



# INSTRUCTION MANUAL

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**BALDWIN**<sup>TM</sup> - Series  
**FLOW CONTROL DRAWERS**  
**MANUAL / PLC CONTROL SERIES**  
**Model 3300**

Version 4.06

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# A: LIMITED WARRANTY

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## B: DESCRIPTION

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The Baldwin™-Series Model 3300 Flow Control Drawer allows easy control of sample and calibration gases. With the Model 3300, you may choose whether to control sample gases, cal gases, and stack probe blowback, manually or by PLC.

The standard Model 3300 is configured for two gas channels, and two calibration gases (zero and span). Manual control switches are provided for selection of system or direct calibration. Four flow meters are included for visual indication & control of stack calibration gas flow, individual analyzer flow, and bypass.



*Model 3300*

Model 3300 has a provision for system bias checks. System integrity is verified by comparing the calibration gas flow to the stack filter head and through the entire sample system to the calibration gas introduced directly to the continuous gas analyzer common sample manifold. This check indicates problems such as system leakage and gas component loss.

### Features:

- Manual or PLC control of sample and calibration gases
- Up to 6 gas analyzer channels
- Up to 8 cal gas channels (including zero and span)
- Multiple flow meters: cal gas to probe, total flow to analyzers, individual analyzer channels
- Pump vacuum gauge
- Sample / cal gas pressure gauge
- Cal gas regulator
- Optional pressure transmitters (sample, cal gas and vacuum), Model 3300P

The Model 3300 Flow Control Drawer is a 19" Rack Mountable integrated gas flow control system for monitoring and controlling of:

1. Total Extracted Sample Flow
2. Individual Analyzer Sample Flow
3. Bypass Flow Control
4. Calibration Gas Pressure Regulation & Flow
5. Bias Check (Sample Loss Due to Leaks or Gas Absorption)
6. Calibration Gas Leak Detection
7. Stack Probe Blowback

Upgrades to the Model 3300:

- Additional analyzer gas channels (6 Gas Channels Maximum).
- Additional calibration gas valves (8 Cal-Gas Channels Maximum).
- 3 Pressure transmitters (sample, cal gas, vacuum) Model 3300P

# C: SPECIFICATIONS

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Input Cal-Gas Channels:

Flowmeters:

Sample 5-15 Psig

Vacuum 0-30" Hg

Calibration 5-35 Psig

Output Gas Channels:

Flowmeters:

0 – 2.5 LPM

Blowback:

Specify 12VDC, line voltage or dry contacts

Voltage:

90 - 240VAC, 50/60 Hz

Power:

100 Watts

Mounting Dimensions:

5U (8.75"), 19" Rack Mount

18" Depth

Weight:

Approx. 24 lbs

# D: OPERATION

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## General Overview

Sample gas is extracted from the process through a filter probe, such as a Baldwin™-Series Heated Filter Probe, to remove particulate. The filtered gas is then transported to a Baldwin Sample Conditioning System where the moisture is removed. The Sample Conditioning System supplies a clean, dry sample when it enters the back panel of the Model 3300 Flow Control Drawer. The stack probe filter and sample pump performance are indicated by the Flow Control Drawer Vacuum/Pressure Gauges.

Note: Please refer to the attached Model 3300 Flow Diagram for an example of an integrated continuous emissions monitoring system flow schematic using the Model 3300 Flow Control Drawer.

Flow from the Sample Conditioning System enters the Model 3300 Flow Drawer sample/calibration manifold. Here, either sample or calibration gas (for direct calibration) can be directed to the atmospheric pressure sample manifold and then on to the individual analyzer gas channels. Individual sample flowmeters indicate the flow rate of each gas channel. A bypass flowmeter vents excess sample gas not used by the continuous gas channels and also acts as an atmospheric vent.

The Model 3300 Flow Control Drawer has the ability to switch the sample and as many as eight (8) calibration gases to the analyzer rack directly or via the total sampling system. This is done through two (2) sets of solenoid valves: (1) the calibration gas solenoid valves which are mounted on a common manifold at the rear of the drawer, and (2) the system/direct solenoid valves located in the front of the drawer. A block & bleed solenoid valve, which prevents the manifolds from being pressurized during sampling, is also part of the system/direct solenoid valve set.

The calibration function will only take place when both a calibration gas solenoid valve and either the system solenoid valve or direct solenoid valve have been selected. In Local mode, the calibration gas solenoid valves are cascaded, that is if there are more than one (1) calibration gas solenoid valve switches in the on position, only the highest numerical calibration gas solenoid valve will be active. This is not the case with computer control. The programmer can select any or all of the calibration gas solenoids. Also, computer control is not allowed in the Local mode. While in the Local/Direct Calibration mode, manual blowback is allowed, but not while in the Local/System Calibration mode. While under computer control, blowback is allowed when nothing else is activated, but not in any Calibration mode.

The Model 3300 has a provision for system bias checks. System integrity is verified by comparison of calibration gas flow through the stack filter assembly to calibration gas flow directly to the gas analyzers. This check indicates problems such as system leakage and gas component loss.

A probe filter blowback relay contact is provided on the Flow Control Drawer to facilitate Manual or computer initiated blowback. For Blowback there is a 250V, 6Amp dry

contact form C relay output provided on the back panel for blowback implementation. There are two (2) vertical terminal block assemblies on the back panel provided for computer interface. The 16-point terminal block is used for computer control and the 40-point terminal block is used for computer verification of flow control drawer operation.

**Pressure Sensor Board Option**

Upstream, (stack filter/and sample line) the pressure drop is actively monitored by a vacuum transmitter, the sample gas flow is verified by a sample manifold pressure transmitter and presence of adequate calibration gas is verified by a pressure transmitter on the calibration gas manifold.

**Local Mode Operation**

To enter the Local mode, toggle the Remote/Local switch to the right. While in the Local mode, the operator can perform manual calibrations and blowback.

The flow control drawer is in Local Control when the Local Switch is selected, the red LED is on and the green Sample LED is on as well. In this mode, all switches on the front panel are enabled for local operator control and Computer Control is disabled. All Calibration Gas (CG) functions, Direct/System, and blowback are available for the local operator. When the Local LED is OFF, the PC or PLC has control and can remotely duplicate local control functions. The Local Switch provides an output to the PLC/PC to indicate that the Flow Control Drawer is offline, (i.e., the analyzers' outputs are not reliable).

**CONTROL FUNCTIONS:**

<b>SWITCHES</b>	Sample	Blowback	Direct Calibration	System Calibration
Local		X	X	X
Direct			X	
System				X
Blowback		X		
Cal Gas 1-8			X	X

*Manual System Calibration:* To perform manual system calibration, toggle the Direct/System switch to the right. Then toggle any of the Calibration Gas switches to the right. This will allow the selected calibration gas to flow to the analyzer suite via the total sampling system. In this mode, manual blowback is not allowed.

*Manual Direct Calibration:* To perform manual direct calibration, toggle the Direct/System switch to the left. Then toggle any of the Calibration Gas switches to the right. This will allow the selected calibration gas to flow to the analyzer suite directly, bypassing the total sampling system. In this mode, manual blowback is allowed.

*Manual Blowback:* To perform manual blowback, depress the Blowback switch to the right. This switch is a momentary switch, that is, it will return when released. When the operator toggles the Blowback switch, two things happen; first, the blowback relay will be activated, and second, the direct solenoid valve will be activated. With the direct

solenoid valve activated, the analyzer suite will be protected from blowback pressurization.

### Computer Control Mode Operation

*Computer Control (CC):* To enter Computer Control mode operation the Remote/Local switch must be toggled to the left. Computer control is initiated through the 16 Position vertical terminal block on the back panel. To activate a particular function, 5VDC is applied to the appropriate terminal. The Remote and Local functions are identical. This can be done in one of two ways. The first way is to take the +5 VDC from terminal 10 or 12, pass it through a set of dry contacts on a computer controlled relay, and back to the appropriate terminal. The second way is to take +5VDC directly from the computer control to the appropriate terminal. For this method, please note that the flow control drawer GND on Terminal 14 and 16 must be connected to the GND on the computer control unit, to electrically reference both systems together.

#### *Computer Control Terminals Summary*

Terminal 2 = System Calibration	Terminal 1 = Cal Gas 1
Terminal 4 = Direct Calibration	Terminal 3 = Cal Gas 2
Terminal 6 = Blowback	Terminal 5 = Cal Gas 3
Terminal 8 = NA	Terminal 7 = Cal Gas 4
Terminal 10 = +5 VDC	Terminal 9 = Cal Gas 5
Terminal 12 = +5 VDC	Terminal 11 = Cal Gas 6
Terminal 14 = GND	Terminal 13 = Cal Gas 7
Terminal 16 = GND	Terminal 15 = Cal Gas 8

*Computer Sense CS:* Along with the computer control mode of operation, a computer verification method is also incorporated into the system. A 40 pin vertical terminal block on the back panel allows the computer to verify the actions initiated by the computer. This is done through a set of normally open dry contacts that are associated with each particular function.

#### *Computer Sense Terminals Summary*

FUNCTION	TERMINALS
Cal Gas Valve 1	1 & 2
Cal Gas Valve 2	3 & 4
Cal Gas Valve 3	5 & 6
Cal Gas Valve 4	7 & 8
Cal Gas Valve 5	9 & 10
Cal Gas Valve 6	11 & 12
Cal Gas Valve 7	13 & 14
Cal Gas Valve 8	15 & 16
System Calibration	17 & 18
Direct Calibration	19 & 20
Blowback*	31 & 32
Local Mode*	39 & 40

\*Note: The sense contacts are normally closed when activated except for blowback

## COMPUTER CONTROL TRUTH TABLE

Terminal #	2	4	1	3	5	7	9	11	13	15	6
FUNCTION											D
System/Calibration 1	*		*								D
System/Calibration 2	*			*							D
System/Calibration 3	*				*						D
System/Calibration 4	*					*					D
System/Calibration 5	*						*				D
System/Calibration 6	*							*			D
System/Calibration 7	*								*		D
System/Calibration 8	*									*	D
Direct/Calibration 1		*	*								
Direct/Calibration 2		*		*							
Direct/Calibration 3		*			*						
Direct/Calibration 4		*				*					
Direct/Calibration 5		*					*				
Direct/Calibration 6		*						*			
Direct/Calibration 7		*							*		
Direct/Calibration 8		*								*	
Blowback											*

D = Disabled

# E. BACK PANEL CONNECTIONS

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See drawing *Flow Control Drawer Back Panel*

## **Mechanical Connections Inlet/outlet Gas Bulkhead Fittings**

1. All Sample Gas Connections are via 1/4" stainless steel bulkhead fittings.
2. All Calibration Gases are 1/4" SS Tube Quick Connects.
3. All Bulkhead Connections are labeled and follow the following functions:

Sample In -----	(SAMPLE)
Sample Vacuum Sense In -----	(VACUUM)
Calibration Gas Out to Stack Filter Assembly -----	(STACK)
Analyzer #1 -----	(CH1)
Analyzer #2 -----	(CH2)
Analyzer #3 -----	(CH3)
Analyzer #4 -----	(CH4)
Analyzer #5 -----	(CH5)
Analyzer #6 -----	(CH6)
Calibration Gas #1-8 -----	(CG1-8)

# F. PRESSURE SENSOR BOARD

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The pressure sensor option provides:

- Vacuum pressure sensor 0- (-15) psig
- Sample pressure sensor 0-30 psig
- Calibration gas pressure sensor 0-30 psig

## Outputs

1. The standard output from all sensors is 4-20 mADC, isolated, loop powered
2. Outputs are terminated on the Flow Control Drawer back panel on the analog output Pressure Transducer Terminal Strip.

## Connections

	<u>24 VDC Supply</u>	<u>4 to 20mA Output</u>
<u>Vacuum</u>	Pin 1	Pin 2
<u>Sample</u>	Pin 7	Pin 8
<u>Calibration gas</u>	Pin 9	Pin 10

## Sensor Calibration

1. All sensors are calibrated at the factory, and should not be adjusted in the field without proper calibration pressure sources.

# G: TROUBLESHOOTING

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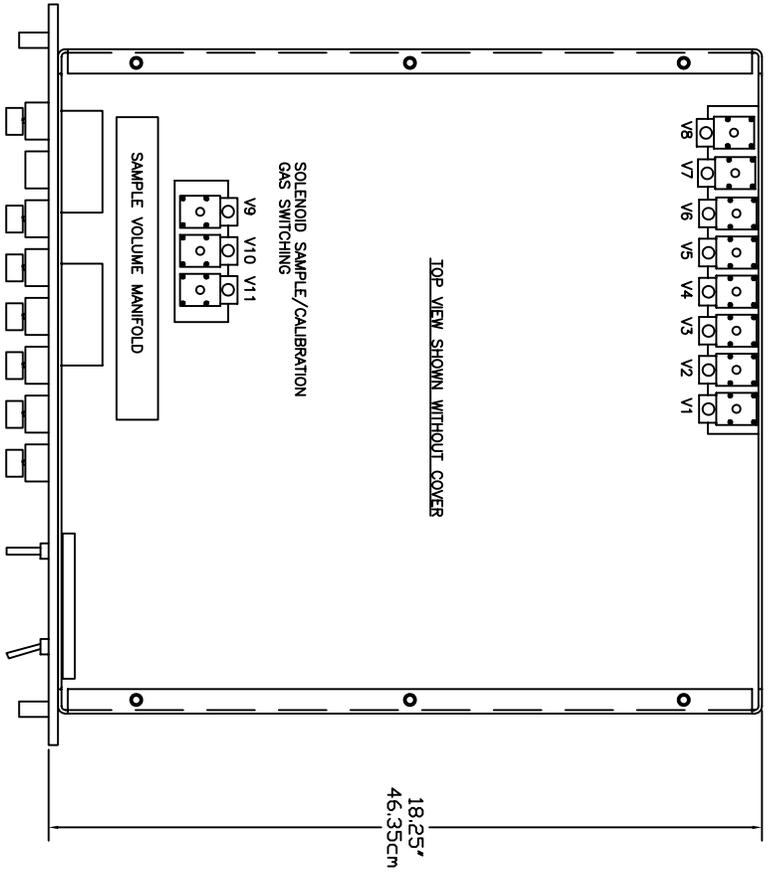
<i>Symptom</i>	<i>Check</i>	<i>Action</i>
No LED display	Not plugged in Power switch is off Fuse blown Power supply defect 12 VDC red-black Check jumper JP1  Ribbon cable loose Defective control board	Plug in instrument Turn on power Replace fuse  Replace power supply Jumper 1-2 Jumper 3-4 Jumper 5-6 Tighten ribbon cables Replace control board
<b>Manual Control (Local)</b> Switches have no effect Inadequate sample flow No system cal gas flow      No direct cal gas flow	Remote/Local switch in remote Low sample pressure  No cal gas from bottle Cal gas solenoid not operating  Flow drawer regulator set <10psig Cal gas Flowmeter closed Block/bleed solenoid constantly vents System cal gas solenoid valve defective  Direct cal gas solenoid valve defective	Select local Adjust sample pressure Cylinder to 15 psig Check cabling Replace cal gas solenoid Replace control board Set regulator to 10 psig Adjust Flowmeter Replace solenoid SV9  Replace solenoid SV10  Replace solenoid SV11 Check cables and connector boards for good connections
<b>Computer Control (Remote)</b> Computer control has no effect      No computer sense	Remote/Local switch in local Computer control wiring to terminal block is wrong   Ribbon cable is loose Defective control board Computer sense wiring to terminal block is wrong Ribbon cable is loose	Select remote See the computer control wiring section in manual, also if using a PLC for control make sure to match your DC GND with the Unit DC GND reference points on pins 14 or 16. Check cables. Replace control board See computer control wiring section in manual Check cables

**For further service assistance, contact:**

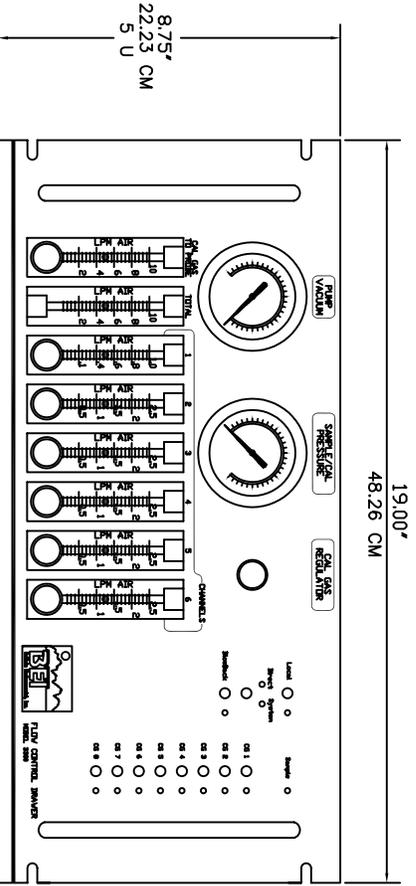
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# APPENDIX

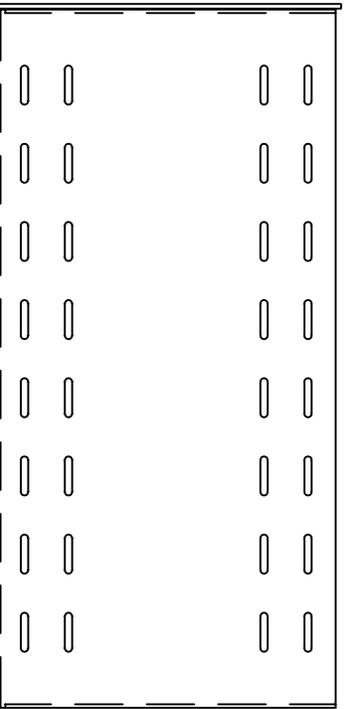
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TOP VIEW



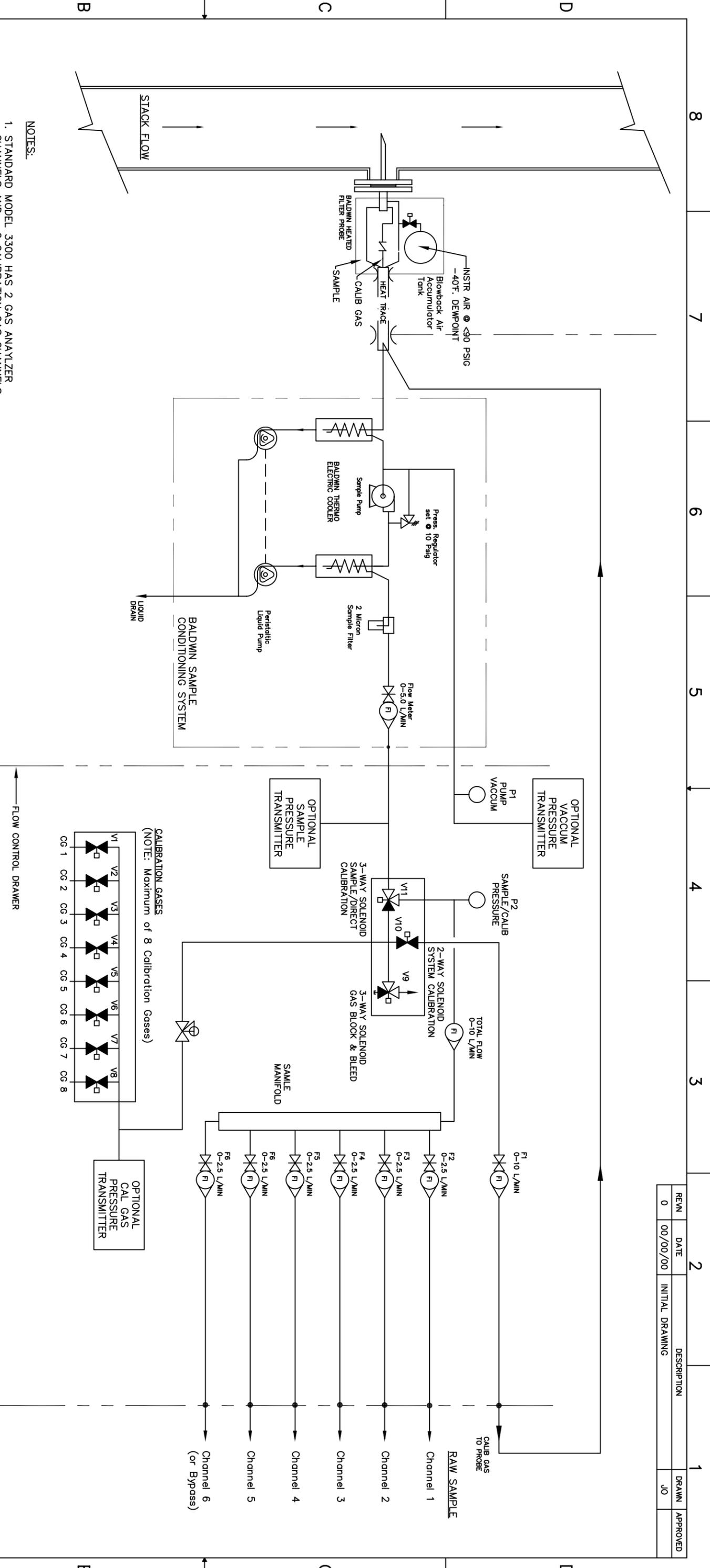
FRONT VIEW



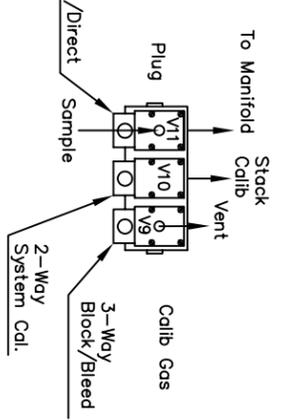
NOTES:

1. ARRANGEMENT AND DIMENSIONS MAY CHANGE ACCORDING TO GOOD ENGINEERING PRACTICES

REV#	DATE	DESCRIPTION	DRAWN	APPROVED
0	00/00/00	INITIAL DRAWING	J0	



NOTES:  
 1. STANDARD MODEL 3300 HAS 2 GAS ANALYZER CHANNELS AND 2 CALIBRATION GAS CHANNELS.



TOLERANCE REQUIREMENTS		UNLESS OTHERWISE SPECIFIED
1 PLACE = ±.02	2 PLACE = ±.02	3 PLACE = ±.010
ANGLES = ±.5°		HOLES = +.003/- .001

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ITEM	QTY	DESCRIPTION	MANUF.
MODEL NUMBER: MODEL 3300 FLOW CONTROL DRAWER			
FOR: DRAWN BY: J0 DATE: 06/19/02			
MATERIAL: FINISH: PART DESCRIPTION: MODEL 3300 FLOW DIAGRAM			
SIZE: SCALE: DRAWING/PART NO.: B NTS 3300 FLOW			
CAD DIR: S:\S&M\DWGSS\LOW CONTROL DRAWER SHEET 1 OF 1			