uncolored compound, fill the large hopper of the machine with the compound to be used and with the shut-off gate of the hopper wide open, start the machine operating. The color concentrate hopper should be empty during this calibration. After the Color-O-Meter has operated for two or three minutes so that the feed table is filled and delivering compound at a constant rate, shut the machine down. Place a clean weighed container under the outlet chute of the Color-O-Meter and, by timing with a stopwatch, start the Color-O-Meter operating and permit it to run for six minutes. Shut the machine down and weigh the amount of compound delivered. Multiplying this weight by ten will give the rate of this specific compound which will be delivered in one hour by the Color-O-Meter.

In calibrating the color concentrate side of the machine, only the color concentrate hopper should be used. The large compound hopper should be empty while the delivery rate of color concentrate is calibrated.

The machine is designed to give anywhere from half a percent to about five percent of color concentrate in the final mixture when diced vinyl compound is used. It has been found that dry blend feeds more rapidly than diced compound. If dry blend is being used, it is suggested that a gate be placed in the outlet chute of the compound hopper to decrease the feed of the compound. The increased amount of dry blend delivered without a gate results in a correspondingly lower proportion of color concentrates. Utilization of a gate can reduce output of dry blend to equal the output of diced vinyl compound. Proportion of color to dry blend using the gate would then be the same as proportion of color to diced compound without the gate.

Where polyethylene is being run, it is also suggested that the limiting gate be employed at the throat of the compound hopper to decrease the proportion of uncolored compound and increase the proportion of color, if needed.

To calibrate the color side of either Color-O-Meter, fill only the color hopper of the machine with the specific color concentrate desired. Set the feed indicator setting at 2.0 with the shut-off valve of the color concentrate hopper wide open. Start the machine running and allow it to run for two or three minutes so that the feed table is full and the delivery of color concentrate is stabilized. Shut the machine down and place a clean weighed container under the feed chute of the Color-O-Meter. Turn the machine on by the manual switch and allow it to run for six minutes by setting the level timer. Stop the machine and weigh the amount of color concentrate delivered at this setting. Multiply this by ten to obtain the feed in pounds per hour.

Move the feed indicator setting to 9.0 and lock it in position. Again, place a clean weighed container under the delivery chute and run the machine for a timed six minutes. And again, weigh the amount of color concentrate delivered and multiply this weight by ten to obtain the feed per hour.

On a piece of graph paper, use indicator settings as ordinates and delivery weights per hour as abscissa. Insert the readings obtained at settings of "2" and "9" and draw a straight line through them. It will then be possible to determine the delivery rate for the specific color concentrate in question at any indicator setting merely by referring to the chart.

This method of calibration should be used for each color concentrate used. The specific gravitation and the flow characteristics of the color concentrates vary so that no two color concentrates have exactly the same delivery rate.

The calibration of flow from the large hoppers on the 126 Model Color-O-Meter should be carried out one at a time. Assuming that the front hopper for the virgin compound is calibrated first, that hopper only should be filled with compound. With the indicator setting on the right-hand side of the Color-O-Meter set at "2" and with the discharge gate under the hopper wide open, the Color-O-Meter should be run for two or three minutes to establish a constant delivery rate. The machine should then be stopped manually

and a weighed container placed under the discharge chute of the Color-O-Meter. The Color-O-Meter should then be switched on manually and the weight of compound delivered in six minutes should be determined. This procedure should then be used at an indicator setting of "5". Again, with the use of graph paper, it is possible to determine the feed rates from this compound hopper at any selected indicator setting.

The Color-O-Meter should then be completely emptied of all compound. The rear half of the large hopper should then be filled with whatever compound or reground scrap material is going to be proportioned from that hopper. Again, the discharge rate beneath this hopper should be in a wide open position. The process of obtaining readings at indicator settings of "2" and "5" should be repeated. The delivery rate at these two settings should be plotted on graph paper as before.

As a final check, all three hoppers of the 126 Model Color-O-Meters should be filled with the respective materials which will be delivered from them in use and the two indicator settings should be established at two arbitrary known points. The Color-O-Meter should then be operated for six minutes and the delivery material weighed. The total weight of delivered material should be the sum of the delivery rates of the three hoppers shown on the graph paper as determined previously for the specific indicator settings selected.

The flow characteristics vary with the material involved and with the size and character of the granules and pellets in each case. Polystyrene flows more readily than either polyethylene or PVC. Small pellets, and especially small, round pellets, flow much more readily than larger pellets or diced material. A six minute test run should be made on any new compound that is to be metered by means of the Color-O-Meter.

Servicing

The gear box has been filled at the factory with 1/3 pint of winter grade automotive gear lubricant. Little is required in the way of lubrication since practically all moving parts are guided by ball bearings or oilless bronze bushings which have been further backed up by grease packing between bushings on assembly.

Failure to maintain color ratio may be due to the feeding clutch dogs being jammed with stock or to improper operation of the brake dogs which bear on the lower rim of the color table and are pivoted on the set cam. This will show up by a reversal of the travel of the color table; i.e., reciprocation instead of a progressive forward motion. If this reciprocation is evident, first see that the drive clutch lever is free to move without undue friction in the reload direction and then see that the brake dogs contact the rim properly. This can be seen more easily if the upper casting is removed from the base by loosening the three bolts through the feet which hold it to the main casting. Usually the only thing that is necessary to reestablish proper action is to merely blow down the entire Color-O-Meter with compressed air.

CAPACITIVE LEVEL CONTROL

Introduction

The Royle capacitive level control is a solid-state proximity detector and timer relay intended to replace the rubber membrane mechanical switch assembly used on the old Wilson-Fiberfil 100 Series Color-O-Meters.

Installation Procedure

1. Disconnect Color-O-Meter power chord.
2. Drill or punch 1 ¼" (30mm) hole in the process hopper as close to the feed throat as possible.
3. Install sensor in hole.
4. Jump wires on existing female plug where the paddle switch is normally plugged.
5. Plug existing power cord connector into male plug base on control box.
6. Plug cord of control box into the male power plug of the Color-O-Meter.

Note: The existing toggle switch wires must be jumped to allow the kit to have sole control of the Color-O-Meter. (Remove toggle switch).

Initial Setup

To assist in the initial adjustment of the sensitivity level, which will vary with the type material to be detected, the capacitive level detector has a built in LED. Sensitivity is adjusted by a small set screw in the rear of the detector and should be set to detect the presence of material at a distance of approximately .40" (1 cm). The LED will glow red when material is detected.

The timer relay supplied is equipped with dip switches that should be set by the customer prior to activating the machine. The timer should be set to allow the process hopper to be filled to approximately three-fourths full.