FuelCell & FlowCell Addendum – Model 892 Data Expansion System Support

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1. Introduction

This document describes setup and operation of Scribner's Model 892/892e Data Expansion System with *FuelCell*[®] software for 840/850/890 series of Fuel Cell Test Systems, and for *FlowCell* software for 857 Redox Flow Cell Test System. This document applies to *FuelCell* version 3.4g and later and *FlowCell*[®] version 1.3e or later.

FuelCell and *FlowCell* software can support up to 6 modules for a maximum of 32 Aux signals.

Configuration of *FuelCell* software for 892(s) can be done through the Instrument Configuration menu or manually by editing the "*fuelaux.ini*" file.

Configuration of *FlowCell* for 892(s) is done manually by editing the "*flowaux.ini*" file.

Both methods are described below.

2. Configuring 892/892e Data Expansion Unit from *FuelCell* Software

To access the configuration settings, start the *FuelCell* program, select **File | Instrument Configuration...**, and enter the serial number of the 890 or 850 unit. The serial number is located on the serial plate located on the back panel of the 890 or 850 unit.
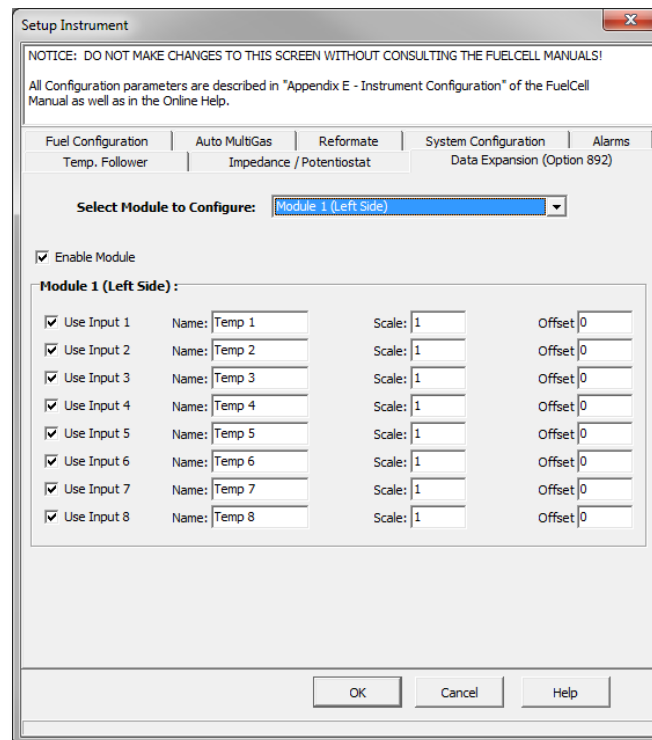
The **Data Expansion** tab is used to configure one or more Model 892 Data Expansion Units for use with an 890 or 850 system. See the 892 manual for additional information on the hardware.

Each model 892 is configured with one or two 8-channel sections (Modules). For example, 892e models are configured with 8 thermocouple inputs and 8 analog inputs. Non-standard 892s may have different configurations of temperature and analog inputs.

The following configuration example is for a standard 892e unit:

Select **Module 1 (Left Side)** and check the **Enable Module** box to activate the 8 temperature (thermocouple) inputs of the 892e.

Check **Use Input 1** through **Use Input 8** for the channels that are used. Unchecked channels will not be available for data recording in *FuelCell*. The channel **Name** is shown in *FuelCell* and is the data column header in the data files.

Select **Module 2 (Right Side)** and check the **Enable Module** box to activate the 8 analog input channels of the 892e. The factory default setting is for the analog inputs to be configured for voltage inputs, for example for stack cell voltage or pressure transducer. See the 892 manual for wiring configurations for other input types, *e.g.,* for a 0-20 mA type device or input source.

Check **Use Input 1** through **Use Input 8** for the channels that are used. Unchecked channels will not be available for data recording in *FuelCell* software. The channel **Name** is shown in *FuelCell* and is the data column header in the data files.

The Scale and Offset values can be used to translate a sensor signal into scaled units. The recorded value for an input is *Recorded Value = (Sensor Value × Scale) + Offset*.

For example a 0-5 V sensor signal that corresponds to 0-100 kPa, set the Scale value to 20 and Offset value to zero to scale the reported values in kPa.

Setup Instrument

NOTICE: DO NOT MAKE CHANGES TO THIS SCREEN WITHOUT CONSULTING THE FUELCELL MANUALS!

All Configuration parameters are described in "Appendix E - Instrument Configuration" of the FuelCell Manual as well as in the Online Help.

Fuel Configuration	Auto MultiGas	Reformate	System Configuration	Alarms
Temp. Follower		Impedance / Potentiostat	Data Expansion (Option 892)	

Select Module to Configure: Module 2 (Right Side)

☑ Enable Module

Module 2 (Right Side):

☑ Use Input 1	Name: Volts 9	Scale: 1	Offset: 0
☑ Use Input 2	Name: Volts 10	Scale: 1	Offset: 0
☑ Use Input 3	Name: Volts 11	Scale: 1	Offset: 0
☑ Use Input 4	Name: Volts 12	Scale: 1	Offset: 0
☑ Use Input 5	Name: Volts 13	Scale: 1	Offset: 0
☑ Use Input 6	Name: Volts 14	Scale: 1	Offset: 0
☑ Use Input 7	Name: Volts 15	Scale: 1	Offset: 0
☑ Use Input 8	Name: Volts 16	Scale: 1	Offset: 0

OK   Cancel   Help

3. Manual Configuration of *FuelCell* or *FlowCell* Software for the 892 Data Expansion Unit

The 892(e) Data Expansion Unit can be configured for *FuelCell* by directly editing the "*fuelaux.ini*" configuration file which is located in the program installation folder (usually located at c:\FuelCell\).

The 892(e) Data Expansion Unit can be configured for *FlowCell* by directly editing the "*flowaux.ini*" configuration file which is located in the program installation folder (usually located at c:\FlowCell\).

The 892(e) modules should be preconfigured for the appropriate RS485 address, baud rate, data format and gain/range.

The format of the *fuelaux.ini* or *flowaux.ini* file is shown below.

Each [Module] section describes a particular unit and must contain the proper **RS485Address** setting. Setting the address to 0 will deactivate the module.

The **Gain** setting (shown for Module2 below) is optional and should only be used to reconfigure a module in the field. It should not be used in preconfigured systems. The Gain setting corresponds to the 8017 and 8018 Data Range values described in their manuals.

Note: The **Gain** value is an integer from 0 to 255. The 8017 and 8018 manuals describe the data ranges in Hexadecimal format (00 to FF).

Each module has 8 inputs. The following settings will activate input #1 and use the text label "Temp1" in the *FuelCell* program for this input channel. If **Used** and **Name** values are not entered, the input will not be used.

Input1Used=1
Input1Name=Temp1

Each input also has optional scaling and offset values. The following settings will multiply the value for input #1 by 10 and then add 5.

Input1Scale=10
Input1Offset=5

Example of the *fuelaux.ini or flowaux.ini* configuration file:

```
[Program]
;This file describes the configuration of the 892 Aux signal options

[Module1]
RS485Address=1

Input1Used=1
Input1Name=Temp1
```

```
Input2Used=1
Input2Name=Temp2
Input3Used=1
Input3Name=Voltage1
Input4Used=1
Input4Name=Voltage2

[Module2]
RS485Address=2
Gain=15

Input1Used=1
Input1Name=Temp3
Input1Scale=2
Input1Offset=0

Input2Used=1
Input2Name=Temp4
Input2Scale=1
Input2Offset=5

Input3Used=1
Input3Name=Voltage3
Input3Scale=1
Input3Offset=0

Input4Used=1
Input4Name=Voltage4
Input4Scale=1
Input4Offset=0
```
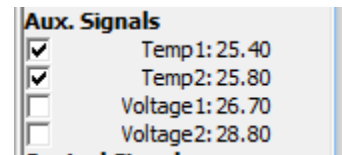
4. Recording 892 Data in *FuelCell & FlowCell* Software

The 892 measurements are displayed in the data values list under *Aux Signals*. Checked items can be graphed and are saved to the Background or Experiment data files.

5. Setting Alarm Limits and Alarm Trigger Modes for 892 Data in *FuelCell* and *FlowCell* Software

   Click the **892e** button to display the 892 Alarms settings screen.

Minimum and Maximum limits can be defined for each parameter. Note that there is no separate on/off switch for each alarm. The default limits are -1e9 and 1e9 to effectively disable the alarms.

The default action is to Stop Flow/Fuel, Stop Load/PSTAT and Stop Temperature(s).

The alarm action can be modified by adding the InputXAlarmMode parameters as shown below. Note that Inputs 1 and 2 will use the default Alarm Mode 4, and Inputs 3 and 4 will use Mode 2.

Alarm Modes:
>   0 = No Alarm
>   1 = Remove Load/PSTAT
>   2 = Remove Load/PSTAT + Remove Fuel/Flow
>   4 = Remove Load/PSTAT + Remove Fuel/Flow + Remove Temperature (default)
>   5 = Remove Load/PSTAT + Remove Temperature

The InputXTriggerMode parameters shown below can be used to modify when an alarm can occur. For example, a low voltage alarm could be active only when the Load/PSTAT is on. This would allow the Fuel/Flow to applied without the alarm occurring.

Note that Inputs 1 and 2 default to Trigger Mode 2, and Inputs 3 and 4 default to Trigger Mode 1.

Trigger Modes:
>   0 = Alarm will occur whenever limits are exceeded
>   1 = Alarm can occur whenever the Fuel/Flow is on
>   2 = Alarm can occur whenever the Load is on (default)
>   4 = Alarm can occur whenever the Temperatures are on
>   8 = Alarm can occur whenever the Pressures are on

Trigger Modes are additive. A value of 6 (4+2) means that the alarm can occur if either Load or Temperature are on. However, for this Trigger Mode the alarm will not be active if only Fuel/Flow is on.

Example of the *fuelaux.ini* or *flowaux.ini* configuration file with modified alarm action settings:

```
[Module1]
;Alarm Modes: Default = 4
;0 = No Alarm
;1 = Remove Load/PSTAT
;2 = Remove Load/PSTAT + Remove Fuel/Flow
;4 = Remove Load/PSTAT + Remove Fuel/Flow + Remove Temperature (default)
;5 = Remove Load/PSTAT + Remove Temperature
;Trigger Modes: Default = 2
;0 = Alarm will occur whenever limits are exceeded
;1 = Alarm can occur whenever the Fuel/Flow is on
;2 = Alarm can occur whenever the Load is on
;4 = Alarm can occur whenever the Temperatures are on
;8 = Alarm can occur whenever the Pressures are on
RS485Address=1

Input1Used=1
Input1Name=Temp1
Input2Used=1
Input2Name=Temp2
Input3Used=1
Input3Name=Voltage1
Input3AlarmMode=2
Input3TriggerMode=1
Input4Used=1
Input4Name=Voltage2
Input4AlarmMode=2
Input4TriggerMode=1
...
```