SYSTEMS
Engineering Associates, Inc.

HSL/HSK-DC5
Stolle Concord Decorator
High Speed Front End
Installation And Setup

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WARNING

To ensure the equipment described by this User Manual, as well as the equipment connected to and used with it, operates satisfactorily and safely, all applicable local and national codes that apply to installing and operating the equipment must be followed. This includes the National Electric Code in the USA and other applicable legislation, regulations, and codes in practice elsewhere. Since codes can vary geographically and can change with time, it is the user's responsibility to determine which standards and codes apply, and to comply with them.

FAILURE TO COMPLY WITH APPLICABLE CODES AND STANDARDS CAN RESULT IN DAMAGE TO EQUIPMENT AND/OR SERIOUS INJURY TO PERSONNEL.

Persons supervising and performing installation or maintenance must be suitably qualified and competent in these duties, and should carefully study the User Manual and any other manuals referred to by it prior to installation and/or operation of the equipment.

The contents of this document are believed to be correct at the time of printing; however, no responsibility is assumed for inaccuracies. In the interests of a commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or it's performance or the contents of this document without notice.

Hardware Included:

The standard HSL-DC5 includes the hardware kit of the HSK-DC5, mounted and pre-wired to a 17”x20” sub-panel, provided for installation inside the existing control cabinet:

The HSK-DC5 is a hardware kit for the HSL-DC5 and includes the following:

1ea. M4508 - PLC/PLS Module with 8 I/O slots and associated I/O boards:
- 2ea. S4563 – 16 point digital DC input board (10-30VDC sourcing)
- 2ea. S4573 – 16 point digital DC output board (10-30VDC sourcing)

1ea. M4508 Power Supply - P4500

1ea. Keypad/Display - D4591, with cable, for mounting on the exterior of control cabinet door

1ea. Program Disk with User Manuals

Options (Purchased Separately):

1ea. RSV34-MS1 Resolver

1ea. RSV-RSCBLE-XX Resolver Cable

1ea. HSL-QCSTA - Remote Select-A-Can PB station

1ea. S4516 - Data Communications Board (MODBUS and DF1 protocols)

Power Required:

The HSL-DC5 is powered from 115VAC/230VAC 50/60HZ and +24VDC. The 115VAC/230VAC is used to power the M4508 module while the +24VDC is used to power the +24VDC I/O (sensors, trip and blow-off solenoids).

Note: +24VDC solenoids must be used for all trip and blow-off solenoids. These provide a more consistent and repeatable response time than 115VAC solenoids.

If +24VDC solenoids were used in the existing system, the +24VDC current required by the HSL-DC5 is no more than the existing systems +24VDC current requirement, therefore the existing +24VDC power supply should be adequate.

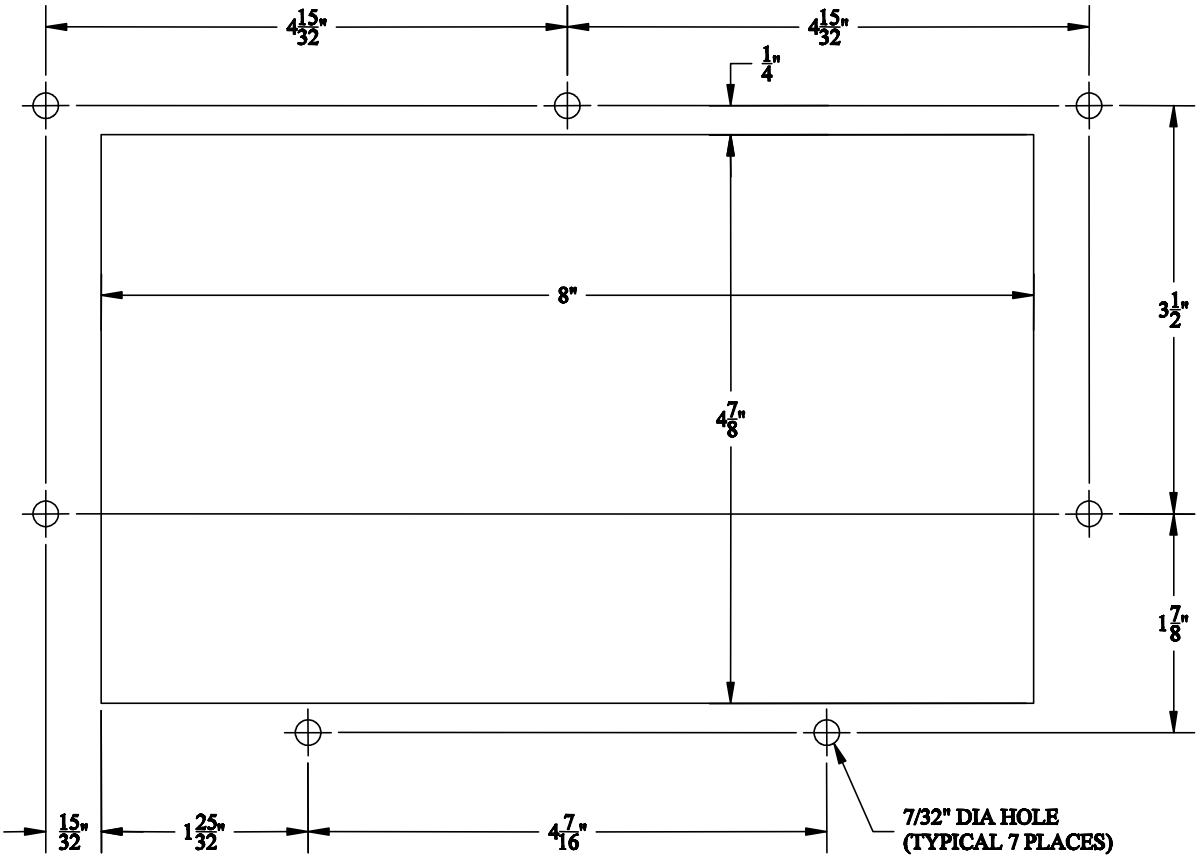
Mounting the HSL/HSK-DC5:

The HSL-DC5 17”x20” sub-panel is mounted inside the existing control cabinet.

The HSK-DC5 requires a minimum area of 11”x14” to mount the P4500 and M4508 hardware. The case of the M4508 chassis and P4500 power supply are required to be positively grounded to the mounting surface. Use a star lock washer to penetrate the painted surface, making a positive connection with the mounting screw, case and mounting surface. It may also be necessary to remove some paint from the area on the case in order to make a solid connection.

A cut-out in the existing control cabinet door is created to mount the D4591 Keypad/Display, refer to the figure below.

Note: The D4591 must be located within 6 feet of the M4508 module to avoid EMI pick-up on the display ribbon cable. Connect the ribbon cable from the M4508 module to the D4591 Keypad/Display.



D4591 Recommended Panel Door Cut-out

Mounting the RSV34-MS1 Resolver (if required):

If not already equipped with a resolver, then one will have to be mounted. If the optional RSV34-MS1 resolver (and required RSV-RSCBLE cable) was purchased with the system then refer to the associated data sheet for details on mounting the resolver. The HSL/HSK-DC5 is designed to interface to a resolver (not encoder) for machine timing. The resolver must make 1 revolution per 2 spindles (interposer trip), 1 revolution per 3 spindles (rotary trip).

Note: Route the resolver cable in a separate conduit, away from all other high voltage and control wiring. Wire the cable directly to the 8-pin resolver connector on the M4508 as shown on the electrical schematics.

Spindle #1 I.D. Sensor (not provided):

A non-discriminating 10-30VDC proximity sensor can be mounted anywhere around the periphery of the spindle wheel. The spindle #1 I.D. sensor must see a target once every revolution of the spindle wheel (once every 24 or 36 spindles) and is used to determine which spindle is #1 for both the QC select-a-can blow-off and the trips per spindle count.

Mounting the HSL-QCSTA (if required):

The HSL-QCSTA is used to blow-off a Can printed on a selected spindle (or blanket) from the pin chain for quality verification. If the optional HSL-QCSTA remote select-a-can PB station was purchased, mount it in a convenient location, in the vicinity of the pin chain blow-off and wire it to the HSL/HSK-DC5, referring to the electrical control schematic.

Wiring:

Referring to the HSL-DC5 electrical control schematic, wire the system as follows:

Note: Keep all +24VDC wiring, resolver cable, and sensor cable wiring away from high voltage wiring and wire the machine mounted resolver directly to the 8-pin resolver input, connector on the M4508.

1) Incoming Power: 115VAC-230VAC to FU1, neutral to 900 and ground to GND. Logic power (+24VDC) to 501 and common to 500. Control power (+24VDC) to 601 and common to 600.

2) Interlocks from existing control system: 6 inputs to terminals I12 through I17 and 3 inputs to terminals I30 through I32 (if ductor control is used).

3) Interlocks to existing control system: 11 outputs from terminals O10 through O19 and FLT – module fault interlock (+24VDC sinking output).

4) Can Gate, Bad Can Blow-off and Q.C. Can Blow-off solenoids (FU2, FU3 & FU4)

5) Trip Cam “ON” and “Off” solenoids (FU5 through FU10)

6) Ductor solenoids (if used - FU11 through FU18)

7) Can/No Can sensor, Mandrel No.1 Mark sensor, Can on Mandrel sensor (terminals I09, I10 & I11) and Ductor Feedback sensors (if used - terminals I40 through I47) using three conductor shielded cables. The shields of the sensor cables should be tied to earth ground at a terminal inside the existing control cabinet and left floating at the sensors.

8) Set-Up Enable key switch (recommended, terminal I25) to allow entry to set-up variables through Keypad/Display

9) Resolver cable from resolver (or existing PLS) to 8-pin resolver input connector on the M4508 using a three pair (six conductor) shielded cable. The shield of the resolver cable should be tied to the “SHLD” terminal of the M4508 resolver input connector. The resolver cable shield is left floating at the resolver.

Modify Existing PLC Program:

PLC program will need to be modified to interface with the HSL/HSK-DC5 by incorporating the following into the existing PLC ladder logic:

1) The HSM-DC5 now controls:
   - The Can Gate Solenoid
   - Pin Chain Blow-Off Solenoids
   - Trip Cam Solenoids
   - Ductor Solenoids

   This logic can be removed or defeated from the existing host PLC logic.

2) **"Test Mode"** is an output from the PLC, a push button or selector switch. The Cans will then be blown off at the "Bad Can" pin chain blow-off port as long as this input is "ON".

3) **"End of Shift"** is an output from the PLC or a push button. The "Current Shift" data is transferred to the "Last Shift" and all data registers for the current shift and trips per spindle are reset to zero.

4) **"Can Feed Enable"** is an output from the PLC. When turned "ON" while running, the infeed is timed "Open" with the Can feed timing signal. When turned "Off" while running, the infeed is timed "Closed" with the Can feed timing signal. When the machine is stopped, turning this input "ON" and "Off" will respectively "Open" and "Close" the Can stop.

5) **"Main Drive On"** is an output from the PLC. This should be "ON" when the drive is enabled (running) and should be "Off" when the drive is disabled (this includes auto stop conditions). This is also true for jog mode.

6) **"Alarm Reset"** should be "ON" as long as the system reset push-button is depressed.

7) **"Pin Chain Manual Blow-off"** is an output from the PLC. When "ON", the bad Can pin chain blow-off is "ON". When "Off", the pin chain blow-off functions normally, blowing off detected bad Cans, restart Cans, etc.

8) **Add** the **"PLC Clock"** (timing channel CH06) as an input to the host PLC logic. This is a general purpose PLC clock timing signal, pulsed once per Can.

9) **Add** the **"Module Fault Interlock"** as an input to the host PLC. This signal will be "ON" if the M4508 controller has faulted. This should immediately stop the machine if this input is "ON" as M4508 is no longer executing the program.

10) **Add** the **"Blow-off Data Clock"** (timing channel CH07) as an input to the host PLC logic. This is used to clock the blow-off data bits (0, 1 and 2). Use the leading edge of this signal to increment the PLC blow-off data counters. The blow-off data is encoded into a 3-bit binary code according to the following chart:

	BLOWOFF 2	BLOWOFF 1	BLOWOFF 0
None	0	0	0
Restart Blow-off	0	0	1
Q.C. Blow-off	0	1	0
Manual Blow-off	0	1	1
Bad Can Blow-off	1	0	0
Good Can	1	0	1

11) The following alarms are available to the host PLC via the discrete encoded alarm bits according to the following chart:

	ALARM BIT 1	ALARM BIT 0
Timing Signal Fail	0	1
No Can Transfer	1	0
Infeed Track Jam	1	1

12) **Add** the **"Canfeed Enable Speed"** as an input to the host PLC logic. The Canfeed enable speed comes "ON" whenever the speed of the machine is within the "Canfeed Enable" window. Use this signal to control the Canfeed enable whenever this signal is "ON".

13) **Add** the **"Ductors Feedback Fault"** (if used) as an input to the PLC logic. A ductor detected as not cycling properly sets the "Ductor Feedback Fault", indicating a problem with the ductor cycling control. If the ductor feedback sensors are used, enable the particular stations that have feedback, otherwise disable all stations that do not have feedback.

14) **"Ductor Control Auto"** and **"Ductor Control Manual"** are outputs from the PLC. When both are "Off" the ductors are "Off", resting on the first steel roll. When the "Manual" is "ON", the ductors can be cycled "ON" and "Off" using the numeric keypad of the Keypad/Display. The ductors will also cycle normally when the machine is in motion, regardless of the "Ductors Auto ON" input. When the "Auto" is "ON", the ductors cycle normally based on the "Ductors Auto ON" input.

15) **"Ductors Auto On"** is an output from the PLC. This output should be "ON" whenever Cans are feeding into the decorator.

Default Set-Up Variables:

As shipped, the user variables for the M4508 are set the following defaults:

Speed Parameters:

Canfeed Enable - Low Speed _____: 600
Canfeed Enable - High Speed _____: 1000
O'Varnish Roll Speed Calibrate _____: 380

Pneumatic Ductor Parameters:

Maximum Cycle Duration (0.1 Cans) _____: 500
Maximum "ON" Duration (0.1 Cans) _____: 200
Response Time Compensation (msec) _____: 25
Color Gain (CG-100% per 2000cpm) _____: 100%
Feedback Enabled _____: 1N, 2N, 3N, 4N, 5N, 6N, 7N, 8N

Bad Can (pin chain) Blowoff:

# of Cans to blowoff from infeed open _____: 012
# of Cans to blowoff from print at restart _____: 000
# of Cans to blowoff from varnish at restart _____: 000
# of bad Cans to blowoff for misload _____: 001
# of pins to pin chain blowoff port _____: 032
Blowoff solenoid "ON" response time (msec) _____: 015
Blowoff solenoid "Off" response time (msec) _____: 028

QC Can (select-a-can) Blowoff:

Blowoff solenoid "ON" response time (msec) _____: 015
Blowoff solenoid "Off" response time (msec) _____: 028
QC Can blowoff port shift offset _____: 001

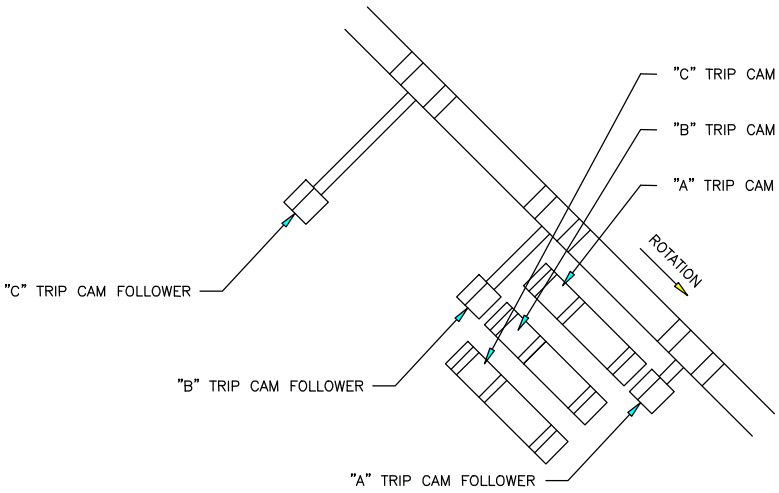
Spindle Trip Offset _____: 000

Timing Setpoints:

Bad Can blowoff "ON" position _____: 180°
Q.C. blowoff timing "ON" position _____: 185°
Can Gate timing "ON" position _____: 0°

Machine Zero:

Position the machine at machine zero ("A" trip cam follower, **in skip position**, just past "A" trip cam, (see figure below).



Perform the following to set the resolver offset using the Keypad/Display:

1) Press the "SET-UP" key.
2) Press the #5 key – "ZERO MACHINE"
3) Enter "0" to zero the resolver. The M4508 will calculate the actual offset value required to make this the 000 position. The "VERIFY CAN PRX" menu will be displayed, now showing the "ACTUAL ABSOLUTE POS:" at zero.
4) Return to the primary set-up menu by pressing the <ESC> key. Return to the default screen by pressing the <ESC> key again.

Location of "Can/No Can" Sensor:

The "Can/No Can" sensor is located approximately at the "One O'clock" position of the spindle wheel.

Enter the "Set-Up" menu:

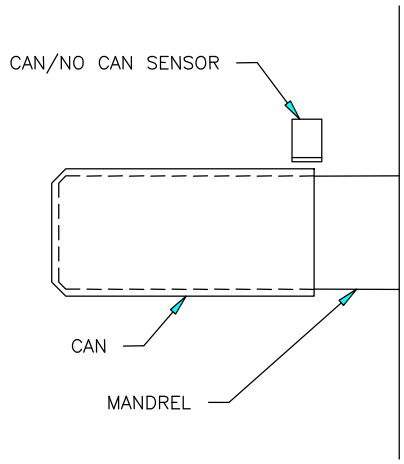
1) Press the "SET-UP" key.
2) Press the #6 key – "VERIFY CAN PRX1 LOCATION/TIMING".

Locate the machine to the exact location, defined as follows:

Rotary Trip Type Machines: Locate the machine at exactly 990 degrees as displayed in the "Actual Absolute POS" field of the Keypad/Display.

Interposer Trip Type Machines: Locate the machine at exactly 630 degrees as displayed in the "Actual Absolute POS" field of the Keypad/Display.

The "Can/No Can" sensor should be centered radially over an "A" spindle at this position. The sensor should also be located axially on the spindle such that the sensor will "See" the top (open end of Can) only if it is fully loaded on the spindle. If necessary, adjust the "Can/No Can" sensor to achieve the location relative to an "A" spindle as described above.

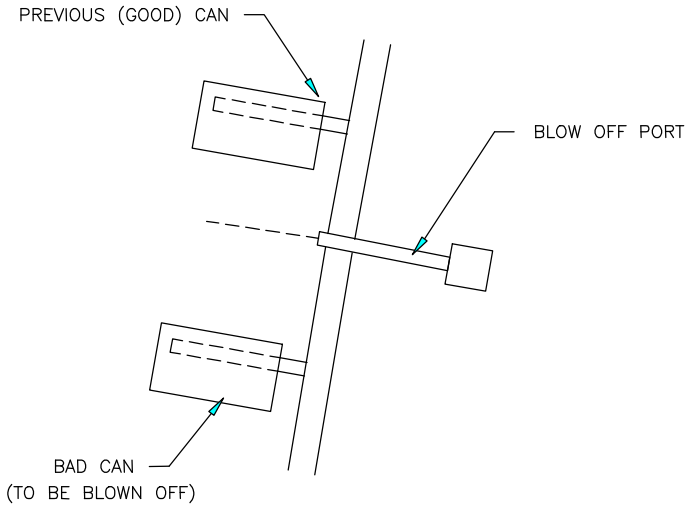


Location of "Can/No Can" Sensor

Pin Chain Blow-Off Timing "ON" Position:

The Pin Chain Blow-Off should just turn "ON" when the blow-off port is centered between "Cans" on the pin chain. This position will be different for the "Bad Can Blow-off" and "Q.C. Blow-off" solenoids.

Warning: The blow-off "ON" timing should not be set within +/- 20 degrees of relative position 320 degrees (CH03, Cam Reset timing). If the optimum position for the blow-off "ON" set-point is within this window (300 to 340 degrees), the blow-off must be physically moved approximately 1 inch from its current location. The blow-off "ON" position timing can then be properly set.



"ON" Position of Pin Chain Blow-off Solenoid

Setting the Number of Pins to Pin Chain Blow-Off Port:

The chain take-up must be after the pin chain blow-off port for reliable blow-off operation. If the take-up is before the port, the relative position of the port to the blow-off timing will vary as the take-up moves, causing partial blow-offs to occur.

Set the "# of pins to pin chain blowoff port" by counting the number of pins from the spindle wheel to disc transfer location to the bad Can pin chain blowoff port. The number entered is the number counted minus 2 (this is just an approximation).

Set the "# of bad Cans to blow-off for each misload" equal to one. Run the machine at low speed with Cans and verify that for each misload, the one bad Can is blown off. If the bad Can is not blown off then adjust the "# of pins to pin chain blow-off port" accordingly until the misloaded Can is blown off.

Note: On this system, only one Can is normally blown off for each misload on a particular mandrel. However, the end user may select to blow-off up to five Cans to get rid of the excess ink on a particular blanket.

Setting the Canfeed Enable Speed:

Set the "Canfeed Enable Low Speed" and "Canfeed enable High Speed" in conjunction with one another to define a window within which the Can gate can be opened or closed. This allows the flow of Cans to be controlled whenever the machine speed is inside this window. When the machine goes to a stand-by condition, the speed of the machine will need to be decreased inside this window for the Can gate solenoid to be deactivated. The M4508 will activate/deactivate the Can gate solenoid on the "Can Gate Timing ON" signal.

Setting the Spindle Trip Shift Offset:

This variable must be a number between 0 and 23 or 35. Set the “Spindle Trip Shift Offset” as follows:

1) Initially set the “Spindle Trip Offset” to zero.

2) Wrap a piece of tape around spindle #1 such that Cans will not load on this spindle.

3) Run the machine very slowly with the Can gate open and verify that Cans do not load on spindle #1 and that the #1 spindle is tripped.

4) Observe the trips per spindle data and determine which spindle number is being incremented every time the #1 spindle trips. The spindle number that should be incrementing is spindle #1. If it is not, subtract 1 from the spindle number that is being incremented and enter this value as the spindle trip offset.

5) Now verify that the spindle #1 count is incremented every time the #1 spindle trips. If it increments another spindle number other than #1, continue adjusting the “Spindle Trip Offset” until it does, then stop the machine and remove the tape from spindle #1.

Setting the QC Blow-Off Shift Offset:

This variable must be a number between 1 and 24 or 36, as there is always a Can printed on spindle #1 every 24 or 36 Cans. Set the “QC Can Blowoff Port Shift Offset” as follows:

1) Initially set the “QC Blow-off Shift Offset” to 1.

2) Dial in spindle #1 on the select-a-can thumb wheel switch.

3) Wrap a piece of tape around spindle #1 such that Cans will not load on this spindle.

4) Run the machine very slowly with the Can gate open and verify that indeed Cans do not load on spindle #1 and that the #1 spindle is tripped.

5) Press the select-a-can push-button repeatedly and observe the Can blown off, relative to the location of the misloaded Can on spindle #1.

6) Add the number of Cans difference between the Can actually blown off and the misloaded Can on spindle number one to the “QC Can blowoff port shift offset”.

7) Continue press the select-a-can push-button and adjust the offset number until no other Can than the misloaded Can is blown-off.

Setting the Number of Cans to Blow-Off:

Set the number of Cans to blow-off as desired:

 # Cans to Blow-Off for Each Mis-Load: This is the number of Cans blown off at the pin chain port when a mis-loaded Can is detected (typically set at 1 Can). Any additional Cans entered, will be blown off every 12th Can later (Cans printed on the same blanket).

 # Cans to Blow-off at Infeed Open: This is the number of Cans blown off when the infeed is first opened. Valid range: 0 to 99.

 # Cans to Blow-off from Print at Restart: This is the number of Cans blown off from the print station when the machine is restarted with Cans in the machine. Valid range: 0 to 99.

 # Cans to Blow-off from Varnish at Restart: This is the number of Cans blown off from the varnish station when the machine is restarted with Cans in the machine. Valid range: 0 to 99.

Setting the Pin Chain Blow-Off Solenoid Response Times:

Pin Chain (Bad Can and QC) Blow-off Solenoid "ON" Response Time (msec): This is the time used as the "ON" response time of the pin chain blow-off port (time from solenoid actuation to first air out port) in milliseconds. The M4508 will activate the solenoid this amount of time ahead of the Pin Chain blow-off "ON" position (usually set at 15 to 20 milliseconds). Valid range: 5 to 60 msec.

Pin Chain (bad Can and QC) Blow-off Solenoid "Off" Response Time (msec): This is the time used as the "Off" response time of the pin chain blow-off port (time from solenoid "Off" actuation to air stopping at port) in milliseconds. The M4508 will activate the solenoid "Off" this amount of time ahead of the Pin Chain blow-off "ON" position (usually set at 15 to 20 milliseconds for double acting solenoids and set at 25 to 30 milliseconds for single acting solenoids). Valid range: 5 to 60 msec.