HSL-DUCTOR
Rutherford Decorator
Pneumatic Ductor Control

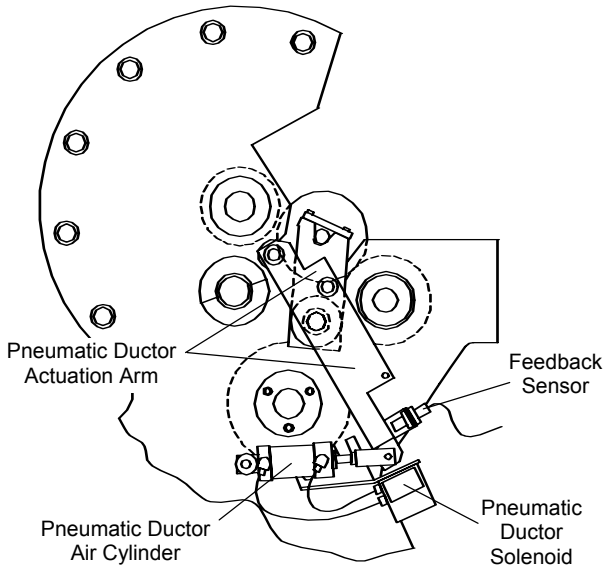
The Systems Engineering HSL-DUCTOR Rutherford Decorator Pneumatic Ductor Control package replaces the mechanically cammed ductors on Rutherford Decorator ink stations with pneumatically actuated ductors providing the following benefits:

◊ **Increased Quality:** With the speed compensation of the HSL-DUCTOR, variation in ink density with changes in speed is eliminated allowing consistent color quality at all speeds. Repeatable color quality from one run to the next of the same label is achieved by the ability to recall the ductor cycle rates from the last time a given label was run.

◊ **Reduced Downtime and Spoilage:** Label change over time is reduced since the ductor cycle rates for a given label can be recalled from the last time a given label was run. Cycle rates for up to 100 labels can be stored in the memory of the HSL-DUCTOR controller. Reduced spoilage at label change over is incurred since fewer cans are wasted to dial in correct color.

◊ **Wider Decorator Operating Speed Range:** With the elimination of color variation as a function of speed, the decorator can now be run at various speeds depending on line conditions (infeed low, downline backed up, etc) thus providing optimum overall line operation.

◊ **Quick Pay-off:** With the reduction in label change over times that can be realized, the HSL-DUCTOR typically pays for itself in just a few months.



Features

- Replaces mechanically cammed ductors on Rutherford Decorators with pneumatically controlled ductors. Allows adjustment of ductor cycle rate to a resolution of one tenth of can at speeds up to 2,400 CPM.
- Enables operator to perform quicker label changes by recalling the ductor cycle rate used the last time a particular label was run. Stores cycle rates for up to 100 labels.
- Incorporates ductor feedback sensors to speed compensate for the response time of the pneumatic ductors and verify that the ductors are cycling correctly.
- Provides control for up to 8 ink stations.
- Keypad adjustment of label parameters (label number, “cycle” duration, and “on” duration) as well as user selectable ductor configuration (max “cycle” duration, max “on” duration, and response time compensation) allows ductor control to be tailored to the specific requirements of each decorator.
- Ductor cycle count data collection allows the viewing of the total number of cycles each ductor has made. This is used for life expectancy and predictive maintenance purposes to determine when air cylinders or solenoids should be replaced.
- Upgrade package which interfaces with existing control system which includes: 16” X 14” X 8” control enclosure with Ductor Control Module and mechanical conversion kit (ordered separately) to convert mechanically cammed ductor to pneumatically controlled ductor (1 kit required per ink station).

General Description

The HSL-DUCTOR pneumatic ductor control package replaces mechanically cammed ductors on Rutherford Decorator ink stations with pneumatically controlled ductors. The ductors are now activated by air cylinders controlled by solenoids which are driven by an electronic controller. This allows the “cycle” duration (number of cans between one complete ductor cycle) and the “on” duration (the time the ductor is in contact with the fountain roll) to be adjusted independently for each ink station. This allows the ink flow rate of each station to be adjusted based on the amount of ink required for each particular color on the label.

The control package is not a dedicated “black box”, but instead is implemented using the high performance Systems M4503 PLC/PLS module which allows easy customization by either SEA or the end user. The module is programmed using the optional “SYSdev” (DOS based) software programming package which allows programming in any combination of Ladder Logic or high-level (subset of “C”), as well as perform on-line monitoring and trouble-shooting. The module interfaces directly with the machine-mounted resolver to provide the necessary tenth of a can resolution.

Increased Printing Quality

With mechanically cammed ductors, ink flow through the ink station generally varies as a function of speed due to atomization of the ink. The higher the speed of the decorator, the higher the ink is transferred through the ink station. This results in a greater degree of atomization as the speed increases and thus less ink transferred to the blanket. If the correct color density is set-up when the machine is at top speed, then the blankets will be over-inked when the machine is slowed down.

Since the ductors are now electronically cammed with the pneumatic ductor control, the rate at which the ductors are cycled can be changed as a function of machine speed. With the HSL-DUCTOR this is achieved via a “Color Gain” parameter that allows the ductor cycle rate to either be decreased or increased, by a percentage, as a function of machine speed, allowing consistent ink density to be achieved at all speeds.

In addition, increased printing quality is also achieved by recalling the ductor cycle rates for a particular label from the last time it was run. This achieves consistent color quality each time a specific label is run.

Reduced Downtime and Spoilage

Changing a label generally entails: changing the ink in the ink wells; changing the plates for the new label that will be printed; registering the new plates; and adjusting the ink color density.

Registering the plates and adjusting the ink color density has classically been a trial and error process. The machine is run with cans while the label is inspected for registration and color quality. The cans printed during this phase are blown-off and scraped (spoilage). The machine is stopped and the registration and color for each plate is adjusted as necessary. This is repeated until the label quality is finally acceptable.

The HSL-DUCTOR package reduces the downtime and spoilage for a label change by allowing the color adjustment to be achieved significantly quicker. By recalling the cycle rates for each ink station the last time the label was run, the color is nearly set correctly before the trail and error process has even begun. Generally only minor adjustments may be necessary to home in on the correct color.

Even when a setting up a label not previously stored, time is saved. The HSL-DUCTOR allows the color to be adjusted on the fly, while the machine is running. The operator no longer has to run back and forth to adjust the ink well keys to set the color. For six and eight color machines, the time saved and cans not scrapped can be significant.

Increased Reliability

With the HSL-DUCTOR pneumatic ductor, the ductor cycle rate and duty cycle are now the primary color control. For cases where a small amount of ink is required, the ductor “cycle” duration is set longer (longer time period between cycles) and the “on” duration is set shorter (ductor in contact with fountain roll less time). This allows the ink well keys to be opened up more allowing the ink well, fountain roll, and ink station in general to run cooler.

In general, for all color settings, the pneumatic ductor allows longer cycle durations and more open key operation which results in less ductor roll wear (less cycles per day, per month, etc) and less temperature build up in the ink station. Adjustable ductor roll pressure allows the ductor pressure to be set for minimum wear and optimum ink flow.

Wider Decorator Operating Speed Range

With the elimination of color variation as a function of speed, the decorator can now be run at various speeds depending on line conditions. This allows more efficient overall line operation since the decorator can now respond to upstream and downstream line conditions as necessary (slowing down and speeding up instead of just stopping or running) allowing more stable line control.

Data Collection

The total number of ductor cycles for each station is collected and can be viewed from the display of the HSL-DUCTOR control module. This is used for life expectancy and predictive maintenance purposes to determine when air cylinders and solenoids should be replaced. By observing the fact that a solenoid or air cylinder used to cycle the ductor is approaching it’s rated life, it can be scheduled to be replaced at the next scheduled maintenance day instead of waiting until the solenoid or air cylinder fails causing unexpected downtime.

HSL-DUCTOR Keypad / Display

The HSL-DUCTOR package is based on the M4503 PLC/PLS/Display module. The membrane keypad of the M4503 contains 24 keys consisting of data display commands, setup commands, and a numeric keypad. The display of the M4503 is a 2 line by 40 character back-lit LCD display which displays the selected data and setup menus. The keypad/display is used by the operator to set the label parameters (label number, “cycle” duration, and “on” duration) for each ink station and view the total number of cycles for each ductor. In addition, the keypad/display can be used by authorized personnel (passcode or key switch protected) to set the ductor configuration (max “cycle” duration, max “on” duration, color gain, and response time compensation).

“HSMDCTR” Setup Program

The “HSMDCTR” setup program allows the user to set the ductor configuration using an IBM PC or compatible. These variables include: max “cycle” duration, max “on” duration, color gain, and response time compensation. In addition to setting the variables, “HSDCTR” is used to download the HSL-DUCTOR application program to the M4503 as well as download and upload the setup data to the M4503.

Specifications

Power Requirements:
Voltage: 100-240VAC, 50/60HZ
Current: 0.5 Amps @ 115VAC
0.25 Amps @ 230VAC

Voltage: +24VDC
Current: 3.0 Amps

Compressed Air: 80-110psi

Temperature Ranges:
Operating: 0 to 55°C
Storage: 0 to 70°C

Resolver Interface:
Resolver Type: Systems Electronics Group RSV34-MS1 or equivalent
Resolver Cable: Systems Electronics Group RSV-RSCBLE-XX

Maximum Number of Ink Stations: 8

Control Inputs:
Voltage Range: 10-30VDC
Input "On" Voltage (min): 10.0 volts
Input "On" Voltage (max): 30.0 volts
Input "Off" Voltage (max): 5.0 volts
Input Current (max): 15 milliamps @ Vin=30V
Optical Isolation: 1500 Vrms

Outputs:
Voltage Range: 10-30VDC
Output "On" Voltage (min): VCC-2.00 volts
Output "On" Voltage (max): VCC-0.25 volts
Output "Off" Voltage (max): 1.5 volts
Output "On" Current (max-cont): 0.5 Amps DC
Output "On" Current (100msec): 3.0 Amps DC
Optical Isolation: 1500 Vrms

Ordering Information

The HSL-DUCTOR package includes a 16" X 14" X 8" NEMA 12 enclosure which should be mounted in a convenient location for the operator to adjust and inspect the label for color quality. An addition, one HSL-DUCTOR-STA kit is required per ink station to convert the ink station from mechanically cammed ductor to pneumatically controlled ductor. The order number for the HSL-DUCTOR is as follows:

Part Number	***Description***
HSL-DUCTOR	Rutherford Decorator Pneumatic Ductor Control package (for control of up to eight ink stations on one decorator) including the following: 1ea. HSL-DUCTOR Enclosure (16" X 14" X 8") with M4503 Ductor Control Module. 1ea. HSM-DUCTOR User's Manual 1ea. HSM-DUCTOR Program Disk 1ea. M4500 User's Manual
HSL-DUCTOR-STA	Rutherford Decorator Pneumatic Ductor Ink Station Conversion Kit (one required per ink station) including the following: 1ea. Pneumatic Ductor actuation arm assembly 1ea. Pneumatic Ductor Solenoid and mount 1ea. Pneumatic Ductor Air Cylinder and mount 1ea. Ductor Feedback Sensor and mount 1ea. Hardware mounting kit

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