

System info

CMGS System X has an industry first “Auto Learn” feature. What this means is that when you install your FSB the system will learn over a period of time how your system is supposed to inject. Once a problem is detected the fault code will turn on and the yellow failsafe wire will trigger based on how you set it up. During the learning process, it is possible to get a 004 or 005 error. If you wish to get rid of the error you can turn the failsafe off until it has fully learned (it will learn even if the failsafe is off). If you have a fast spooling turbo or supercharger and it has not fully learned, you may want to manually learn. You can read in this document how to do this.

How does all of this work behind the scenes?

It’s quite simple for you however the engineering that went into this is very detailed. There are 2 tables that are stored in memory. These tables are for pump information and flow rate. These tables will store information from 25% to 100%. When you first start up the CMGS/VC2 there will be a 10 seconds period where you will see “1.10” blink rapidly. This is the flash version. After that, you will see up to 8 bars light up for a second.

- Bar 1: 25-39 %
- Bar 2: 40-49 %
- Bar 3: 50-59 %
- Bar 4: 60-69 %
- Bar 5: 70-79 %
- Bar 6: 80-89 %
- Bar 7: 90-99%
- Bar 8:100%

AUTOLEARN: While you are driving, the system will be recording the data and once CMGS has learned all of the pump information for each bucket above, that bar will light up on start-up after the 10 second flash. For example, assume you are using the FSB only and you have recorded the pump values from the duty cycles 80-95%, 40-52% and from 55 to 63% , when you start up the controller you will see bar 2 light up, and bar 8 light up. None of the other bars will be lit. This is how you know the system has completely learned. You can manually learn by going into configuration mode and setting failsafe to 001 and setting param #6.

RESETTING THE TABLES: The learning is automatic, even if you turn the failsafe off the system will learn. If you later add a 2nd nozzle or change nozzle sizes, you must reset the failsafe so it can relearn. To reset the failsafe tables its simple. Turn the MIN and max all the way to the right while you see the “000” in the main display. You will see it count down from “10”. Once it gets to zero the failsafe tables will be cleared. The system will relearn, regardless of whether you turn the failsafe on or not.

ADJUSTING SENSITIVITY: Failsafe sensitivity can be adjusted on several factors. You can set the sensitivity from 1 to 50 on the low side, high side for both flow and pump electronic feedback. You can see details later in this document

To go into configuration mode, turn the MIN dial and the MAX dial to 1 and it will count down from 5 to 0. Now you can set a few parameters. Coolingmist chose to make this system as automatic as possible with only a few parameters for convenience or necessity.

How it works: Each bar across the top is a parameter. Bar #1 is param #1, Bar # 10 is param #1. You use the Maximum dial to move to the next param and the Minimum dial to change the value. Once you get past the 10th, bar, it will be Parm #11 and the fault light will flash faster.

PARAM # 1 3 digit display. This is the information that you want to display on the 3 digit center display. 000 Boost/Vacuum. Range is -30 PSI to + 30 PSI. 001 BAR 002 MAF (can only display maf if injecting based on MAF) 003 Flow (not used) 004 Pump Duty cycle 005 special failsafe values

PARAM #2 Injection mode. 000 Boost (DEFAULT) 001 MAF 002 VACUUM (Negative PSI). IF you are used to hhgg (inches of mercury) you can convert to PSI by multiplying the HHgg by .5. This will get you approximate -PSI.

PARAM #3 5 volt output (small orange wire) 000 Duty cycle (default) 0 VOLTS=0%, 5 VOLTS=100% 001 NOT USED
NOTE: During a flow or pump error the value of the 0-5 output will drop to 0.

PARAM #4 FAILSAFE: 000 Failsafe Off 001 Failsafe On NOTE: If you are going to manually fill your tables instead of auto learn you will need to set this param to 001 for it to work. 002 Failsafe Automatic (DEFAULT) ** this param is default and will auto sense the FSB.

PARAM #5 AUX Failsafe Wire Config (Yellow wire) 000 Normally Open (Default) 001 Normally Closed 002 Normally Open (closed when MIN set point reached) **** YOU MUST SET THIS IF YOU DON'T HAVE THE FSB AND WANT TO USE A SOLENOID. THIS WILL GROUND THE SOLENOID AT MIN BOOST** 003 Normally Open (closed when MAX set point reached) **** NOTE 002 and 003 could be used if you don't need to activate the failsafe but need to open a solenoid, turn on a second pump or do some other operation when the min or max set point is reached.**

PARAM #6 PUMP TEST MODE (PRIME THE LINE OR MANUALLY LEARN) Use the minimum knob to turn the pump on at specific duty cycles for testing. Your pump will be running at the duty cycle shown on the screen. Once you turn the max knob to the next setting the pump turns off and you go to the next param

PARAM #7 NOT USED AT THIS TIME

PARAM #8 NOT USED AT THIS TIME

PARAM #9 LOW PUMP FEEDBACK FINETUNING The FSB (failsafe control box) reads the electrical state of the pump at all duty cycle and by doing this we know exactly how the pump should be operating at each duty cycle. Use this to set the low end of the variance. That his how much lower than the failsafe table setting for that duty cycle you are willing to let it vary. This value references 25 to 59% DC. By default, its set at 20.

PARAM #10 HIGH PUMP FEEDBACK FINE TUNING The FCB (failsafe control box) reads the electrical state of the pump at all duty cycle and by doing this we know exactly how the pump should be operating at each duty cycle. Use this to set the high end of the variance. That his how much higher than the failsafe table setting for that duty cycle you are willing to let it vary. This is the 60 to 100% DC value. **THIS VALUE IS 10 BY DEFAULT. IF YOU HAVE FULLY LEARNED AND GET ERRORS, SET IT TO 1 DIGIT HIGHER UNTIL ERROR GOES AWAY**

Once you are at param #10 you notice the fault light flashes slow. If you turn the MAX knob one more setting you will see one bar across the top lit and the fault flashing fast. This is param 11. Param #11 onward are for tech support and not to be used. To save your configuration settings turn the MAX dial all the way to the right till it cannot turn anymore and then do the same for the MIN dial. Now you can set the MIN/MAX where you need them for injection.

ENTERING CONFIGURATION MODE: To make changes to the system you need to go into configuration mode. Turn the MIN and MAX both to 1. The system will count down from 5 to 0. Once you reach 0 you are in configuration mode. Once you make your changes turn the MAX all the way to right and the MIN all the way to right (in that order) and changes will be saved.

RESET YOUR AUTOLEARNED TABLE: When you make changes to your system such as nozzle size, or pump or add more nozzles or if you add a flow sensor to the system after it has learned with FCB you will need to reset the table. When you are in run mode turn the min/max all the way to the right. It will count down from 10, at 0 the table is erased. If you re-start the system you will see none of the flow bars light up at start-up indicating the table is empty. This does not erase the configuration settings.

RESET CONFIGURATION TO DEFAULT: This does not affect or erase your tables but will set the params #1 to 10 back to default. When you first start the system turn the min and max all the way to the right. You will see a 15 second count down. At 0 you will be reset.

Fail Safe error codes for version 1.10 and 1.11:

000 – Fault Input error This error occurs when you are low on fluid OR if you have a bad ground on the FCB.

004 – Minimum pump electrical error This error occurs when the pump electrical state is below the Fail Safe minimum operating parameters as established in the Fail Safe table or default fail safe rules. Could be hardware failure, clog, leak, etc.

005 – Maximum pump electrical This error occurs when the pump electrical state is above the Fail Safe maximum operating parameters as established in the Fail Safe table or default fail safe rules. Could be hardware failure, clog, leak, etc.

999 – Critical error But when this type of error condition occurs the CMGS sends a command to the CMGS Current Meter via the 0-5V output to open the pump motor relay and shutdown the pump. The Critical error latches on and can only be cleared by power cycling the CMGS and removing the cause(s) of the error. This error would occur if the pump was miss wired (for example, grounding the pump to the chassis) or if an electrical problem caused the controller to malfunction. 999 code causes the pump to completely shut off and can protect your engine.

Failsafe error codes for 4.11 and 5.11

FIE (Fault Input Error) LOW fluid or fault light has been triggered.

LOC (Low Current) pump may have a leak or some other issue

HIC (High Current) may be a clog or some hardware failure.

UFE (Urgent Error) Pump is running when it should not be OR your FSB is not installed correct.

NOTE: IF YOU GET A FAULT CODE AFTER THE SYSTEM HAS BEEN INSTALLED FOR A PERIOD OF TIME, YOU HAVE SOME SORT OF PROBLEM. THIS CAN BE A CLOG, OR HARDWARE FAILURE OF SOME SORT. IT HELPS TO LOOK AT THIS CHART AND ALSO IT WILL HELP TO KNOW WHAT DUTYCYCLE THE ERROR IS HAPPENING AT.

INJECTING BASED ON BOOST By default the system will inject based on boost and it will display vacuum and boost. You can change the boost to BAR if you prefer that unit of measurement. See the configuration settings detail to understand how to set that up. The MIN dial is your start point. The MAX dial is your full point. The system will turn on when you reach your MIN setting and as your boost increases it will inject more until you reach your MAX setting. After your MAX setting, you will remain at full flow.

INJECTING BASED ON VACUUM The system has safety features built in for injecting based on vacuum. To configure the system for vacuum go into configuration mode and set the injection mode to vacuum (param #2 to 002). Vacuum is displayed in PSI from -30 to 0. If you are used to inhg or inches of mercury you can convert to PSI by multiplying the inhg to .49 to get approximate value. For example, if you idle at 16 inches of mercury, the PSI equivalent of that is approximately 8. You then can set the MIN dial and MAX dial. The MIN dial will be the -PSI that you want it to turn on and the MAX dial will be where you want it to be at full flow. For example, if you want it to turn on around 15 inches of mercury and be full flow by around 2 you would set the MIN dial around -7 and the max dial around -4. The system will learn what -psi you idle at and it will not allow the system to turn on at idle.

*****NOTE***** You must set the injection mode to vacuum otherwise it will inject based on boost.

INJECTING BASED ON FREQUENCY MAF This system can inject based on frequency MAF as well. BY DEFAULT THE CMGS SYSTEM X WILL INJECT BASED ON BOOST. YOU NEED TO SET PARAM #2 TO 001 TO INJECT BASED ON MAF. IN ADDITION, IF YOU WANT TO DISPLAY MAF YOU WILL NEED TO SET PARAM #1 TO 002. You can inject within a range of 200 HZ to 20,000 HZ. The scale will 100. So 002 HZ is 200 HZ and 200 is 20,000 HZ. You can also inject based on descending hertz. For example, if you set the MIN to 005 and the max to 010 you will start at 500 HZ and be full flow at 1000 HZ. If you however set the MIN to 010 and the max to 005, the system would turn on at 1000 HZ and be at full flow by 500 HZ. You will need to know where your MAF system frequencies are to use this feature. Always look at the duty cycle bar across the top of the controller so you know when its injecting.

NOTE: THIS VERSION OF THE CMGS CANNOT INJECT BASED ON A 0-5 V.

DISPLAYS: 10 bars across the top: Each bar represents 10% duty cycle when using the failsafe box each duty cycle is verified before it displays (this is why it appears to be a slight delay, but injection is in real time)

7 Segment Display. The centre display has 3 digits and can be configured to display MAF value, Boost/vacuum, BAR, , Pump Electrical Status or Duty cycle. See the configuration setup for this feature.

Controller Wiring Testing: 1) Remove the nozzle from your charge pipe so it will spray in the air. 2) Set the MIN and MAX to 1 and count down from 5 to 0 to go into configuration mode. 3) Move the max dial until 6 bars are lit up on the controller. 4) turn the min dial through the various duty cycles (make sure water is in your tank) Doing the above the system will turn on and prime. What this does is prime your line. It does not test the failsafe.

Filling the failsafe tables through config mode instead of auto learn Please note that once you connect everything correct and drive for the first time the system will fill a base failsafe table. This base failsafe table will protect you against complete failure of hardware, over flow and things like that. If you want to get more specific to your setup faster than the auto learn here are the steps:

- 1) Set the MIN and MAX to 1 and count down from 5 to 0 to go into configuration mode.
- 2) Set Param #4 to "001"
- 3) Follow #3 and #4 on the "Controller Wiring Testing" feature above

Doing basic tests of your failsafe: To test the failsafe is pretty simple. Disconnect the red wire from the pump to simulate a pump failure and drive. You will get a "004" error and your failsafe will trip.

Check to see what failsafe values have been stored in your tables:

- 1) turn power OFF to the controller
- 2) turn power ON to the controller
- 3) look at the bars across the top and note which ones are lit up. Once all failsafe buckets are full it will light up the first 8 bars. If you see bars 2 and 6 not lit up, then the 40% to 49% bucket and the 70 to 79% DC are not full yet. You still will have failsafe protection at those DC, but it will be the base map.
- 4) If you see the 10th bar lit up, that means the system auto detected your flow sensor as well.

GOTCHAS: Once the system has learned, it has learned. If you change your injector or pump You must reset the failsafe tables and learn again. (min/max to right count down from 10). This also holds true if you change your nozzle size or make other changes to your system. If your system sits for a long period of time you may get errors when you drive. This indicates changes in the system such as a clogged nozzle or debris that is on the nozzle that needs cleaned.

FINETUNING YOUR FAILSAFE: After all 10 buckets are full, if you get 001, 002, 004 or 005 errors and there is no real problem you will need to adjust the sensitivity of the system. Anytime you get these errors, you must recycle power to the controller to clear the codes. If you do get a false error you may want to fine tune the system. Its important to know where the error came from. See page 8 for the configuration params.

004 means FCB reported a pump feedback problem. Pump may have lost pressure or many other issues.

005 means the FCB reported a pump feedback problem. Pump may have more pressure than should or other issues. Could be clogged nozzle, restriction or kinked hose.

FSB ADJUSTMENTS

- Param#9 controls DC range 25-59%
- Param #10 controls DC range 25-59%

Example for above...If you get an error code 004 or 005 above 59% you adjust param # 10 If you get an error code 004 or 005 prior to 59% you adjust param #9.

When you first install the FSB by default param #9 is set to 20 and Param #10 is set to 6. Param #10 is most important because that is your higher DC range. If you just need to know major problems like pump dead, solenoid does not open or line is not connected you can leave as is. If you need more detail such as partial flow you may want to adjust param #10 lower. In this case adjust param #10 to 3. If you get a 004 or 005, adjust to 4 and do so until you don't get any errors at 100% DC. Most customers will leave at default, but if you need more detailed failsafe feel free to adjust.