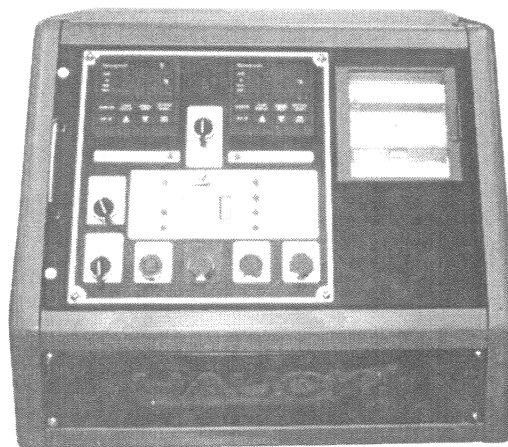




Asphalt Equipment

INSTRUCTIONS

BCS-3000H BURNER CONTROL SYSTEM



WARNING

These instructions are intended for use only by experienced, qualified combustion start-up personnel.

Adjustment of this equipment and its components, by unqualified personnel, can result in fire, explosion, severe personal injury, or even death.

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Attachments: Appropriate Drawing and Schematics

These instructions are intended to serve as guidelines covering the installation, operation, and maintenance of Hauck equipment. While every attempt has been made to ensure completeness, unforeseen or unspecified applications, details, and variations may preclude covering every possible contingency. **WARNING: TO PREVENT THE POSSIBILITY OF SERIOUS BODILY INJURY, DO NOT USE OR OPERATE ANY EQUIPMENT OR COMPONENT WITH ANY PARTS REMOVED OR ANY PARTS NOT APPROVED BY THE MANUFACTURER.** Should further information be required or desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, contact Hauck Mfg. Co.



WARNING

This equipment is potentially dangerous with the possibility of serious personal injury and property damage. Hauck Manufacturing Company recommends the use of flame supervisory equipment and fuel safety shutoff valves. Furthermore, Hauck urges rigid adherence to National Fire Protection Association (NFPA) standards and insurance underwriter's requirements. Operation and regular preventative maintenance of this equipment should be performed only by properly trained and qualified personnel. Annual review and upgrading of safety equipment is recommended.

A. GENERAL INFORMATION

The Hauck Burner Control System (BCS) provides burner management and temperature control of a single pilot ignited burner firing on gas, oil or liquid propane (LP). The spark ignited, gas fired pilot is interrupted after the main burner flame has been established. Flame supervision is provided by a Honeywell RM7890A1015 flame relay combined with a R7849A1023 amplifier module and two C7027A1049 UV detectors.

Two Honeywell UDC3000 series microprocessor based instruments are provided for temperature control. The controllers are electronically linked to the burner control motor(s) to automatically adjust the burner firing rate and maintain process temperature near the controller setpoint. The STACK TEMPERATURE controller thermocouple senses the temperature of the exhaust gases while the MATERIAL TEMPERATURE controller thermocouple is positioned to read the temperature of the material as it exits the dryer. Both instruments generate a position proportional output based on the difference between the controller setpoint and the process temperature input.

The CONTROL MODE selector enables the operator to assign control of the burner to either controller. The center, LOW FIRE, position of this switch is used to hold the burner at low fire. The alarm contact of the STACK CONTROLLER is used to shut down the burner if the preset high temperature limit is exceeded. Refer to Appendix B for entering the desired alarm setpoints.

NOTE

High temperature limits will not prevent baghouse fires. They will, when properly installed and adjusted shut off the burner when a given temperature setpoint is exceeded. Outside factors such as chemicals, bag contamination or other ignition sources are beyond the control of the burner management system.

CAUTION

The **STACK** alarm setpoint is factory set at 400°F (204 C). If the system is equipped with a fabric dust collector (baghouse), consult the manufacturer for recommended baghouse temperature limitations.

B. RECEIVING AND INSPECTION

Upon receipt, check each item on the bill of lading and/or invoice to determine that all equipment has been received. Examine all parts to determine if there has been any damage in shipment. If equipment is to be stored prior to installation, provide a dry storage area.

IMPORTANT

For optimum use of the BCS panel, it is suggested that the drawings provided by Hauck be referred to for limit switch and valve installation and wiring. In the event that a recommended switch or valve is not used, it may be necessary to connect jumper wire(s) between appropriate terminals in the control panel or burner junction box. Such determination remains the responsibility of the Customer, based upon his application, accepted safe installation and operating procedures, and any applicable insurance guidelines or governmental regulations.

C. DRAWINGS AND SUPPLEMENTAL LITERATURE

Burner System

	StarJet	EcoStar	PowerStar
System Schematic	CY6502	CY6493	CY6348
External Wiring	CY6496	CY6495	CY6352
Wiring Diagram	CY6350	CY6350	CY6350
Tabletop Panel Assy.	CY6351	CY6351	CY6351
Drop-in Panel Assy.	CY6349	CY6349	CY6349

D. INSTALLATION



WARNING

Adjustment of this equipment, by unqualified personnel, can result in fire, explosion, severe personal injury, or even death.

1. Locate the tabletop panel on a firm support in an area which is protected from the weather and free from vibration. The drop-in version is designed to install in an existing enclosure. Reference drawing CY6349 for required cutouts and mounting dimensions.

IMPORTANT

Operating specifications of 32 to 130 °F, 30 to 95% relative humidity (non-condensing) should be considered in selecting a suitable location for the control panel.

2. Provide 120Vac single phase **GROUNDING NEUTRAL** power to the burner control panel. It is recommended that the customer provide a master disconnect switch to interrupt power service to the panel. Maintain polarity as indicated on the drawings provided when connecting the main power source to the panel.
3. **Install a heavy gauge (No. 12 AWG minimum) ground wire between the panel ground connector and "Earth" ground.**

IMPORTANT

A ground wire is also required between the burner junction box(es) and the control panel terminal strip.

4. Wire the fuel valves, valve position limit switches and fuel pressure limit switches as shown on the external component wiring diagram.
5. Install the exhaust fan flow limit switch in the dryer exhaust duct as shown in **Appendix C**. Wire the normally open contact of the exhaust flow limit to the appropriate terminals in either the burner junction box or the BCS control panel.
6. Install the stack temperature thermocouple in the dryer exhaust duct to sense exhaust gas temperature. See **Appendix D** for installation instructions.
7. Install a Hauck Rapid Response material temperature thermocouple in the material discharge chute to sense the temperature of the material leaving the dryer. See **Appendix E** for recommended installation.
8. Connect the thermocouples to the appropriate terminals in the BCS control panel using thermocouple cable of the same type as the Material and Stack thermocouples.

IMPORTANT

Thermocouple cables must be separated from AC power and control wiring to avoid interference and nuisance shutdowns. Observe polarity when making thermocouple connections. Regardless of thermocouple type, the red wire is always negative. Shielded cable may be used to provide additional protection from AC power and radio frequency (RF) interference. **ONLY ONE END OF THE CABLE SHOULD BE GROUNDED.** Use a ground terminal in the BCS panel for this purpose.

9. Install the pilot and main flame scanners on the burner and wire them to the appropriate terminals in the burner junction box. Reference burner instructions for scanner installation details.
10. Refer to the external component wiring diagram for interconnection between the burner junction box(es) and the BCS panel terminal strips.

IMPORTANT

The flame scanner and control motor position feedback signals should be run in a separate cable from the burner junction box to the BCS control panel. This cable may be run along with thermocouple cables but must be separated from all other AC power and control cables. Shielded cable may be used to provide additional protection from AC power and radio frequency (RF) interference. **ONLY ONE END OF THE CABLE SHIELD SHOULD BE GROUNDED.** Use one of the ground terminals in the BCS control panel for this purpose.

E. ADJUSTMENTS

1. Adjust the purge timer, 1TR, for the required purge time (1/2 to 10 minutes).

IMPORTANT

Before igniting the burner, the dryer must be purged to remove possible accumulation of combustible gases. **A MINIMUM OF FOUR COMPLETE AIR CHANGES MUST BE SUPPLIED.** Multiply the total system volume (dryer, baghouse and exhaust ducts) in cubic feet by four. Divide this value by the burner air capacity in cubic feet per minute. The result will be the required purge time in minutes

2. Perform the fuel motor calibration procedure described in Appendix A.

RECALIBRATE ANNUALLY OR WHENEVER A CONTROL MOTOR IS SERVICED OR REPLACED.

3. Verify that all low fire limit switch contacts are closed when the burner is at 0% and open when the burner leaves low fire. Reference burner operating instructions for switch adjustment.
4. Install a limit switch on the exhaust damper set to close when the damper is greater than 50% open.
5. Verify that all purge permissive contacts are closed after the air control valve(s) drive open for purge (EcoStar and PowerStar burners only).

F. FINAL CHECKOUT

1. Be sure that all equipment and components have been installed in accordance with the manufacturer's instructions.
2. Verify all wiring and tighten connections.
3. Confirm all linkage adjustments and insure that control arms and linkage rods are tight.
4. Clean all traps and filters.
5. Check all fuel and air supply lines for leaks.
6. Verify all pressure settings.

G. PANEL OPERATION

NOTE: Slow flash = 1.5 seconds on, 1.5 seconds off.
 Normal flash = 1 second on, 1 second off.
 Fast flash = ½ second on, ½ second off.

1. Open all manual shutoff valves to supply air and fuel to the system.
2. Move the panel **POWER** switch to **ON** and verify that the **FUEL SELECTOR** switch is in the desired position.
 - a. The temperature controllers and flame relay will perform their self test procedures.
 - b. The burner fuel control motor will drive to its low fire position.
 - c. The **RESET** indicator will come on.
3. Start the combustion air and exhaust fans and all other equipment required for plant operation. After all safety limits have closed:
 - a. The **EXHAUST, COMBUSTION AIR, FUEL** and **STACK LIMITS** indicators will be illuminated.
 - b. Purge relay, R4, will be energized and the air control motor(s) will drive open to prepare for system purge (EcoStar and PowerStar burners only).
4. Place the **CONTROL MODE** selector in the desired position and verify the setpoints of both temperature controllers.
5. Momentarily press the **RESET** button to initiate the system purge sequence.
 - a. Run relay, R1, will be energized.
 - b. The **RESET** indicator will go out.
6. If all purge permissive contacts are closed:

- a. The purge timer, 1TR, will begin its timed delay and its "Timing" indicator will begin flashing.
- b. The **PURGE** indicator will begin flashing slowly.
7. After the purge delay has been completed:
 - a. Purge timer, 1TR, and purge latch relay, R2, will be energized.
 - b. The air control motor(s) will drive closed to prepare for pilot ignition (EcoStar and PowerStar burners only).
8. When the motor(s) have reached their low fire start positions and the burner low fire limit switches have closed:
 - a. The **PURGE** indicator will stop flashing and remain on.
 - b. The **START** pushbutton will flash indicating that the burner is ready to start.
9. Press and hold the **START** pushbutton to begin the burner ignition sequence.
 - a. The RM7890A flame relay will be energized.
 - b. Start relay, R3, will be energized and a ten second trial for ignition will begin.
 - c. As soon as the **PILOT** indicator comes on the **START** pushbutton may be released.
 - d. The ignition transformer and pilot solenoid valve will be energized.
10. If a satisfactory pilot flame is detected by the UV scanner:
 - a. Flame signal strength will be displayed on the **FLAME METER** bar.
 - b. Spark timer, 2T, will be energized and begin timing.
11. After 2T timer has completed its three second delay:
 - a. 2TR relay will be energized.
 - b. The purge timer, 1TR, will be de-energized and reset and the **PURGE** indicator will go out.
 - c. The ignition transformer will be de-energized.
 - d. Power will be supplied to the main fuel valves.
12. As soon as the valve open switch contact in the main fuel valve has closed, pilot timer, 3T will begin timing.
13. After the pilot timer has completed its 10 second delay:
 - a. The pilot solenoid valve will be de-energized and the **PILOT** indicator will go out.
 - b. The pilot scanner will be de-energized.
 - c. The **MAIN** indicator will come on.
 - d. The burner control motor(s) will be released from low fire and respond to the motor positioning output of the selected temperature controller.
14. Start material flow to the dryer. Use the [↑] and [↓] keys to manually control the burner firing rate, or press the **MANUAL/AUTO** key on the selected controller to begin automatic temperature control.

NOTE: The center, **LOW FIRE**, position of the **CONTROL MODE** selector will return the burner to its low fire position.

15. To terminate burner operation, press the **STOP** pushbutton.

- a. Run relay, R1, will be de-energized and the **RESET** indicator will come on.
- b. Purge latch relay, R2, will be de-energized and the **PILOT** or **MAIN** indicator will go out.
- c. The Honeywell RM7890 flame relay will be de-energized.
- d. All fuel valves will be de-energized.
- e. The fuel control motor will drive closed.
- f. Purge relay, R4, will be energized and the air control motor(s) will drive open to prepare for system purge.

H. TROUBLESHOOTING

NOTE: Slow flash = 1.5 seconds on, 1.5 seconds off.
Normal flash = 1 second on, 1 second off.
Fast flash = ½ second on, ½ second off.

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
No power to instruments or indicator lights.	L1 fuse blown	Check for 120Vac between L1 and L2. Replace 10A fuse, L1.
PURGE indicator flashes fast after RESET is pressed	Purge limits are not made	Check purge limits series: 120Vac on terminals 19, 24F, 24E, 24D, 24C, 24B, 24A and 24.
PURGE indicator begins fast flash after purge time is completed & air motor(s) have driven to low fire.	Low fire limit switch(es) are not made.	Check low fire limit switch(es). Check for 120Vac on terminals 21B, 21A and 21.
Limits are made but air motor(s) do not drive open for purge.(EcoStar, PowerStar & StarJet Conversion burners)	Slidewire feedback voltage fault. Motor positioner fault.	Check for 1.2Vdc between terminals 82 (+) and 81 (-). (Replace Stack instrument) Check for 1.2Vdc between terminals 99 (+) and 81 (-). Verify positioner mode switch is in AUTO. (Replace positioner)
Pilot will not light.	Pilot fault Flame relay fault	Verify operation of pilot solenoid & ignition transformer. Check pilot adjustment and fuel supply. Check for 120Vac on terminals 8 and 9 (Replace 2A fuses...Replace flame relay).
Pilot lights but not main flame.	Fuse 6 blown 3 second spark timer fault.	Check for 120Vac at fuse 6 (replace 5A fuse). Verify operation of 2TR relay (replace 2T timer).
Alarm sounds and limits indicator flashes	Limits series not complete.	Investigate cause of limits failure. Verify FUEL SELECTOR is in desired position.
Alarm sounds and RESET indicator flashes	Pilot ignition fault or flame failure.	Investigate cause of ignition or flame failure.

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Main flame lights but MAIN indicator does not come on.	Valve open switch fault. 10 second pilot timer fault.	Check for 120Vac on terminal 43 (verify operation of main valve open switch). Verify operation of 3TR relay (replace 3T timer).
Flame meter indicates presence of flame when burner is shut off.	Fire in dryer drum. Poor flame meter connection. Defective scanner.	Check for fire in drum. Check flame meter connections. Unplug 3TR relay. If signal disappears replace pilot scanner. If signal remains replace main flame scanner.
Flame relay fault indicator comes on and will not reset.	Improper grounding or voltage polarity. Flame relay failure.	Verify neutral (L2) of 120Vac supply is grounded. Verify that control panel is grounded. Replace flame relay amplifier and/or relay module.
Fuel control motor will not drive.	Fuse 5 blown. Pilot timer failure Control motor failure Controller failure	Check fuse 5 and replace if necessary. Verify 3TR relay is energized and that the CONTROL MODE switch is not in the LOW FIRE position Verify 120Vac Between motor terminals L1 and L2. Remove fuse 5 then jumper motor terminals X to 2 and X to 3 to test motor operation. Move CONTROL MODE switch to other controller.

APPENDIX A: FUEL MOTOR SLIDEWIRE CALIBRATION

The burner fuel control motor incorporates a position feedback slidewire. A 1.2 Vdc supply voltage from the **Stack** temperature instrument is connected to the slidewire in order to generate a 0 to 1.2 Vdc position feedback signal for the control panel. The following calibration procedure must be performed before operating the burner for the first time.

RECALIBRATE ANNUALLY OR WHENEVER A CONTROL MOTOR, SLIDEWIRE OR TEMPERATURE CONTROLLER IS SERVICED OR REPLACED.

1. Turn the panel **POWER** switch to **OFF**. Move the **FUEL SELECTOR** switch to the center (Off) position and place the **CONTROL MODE** selector in the **MATERIAL** position.
2. Unplug 3TR relay from its socket and place a **temporary** jumper between control panel terminal 47 and Ground for Barber Colman EA-57 (Medium Torque). Jumper between 47 and 7 for an Barber Colman EA-71 or EA-73 (High Torque) This will enable the burner control motor(s) to be driven by the Honeywell temperature controller without having to fire the burner.
3. Turn the panel power on. Enter the calibration mode on the **Material** controller by pressing the [**SETUP**] key until the display reads CALIB POS PROP.
4. Press the [**FUNCTION**] key to display MTR TIME then use the [↑] and [↓] keys to set the upper display to the fuel motor travel time in seconds (40 seconds for Barber-Colman medium torque motors).
5. Press [**FUNCTION**] again to display DISABLE POS PROP then press the [↑] key to change the upper display to DO AUTO.
6. Press [**FUNCTION**] to begin motor calibration. The lower display will read ZERO VAL while the upper display will show the slidewire feedback value,
7. Wait for the zero value to stop changing and confirm that the motor(s) are in their low fire positions.
8. Press [**FUNCTION**] again to advance to SPAN VAL. The control motor(s) will drive open and the upper display value should increase.
9. After the feedback value has stopped increasing, confirm that the motors have reached their high fire positions then press [**FUNCTION**] once more to complete the calibration sequence.
10. Move the **CONTROL MODE** selector to the **STACK** position and repeat steps 3 through 9 for the **Stack** controller.
11. Turn the panel **POWER** switch **OFF** and return the **FUEL SELECTOR** to the **GAS** or **OIL** position. Replace 3TR relay and remove the temporary jumper from terminal 47 and Ground.

APPENDIX B: UDC3000 SERIES CONTROLLERS

Hauck part number 56887 Honeywell model DC300E-E-000-22-0A00-0.

The Honeywell DC300E controllers have been configured at the factory with parameters which generally produce accurate temperature control. Before making any field adjustments, other than as noted in this instruction sheet, **PLEASE CONTACT THE HAUCK SERVICE DEPARTMENT.**

I. OPERATOR INTERFACE

Figure 1 shows the front face of the DC300E instrument. The following paragraphs describe the function of the various displays and keys. Examples are given for changing the controller setpoint, positioning the burner control motor(s) in the manual mode, and changing the alarm setpoints. Detailed information is given in the vendor literature supplied with the control panel.

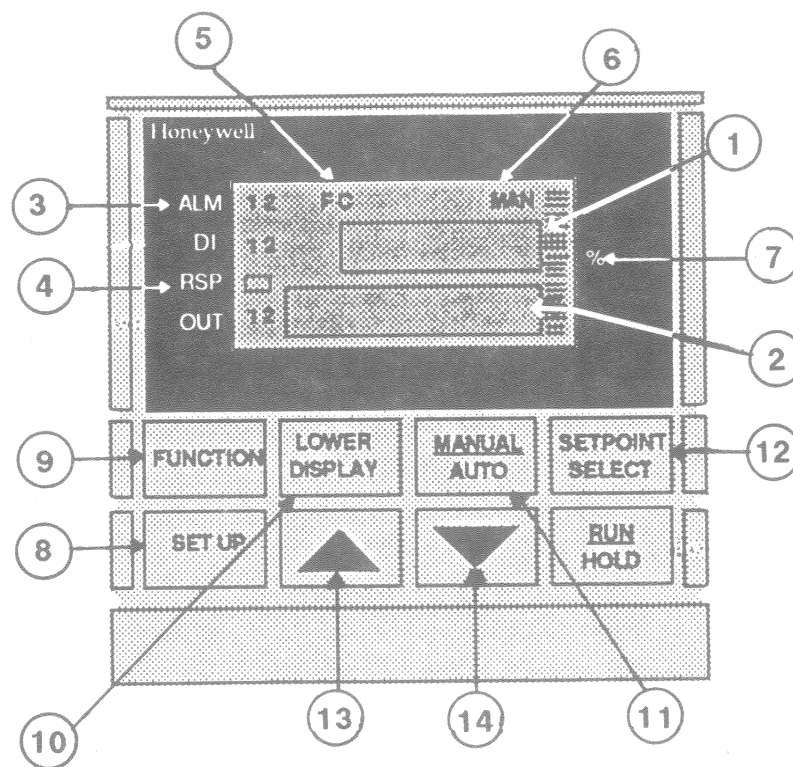


Figure 1.

1. **Upper Display:** Normally displays process temperature. Also displays parameter values or selections when in the configuration set up mode.
2. **Lower Display:** Shows value of set point deviation from setpoint or output percentage. Also displays function groups and parameters when in the configuration set up mode.
3. **ALARM 1 INDICATOR:** Illuminated when alarm 1 setting has been exceeded.
4. **RSP INDICATOR:** Illuminated when the remote setpoint or second local setpoint has been selected.
5. **UNITS INDICATOR:** Indicates degrees F or degrees C as applicable.

6. **AUTO/MANUAL INDICATOR:** Indicates **A** for automatic or **MAN** for manual controller mode.
7. **DEVIATION BARGRAPH:** Displays difference between the process variable temperature and the controller's setpoint. Each bar represents a deviation of 1% of span (7.5 degrees F for type J TC low range.)
8. **[SET UP] KEY:** Places the controller in the configuration set up mode. Scrolls through set up groups and enables the **[FUNCTION]** key to access parameters within each group. Note that selections made in this mode affect the basic operation of the controllers (deg. F or deg. C, thermocouple type, alarm type, etc.) These parameters have been pre-configured by Hauck and should not be changed without consulting the Hauck service department.
9. **[FUNCTION] KEY:** Used in combination with the **[SET UP]** key to display and select functions within the set up groups.
10. **[LOWER DISPLAY] KEY:** Selects which operating parameter will be shown in the lower display.
 - **SP:** Controller setpoint
 - **2SP:** Second setpoint when so configured.
 - **DEV:** Deviation between process temperature and setpoint.
 - **OUT:** Output percentage.

This key is also used to exit the set up mode and return the controller to its normal operating mode.
11. **[MANUAL/AUTO] KEY:** Alternately selects manual or automatic control mode.
12. **[SETPOINT SELECT] KEY:** Alternately selects setpoint 1 or setpoint 2. A **KEY ERROR** message appears if the controller is not configured for two setpoints.
13. **[↑] KEY:** Used to increase setpoint, % output or configuration values.
14. **[↓] KEY:** Used to decrease setpoint, % output or configuration values.

II. OPERATING THE CONTROLLER

EXAMPLE 1: CHANGING THE SETPOINT

Press the **[LOWER DISPLAY]** key until **SP** and the current setpoint appears in the lower display.

Press and hold the **[↑]** key to increase the set point value. To make changes more quickly, press the **[↓]** key while holding **[↑]** key. This will shift the changing digit one place to the left.

To decrease the set point value, reverse the above procedure.

EXAMPLE 2: ADJUSTING THE BURNER FIRING RATE IN THE MANUAL MODE

Press the **[AUTO/MANUAL]** key to place the Controller in the Manual Mode. The **MANUAL** indicator will come on and the lower display will automatically change to show % **OUT**.

Press and hold the **[↑]** key to increase % Output value. To make changes more quickly press the **[↓]** key while holding **[↑]** key. This will shift the changing digit one place to the left.

To decrease the % Output value, reverse the above procedure.

EXAMPLE 3: CHANGING THE ALARM SET POINT

Press and hold the **[SET UP]** key until the display reads **SETUP ALARMS**.

Press the **[FUNCTION]** key once to change the lower display to **A1S1 VAL** or **A1S2 VAL**. The upper display will show the current alarm set point. Use the **[↑]** or **[↓]** arrow key to change to the desired set point.

Press the **[LOWER DISPLAY]** key to exit the Set Up mode and return the controller to normal operation.

NOTE

High temperature limits will not prevent baghouse fires. They will, when properly installed and adjusted shut off the burner when a given temperature setpoint is exceeded. Outside factors such as chemicals, bag contamination or other ignition sources are beyond the control of the burner management system.

CAUTION

The **STACK** alarm setpoint is factory set at 400 °F (204 C). If the system is equipped with a fabric dust collector (baghouse), consult the manufacturer for recommended baghouse temperature limitations.

III. MATERIAL CONTROLLER CONFIGURATION RECORD SHEET

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SET UP GROUP	LOWER DISPLAY (FUNCTION)	FACTORY CONFIGURATION	FINAL SETTING
<u>TUNING</u>			
	PROP BAND	15	_____
	RATE MIN	0.00	_____
	RESET RPM	1.00	_____
	SECURITY	0	_____
	LOCKOUT	NONE	_____
	AUTO MAN	ENABLE	_____
	SP SEL	ENABLE	_____
	RUN HOLD	ENABLE	_____
<u>SP RAMP</u>			
	SP RAMP	DISABLE	_____
	SP RATE	DISABLE	_____
	SP PROG	DISABLE	_____
<u>ALGORITHM</u>			
	CONT ALG	PID A	_____
	OUT ALG	POSITN	_____
	RLY TYPE	MECHAN	_____
	TIMER	DISABL	_____
<u>INPUT 1</u>			
	DECIMAL UNITS	X X X X	_____
	IN 1 TYPE	DEG F OR DEG C	_____
	IN 1 HIGH	J TC L OR K TC L	_____
	IN 1 LOW	(Note 1)	_____
	BIAS IN 1	(Note 2)	_____
	FILTER 1	0.0	_____
	BURNOUT	1	_____
	POWER FREQ	UP	_____
	LANGUAGE	(See order)	_____
		ENGLISH	_____
<u>CONTROL</u>			
	PID SETS	1 ONLY	_____
	SP SOURCE	1 LOCAL	_____
	SP TRACK	NONE	_____
	POWER UP	MANUAL	_____
	SP HI LIMIT	(Note 1)	_____
	SP LO LIMIT	(Note 2)	_____
	ACTION	REVERSE	_____
	OUT RATE	DISABLE	_____
	OUT HI LIM	100.0	_____
	OUT LO LIM	0.0	_____
	DROPOFF	0	_____
	DEADBAND	1.0	_____
	FAILSAFE	0.0	_____
	MAN OUT	0.0	_____
	AUTO OUT	0.0	_____

SET UP GROUP	LOWER DISPLAY (FUNCTION)	FACTORY CONFIGURATION	FINAL SETTING
<u>CONTROL</u> (cont.)			
	PB OR GAIN	PB PCT	_____
	MIN OR RPM	RPM	_____
<u>ALARMS</u>			
	A1S1 VALUE	400 F OR 204 C	_____
	A1S1 TYPE	PV	_____
	A1S2 TYPE	NONE	_____
	A2S1 TYPE	NONE	_____
	A2S2 TYPE	NONE	_____
	A1S1 H L	HI	_____
	ALARM HYST	0.1	_____

IV. STACK CONTROLLER CONFIGURATION RECORD SHEET

SET UP GROUP	LOWER DISPLAY (FUNCTION)	FACTORY CONFIGURATION	FINAL SETTING
<u>TUNING</u>			
	PROP BAND	15	_____
	RATE MIN	0.00	_____
	RESET RPM	1.00	_____
	SECURITY	0	_____
	LOCKOUT	NONE	_____
	AUTO MAN	ENABLE	_____
	SP SEL	ENABLE	_____
	RUN HOLD	ENABLE	_____
<u>SP RAMP</u>			
	SP RAMP	DISABLE	_____
	SP RATE	DISABLE	_____
	SP PROG	DISABLE	_____
<u>ALGORITHM</u>			
	CONT ALG	PID A	_____
	OUT ALG	POSITN	_____
	RLY TYPE	MECHAN	_____
	TIMER	DISABL	_____
<u>INPUT 1</u>			
	DECIMAL	X X X X	_____
	UNITS	DEG F OR DEG C	_____
	IN 1 TYPE	J TC L OR K TC L	_____
	IN 1 HIGH	(Note 1)	_____
	IN 1 LOW	(Note 2)	_____
	BIAS IN 1	0.0	_____
	FILTER 1	1	_____
	BURNOUT	UP	_____
	POWER FREQ	(See order)	_____
	LANGUAGE	ENGLISH	_____

SET UP GROUP	LOWER DISPLAY (FUNCTION)	FACTORY CONFIGURATION	FINAL SETTING
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CONTROL

PID SETS	1 ONLY	_____
SP SOURCE	1 LOCAL	_____
SP TRACK	NONE	_____
POWER UP	MANUAL	_____
SP HI LIMIT	(Note 1)	_____
SP LO LIMIT	(Note 2)	_____
ACTION	REVERSE	_____
OUT RATE	DISABLE	_____
OUT HI LIM	100.0	_____
OUT LO LIM	0.0	_____
DROPOFF	0	_____
DEADBAND	1.0	_____
FAILSAFE	0.0	_____
MAN OUT	0.0	_____
AUTO OUT	0.0	_____
PB OR GAIN	PB PCT	_____
MIN OR RPM	RPM	_____

ALARMS

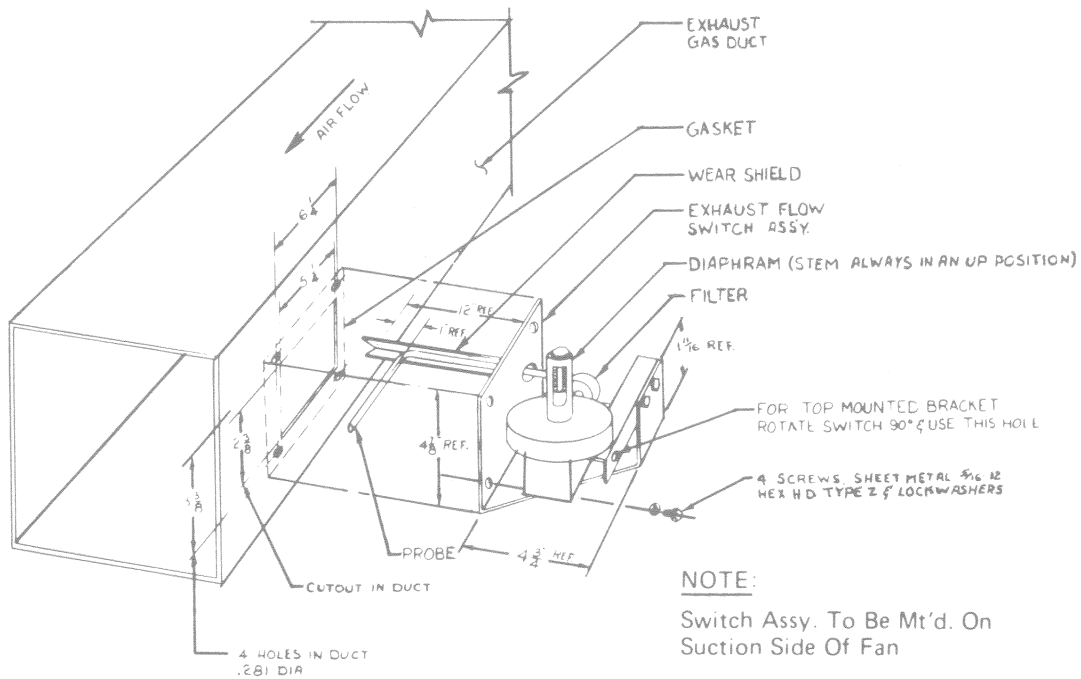
A1S1 VALUE	400 F OR 204 C	_____
A1S1 TYPE	PV	_____
A1S2 TYPE	NONE	_____
A2S1 TYPE	NONE	_____
A2S2 TYPE	NONE	_____
A1S1 H L	HI	_____
ALARM HYST	0.1	_____

Notes:

1. High = 770 F or 410 C for type J. 1000 F or 537.8 C for type K.
2. Low = 20 F or -6.67 C for type J. -20 F or -28.89 C for type K.

APPENDIX C: EXHAUST FAN FLOW LIMIT SWITCH INSTALLATION

Mount the exhaust fan flow switch in the dryer exhaust duct as shown below.

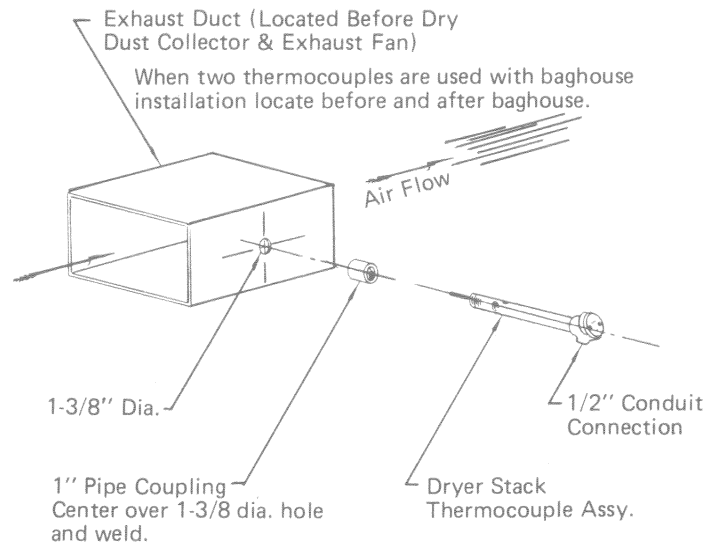


Drawing showing the installation
of the exhaust fan flow switch.

Wire the exhaust flow switch to the appropriate terminals. The exhaust flow switch is an interlock which requires the exhauster to be operating prior to ignition of the burner.

APPENDIX D: STACK THERMOCOUPLE INSTALLATION

Install a Hauck stack temperature thermocouple in the dryer exhaust duct to sense exhaust gas temperatures.



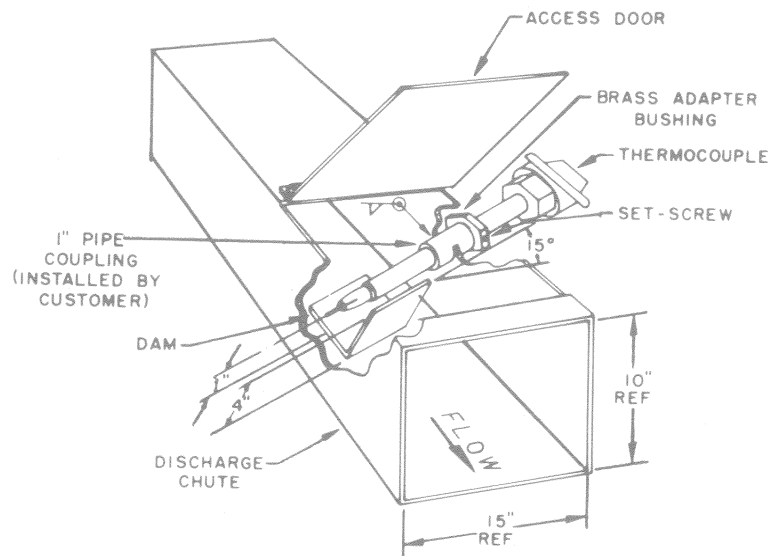
Drawing showing placement of thermocouple in exhaust duct.

NOTE

Thermocouple cables must be separated from AC power and control wiring to avoid interference and nuisance shutdowns. Observe polarity when making thermocouple connections. Regardless of TC type, the red wire is always negative.

APPENDIX E: MATERIAL THERMOCOUPLE INSTALLATION

Install a Hauck Rapid Response Material Temperature Thermocouple in the material discharge chute to sense the temperature of the material leaving the dryer. Wire the thermocouple to the proper terminals in the panel.



Drawing showing the placement of the thermocouple and "dam" in the dryer discharge chute.

IMPORTANT

A small clearance (1" maximum) should be provided under the thermocouple so material will not be trapped between the thermocouple and the chute. Trapped material will cause a heat loss path and the thermocouple will give erroneous readings.

The thermocouple should make good contact with the material but not be subject to severe abrasion caused by high velocities. If the material is moving so fast that it bounces and leaves air adjacent to the thermocouple, the temperature it senses will be lower than the material. It may be necessary to place a dam in the chute so that the thermocouple is in a relatively slow moving area next to the dam. The dam must only be wide enough and high enough to create a localized area of build-up where the material loses velocity **BUT DOES NOT STOP FLOWING**. The thermocouple must not be located in a stagnant zone or erroneous temperature readings will result. Because of the large number of variables involved, it is impossible to set down any exact size or location of the dam that will always work. Field experimentation will be necessary if good results are to be obtained. It is advisable to tack weld the dam in place so that it can be easily modified if it fails to perform satisfactorily.

NOTE

During normal operation, the thermocouple should be rotated once a month to expose a different area of its surface to the abrasive forces of the material. This procedure will increase the effective life of the thermocouple. If excessive wear occurs, a protective tube may be added to shield the shaft in the region of the high velocity flow.

NOTE

Thermocouple cables must be separated from AC power and control wiring to avoid interference and nuisance shutdowns. Observe polarity when making thermocouple connections. Regardless of TC type, the red wire is always negative.

APPENDIX F: RECOMMENDED SPARE PARTS

PART NO.	QTY.	DESCRIPTION
56648	1	Flame relay, Honeywell RM7890A1015
56650	1	Amplifier, Honeywell R7849A1023
20579	2	Scanner, Honeywell C7027A1049
17292	2	Relay 3PDT, P&B KUP 14A35 or equal
61961	1	Purge timer, Eagle Signal B846-500
56887	1	Controller, Honeywell DC300E-E-000-22-0A00-0
40744	1	Timer, 10 second solid state, Omnetics MMS115A19-1/2B
40747	1	Timer, 3 second solid state, Omnetics MMS115A1Z3B
58889	2	Bulb, T 3-1/4 bayonet base, 120Vac, C-H 28-2468-7
58762	5	Fuse, 2A, 1/4 x 1-1/4, Buss MDA-2
58763	5	Fuse, 5A, 1/4 x 1-1/4, Buss MDA-5
48044	5	Fuse, 10A, 1/4 x 1-1/4, Littlefuse 312010
43508 --- or --- 43508R2037	1	Material thermocouple, Hauck TC100A-J --- or --- Material thermocouple, Hauck TC100A-K
43868 --- or --- 45474	1	Stack thermocouple, Hauck TC200A-J --- or --- Stack thermocouple, Hauck TC200A-K