

Operating Instructions For 8600 FCS Fill Control System

8600 FCS Functionality:

The Doran 8600 FCS provides a fail safe Indicator and Controller for automated filling applications. The indicator provides ease of operation for the end user, while supporting the batch program complexity necessary for any application. As always, the Doran 8600 FCS is completely washdown safe.

The four different 8600 FCS models offered are: 8600 FCS-1, FCS-2, FCS-3 and FCS-4. The number after FCS designates how many speeds (relay output controls) the model offers. For example: The FCS-4 has four speeds, which provides four electromechanical relay controls.

Model	Description
8600FCS-1	1 Relay Control
8600FCS-2	2 Relay Controls
8600FCS-3	3 Relay Controls
8600FCS-4	4 Relay Controls

8600 FCS Operation:

The operation of the 8600 FCS is customized with two programmable features of the Model 8600:

1. BATCH PROGRAM

The batch programming capability of the Model 8600 is very flexible and gives the ability to customize the batch operation of the fill control system. The batch program defines the steps the 8600 FCS must take for each batch filling process.

2. SETPOINT CONFIGURATION

The setpoints define when and how the relay controls react to the weight applied to the load cells.

Each 8600 FCS application will be automated with a custom batch program. The 8600 FCS is easily configured and customized using the 8600 Setup Program or manually via the touch panel. The 8600 Setup Program is a Windows® based utility for configuring the Model 8600. Doran recommends using the 8600 Setup Program for configuration of the 8600 FCS. The 8600 Setup Program is a standard feature with every 8600 FCS.

With 8600 Setup, the batch control program and setpoints can be configured, downloaded, and saved to a separate file for preservation of indicator data. Refer to Appendix A for 8600 Remote Configuration Program instructions provided with the software application.

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8600 FCS Controls:

START: The green button Starts, Pauses, or Stops the batch program. From this one simple button the user can completely control the batching program. For the start button to operate the JOG-STOP-RUN toggle switch must be in the RUN position.

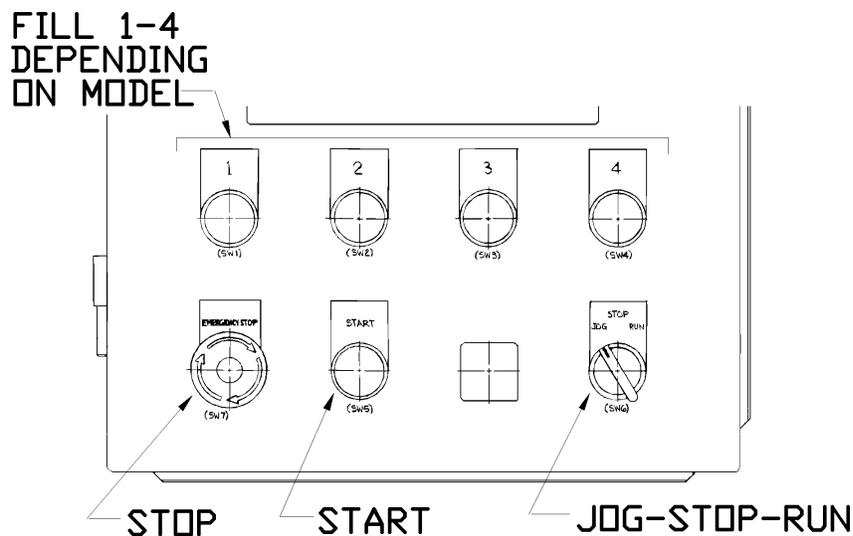
1. Place JOG-STOP-RUN in RUN position
2. Press and release to START the batch program.
3. Press and release to PAUSE while batch program is running.
4. Press and release to CONTINUE the batch program while paused.
5. Press and hold for one second to STOP and RESET the batch program.

FILL: Relay control is indicated active with a button/light illuminated for each active speed. The FILL button/light can also be pressed to manually activate the corresponding relay control. The JOG-STOP-RUN must be in the JOG position to manually control each relay control. When JOG-STOP-RUN is in any other position the manual relay control buttons will be deactivated.

STOP: This is an EMERGENCY STOP switch. Press in to remove power from the relay controls and reset the batch program. This is a latching switch, so once it is depressed, the switch will stay depressed until the user rotates clockwise to reapply power to the circuit. While the STOP switch is depressed, the START and FILL buttons will not operate.

JOG-STOP-RUN: Selects the operation mode of the relay circuitry.

- RUN activates the START button, which applies power to the relay control circuitry that is controlled by the batch program.
- OFF removes all power from the relay control circuitry.
- JOG enables the FILL buttons for manual relay control.



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Batch Programming:

The batch programming capability of the Model 8600 is very flexible and gives the ability to customize the operation of the fill control system. Some elements of the batch program that can be programmed are pauses, repeats, tests for input switches or contacts, and setpoint control. For a complete listing see Appendix B.

Setpoints can be configured for continuous operation, latching, 'dump' operation, related to an accumulator, and trip or activate above or below setpoint value.

Note: Refer to the Section 5 Parameter Setup; 8. SETPT, 8.1 SPTOP, 8.2 PREAT, 8.3 TRIP, and 8.4 REL of the Model 8600 Instruction Manual for more information on the configuration parameters for setpoints.

Batch Example 1

The following configuration parameters are the default settings for a model 8600 FCS. This will function as a basic fill control that has cutoffs for 4 setpoint controls or speeds:

Parameter	Description	Selection
1.E OPER	Operation	BATCH
8.0 Setpoint	Operation Type	CONT
8.1 Setpoint	Trip value	GROSS
8.3 Setpoint	Trip Criteria	HIGHER

The following batch program is entered into 9.0 BATLST:

Program Line	Command	Description	Setpoint Cutoff Point
Line 0:	SP0	Activates Setpoint 0	10.00 lb
Line 1:	SP1	Activates Setpoint 1	20.00 lb
Line 2:	SP2	Activates Setpoint 2	30.00 lb
Line 3:	SP3	Activates Setpoint 3	40.00 lb

When the JOG-STOP-RUN is in the RUN position and the START button is pressed, the batch program starts and Setpoint 0 is active. As the vessel fills and the weight reaches the value entered in Setpoint 0, Setpoint 0 becomes inactive. Then Setpoint 1 is active until the weight in the vessel reaches the value in Setpoint 1. This process follows until the value in Setpoint 3 is met and the batch program ends.

Batch Example 2

Fill control for 3 ingredients and a dump or empty cycle. This also contains a stability test at the beginning of the cycle, a pause at the end to allow the machinery to reset and a global repeat to automatically do 5 batches.

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The following configuration parameters have been set for this application:

Parameter	Description	Selection	Notes
1.E OPER	Operation	BATCH	
8.0 Setpoint	Operation Type	CONT	For Setpoints 0-2
8.0 Setpoint	Operation Type	DUMP	For Setpoint 3
8.1 Setpoint	Trip value	GROSS	For all setpoints
8.3 Setpoint	Trip Criteria	HIGHER	For Setpoints 0-2
8.3 Setpoint	Trip Criteria	LOWER	For Setpoint 3

The following batch program is entered into 9.0 BATLST:

Program Line	Command	Description	Setpoint Cutoff Point
Line 0:	UUTST	Wait for stability	
Line 1:	SP0	Activate Setpoint 0	10.00 lb
Line 2:	SP1	Activate Setpoint 1	20.00 lb
Line 3:	SP2	Activate Setpoint 2	30.00 lb
Line 4:	SP3	Activate Dump	2.00 lb
Line 5:	PAS 0	Pause	
Line 6:	GREPT (5)	Repeat cycle 5 times	

This sequence starts by checking for stability of the scale, then Setpoint 0 is activated. Setpoints 0 thru 2 are activated as in the previous example. Setpoint 3 is active above the empty threshold of 2.00 lbs. When the vessel empties to 2.00 lbs, Setpoint 3 becomes inactive. (See the settings for Setpoint 3)

Other commands that could be used with this type of application could be to insert a Pause (PAS) or Stability check (UUTST) between the last fill Setpoint (Stpt 2) and the Dump Setpoint to allow the equipment to become stable before dumping the vessel. Many more complex batch programs are possible. If you have any questions call Doran Service at 800-262-6844

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Connections to the 8600 FCS:

Load Cell connections:

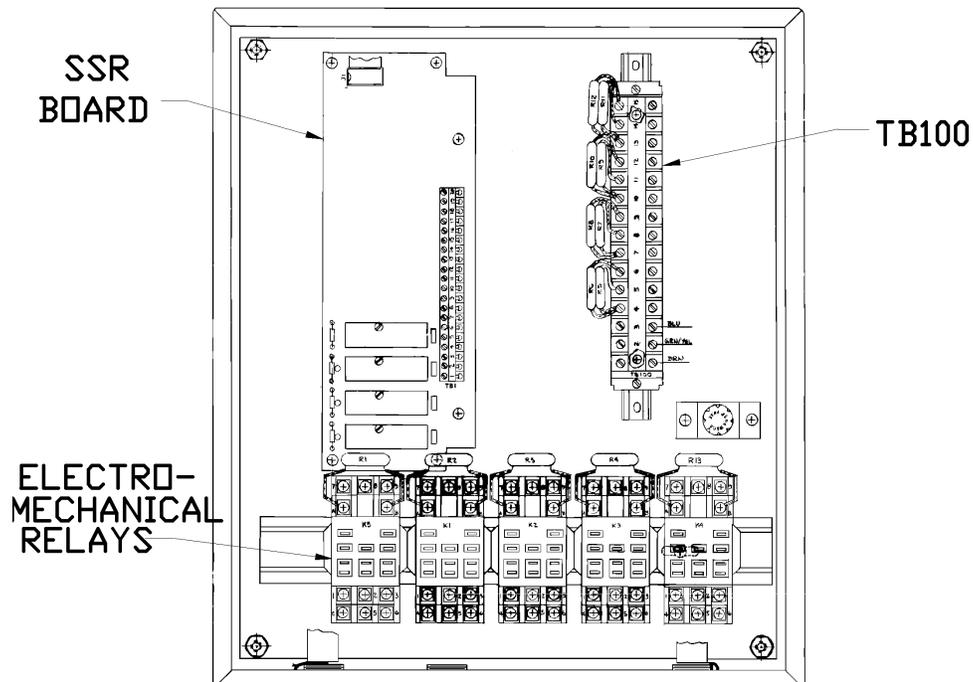
The load cell or platform is connected to TB1 of the Main Scale PCB assembly. The Main Board is located on the door of FCS enclosure.

The load cell cable should enter the enclosure using the far left feed thru on the bottom of the enclosure. Route the cable under the harness going to the door. Feed the cable thru the ferrite cores on the left wall and loop up to the Main Board.

Make sure that the shield of the load cell cable is connected to chassis ground.

Main Board TB1	
Terminal	Function
1	Chassis Grd
2	+ Signal
3	- Signal
4	+ Excitation
5	- Excitation
6	+ Sense
7	- Sense
8	Chassis Grd

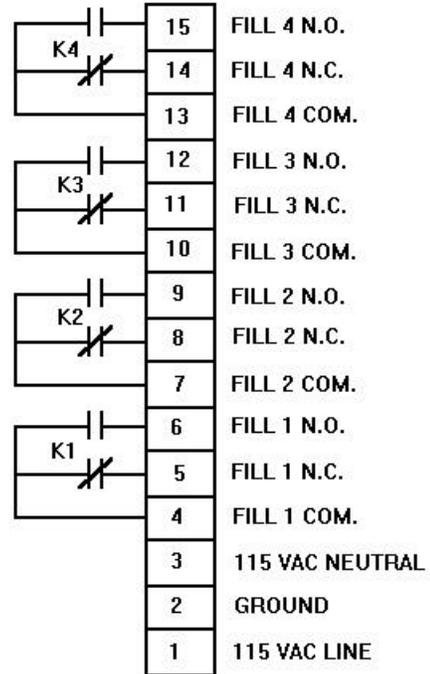
Note: If the sense leads are not used, place a jumper between +Sense and +Excitation and place a jumper between -Sense and -Excitation.



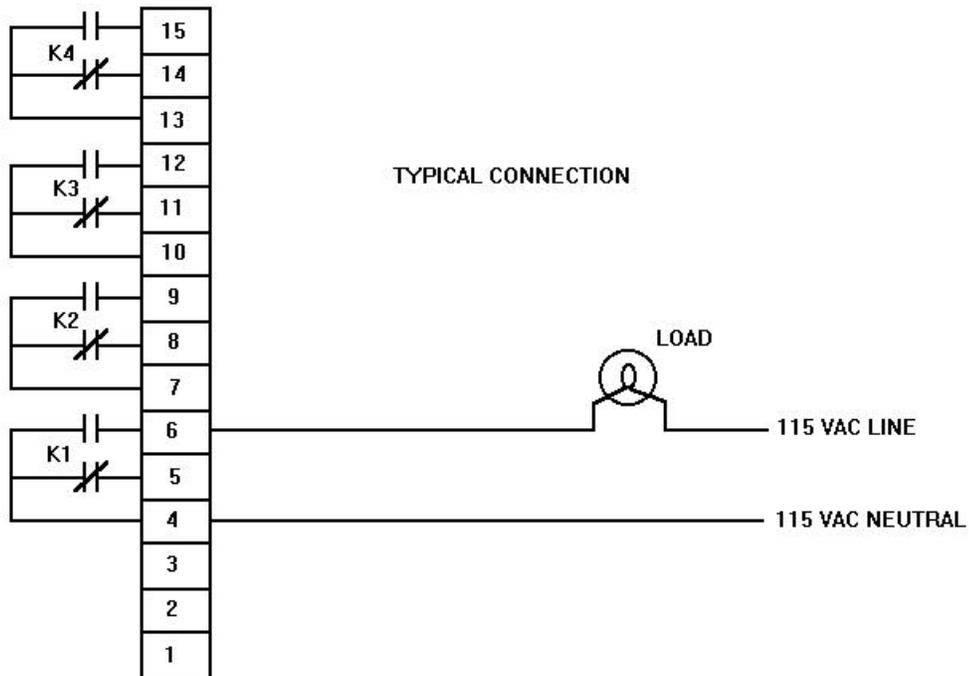
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Connections to the control circuitry:

TB100 Connections	
Terminal	Function
15	K4 N.O.
14	K4 N.C.
13	K4 Common
12	K3 N.O.
11	K3 N.C.
10	K3 Common
9	K2 N.O.
8	K2 N.C.
7	K2 Common
6	K1 N.O.
5	K1 N.C.
4	K1 Common
3	110 vac (Neutral)
2	Chassis Ground
1	110 vac (Line)



TB-100



TYPICAL CONNECTION

TB-100

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Appendix A

Batch Programming Instructions For Doran 8600 Set Up Software

This software is designed for an IBM compatible PC operating in a Windows 3.1 environment. This software is provided solely to assist users of the Doran Model 8600 Scale Indicator in setting up and changing operational parameters. All 8600FCS parameters can be saved to disk for backup purposes.

For proper communication, connect PC COM port to the 8600 FCS duplex port. The duplex port is an 8600 FCS Indicator option that is specified upon initial order. See below for cabling information or contact Doran Sales department for cable purchase pricing.

- 1) Run Setup 8600 Software.
- 2) Connect PC to 8600 duplex port.
- 3) Confirm com port settings by selecting COM.
- 4) Select SETUP – BATCH PROGRAM.
- 5) The setup 8600 program will download currently saved program.
- 6) Double Click on batch steps in COMMAND LIST to place command in currently selected step to the left.
- 7) To save to file select FILE – SAVE CURRENT BATCH PROGRAM TO FILE.
- 8) To update 8600 FCS select FILE – SAVE CURRENT BATCH PROGRAM TO 8600.

Some commands Such as PAUSE 0 will require a parameter, in this case a pause time in seconds. A window will prompt for any parameter that needs to be defined. To change a previously placed parameter, Double Click on step in the batch program list window.

Do not leave 'none' parameter between batch commands. Once the 8600 FCS batch program interprets a none command, the batch program stops.

If you have difficulties connecting to the 8600 Setup Program, check cabling information below and confirm COM settings are correct before calling Doran Service Department. The Model 8600 must be configured with Rev 3.0 or higher software to work with 8600 Setup.

RS-232 Connector Configuration		
9 Pin Connector	25 Pin Connector	Connect to 8600*
1,4,6 tie together	4,5 tie together	J2-2 Txd
2 Rxd	3 Rxd	J2-4 Rxd
3 Txd	2 Txd	J2-3 Gnd
5 Gnd	7 Gnd	
7,8 tie together	6,8,20 tie together	

*See 8600 manual for 8600RSS connections

For 8600 Setup Program installation information, please refer to the 8600 Set Up Software manual located in the C:\8600 directory listed as "mn118r14.txt".

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Appendix B

Section 7. Batching Mode Operation

The batching mode provides a fully functional batching indicator to meet even the most demanding of batching applications. The batching function is designed as a 76 step batching process. For each of the 76 steps any one of 93 commands can be executed as part of the batching sequence. The commands must be entered in the setup mode, under main menu 9 - Batch List. A batch sequence is started by pressing the START button and ends when a 'NONE' command is encountered in a step, or when the START button is pressed and held. If there are commands issued in steps after a 'NONE' command is executed, they will be ignored.

START/STOP/PAUSE BUTTON

The START push-button is used as the start/stop/pause button. To start the batching sequence, press the START button momentarily. The indicator will respond with "START" and the batching sequence will start at step 00. If the START button is pressed at any time during the batching process, a pause will be issued and the message "PAUSE" will be displayed momentarily. To restart the batching process, momentarily press the hidden button and the batching process will continue. The indicator will flash "CONT" on the display before continuing. Pressing and holding the START button will cause the indicator to stop the batching operation and turn off all of the batching setpoints called in the batching sequence. The indicator will display "STOP" momentarily. When in a pause or stop state, all of the setpoints called in the batching sequence will be disabled.

PAUSES

There are 10 pauses that can be used to pause the batching process either for a period of time in seconds or until the start/stop/pause button is pressed. The length of the pause can only be accessed when it is selected in the batch list setup. If a timer value of 0 is entered for the pause, then the indicator will pause the batch sequence indefinitely until the pause button is pressed. At that time the batch sequence will continue on to the next step.

Each of the 10 available pauses can be set up for different time delays and can be used as many times as needed. For example, if a pause of 2 seconds is needed in 3 different parts of the batch, enter 02 into PAS0 and use PAS0 3 times.

To enter a value into a PAS, go to the step where it is to be used, and select the desired PAS from the command list. When the correct PAS is selected, press ENTER and the current value of that PAS will be displayed (if it hasn't been used yet, the value will be 00). To enter a new value, simply enter the value between 00 and 99 on the numeric keypad and press ENTER again. The display will show "DONE", signifying that the value has been accepted. Press SETP to return to the batch list and continue command selection.

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SETPOINTS

The SP0 - SP9 commands initialize the specified setpoints as batching setpoints. All setpoints will be inactive until they are called within the batching program. When execution of the batch sequence reaches a SP0 - SP9 command, the specified setpoint becomes active, and stays that way until the trip criteria is met. The batching sequence will remain at that step in the sequence until the setpoint trips. Once the setpoint trips, the output is disabled and the next step in the batch sequence is executed.

The DEFSP command selects the default setpoint, i.e. the currently selected setpoint, as a batching setpoint. This allows the user to use different setpoints within a batch sequence without changing the command list.

When a setpoint is set for a state type output (COZ, NET MODE, GROSS MODE, PAUSED, etc.) the output will always be continuously true for the validity of the state type selected. For example, for as long as the indicator is within the center of zero and setpoint 0 is selected to output the state of the COZ, the output of setpoint 0 will be active until the indicator goes beyond the center of zero.

When a setpoint is designated as a DUMP setpoint, when the DUMP command is issued as a command in the batching sequence, the setpoint will become active until the gross weight returns to below the setpoint value entered. This is useful for when a dump operation is required to empty a vessel until a threshold or an empty point is met. Once the setpoint is achieved and the dump is completed, the next command will be executed.

The SETS0 - SETS9 and CLRS0 - CLRS9 commands set or clear the specified setpoint, respectively. For example, a SETS0 command will cause setpoint 0 to be active, while a CLRS0 command will cause it to be inactive. In order to use these commands, the specified setpoints must be set as 'BAT SET' in **8.0 tyPE** in the setup menu.

Note: Only those setpoints called out in the batch program will act as batching setpoints; all others will operate as if the indicator is in the normal mode of operation.

REVIEW/CHANGE BATCH COMMAND LIST

When selecting the batching command list, you can specify any one of 93 commands in up to 76 steps. To enter a command, select main menu **9.bAtLSt**. Once selected, press ACCUM and the first step (00) in the list will be displayed with the current command for that step. To select the step to review or change, press ACCUM to increment to the next step or press NET/GROSS to decrement to the previous step.

There are two ways to select a command for a given step. The easiest way is to enter the 3-digit command number followed by ENTER (the command list is at the end of this section under BATLST). The second way to change the command is to press RCL to increment through the

