

## FS10 Button Setup Quick Guide

This guide provides a quick reference to field set-up of the trip point and span of the FS10A flow monitor on units not pre-calibrated at the factory to specific application parameters. The available PC or command line interface through the RS232 provides the most comprehensive means of setting up the FS10A flow monitor (refer to operating manual for complete instructions). If that is not feasible, the buttons with LED feedback provide access to all required functions for field set-up.

### FS10 Button Controls

#### General Control Description

The FS10 control “functions” can be accessed through the two buttons by:

1. Entering “function selection”
  2. Selecting the desired function to adjust
  3. Adjusting the function control
  4. Exiting to normal operation
1. To Enter “Function Selection” mode:
    - a. Press and hold both buttons down for 3 seconds
    - b. When “function selection” is entered, all the LEDs will flash “on”, then
    - c. The first function (LED # 1) will be illuminated
  2. “Function Selection” mode:
 

Once the unit is in “function selection” mode, the buttons take on new controls:

    - The “-” and “+” buttons will step (increment down or up respectively) through the different functions. The current function number will be indicated on the LED blinking at the slow rate.
    - Holding either the “+” or “-” for 3 seconds will “select” the current function to be adjusted.
  3. When a Function has been selected for adjustment:
 

After selecting the desired function by pushing and holding either the “-” or “+” button for 3 seconds the LEDs will flash at a faster rate. The pattern of the LEDs will either reflect the current value of the parameter being adjusted, or the “ready to capture” pattern for parameters to be captured (see specific function descriptions for details).

The buttons will either increment or decrement the function parameter, or capture a value for the corresponding parameter.
  4. To exit out of the current function, push and hold both buttons down for 3 seconds. The LEDs will indicate that you are once again in “function election” mode, and the current mode will have incremented to the next function. To exit completely (into operational mode), press the two buttons simultaneously for 3 seconds once again.

Note: Function #4 (load a bank) and function #15 (save to a bank), requires holding either button for 3 seconds to load or save.

**Holding both buttons will exit either function** without performing the operation.

### Button Operation

1	Enter “function selection”	Push and hold both buttons simultaneously 3 seconds
2	Select desired “function”	Push “+” or “-” to step through (LEDs indicate function #)
3a.	Enter “function adjust”	Push and hold either “-” or “+” button 3 seconds
3b.	Adjust within function	Follow instructions for particular function entry
4a.	Exit “function adjust”	Push and hold either “-” or “+” button 3 seconds (now in “function selection” operation) [NOTE: Function #4 or #15 requires holding both buttons to exit into function select operation]
4b.	Exit “function selection”	Push and hold both buttons simultaneously 3 seconds (now in normal operation)

## Bank Selection of Stored Parameters

The FS10A has 7 storage banks. Banks 1-6 are factory set defaults of common applications or specific factory calibrations. Bank 7 is available for user saved parameters. Bank 0 is always the “operating” bank. Function 4 is used to move parameters from a selected bank to operational Bank 0. Function 15 is used to store new field set-up parameters into Bank 7 for future retrieval.

Un-calibrated units are shipped with default parameters from Bank 1 active in the 0 Bank. The parameters permit operation over the entire range of the meter as it may be applied to any gas or liquid.

## Recommended Set-up Order

1. Scale the FS10A over the desired flow range — Adjustment of flow over useable range is recommended if possible. This span setting will be reflected on the LEDs (1-10) as well as the 4-20 mA output (0% - 100%). If it is impossible to throttle the flow, it is recommended a span be established initially with normal flow, then use the LEDs to set a trip-point below that value for low flow alarm. Dynamic Mode, FUNCTION 5, automatically establishes the highest flow rate as the span and could be considered to aid in setup in these cases. Refer to Operating Manual for complete instructions on using Dynamic Mode.
  - a. Set the Zero using Button FUNCTION 6 (no-flow full tube is suggested in liquid service) to capture the zero point.
  - b. Set the Span using Button FUNCTION 7. Capture this setting while simulating highest flow rate in the tube.
2. Set the trip point using either method below:
  - a. 10% increment method, Button FUNCTION 1, allows setting against the 10 LEDs on the display. Each LED represents 10% of the flow range established in 1. Flashing LED confirms value of trip point.
  - b. Capture method, Button FUNCTION 2, allows setting the trip-point at precisely the flow rate through the tube at the time of capture. Flashing LED indicates approximate value of trip point.
3. Final adjustments
  - a. Set Failsafe using Button FUNCTION 3; relay normally activated above trip point (default condition) or below trip point.
  - b. Other settings are available through the buttons if required, including hysteresis, time delay and filtering. Refer to the Operating Manual for complete descriptions. After all adjustments are finalized, the new settings now in operational Bank 0 may be saved to Bank 7, 8 or 9 using Button FUNCTION 15.

## Bank Default Values

Bank No.	Process Fluid	Range Setting
0	FS10 Current Active Parameters	
1	Universal Default Setting A - Low flow sensitivity	Un-calibrated output - low sensor excitation power setting Full range gas or liquid
2	Air/Gas -40 °F to 250 °F (1/4 tube and SP76 adapter)	1 SFPS to 50 SFPS (200 cc/min to 10,000 cc/min, [0.4 SCFH to 20 SCFH] in 1/4" tube) – trend accuracy 10% full scale
3	Universal Setting B - High flow gas, liquids	Un-calibrated output – 1.5X sensor excitation power setting Full range liquid and gas
4	Water/Glycol -40 °F to 250 °F	0.02 SFPS to 0.5 SFPS (4 cc/min to 100 cc/min [0.001 GPM to 0.03 GPM] in 1/4" tube) – trend accuracy 10% full scale
5	Reserved for custom calibration	
6	Reserved for custom calibration	
7	User defined and stored	

## Button Controls

Function #	Function Name	LED Pattern 0 = LED off, 1 = LED on	Parameter	LED Pattern for Parameter	Description
1	Trip Point Adjust	1000000000 -            + 	RELAY_LIMIT	1 – indicates current value relative to full scale	Button controls adjust relay trip point in 10% increments.
2	Trip Point Capture	1100000000 -            + 	RELAY_LIMIT	1 – indicates current value relative to full scale	When entering this function the “ready to capture” LED pattern will be presented (0101010101). Pressing either button will “capture” precisely the current flow value as the new relay trip point.
3	Failsafe	1110000000 -            + 	RELAY_POLAR	0000011111 = “on” above (default)  1111100000 = “on” below	Selects whether the relay is “on” (energized) if the flow value is above the relay trip point, or if the relay is “on” (energized) when the flow value is below the relay trip point. Pressing the buttons will toggle between the two options (default = “on” above trip point -- typical for low flow alarm).
4	Bank Selection of Stored Parameters	1111000000 -            + 	CAL_DATA_INDEX	1 – indicates current index (1..7)	Select and load a bank of configuration parameters. If the bank corresponding to the selected index has not been set, the “error pattern” (1100110011) will display. Use “+” or “-” to move to a bank that has desired parameters populated for loading into active bank (0). **
5	Static or Dynamic Range Selection	1111100000 -            + 	DISPLAY_RANGE_MODE	1111100000 = “static”  0000011111 = “dynamic”	Selects the output range function static/dynamic. If “static” mode, then the output range is defined by the CUST_FLOW_MIN and CUST_FLOW_MAX parameters. If “dynamic” mode the CUST_FLOW_MAX will adjust if the flow value is greater than the current maximum value. Default value is “static.”
6	Minimum Flow Capture	1111110000 -            + 	CUST_FLOW_MIN	1 – indicates current value relative to full scale	When entering this function the “ready to capture” LED pattern will be presented (0101010101). Pressing either button will “capture” the current flow value as the new display “zero” point.
7	Maximum Flow Capture	1111111000 -            + 	CUST_FLOW_MAX	1 – indicates current value relative to full scale	When entering this function the “ready to capture” LED pattern will be presented (0101010101). Pressing either button will “capture” the current flow value as the new display “maximum flow” point. Note: this mode is only valid if the DISPLAY_RANGE_MODE (5) is “static.”
8	Hysteresis Applied Above or Below Trip Point	1111111100 -            + 	RELAY_HYSTERESIS_EFFECT	0000011111 = apply above  1111100000 = apply below	Selects whether the hysteresis is to be applied above (default) or below the relay trip point. Pressing the buttons will toggle between the two options.

9	Maximum Hysteresis Value	1111111110 - +	RELAY_HYSTERESIS	1 – indicates current value relative to maximum 10% hysteresis (MAX_HYSTERESIS)	Buttons adjust the value of the dead band effect. Increments in 1 percent of trip-point value. Default setting is 2% of trip-point. Button range 0-10%. Wider range available through RS232 interface.
10	Time Delay to Activate Relay or Binary Pulse	1111111111 - +	RELAY_TURN_ON_DELAY	1 – indicates current value relative to maximum delay (MAX_DELAY)	Time delay from when flow measurement is greater/less than relay trip point, to turn on relay. Increments and decrements in 1 second steps [Max default setting 10 seconds when using buttons].*
11	Time Delay to De-activate Relay or Binary Pulse	1000000001 - +	RELAY_TURN_OFF_DELAY	1 – indicates current value relative to maximum delay (MAX_DELAY)	Time delay from when flow measurement is greater/less than relay trip point, to turn off relay. Increments and decrements in 1 second steps [Max default setting 10 seconds when using buttons].*
12	Alarm Simulation	1100000001 - +		0000011111= output "max" 1111100000= output "min"	Alarm simulation mode. Pressing the "+" button forces "maximum" (corresponds to A_OUT_DAC_COUNT_100) 4-20 mA output. Pressing "-" forces "minimum" (corresponds to A_OUT_DAC_COUNT_0) 4-20 mA output. Relay output will correspond with RELAY_POLAR setting.
13	Keypad Lockout	1110000001 - +	BTN_ENTER_TIMEOUT	1111100000 = 3 seconds 0000011111= 10 seconds	Keypad lockout time. Pressing the buttons toggles between either 3 seconds or 10 seconds to hold both buttons to enter "function selection" mode.
14	Filter Setting	1111000001 - +	INPUT_FILTER_COUNT	LED 1 on = setting 3 LEDs 1-3 on = 18 LEDs 1-5 on = 30 LEDs 1-7 on = 50 LEDs 1-10 on = 100	Input filtering count: Default = 18. "-" decreases filter, min. = 3. "+" increases filter, max. = 100. Filter value 18 reduces response time <2 sec
15	Save To Bank	1111100001 - +		1111111000=7	User preset. Save current active parameters (in 0 bank) to user bank location 7. (Hint- use "-" button to quickly move to FUNCTION 15 from FUNCTION position 1). **

\* Maximum time delay may be up to 65,000 seconds when using RS232 command line or PC interface.

\*\* Function #4 (load a bank) and function #15 (save to a bank), requires holding either button for 3 seconds to load or save. Holding both buttons will exit either function without performing the operation.

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