



Altanium Delta²

User Guide

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If you require assistance in the North America, please contact the toll free number. Elsewhere, contact your nearest Husky Regional Service and Sales Office. When you email one of our Support staff, please put the Case ID number as the subject line if this an existing case; otherwise use "New Case" as the email subject.

To improve the response time, please have the following information available:

- The release number and build number of the Delta² software that you are using.
- The serial number of your Altanium /Delta² system.
- If possible, detailed steps to reproduce your issue.

Telephone Support Numbers

North America	Toll free	1-800-465-HUSKY (4875)
	Direct	(905) 951-4875

For on-site service, contact your nearest Husky Regional Service and Sales office.

Husky Regional Service and Sales Offices

For the location closest to you, please visit www.husky.ca.

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Chapter 1 Introduction

This User Guide includes general warnings and cautions to avoid injury to personnel and damage to the system. These warnings and cautions are not intended to be, nor are they all-inclusive to every condition or application that may occur during operation. Maintenance and safety procedures remain the sole responsibility of the individual and his or her company.

1.1 General Safety

- Only a licensed electrician should install the system.
- Only persons with a thorough knowledge of the system's operation and capabilities should operate the system.
- Read all of these instructions before connecting power and turning on the system.
- Follow all warnings and instructions marked on the system.
- Unless specifically explained in this manual or directed by Husky, do not attempt to repair the system yourself. Doing so could result in damage to the system, or serious personal injury.
- Only use the specified input supply voltage that is indicated on the identification label attached to the power input cable and/or the cabinet

NOTE: If you are not sure of the appropriate supply voltage, call your nearest Husky Regional Service and Sales office.

CAUTION!

NEVER allow the fan inlets or outlets on the unit to become blocked. This is where the system's cooling airflow enters and exits. If this area of the mainframe becomes cluttered and insufficient airflow results, damage may occur to the system.

CAUTION!

When switching OFF the system you MUST wait 30 seconds before switching the main disconnect back ON. You may experience communication issues if you do not wait the required 30 seconds.

1.2 Altanium X-Series Mainframe Configurations

The Altanium X-Series product line is made up of 2 different models of mainframes which change based on the number of zones required. These are referred to as Single Stack and Custom Mainframes.

Within each mainframe category there are style variations which determine how they will be installed in your factory. These styles are referred to as Freestanding, External Machine Mount and Mold Mount.

While there may be many different variations in the mainframe, there are only 3 variations to the X-Series ICC² (Intelligent Control Cards). These cards are referred to as the XL, X and XE ICC² (Intelligent Control Cards). The differences between these 3 cards and some typical mainframe configurations are described over the next few pages.

1.2.1 Altanium XL ICC² (Intelligent Control Card)

The XL ICC² card is the most economical version of X-Series cards. All X-Series cards control temperature exactly the same with the same accuracy you have come to expect from Husky. The difference is the XL card does not have some of the advanced features that the X and XE cards have. The XL ICC² card does not include current monitoring, bake out or ground fault functionality.



The XL ICC² card is distinguishable by a black heat sink.

1.2.2 Altanium X ICC² (Intelligent Control Card)

The X ICC² card is the mid-range version of X-Series cards. All X-Series cards control temperature exactly the same with the same accuracy you have come to expect from Husky. The X card is similar in design and includes all of the features of the XL card but adds the ability to monitor current, and check for bake out or ground fault situations.



Figure 1-2 Typical X ICC² (Intelligent Control Card)

The X ICC² card is distinguishable by a silver heat sink.

1.2.3 Altanium XE ICC² (Intelligent Control Card)

The XE ICC² card is the top of the line X-Series card. All X-Series cards control temperature exactly the same with the same accuracy you've come to expect from Husky. The XE card is similar in design and includes all of the features of the X card but adds the following advanced functionality:

- View and change temperatures to a tenth of a degree
 - ▣ Higher resolution and control
- Advanced bake out procedure
 - ▣ Eliminates moisture trapped in heaters
 - ▣ Extends heater life
- Current deviation feature
 - ▣ Integral part of heater failure prediction alarm
 - ▣ Reduces downtime and maintenance costs
- Three year warranty



Figure 1-3 Typical XE ICC² (Intelligent Control Card)

The XE ICC² card is distinguishable by a green heat sink.

1.2.4 Altanium X-Series f-12 Mainframe

The Altanium X-Series f-12 mainframe is typically used in applications where the end user desires to move the system from place to place on the factory floor and your zone heating requirements total 12 zones or less. For this application, the Altanium X-Series f-12 mainframe is mounted on four rubber feet. This system is small enough to be placed on a small table beside the injection molding machine or right on the molding machine itself. As an option, the Altanium X-Series f-12 mainframe can be mounted on a stand with wheels.

The Altanium X-Series f-12 mainframe power and thermocouple connectors are located at the rear of the cabinet. The main disconnect is located on the front.



Figure 1-4 Typical Altanium X-Series f-12

Access all user-serviceable parts, including fuses and circuit boards, by loosening the upper and lower slotted screws on each heat sink assembly, and then sliding your screwdriver between the horizontal silver post and the ledge on the cabinet and prying the board out.

1.2.5 Altanium X-Series *f* Mainframe - Freestanding

The Altanium X-Series *f* mainframe (freestanding) is typically used in applications where you need to move the system from place to place on the factory floor. The Altanium X-Series *f* mainframe is mounted on a stand with wheels. It comes in a Single Stack configuration for up to 48 zones of control.

The Altanium X-Series *f* mainframe power and thermocouple connectors are located at the rear of the cabinet. The main disconnect is located on the front.



Access all user-serviceable parts, including fuses and circuit boards, by loosening the upper and lower slotted screws on each heat sink assembly, and then sliding your screwdriver between the horizontal silver post and the ledge on the cabinet and prying the board out.

1.2.6 Altanium X-Series *m* Mainframe - Mold Mount

The Altanium X-Series *m* mainframe (mold mount) is typically used in applications where available floor space is limited. This patented design uses the least amount of floor space due to its ability to be mounted directly to the top of the mold. It comes in 3 different models depending on the number of zones you need to heat. These models are the Compact 12 for up to 12 zones, the Single Stack for up to 24 zones and the Double Stack for up to 48 zones.

This Altanium X-Series *m* mainframe design also requires no power or thermocouple cables. In most cases, the mainframe is out of the operator's reach so there is no main disconnect provided with the system. You must attach the power input cable to a suitable disconnect that is easily accessible by the operator.



Access to all user-serviceable parts, including fuses and circuit boards, is achieved by loosening the upper and lower two slotted head screws on each heat sink assembly, and then sliding your screwdriver between the horizontal silver post and the ledge on the cabinet and prying the board out.

1.2.7 Altanium X-Series e Mainframe - External Machine Mount

The Altanium X-Series e mainframe (external machine mount) is designed to minimize floor space usage by hanging the system on the molding machine or anywhere else. The Altanium X-Series e mainframe is equipped with a hanging bracket on the back of the cabinet. It comes in a Single Stack configuration for up to 48 zones of control.

The power and thermocouple connectors are located on the top for simple, short runs to the mold. The main disconnect is located on the front of the system.



Figure 1-7 Typical Altanium X-Series e-24

Access all user-serviceable parts, including fuses and circuit boards, by loosening the upper and lower slotted screws on each heat sink assembly, and then sliding your screwdriver between the horizontal silver post and the ledge on the cabinet and prying the board out.

1.3 Input Wiring (Conventional)



IMPORTANT!

IF AN EXTERNAL INPUT TRANSFORMER IS USED AS A POWER SOURCE FOR THE SYSTEM, THE SECONDARY COILS MUST HAVE AN ELECTRICAL CONNECTION TO EARTH GROUND.

Table 1-1 Input Wiring

	USA	European Alternatives	
Phase 1 (R) (1)	Red	Black#1	(Brown)
Phase 2 (S) (2)	White	Black#2	(Black#1)
Phase 3 (T) (3)	Black	Black#3	(Black#2)
Neutral	Orange	Black#4	(Blue)
Earth / Ground	Green	Green/Yellow	Green/Yellow

1.4 Environmental Specification

Operating Temperature: 0-40 °C (32-104 °F)

Operating Humidity: 0%-95% RH, Non-Condensing

Chapter 2 Hot Runner Temperature Control

This guide is designed to ensure that you receive the maximum possible benefit from the use of the Altanium Hot Runner Control Systems.

The Altanium controllers were designed as a processor's tool for hot runner molding. The fact that it controls temperature extremely well is an added benefit. Seriously though, the fundamental criteria required to operate a hot runner mold is controlling the process temperature so that it is as consistent and repeatable as possible with respect to the process setpoint. The closer to the setpoint the process temperature is maintained at, the lower the setpoint temperature may be set. This equates to less cooling time required (energy in - energy out), and faster cycle times. This is usually very desirable and can have a significant impact on your profit margin.

2.1 Types of Temperature Control

The Altanium controller uses two basic types of control:

- Open loop control with no thermocouple feedback.
- Closed loop control with thermocouple feedback. Closed loop can be sub-categorized as follows:
 - ✘ Internal Thermocouple - Located inside and as part of the heater assembly.
 - ✘ External Thermocouple - Located close to but not actually part of a single heater assembly, and may even be allocated to a group of heaters to form a zone.

2.1.1 Open Loop Control

Without a thermocouple, it is not possible to control the temperature inside the mold, only the amount of power that is supplied to the heater. The Altanium controller is able to maintain this power output accurately with a resolution of 1%. This method of control is called Manual Regulation.

Open loop control is normally associated with tip heaters where the physical size of the tip precludes the use of an internal thermocouple.

2.1.2 Closed Loop Control

With the aid of a thermocouple, it is possible to control the actual temperature inside the mold. The Altanium controller can only control the temperature at the point at which the temperature sensor is positioned. The position of the thermocouple, combined with the capacity (wattage) of the heaters, in relation to the application, will be the over-riding factors in the response of the system. The control parameters have been matched to this response for optimum control. This method of control is referred to as Automatic Regulation.

- Internal thermocouples are normally associated with larger part weight tips, bodies, and runners. These tend to have relatively fast responses due to the fact that the thermocouple is in close proximity to the heater.
- External thermocouples are normally associated with manifolds. These tend to have relatively slow responses due to the fact that the thermocouple is separated from the heater by a mass of metal.

2.1.2.1 Temperature Measurement (thermocouples)

To control the temperature within a closed loop system, the Altanium controller must be able to measure the process temperature. This is achieved using a thermocouple.

There are various types of thermocouples, but in the plastics industry they are predominantly of the Iron/Constantan type, generally known as Fe/Cu-Ni, Iron/Con or type "J" thermocouple. The other types used to a lesser extent are Nickel-Chromium/Nickel-Aluminum, Ni-Cr/Ni-Al, or type "K" and Constantan/Copper-Nickel, Cu/Cu-Ni, or type "T".

These thermocouple types are physically recognizable by a combination of their individual core and sheath colors; however, these vary from standard to standard.

2.2 Power Control Methods

In an effort to match the energy input requirements of differing types of loads, it is necessary for the output power delivered to the heaters to be adjusted over a range of 0 to 100%. The Altanium controller can be set up to achieve this by using either Zero Cross Control or Phase Angle Control.

2.2.1 Zero Cross Control

This method defines how the power to each heater is averaged over a period of time. This is achieved by switching complete half cycles of the heater supply voltage using an Alternistor Triac as a switching device.

2.2.2 Phase angle control

This method defines how the power to each heater is adjusted, by varying the point in each half cycle at which the Alternistor Triac (switching device) is turned on.

In either control method, the Altanium controller recalculates the power output requirements for the entire system every 8 milliseconds to obtain the maximum control resolution. By combining either of the above control methods with the Active Reasoning Technology (ART) control algorithm, it is possible to achieve accurate temperature control with the expectation of control accuracy of ± 1 digit under steady state conditions.

2.3 Heating Elements

Hot runner molds can have a number of different types of heating elements:

- Integral, which is a part of the probe.
- Cartridge, which is slid into the probe or directly into the mold steel.

In the manifold, a series of cartridge heaters or bent tubular style heaters are normally used.

The wire inside an element is typically made of nickel-chrome, which is then surrounded by magnesium oxide. The size of this wire and number of turns determine its resistance, which in turn determines its wattage (the amount of energy). This determines its performance in the mold. Undersize heating elements (too little wattage) create a serious problem when the control asks for power and none is available. In almost all cases it is better to be oversize than undersize in a hot runner mold.

If your heating element supplier has not provided you with wattage, resistance or amperage information for your heaters, the Altanium controller will provide this for you. Alternatively, you can determine this information using OHMS Law. The diagram and formulas below show you how.



WARNING!

Disconnect all electrical power from the mold and controller prior to performing this test.

1. Using your multimeter, set the selector to measure resistance.
2. Place the (red) positive lead onto the first wire from the heating element and place the (black) negative lead from the meter onto the second wire (these may be pins on a connector, or the zone output fuses in the system as long as you are sure they are connected to the heating element).

The meter will now display a resistance in ohms. Note this measurement on a piece of paper.

Ohm's Law says:

$$\text{Amps} = \text{Watts} / \text{Volts}$$

$$\text{Amps} = \text{Volts} / \text{Resistance}$$

$$\text{Resistance} = \text{Volts} / \text{Amps}$$

$$\text{Watts} = \text{Volts} \times \text{Amps}$$

Example: If the resistance is 12.5 ohms, and the input voltage is 240 volts, you would divide 240 by 12.5 to calculate the maximum amperage draw on that heating element:

$$240 / 12.5 = 19.2 \text{ amps}$$

$$19.2 \text{ Amps} \times 240 \text{ volts} = 4,608 \text{ watts.}$$

In hot runner molding, some portions of Ohm's law are more useful than others. We have only presented here those laws that apply.

Input voltage	24 V	110 V	208 V	220 V	240 V
Resistance	20 Ω	20 Ω	20 Ω	20 Ω	20 Ω
Amperage	1.2 A	5.5 A	10.4 A	11.0 A	12.0A
Watts	28.8 W	605.0W	2163.2 W	2420 W	2880 W

2.4 Thermocouple Types and Color Codes

Code	Type	International Color Code (BS4937 Part 30:1993)	BRITISH (BS1843:1952)	AMERICAN ANSI	GERMAN DIN
J	Iron/ Constantan/ (Copper-Nickel)	Overall Black	Overall Black	Overall Black	Overall Blue
		+ ve - ve Black White	+ ve - ve Yellow Blue	+ ve - ve White Red	+ ve - ve Red Blue
K	Nickel- Chromium/ Nickel-Aluminum	Overall Green	Overall Red	Overall Yellow	Overall Green
		+ ve - ve Green White	+ ve - ve Brown Blue	+ ve - ve Yellow Red	+ ve - ve Red Green
T	Copper/ Constantan/ (Copper-Nickel)	Overall Brown	Overall Blue	Overall Blue	Overall Brown
		+ ve - ve Brown White	+ ve - ve White Blue	+ ve - ve Blue Red	+ ve - ve Red Brown

Chapter 3 Connecting the System to the Mold

This chapter outlines various checks to make prior to starting up the system.

3.1 Prior to Start Up

- Check that the system is completely disconnected from the power source.
- Clean up any water, oil, dirt, cleaning fluids etc. that may have spilled during a mold change or since the last production run.
- Check all of the cable connections between the system and the mold (if required). Make sure all of the cables are free from wear or damage.
- Check that the earth/ground connection is in good condition. Verify the system and the mold have the same ground reference.

3.2 Verifying the Connection

1. Connect the thermocouple and power output cables (if required).
2. Using an Ohmmeter, touch one test lead to the mold and the other to the mold ground terminal on the system. Resistance must be less than 1 Ω .
3. Check the main input power disconnect and make sure it is in the OFF position prior to connection of the controller to the power source.

3.3 Start Up Procedure Checklist

Item	Step	✓
1	Connect power/thermocouple cables between the mold and controller (if required).	
2	Connect the I/O box and option cables (if required).	
3	Connect the printer cable to the printer and controller (if required).	
4	Connect the controller to the power source.	
5	Switch the controller ON.	
6	Login to the system.	
7	Select the required mold setup.	
8	Verify the mold setup is the correct one.	
9	Run TEST mold diagnostics.	
10	Correct any faults found during diagnostics.	
11	Press START to run the system.	
12	Check that the controller is functioning correctly.	

NOTE: There are no Controller to Mold Interconnection details included in this User Guide. Please see the Mechanical / Electrical Engineering Documents provided with the controller.

CAUTION!

When switching Off the system you MUST wait 30 seconds before switching the main disconnect back On. You may experience communication issues if you do not wait the required 30 seconds.

Chapter 4 Delta² Operator Interface

This section is designed to help you understand the fundamental operating procedures of the Altanium/Delta² hot runner controller.

The interface between the user and the Altanium/Delta² is a Color LCD Display covered by a transparent protective cover. This display is referred to as the Delta² for the remainder of this guide. All software functions of the system are accessed via a membrane switch keypad built into the overlay. Data entry is initiated by pressing, using only a finger, the center of the required key.

CAUTION!

DO NOT use a screwdriver, pen, or any other tool to operate the keys as this may cause damage to the keypad on the Delta².

4.1 Display Overview

The Delta² comes standard with a high-resolution color display. This offers the advantages of high definition and a wide viewing angle, even in adverse lighting conditions.

During general operation the controller will display up to 24 zones of information on this page. If the system has more than 24 zones, use the HOME/PAGE key to view the remaining zones.

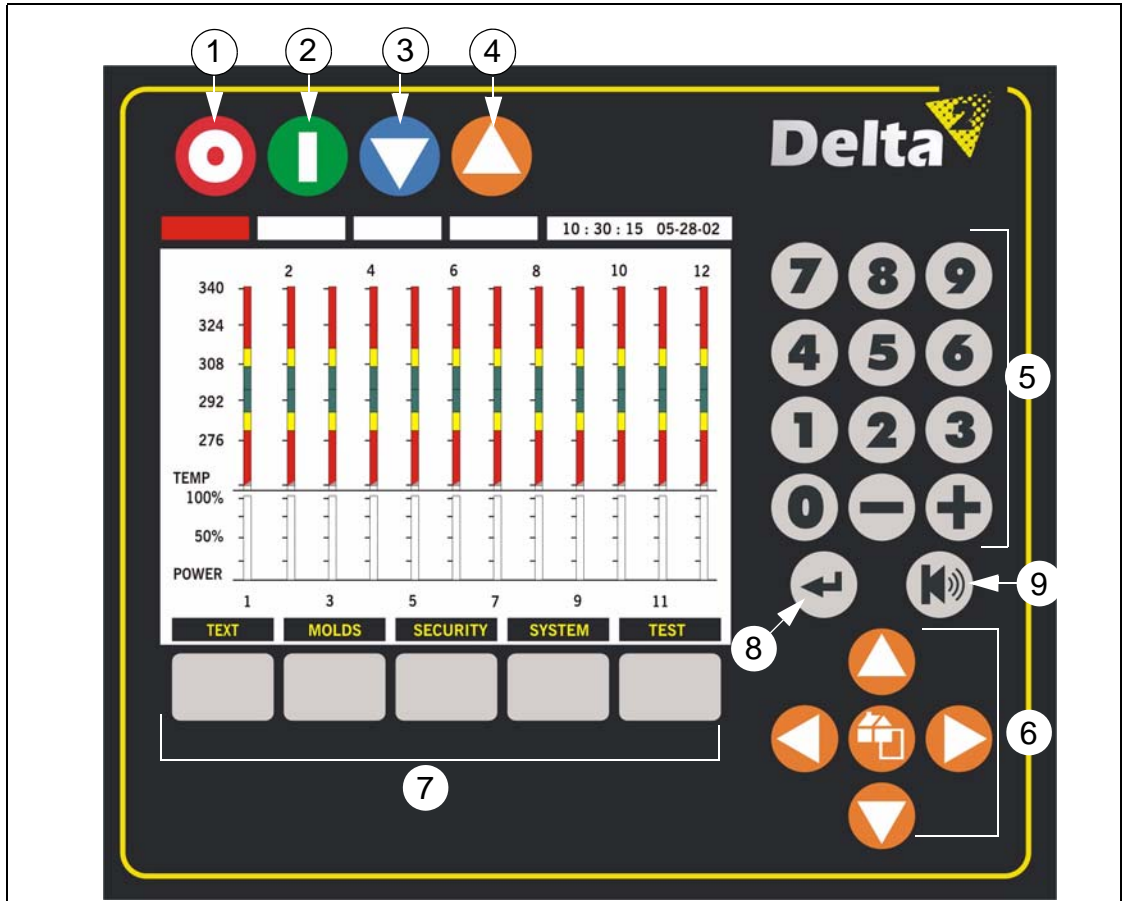


Figure 4-1 Graphs Page

- 1. Stop Key 2. Start key 3. Standby key 4. Boost key 5. Number keys 6. Navigation keys
- 7. Function keys 8. Enter key 9. Clear/Reset alarm key

For operational simplicity, the keypad uses NUMBER keys and FUNCTION keys.

The STOP, START, STANDBY and BOOST function keys are located above the LCD in the upper left hand portion of the display. A status line located directly below these keys will change color based on the mode the controller is in. At times there may also be a timer located in these areas.

Table 4-1 Function Keys





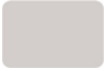






Key	Description
	STOP key (red) - Turns power OFF to all zones, regardless of system condition. A red bar on the status line is present when the system is Stopped. The bar blinks when the system is in Bake Out.
	START key (green) - Turns power ON to the zones that have a set point displayed. A green bar on the status line is present when the system is Running. The bar blinks during ART, Soft Start and Bake Out.

Table 4-1 Function Keys

Key	Description
	STANDBY key (light blue) - Places the system in STANDBY mode until either: The STANDBY timer runs out or until the key is pressed again. A time is displayed on the status line if the timer is active. 0:00 is displayed when the system is in STANDBY without a time set.
	BOOST key (orange) - Places the system in BOOST mode until either: The BOOST timer runs out or until the key is pressed again. A time is displayed on the status line if the timer is active. 0:00 is displayed when the system is in BOOST without a time set.
	The GRAY FUNCTION keys (5 gray rectangles) located directly below the LCD are used to navigate around all of the pages in the Delta ² . A status line located directly above these keys will tell you the present function of the key. This may change depending on the page you are on.
	The 10 NUMBER keys (0 through 9) are used to enter numerical values into the Delta ² .
	The - and + keys are used to increase or decrease values. These are also used to toggle the value when the setting is not numerical.
	The ENTER key is used to enter set values into the Delta ² .
	The ALARM key is used to clear and reset the Delta ² in the event of an alarm condition.
	The ARROW keys are used to navigate the cursor around the display.
	The HOME / PAGE key is used to go directly back to the Graphs (Home) page in a single key press no matter where you are in the system. If there are more than 24 zones in the system this key is used to view the next page of zones, over 24. The Home function is disabled if the system has more than 24 zones.

Chapter 5 Security

Once the system is powered up the following display will appear on your screen. From here you must enter the appropriate security code to gain access to operate the system. You may also change the security access level for any one or all of the items listed on the window. All system functions are listed on this page along with the required security code needed to adjust them.

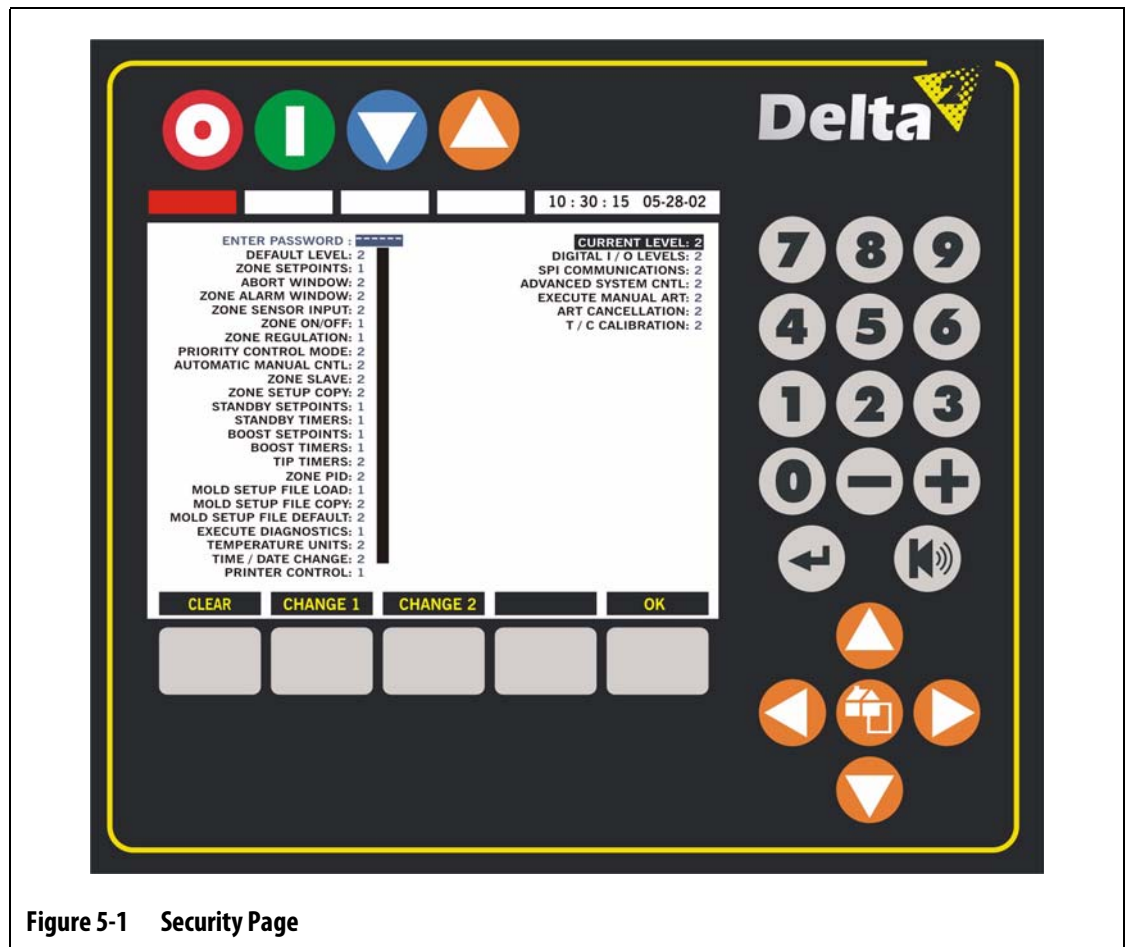


Figure 5-1 Security Page

Table 5-1 Security Page Function Key Descriptions

Key	Description
Clear	Press to clear out any mistakes while entering the password.
CHANGE 1	Press to change the password for level 1. You must know the present level 2 password to do this.

Table 5-1 Security Page Function Key Descriptions

Key	Description
CHANGE 2	Press this key to change the password for level 2. You must know the present level 2 password to do this.
OK	Press this key to exit out of the Security page.

5.1 Entering a Password

Factory set passwords; (Level 1 and 2) are shipped in a sealed envelope along with the controller. These passwords should be kept in a secure place.

To enter your password:

1. Place the cursor is in the ENTER PASSWORD column.
2. Press the number keys on the keypad, and then press ENTER.
3. In the column marked ENTER PASSWORD a star (*) will appear each time you press a key.
If you make a mistake and want to start over press CLEAR and all entered characters will be cleared.

The present level will change based on the code you entered. The system will power up with the Default security level selected in the Security window. Look at the PRESENT LEVEL in the Security window and your entered level should be displayed.

NOTE: When the screen saver appears the password will automatically return to the default Security Level

5.2 Changing a Password

To change the password for Level 1 or 2:

1. Enter the level 2 password.
2. To change the Level 1 password, hold down the CHANGE 1 key for about 5 seconds and the present level 1 password will appear in the ENTER PASSWORD space. The ENTER PASSWORD space will change to ENTER LEVEL 1.
3. Using the NUMBER keys enter your new level 1 password followed by ENTER.
You are limited to 6 numbers. The new level 1 password will now be displayed.
4. Press OK and your new password will be saved.

5.3 Setting Security Levels for Specific Functions

Using the Delta² security system can provide you levels of security to restrict the access of users and to maintain the controls and settings for the system.

To change a Security Level for a function you must first enter the level 2 password. Look at the PRESENT LEVEL in the Security page and level 2 should be displayed.

To change the Security Level for a specific function:

1. Use the ARROW keys to move the cursor to the desired function.
2. Press the 0, 1 or 2 key to set the desired level.

For a description of the items on the security page refer to [Table 5-2](#).

5.3.1 Security Item Descriptions

Following is a brief description of the different features that require a Security Level.

Table 5-2 Feature Descriptions

Feature	Description
Zone Setpoints	Enables the operator to adjust the zone setpoints.
Abort Window	Enables the operator to adjust the value for the ABORT shutdown condition.
Zone Alarm Window	Enables the operator to adjust the value for the ALARM condition.
Zone Sensor Input	Enables the operator to reassign Thermocouple Inputs.
Zone ON / OFF	Enables the operator to turn a zone ON or OFF.
Zone Regulation	Enables the operator to adjust the zone regulation mode between AUTO and MANUAL modes.
Priority Control Mode	Enables the operator to select the zone shutdown sequence between ZONE and SYSTEM in an abort condition. If ZONE is selected ONLY the zone will turn OFF, but if SYSTEM is selected ALL zones will turn OFF.
Automatic Manual Cntl	Enables the operator to enable the zone to continue running when the thermocouple fails. The zone is supplied with an averaged power output percentage in Manual Control Mode, based on the history of that same zone.
Zone Slave	Enables the operator to manually select a zone to follow the power output control of a different zone should the thermocouple fail.
Zone Setup Copy	Enables the operator to copy setup values to other zones.
Standby Setpoints	Enables the operator to adjust the Standby setpoints in the System page.
Standby Timers	Enables the operator to adjust the Standby timers in the System page.
Boost Setpoints	Enables the operator to adjust the Boost setpoints in the System page.
Boost Timers	Enables the operator to adjust the Boost timers in the System page.

Table 5-2 Feature Descriptions

Feature	Description
Tip Timers	Enables the operator to adjust the Tip timers in the More... page.
Zone PID	Enables the operator to adjust the P-I-D parameters in the ART/PID page.
Mold Setup File Load	Enables the operator to load Mold Setups from the Molds page.
Mold Setup File Copy	Enables the operator to copy a stored mold setup to a different location.
Mold Setup File Default	Enables the operator to delete the contents of a stored mold setup and return all values to Husky's default.
Execute Diagnostics	Enables the operator to run the Diagnostics (Test) program.
Temperature Units	Enables the operator to toggle the displayed temperature units between F and C.
Time / Date Change	Enables the operator to set the Time and Date from the System page.
Printer Control	Enables the operator to adjust the port settings and control the printing jobs in the in the System page.
Digital I/O Levels	Enables the operator to toggle the digital I/O levels from normally open (N/O) to normally closed (N/C).
SPI Communications	Enables the operator to change the port settings and turn SPI ON or OFF.
Advanced System Control	Enables the operator to enter and change values in the Advanced Setup page.
Execute Manual ART	Enables the operator to ART a zone or group of zones.
ART Cancellation	Enables the operator to cancel the ART process before it is complete.
T/C Calibration	Enables the operator to calibrate the thermocouple inputs on the system.

Chapter 6 Mold Setups

Once you have entered the desired security level the next step you must complete before heating up the mold is to load a mold setup. After you have finished in the Security page press OK and the Mold Setup page will appear.

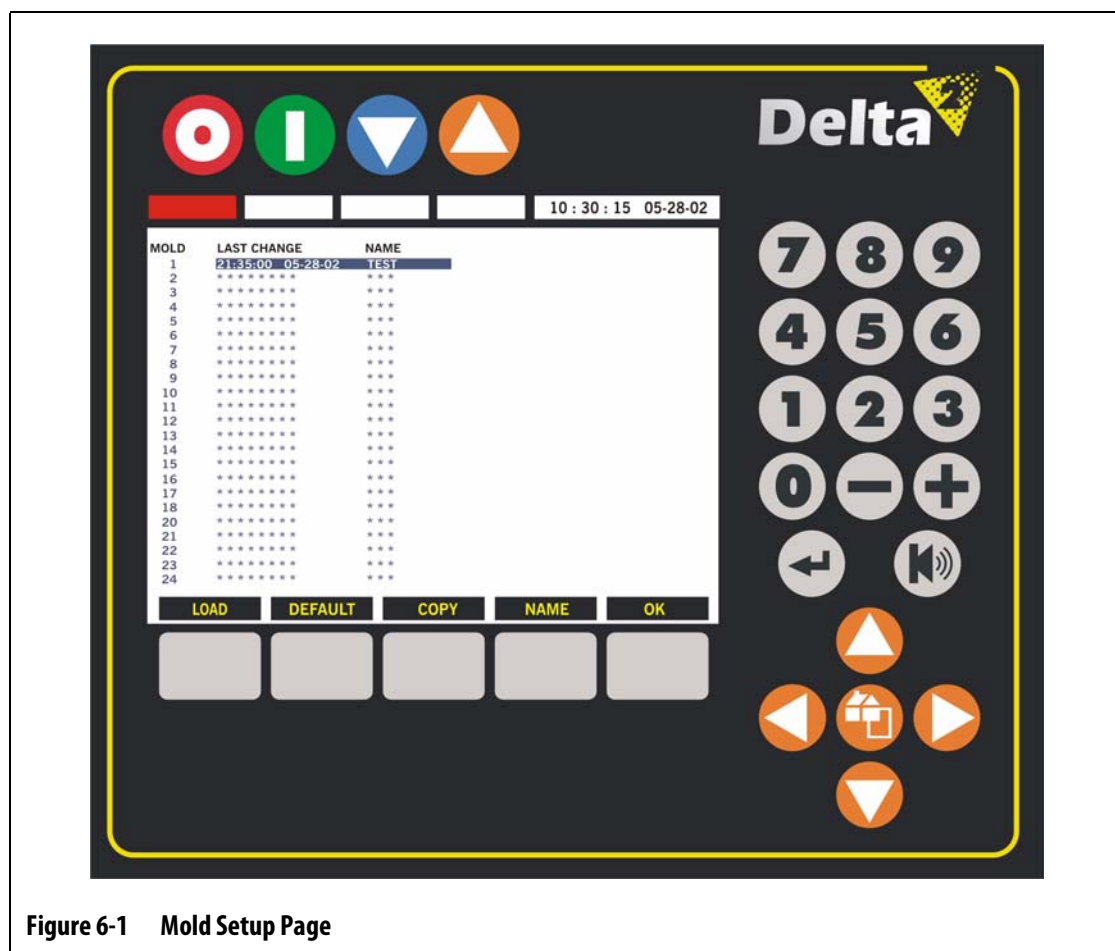


Figure 6-1 Mold Setup Page

Table 6-1 Mold Setup Page Function Key Descriptions

Function	Description
LOAD	Press this key to load the highlighted mold setup into the system. You must have a mold setup loaded before you can heat up the mold.
DEFAULT	Hold this key down for 5 seconds and it will return all settings on the highlighted mold setup to the default values. For safety reasons the system will not allow the presently loaded mold setup to return to default values.
COPY	Press this key to make a copy of an existing mold setup in a different location.

Table 6-1 Mold Setup Page Function Key Descriptions

Function	Description
NAME	Press this key to name or rename a mold setup. The maximum number of characters allowed is 10.
OK	Press this key to exit out of the Mold Setup page.

Table 6-2 Mold Setup Page Item Descriptions

Item	Description
MOLD	The 24 mold setups stored in the system memory. There are always 24 listed.
LAST CHANGE	The time and date the last change was made to that mold setup.
NAME	The name of the mold setup. Change this by using the NAME key.

6.1 Loading an Existing Mold Setup

You must load a mold setup before the controller can heat up the mold. Loading a mold setup tells Delta² the values for the setpoints, alarm bands, abort bands, etc.

NOTE: Make sure the present security level is allowed to make this change.

To load an existing mold setup:

1. Move the cursor with the ARROW keys to select the mold setup file you want to load.
2. Press the LOAD key and the selected mold setup will be loaded.

Once a mold setup is loaded an arrow will appear next to its number to remind you which one is loaded.

6.2 Setting a Mold Setup to Default

The Delta² can store up to 24 different mold setups. If you ever want to replace or create another setup it is a good idea reset all the parameters back to the Husky default.

NOTE: Make sure the present security level is allowed to make this change.



IMPORTANT!

For safety reasons the system will not allow you to default the mold setup that is presently loaded.

To default a mold setup:

1. Move the cursor with the ARROW keys to the mold setup you want to default.
2. Hold down the DEFAULT key for 5 seconds and the present settings on all zones will change to the following:

Last Change column will change to *****

Name column will change to ***

Setpoint: 177 °C (350 °F)

Alarm: 6 °C (10 °F)

Abort: 11 °C (20 °F)

Regulation: Automatic (closed loop)

Slave: -- (none)

Manual Standby Setpoint: 121 °C (250 °F)

Manual Boost Setpoint: --- (no change)

Remote Standby Setpoint: 121 °C (250 °F)

Remote Boost Setpoint: --- (no change)

Sensor Assignment: 1 to 1, 2 to 2, etc.

PCM: SYS (system)

AMC: ON

OUT: Z/C (zero cross)

Ground Fault: Yes

CTL: ART

ART: Cleared

6.3 Copying a Mold Setup

This function is used to make a backup copy of a mold setup in a different number location on the Delta².

NOTE: Make sure the present security level is allowed to make this change.

To copy a mold setup:

1. Move the cursor with the ARROW keys to select the mold setup file you want to copy.
2. Press COPY and that mold setup will highlight.
3. Move the cursor with the ARROW keys to select the destination mold setup file location.

4. Press COPY once more and all of the information contained in the setup file will be copied to the new location.
 You will notice the time and date will be copied to the new location but the mold name will not. This is done so you will have some way to distinguish between the original and the copied setup.
5. When finished press OK to exit out of the COPY mode.

6.4 Entering a Mold Name

To help in identifying different mold setups the Delta² allows you to assign them a name.

NOTE: Make sure the present security level is allowed to make this change.

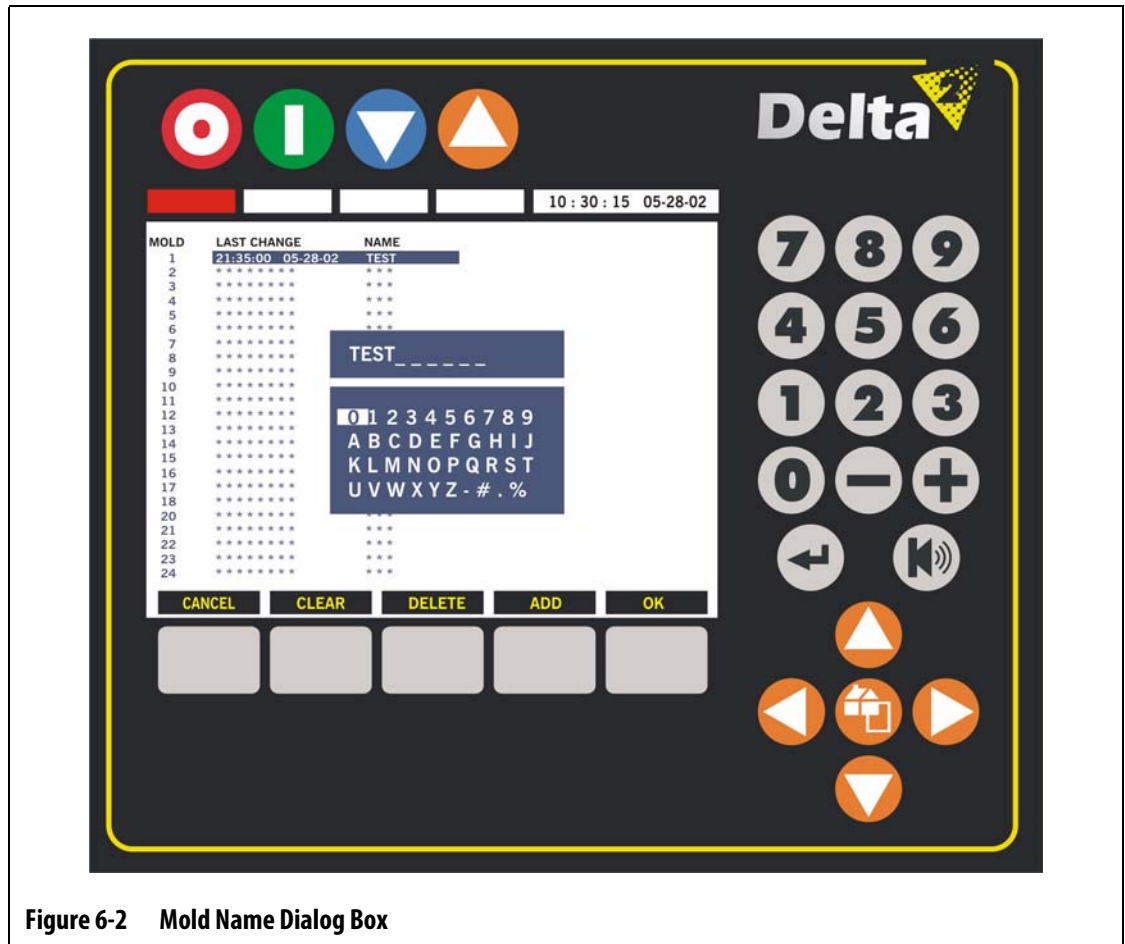


Figure 6-2 Mold Name Dialog Box

Table 6-3 Mold Name Dialog Box Function Key Descriptions

Function Key	Description
CANCEL	Press this key to cancel the mold naming function.
CLEAR	Press this key to clear out all characters in the field.
DELETE	Press this key to clear out 1 character at a time in the field.
ADD	Press this key to add the character the cursor is placed on to the field.
OK	Press this key when you are finished entering the mold name.

To enter a mold name:

1. Move the cursor with the ARROW keys to select the mold setup file you want to name. You are allowed up to 10 characters for each mold setup.
2. Press NAME and the Mold Name Dialog box appear. Refer to [Figure 6-2](#).
3. Press CLEAR to erase all previously entered characters.
4. Using the ARROW keys move the cursor to the desired character and press ADD. That character will be added to the field. If you make a mistake, use DELETE to erase 1 character at a time.
5. When finished entering the mold name press OK to exit out of the name function. The name will now be stored in the NAME column in the location you selected.

Chapter 7 Making Adjustments

You can make adjustments to the process settings for a mold setup before you start the mold, or while the mold is running. This chapter explains how to use Delta² to monitor and modify the system.

7.1 Graphs Page Overview

The Graphs page is also referred to as the Home page. Here you can view up to 24 heater zones on one page in a graphical format. You can view each zones setpoint, actual temperature, power output percentage, regulation, ON/OFF status, slave information, alarm band and abort band.

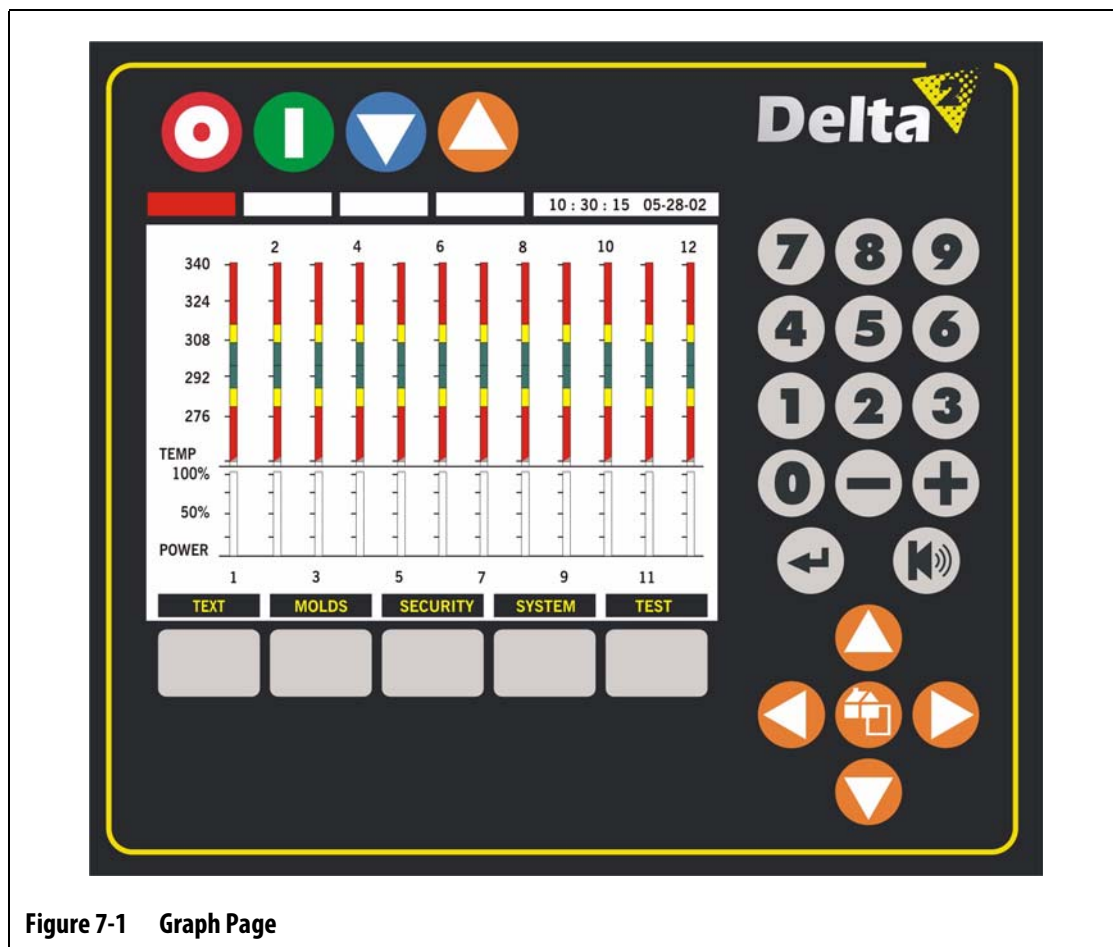
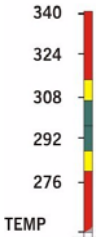
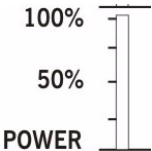


Figure 7-1 Graph Page

Table 7-1 Graph Page Function Key Descriptions

Function Key	Description
TEXT	Press this key to enter the Text page.
MOLDS	Press this key to enter the Molds page.
SECURITY	Press this key to enter the Security page.
SYSTEM	Press this key to enter the System page.
TEST	Press this key to enter the Test page.

Table 7-2 Graph Page Item Descriptions

Item	Description
<p>ZONE BAR</p> 	<p>On the Graphs page each zone has a bar assigned to it. Many parameters for each zone are shown in a graphical format. They show you the setpoint via a WHITE LINE in the center of the green section on the bar. The actual temperature is depicted by the TRIANGLE that floats inside the bar. The triangle is GRAY when it is outside the temperature scale and BLUE when it's within the scale. When the white line "splits" the triangle, you are right on setpoint. The GREEN area is the molding window. The YELLOW outer area is the warning band that sets off a warning alarm before a major problem occurs. The RED far outer band is the abort area. If a zone strays out this far there is a serious problem.</p>
<p>ZONE NUMBER</p>	<p>The even zone numbers are listed above the bars and odd zone numbers are listed below the bars. If one zone is slaved to another, the number will bounce between the actual zone number and the zone it's slaved to.</p>
<p>POWER OUTPUT BAR</p> 	<p>This bar shows the percentage of power being applied to the heater. If the zone is in AUTO (closed loop) regulation, the bar will be ORANGE. If the zone is in MANUAL (open loop) regulation, the bar will be GREEN. If the zone is set to MONITOR mode, there will be no bar. There is no power output for zones in MONITOR mode. (Monitor mode is an option on the Delta²)</p>

7.2 Text Page Overview

The Text page gives you a different way to view similar zone information displayed on the Graphs page. Here you can view up to 24 heater zones on one page in a text format. You can view all of the information contained in the Graphs page plus amperage draw, zone regulation and alarm status for each zone. The Text page is where you go to make process adjustments to the heaters in the mold.

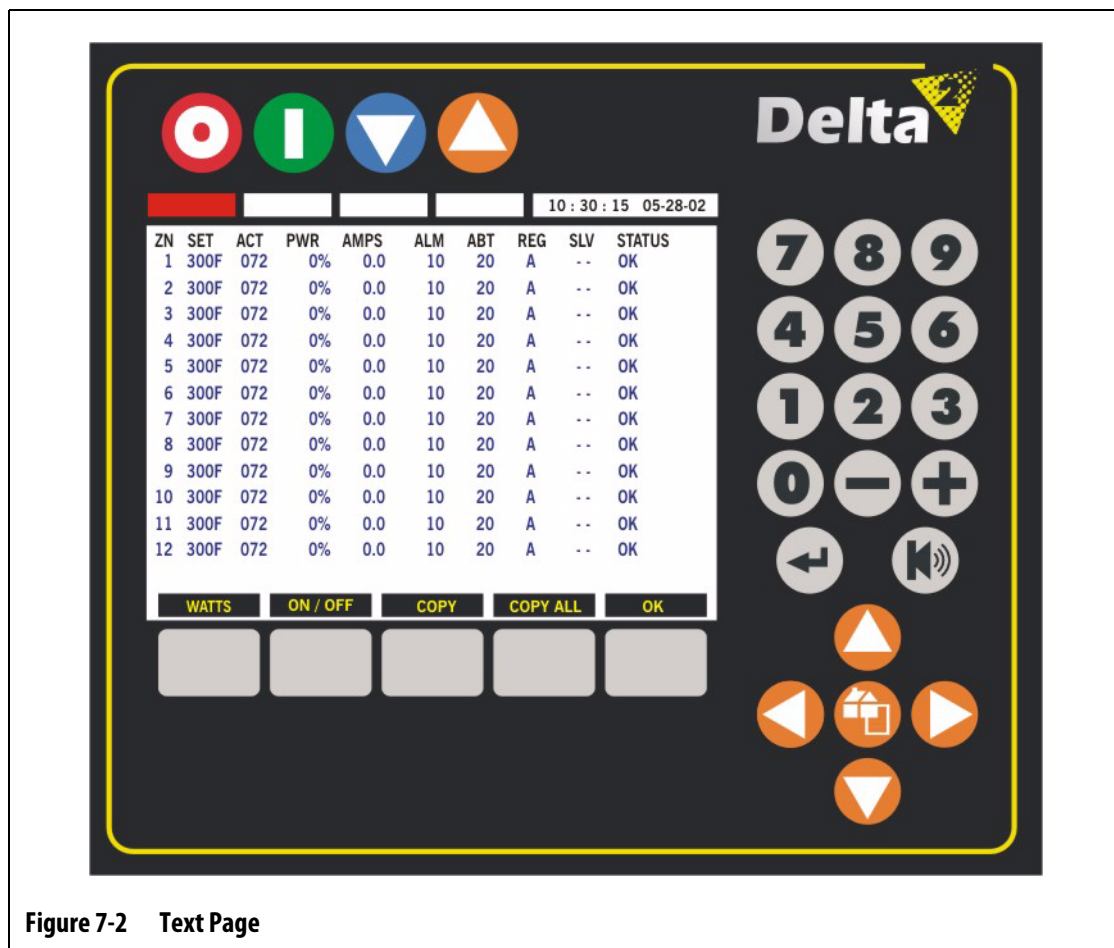


Figure 7-2 Text Page

Table 7-3 Text Page Function Key Descriptions

Function Key	Description
WATTS	Press this key to enter the Watts page. Here you will find real-time voltage, real-time wattage and resistance displayed for every heater in the mold.
ON/OFF	Press this key to toggle the individual zones ON or OFF.
COPY	Press this key to select a certain parameter on one zone and copy it to other zone(s).
COPY ALL	Press this key to select all parameters on one zone and copy it to other zone(s).
OK	Press this key to go back to the Graphs page.

Table 7-4 Text Page Item Descriptions

Item	Description
ZN	The zone number. You can view up to 24 zones on one page. If there are more than 24 zones use the HOME / PAGE key to view the rest of the zones.
SET	The zone setpoint. Specifies the temperature you want the zone to heat up to once you press start.
ACT	The actual temperature being read from the thermocouple in the mold.
PWR	The actual power output percentage being delivered to the heater.
AMPS	The actual current being drawn by the heater.
ALM	The alarm setting. Specifies how many degrees over or under the setpoint you want the alarm to be initiated.
ABT	The abort setting. Specifies how many degrees over or under the setpoint you want the alarm to be initiated and shut down.
REG	The control mode for the zone. Automatic (closed loop), Manual (open loop) or Monitor (no power output, view temperature only). Monitor mode is not standard on the Delta ² , it is an option.
SLV	The slave status of a particular zone. If slaved there will be a number displayed, if not there will be two dashed lines.
STATUS	The zone status. In the event of an error condition, the error will be displayed here.

7.3 Changing a Setpoint

The temperatures you want the heaters in the mold to heat up to must be set in Delta². The default setting is 177 °C (350 °F).

NOTE: Make sure the present security level is allowed to make this change.

To change a setpoint:

1. From the Graphs page, press TEXT to enter the Text page.
2. Using the ARROW keys move the cursor to the zone you want to adjust.
3. To enter a new value use the NUMBER keys and then press ENTER.

NOTE: If you want to change the setpoint by only a few degrees you can use the - and + keys.

4. To change another zone, move the cursor to that zone and repeat the process.

7.4 Copying a Parameter

To make setting up the Delta² easier, we have included a COPY function. This feature allows you to copy one set parameter to the other zones without having to use the NUMBER keys.

NOTE: Make sure the present security level is allowed to make this change.

1. From the Graphs page, press TEXT to enter the Text page.
2. Using the ARROW keys move the cursor to zone you want to copy.
3. Press COPY and the setpoint will highlight.
4. Use the ARROW keys to move to zone you want to change.
5. Press COPY and the setpoint from copied zone will be copied to selected zone.
6. Use the ARROW keys if you want to copy the setpoint to other zones.
7. When finished copying press OK to exit out of COPY mode.

7.5 Copying All Displayed Settings from One Zone to Another

To make setting up the Delta² easier, we have included a COPY ALL function. This feature allows you to copy all of the displayed settings for a particular zone to another zone.

NOTE: Make sure the present security level is allowed to make this change.

NOTE: The SLV parameter cannot be copied.

For example we will copy all of the displayed settings from zone 4 to zone 6.

1. From the Graphs page, press TEXT to enter the Text page.
2. Using the ARROW keys move the cursor to zone 4.
3. Press COPY ALL and all parameters to be copied will highlight.
4. Use the ARROW keys to move to zone 6.
5. Press COPY ALL and all parameters from zone 4 will be copied to zone 6.
6. Use the ARROW keys if you want to copy the parameters to other zones.
7. When you are finished press OK to exit out of COPY ALL mode.

7.6 Changing the Alarm Band

You must specify how many degrees above or below the setpoint you want the alarm to be initiated. The default setting is 6 °C (10 °F).

NOTE: Make sure the present security level is allowed to make this change.

To change the alarm band:

1. From the Graphs page, press TEXT to enter the Text page.

2. Using the ARROW keys move the cursor to the zone you want to adjust.
3. Using the ARROW keys move the cursor to the ALM column.
4. To enter a new value use the NUMBER keys and then press ENTER. If you want to change by only a few degrees you can use the - and + keys.
5. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

Alarm Example: Setpoint = 300 °F, ALARM = 10 °F

At 311 °F or 289 °F the alarm will be initiated. If the setpoint is changed to 350 °F, the ALARM will be initiated at 361 °F or 339 °F. The setting is always represented as an amount above and below the present setpoint.

7.7 Changing the Abort Band

You must specify how many degrees above or below the setpoint you want the abort to be initiated and shut down. The default setting is 11 °C (20 °F).

NOTE: Make sure the present security level is allowed to make this change.

NOTE: The setting in the ALM or ABT column is directly related to the setpoint.

To change the abort band:

1. From the Graphs page, press TEXT to enter the Text page.
2. Using the ARROW keys move the cursor to the zone you want to adjust.
3. Using the ARROW keys move the cursor to the ABT column.
4. To enter a new value use the NUMBER keys and then press ENTER. If you want to change by only a few degrees you can use the - and + keys.
5. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

Abort Example: Setpoint = 300 °F, ABORT = 20 °F.

At 321 °F or 279 °F the alarm will be initiated and shut down based on your PCM directive ([Section 7.12.6](#)). If the setpoint is changed to 350 °F, the ALARM will be initiated at 371 °F or 329 °F. The setting is always represented as an amount above and below the present setpoint.

7.8 Changing the Zone Regulation

Each zone has the ability to run in one of three control modes, Automatic (closed loop), Manual (open loop), and optionally, Monitor mode (view the temperature only). This is referred as Zone Regulation. Each zone must have the control mode set. The default setting is A (Automatic).

NOTE: Make sure the present security level is allowed to make this change.

CAUTION!

For systems equipped with the optional Monitor Mode. If you place a zone in MONITOR mode by mistake, the system will give no power output to that heater.

To change the regulation:

1. From the Graphs page, press TEXT to enter the Text page.
2. Using the ARROW keys move the cursor to the zone you want to adjust.
3. Using the ARROW keys move the cursor to the REG column. Use the - or + key to toggle the setting between A, MAN or MON.

NOTE: If your system is not equipped with the MONITOR option, MON will not be displayed.

4. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

7.9 Zone Slave

Some of the most vulnerable components in the mold are the thermocouples. If a thermocouple fails, Delta² will initiate an alarm and display an error on the Zone Status screen for the affected zone. At this point you have three choices:

1. Stop molding, remove the mold and repair the fault. This may not be desirable or even possible.
2. Switch the zone to Manual control mode and continue processing. This has limitations as Manual mode is not able to compensate for changes in the process that affect the heater's power requirements, for example, shear heat.
3. Slave the faulty zone to another. Due to the symmetry in the design of hot runner molds, frequently there are other zones that have very similar thermal characteristics as the faulty zone. Delta² can apply the power output from a fully functioning zone to the zone with the defective thermocouple. This means that any processing changes that affect the power requirements of the heaters are automatically applied to the defective zone. It is similar to repairing the defective thermocouple without ever opening the mold.

7.9.1 Automatic Slave Function

If a thermocouple malfunctions during operation of the mold, the Delta² Auto-Slave function will take over. Delta² constantly monitors the heaters in the mold and stores comparative data. This data is used to select an almost identical Master/Slave relationship for every zone in the mold. If a thermocouple fails, Delta² will initiate an alarm and display an error in the STATUS column for the offending zone.

Based on the comparative data stored, the system knows which zone to slave the faulty zone to so that it continues to operate in a closed loop control mode. On the Graphs page you will notice the auto-slaved zones number will switch between the slaved zone number and the master zone number.

7.9.2 Using the Automatic Slave Function

Your only requirement as the operator is to see the error, clear and reset the alarm. You will notice the Auto Slave Zone Number is displayed under the SLV column on the faulty zone. On the Graphs page you will notice the auto-slaved zones number will switch between the slaved zone and the master zone. In the event the automatic slaving function was unable to find a suitable partner it would pass onto the Automatic Manual Control (AMC) function ([Section 7.12.7](#)). If AMC is set to ON, the system will automatically switch the bad zone into manual mode. If AMC is OFF the control will skip to the PCM (Priority Control Mode) ([Section 7.12.6](#)) and shut something down based on your PCM directive.

7.9.3 Manually Slaving One Zone to Another

If a thermocouple is about to fail and you can to manually slave it to another zone before it fails completely.

NOTE: Make sure the present security level is allowed to make this change.

To manually slave one zone to another:

1. From the Graphs page, press TEXT to enter the Text page.
2. Using the ARROW keys move the cursor to the defective zone.
3. Using the ARROW keys move the cursor to the SLV column.
4. Enter the zone number you want to slave the faulty zone to using the NUMBER keys and then press ENTER.

On the Graphs page you will notice the slaved zones number will switch between the slaved zone and the master zone. Be sure to pick a zone with similar heater characteristics, you would not necessarily want to slave a manifold zone to a tip zone.

5. To change another zone, move the cursor to that zone and repeat the process. You are not able to slave a zone to itself, if you attempt this, the Delta² will ignore it.

7.10 Status Column/Alarm Conditions

In the event an error occurs, the Delta² will turn on the audible and visual alarms and display the alarm condition in the STATUS column on the Text page. No matter what page you are on, the system will automatically displays the Text page so you can view the error. After reviewing, press ALARM once to silence the audible alarm. A second press will reset the visual alarm and the error message in the Status column.

If after one minute you have not pressed ALARM a second time (resetting the light and error message) the system will initiate the audible and visual alarms again.

7.10.1 Error Messages

In the event of an error, malfunction or failure, the Delta² will turn on the audible and visual alarms and display the alarm condition in the STATUS column on the Text page.

7.10.1.1 Alarm Conditions —Warning Errors

The following conditions will cause the audible and visual alarms to initiate. Since they are warning errors, they will not shut anything down.

Table 7-5 Alarm Condition Descriptions

Alarm Condition	Description
ALM OVER TEMP	Over Temperature Alarm. A zone's actual temperature has exceeded its setpoint by the amount set for the alarm limit (ALM) on the Text page.
ALM UNDER TEM	Under Temperature Alarm. A zone's actual temperature has dropped below its setpoint by the amount set for the alarm limit (ALM) on the Text page.
AUTO SLAVE	Auto Slave Active. A zone has had its thermocouple become defective while running in automatic control mode. The system has AUTOMATICALLY SLAVED this zone to another one using data it collected before the thermocouple became faulty. The faulty zone is now being controlled by the power output from another similar zone. The master zone number will be displayed in the SLV column of the faulty zone.
LOST THERM-AMC	Lost Thermocouple Alarm, AMC Activated. A zone has had its thermocouple become defective while running in automatic control mode. There was no match found for this zone in the mold by the Auto-Slave feature. The zone has been setup to go into AUTOMATIC MANUAL CONTROL in this event. The zone is now being controlled in manual mode at a power percentage selected by the controller using data it collected before the thermocouple became faulty.

7.10.1.2 Abort Conditions — Shut Down Errors

The following conditions will cause the audible and visual alarms to initiate. Since they are shut down errors, they will cause a zone or system shut down situation based on your PCM setting ([Section 7.12.6](#)).

Table 7-6 Abort Condition Descriptions

Abort Condition	Description
ABT OVER TEMP	Over Temperature Abort. A zone's actual temperature has exceeded its setpoint by the amount set for the abort limit (ABT) in the Text page.
ABT UNDER TEMP	Under Temperature Abort. A zone's actual temperature has dropped below its setpoint by the amount set for the abort limit (ABT) on the Text page.
FUSE 1 BLOWN	The heater protection circuit on this Power Card have been blown. It is necessary to replace it. Refer to Section 12.2.3 .
FUSE 2 BLOWN	The protection circuits on this Heater Control Card have been blown. It is necessary to replace them. Refer to Section 12.2.3 .
NO RESPONSE	The Delta ² has been applying 96% to 100% power to this heater and the thermocouple connected to this zone is not responding. The thermocouple may be pinched or the heater power wires may be broken.
LOST THERM	Lost Thermocouple. This zone has a defective or open thermocouple.
REVERSE T/C	Reversed Thermocouple. The positive and negative leads from the thermocouple have been switched or the connections are reversed. As power is applied, the temperature goes down instead of up. You must correct this situation at the point where the wires are reversed.
GROUND FAULT	This zone has current flowing greater than 3 amps to ground (earth) and there is potential for a short circuit.
OVER MAX TEMP	Over Maximum Temperature. The temperature on this zone has risen above the maximum value allowed. This usually means the switching device has failed in the closed position and the zone ran away. The factory setting is 200 °F over the normal setpoint.
OVER CURRENT	Over Maximum Current. The current on this zone is above the maximum value allowed.
NO HEATER	This zone is not showing any current draw. This usually means there is not a heater connected to this zone or the wires to the heater have been severed.
CC RX COMM	Control Card Receive Communications Error. This zone has stopped receiving data from the Delta ² operator interface.
CC TX COMM	Control Card Transmit Communications Error. This zone has stopped transmitting data to the Delta ² .

7.10.2 Clearing and Resetting Errors

To clear and reset an alarm:

1. Press ALARM once will silence the audible alarm. This will not remove the error message on the screen.
2. A second press of ALARM resets the visual alarm and the error message in the Status column.

If after one minute you have not pressed ALARM a second time (resetting the light and error message) the system will initiate the audible and visual alarms again.

7.10.3 Error Log

The Delta² is equipped with an error log that will store into memory the 384 most recent errors. This is useful for supervisors when errors happen and you cannot be there to observe them.

To view the error log:

1. From the Graphs page, press SYSTEM. The System page is displayed. Refer to [Section 7.16](#).
2. Using the ARROW keys, move the cursor to the CODE ---- area on the page. Enter the code 4444. The Error Log page is displayed.

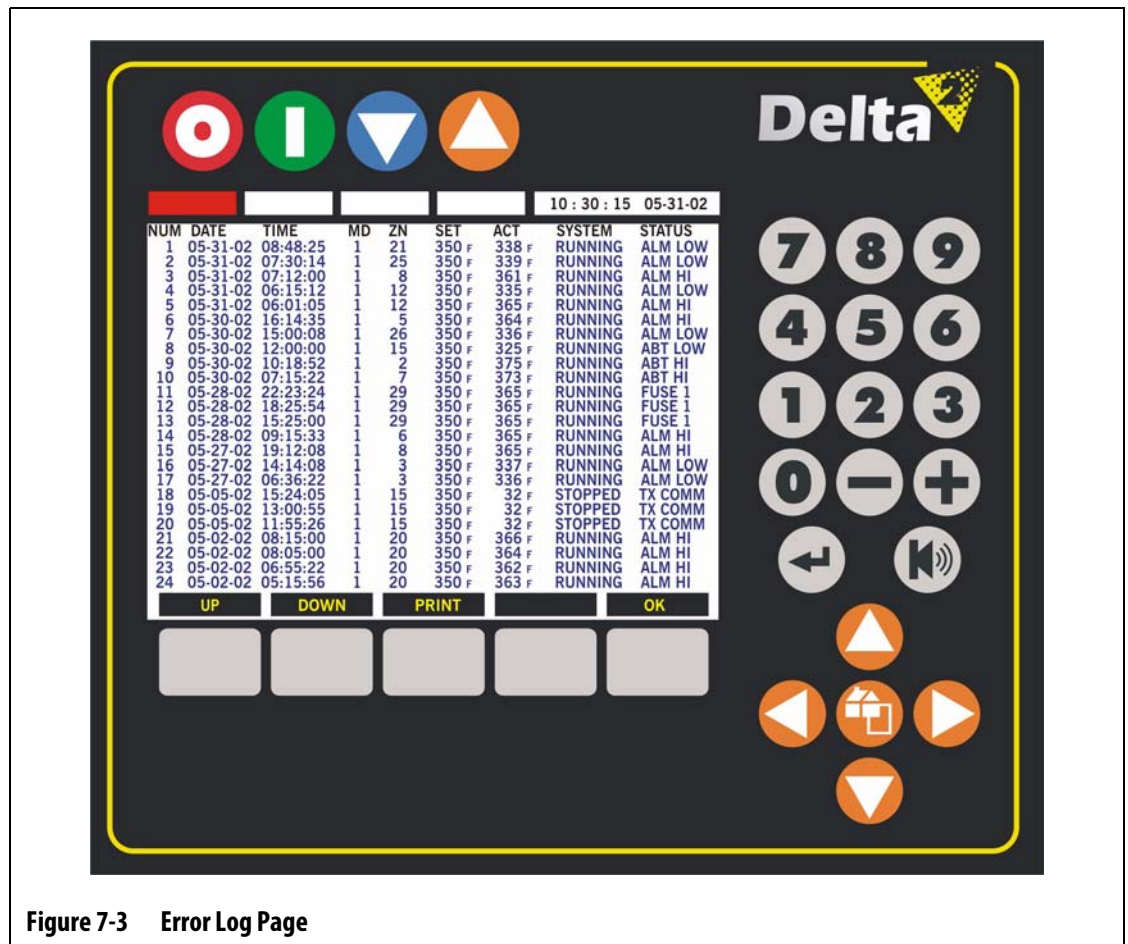


Figure 7-3 Error Log Page

Table 7-7 Error Log Page Function Key Descriptions

Function Key	Description
UP	Press this key to view the next page of errors. The system will store the most recent 384 errors.
DOWN	Press this key to view the previous page of errors. The system will store the most recent 384 errors.
PRINT	Press this key to print the present page of errors. 24 errors will be printed.
OK	Press this key when you are finished viewing the error log.

Table 7-8 Error Log Page Item Descriptions

Item	Description
NUM	The error number. You can view up to 24 errors on one page. The system stores the last 384 errors. If there are more than 24 errors use the UP or DOWN key to view the other errors.
DATE	The date the error occurred.
TIME	The time of day the error occurred.
MD	The mold setup number that was running when the error occurred.
ZN	The zone number the error occurred on.
SET	The zone setpoint.
ACT	The actual temperature of the zone when the error occurred.
SYSTEM	The status of the system when the error occurred. Some examples are, STOPPED, RUNNING and DIAG (Diagnostics).
STATUS	The actual error condition. Because of the limited available space on the page, the errors messages have been abbreviated. Refer to Table 7-9 .

Table 7-9 Error Abbreviations

Abbreviation	Error
ABT HI	ABORT OVER TEMPERATURE
ABT LOW	ABORT UNDER TEMPERATURE
ALM HI	ALARM OVER TEMPERATURE
ALM LOW	ALARM UNDER TEMPERATURE
A-SLAVE	AUTO SLAVE
FUSE 1	FUSE 1 BLOWN
FUSE 2	FUSE 2 BLOWN
GND FLT	GROUND FAULT
MAX AMP	OVER CURRENT

Table 7-9 Error Abbreviations

Abbreviation	Error
MAX TMP	OVER MAXIMUM TEMPERATURE
N/C AMC	LOST THERMOCOUPLE-AMC
NO HTR	NO HEATER
NO RESP	NO RESPONSE
NO T/C	LOST THERMOCOUPLE
REV T/C	REVERSE THERMOCOUPLE
RX COMM	CONTROL CARD RECEIVE ERROR
TX COMM	CONTROL CARD TRANSMIT ERROR

7.11 Watts Page Overview

The Watts page displays real-time voltage, real-time wattage and resistance for every heater in the mold. You can view up to 24 heater zones on one page in a text format.

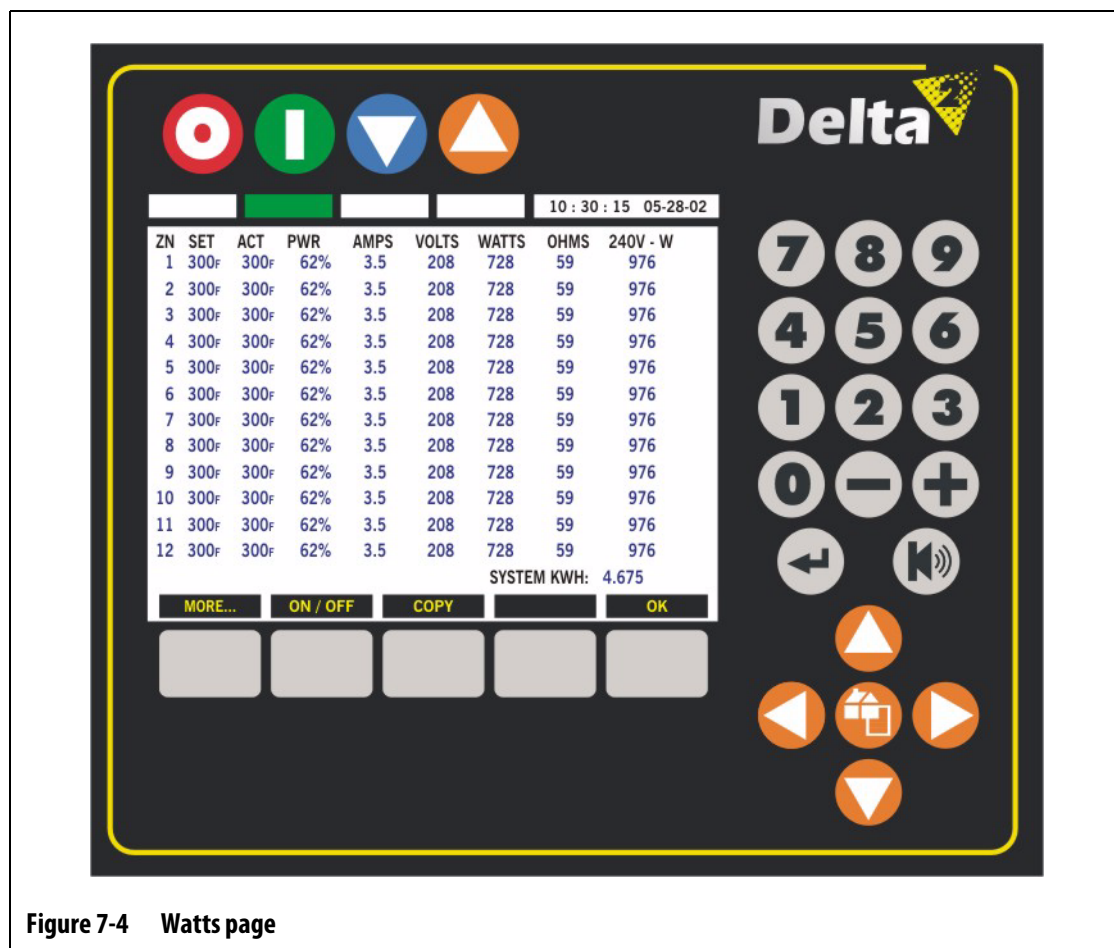


Figure 7-4 Watts page

Table 7-10 Watts Page Function Key Descriptions

Function Key	Description
MORE...	Press this key to enter the More... page.
ON/OFF	Press this key to toggle the individual zones ON or OFF.
COPY	Press this key to select the setpoint parameter on one zone and copy it to other zone(s).
OK	Press this key to go back to the Text page.

Table 7-11 Watts Page Item Descriptions

Item	Description
ZN	The zone number. You can view up to 24 zones on one page. If there are more than 24 zones use the HOME / PAGE key to view the rest of the zones.
SET	The zone setpoint. Specifies temperature you want the zone to heat up to once you press start.
ACT	The actual temperature being read from the thermocouple in the mold.
PWR	The actual power output percentage being delivered to the heater.
AMPS	The actual current being used by the heater.
VOLTS	The actual voltage being delivered to the heater. This is directly related to the supply voltage feeding the Altanium mainframe.
WATTS	The actual wattage being used by the heater.
OHMS	The actual resistance of the heater. This will display --- until you run the Diagnostics program and save the test results. Refer to Section 8.1 .
240V - W	The adjusted wattage being used by the heater. This is based on the actual voltage rating of your heaters versus the actual voltage being delivered to them. This can be helpful for troubleshooting heaters that cannot seem to get to setpoint, even at 100% power output. It could be that you are delivering less voltage to the heater than required.
SYSTEM KWH	Displays a Kilowatt per hour meter. This shows the amount of power being consumed by the mold while it is running.

7.11.1 Changing a Setpoint

You can change setpoints in the Watts page as you can from the Text page.

To change a setpoint from the Watts page:

1. Using the ARROW keys move the cursor to the zone you want to adjust.
2. To enter a new value use the NUMBER keys, and then press ENTER. If you want to change the setpoint by only a few degrees you can use the - and + keys.
3. To change another zone, move the cursor to that zone and repeat the process.

7.11.2 Using the Copy Function

To make setting up the Delta² easier we have included a COPY function. Using this you can copy one setpoint to the other zones without having to use the NUMBER keys.

NOTE: Make sure the present security level is allowed to make this change.

For example we will copy the setpoint from zone 4 to zone 6.

1. Using the ARROW keys move the cursor to zone 4.
2. Press COPY and the setpoint will highlight.
3. Use the ARROW keys to move to zone 6.
4. Press COPY and the setpoint from zone 4 will be copied to zone 6.
5. Use the ARROW keys if you want to copy the setpoint to other zones.
6. When you are finished copying press OK to exit out of COPY mode.

7.12 More... Page Overview

The More... page is where some of the zone settings that are used less frequently are kept. Here you can view up to 24 heater zones on one page in a text format.

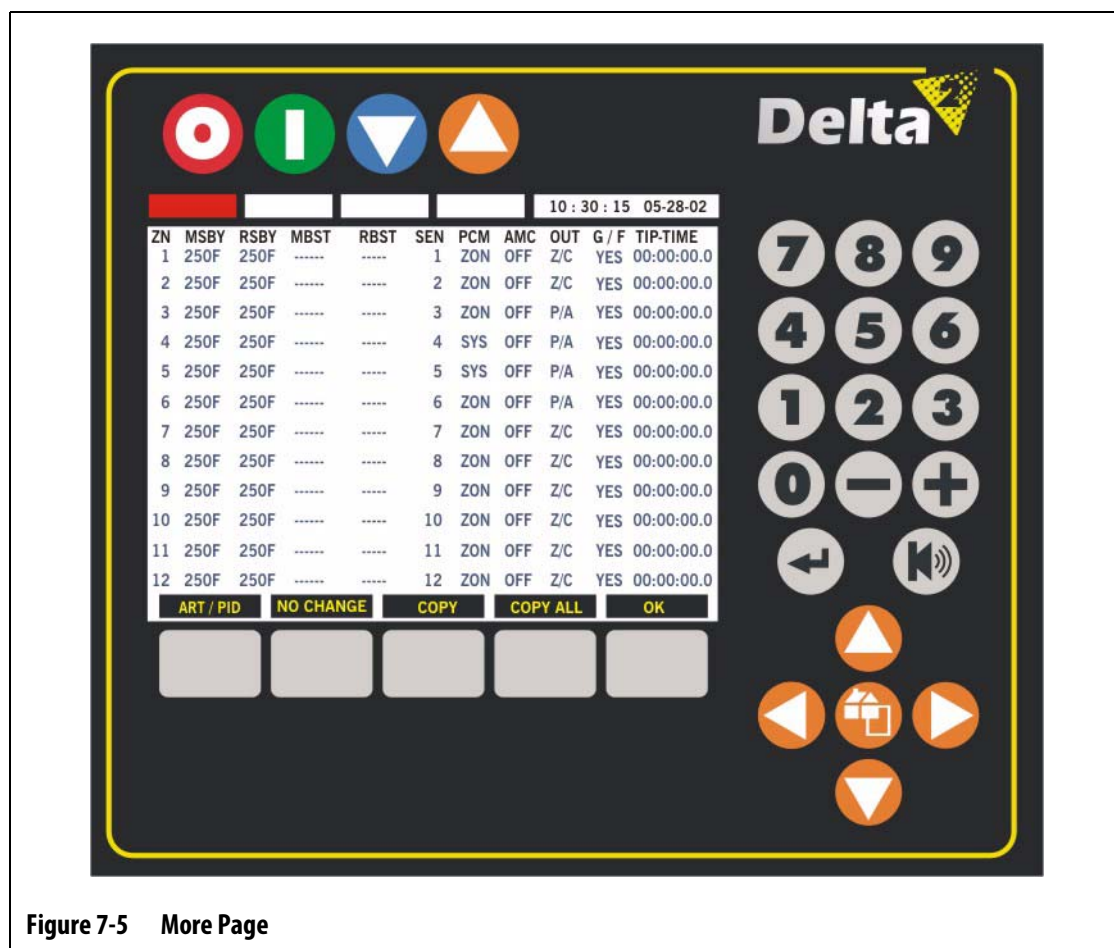


Figure 7-5 More Page

Table 7-12 More Page Function Key Descriptions

Function Key	Description
ART/PID	Press this key to enter the ART/ PID page.
NO CHANGE	Press this key to remove a Boost or Standby setpoint in one step instead of using the NUMBER keys.
COPY	Press this key to select a certain parameter on one zone and copy it to other zone(s).
COPY ALL	Press this key to select all parameters on one zone and copy it to other zone(s).
OK	Press this key to go back to the Watts page.

Table 7-13 More Page Item Descriptions

Item	Description
ZN	The zone number. You can view up to 24 zones on one page. If there are more than 24 zones use the HOME / PAGE key to toggle to the rest of the zones.
MSBY	The Manual Standby Setpoint. Specifies the temperature to heat to when the STANDBY key is pressed.
RSBY	The Remote Standby Setpoint. Specifies the temperature to heat to when it receives the Remote Standby digital input. If your system is not equipped with this option there will be nothing displayed in this column.
MBST	The Manual Boost Setpoint. Specifies the temperature to heat to when the BOOST key is pressed.
RBST	The Remote Boost Setpoint. Specifies the temperature to heat to when it receives the Remote Boost digital input. If your system is not equipped with this option there will be nothing displayed in this column.
SEN	The thermocouple sensor assignment. Specifies which thermocouple is associated with which heater.
PCM	The Priority Control Mode setting. Specifies what to shut down in the event an abort condition occurs, either the whole system or just the zone the error occurred on.
AMC	The Automatic Manual Control setting. Specifies if you want it to automatically go into manual control mode in the event of a thermocouple failure.
OUT	The Power Output Control method. Specifies what method of control to use for this zone, Zero Cross or Phase Angle.

Table 7-13 More Page Item Descriptions

Item	Description
G/F	The Ground Fault setting. Specifies whether or not to check for ground fault errors on each zone.
TIP-TIME	The Tip Time setting. Specifies how long to keep the power applied to the tips if you are running a thermal valve gated hot runner system. If your system is not equipped with this option there will be nothing displayed in this column.

7.12.1 Changing the Manual Standby Setpoint

It may be necessary to lower the temperatures in the mold for a period of time. Delta² gives you the ability to do this by pressing one button and without you having to change the normal setpoint. You must specify the temperatures you want the heaters in the mold to heat to when the STANDBY button is pressed. The default setting is 121 °C (250 °F).

NOTE: Make sure the present security level is allowed to make this change.

To change a Manual Standby setpoint:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press WATTS, and then press MORE... to enter the More... page.
3. Using the ARROW keys move the cursor to the zone you want to adjust.
4. Using the ARROW keys move the cursor to the MSBY column.
5. To enter a new value use the NUMBER keys, and then press ENTER. If you want to change by only a few degrees you can use the - and + keys.
6. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

7.12.2 Changing the Remote Standby Setpoint

It may be necessary to lower the temperatures in the mold for a period of time. As an optional feature, Delta² gives you the ability to do this remotely. You must specify the temperatures you want the heaters in the mold to heat to when the Delta² receives the digital input signal. The default setting is 121 °C (250 °F).

NOTE: Make sure the present security level is allowed to make this change.

To change a Remote Standby setpoint:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press WATTS, and then press MORE... to enter the More... page.
3. Using the ARROW keys move the cursor to the zone you want to adjust.
4. Using the ARROW keys move the cursor to the RSBY column.
5. To enter a new value use the NUMBER keys, and then press ENTER. If you want to change by only a few degrees you can use the - and + keys.

6. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

NOTE: If your system is not equipped with this option there will be nothing displayed in this column.

7.12.3 Changing the Manual Boost Setpoint

It may be necessary to raise the temperatures in the mold for a period of time. Delta² gives you the ability to do this by pressing one button and without you having to change the normal setpoint. You must specify the temperatures you want the heaters in the mold to heat to when the BOOST button is pressed. The default setting is NO CHANGE, which is displayed as dashed lines.

NOTE: Make sure the present security level is allowed to make this change.

To change a Manual Boost setpoint:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press WATTS, and then press MORE... to enter the More... page.
3. Using the ARROW keys move the cursor to the zone you want to adjust.
4. Using the ARROW keys move the cursor to the MBST column.
5. To enter a new value use the NUMBER keys, and then press ENTER key. If you want to change by only a few degrees you can use the - and + keys.
6. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

7.12.4 Changing the Remote Boost Setpoint

It may be necessary to raise the temperatures in the mold for a period of time. As an optional feature, Delta² gives you the ability to do this remotely. You must specify the temperatures you want the heaters in the mold to heat to when the Delta² receives the digital input signal. The default setting is NO CHANGE, which is displayed as dashed lines.

NOTE: Make sure the present security level is allowed to make this change.

To change a Remote Boost setpoint:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press WATTS, and then press MORE... to enter the More... page.
3. Using the ARROW keys move the cursor to the zone you want to adjust.
4. Using the ARROW keys move the cursor to the RBST column.
5. To enter a new value use the NUMBER keys, and then press ENTER. If you want to change by only a few degrees you can use the - and + keys.
6. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

NOTE: If your system is not equipped with this option there will be nothing displayed in this column.

7.12.5 Changing the Sensor Assignment

The Sensor Assignment function allows the operator to assign any thermocouple to control any heater. This is important in the instance where there may be mis-wired thermocouples or heaters in the mold.

For example, heater number 1 is connected to thermocouple 5 and heater number 5 is connected to thermocouple number 1. In this instance you may manually switch the thermocouple inputs by changing the number in the SEN column to the appropriate number.

NOTE: Make sure the present security level is allowed to make this change.

NOTE: The Delta² will automatically account for mis-wired molds in the TEST diagnostics program ([Section 8.1](#)). This eliminates the need for you to make any adjustments.

To manually change the sensor assignment:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press WATTS, and then press MORE... to enter the More... page.
3. Using the ARROW keys move the cursor to the zone you want to adjust.
4. Using the ARROW keys move the cursor to the SEN column.
5. To enter a new value use the NUMBER, and then press ENTER. If you want to change by only a few values you can use the - and + keys.
6. To change another zone, move the cursor to that zone and repeat the process. (You are not able to use the COPY function for thermocouple assignments) The default setting is thermocouple 1 matched up to heater 1 and so on.

7.12.6 Changing the Priority Control Mode (PCM) Setting

If there is a malfunction during normal operation, the software will make every attempt to circumvent the problem. If this is impossible, it will initiate a shutdown sequence. You must specify what to shut down if this happens.

In the case of an Abort condition, if PCM is set to ZON, the control will turn OFF only the defective zone and continue to operate all other zones as normal. If PCM is set to SYS, the controller will shutdown all power output to the mold (if the failure occurs on this zone). The PCM is zone selectable, so one zone may only shut itself OFF and another may shut down the mold. What you set this to all depends on the zone and how critical it is to your mold. Usually the cavities are set to Zone and the manifolds are set to System. The default setting is SYS on all zones.

NOTE: Make sure the present security level is allowed to make this change.

To change the PCM setting:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press WATTS, and then press MORE... to enter the More... page.
3. Using the ARROW keys, move the cursor to the zone you want to adjust.
4. Using the ARROW keys, move the cursor to the PCM column. Use the - and + keys to toggle the setting between SYS and ZON.

5. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

7.12.6.1 The Optional Priority Control Mode (PCM) Digital Output

If the PCM digital output option is turned on, it will be activated ONLY when a zone set to SYS experiences an abort condition. It will remain in this state until the PCM error is reset. Refer to [Section 10.2.6](#) for the connector pin-out.

7.12.7 Changing the Automatic Manual Control (AMC) Setting

If a thermocouple malfunctions during normal operation, the software can automatically apply a manual power output percentage to the heater based on the information gathered before the thermocouple failed. This feature is called Automatic Manual Control (AMC).

If a thermocouple fails and AMC is turned ON, the control changes the failed zone into manual mode and sets a manual power output based on the previously recorded average power output to that heater. If AMC is turned OFF, the control skips to PCM (Priority Control Mode) and performs the designated task. The default setting is ON for all zones.

NOTE: Make sure the present security level is allowed to make this change.

To change the AMC setting:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press WATTS, and then press MORE... to enter the More... page.
3. Using the ARROW keys move the cursor to the zone you want to adjust.
4. Using the ARROW keys, move the cursor to the AMC column. Use the - and + keys to toggle the setting between ON and OFF.
5. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

7.12.8 Changing the Ground Fault (G/F) Setting

In some cases you may not want to check for ground fault errors on some zones. Delta² gives you the ability shut the ground fault check off on one or more zones in the system. The default setting is YES on all zones which means all zones are checking for ground faults.

NOTE: Make sure the present security level is allowed to make this change.

To change a G/F setting:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press WATTS, and then press MORE... to enter the More... page.
3. Using the ARROW keys move the cursor to the zone you want to adjust.
4. Using the ARROW keys move the cursor to the G/F column.
5. To enter a new value use the NUMBER keys, and then press ENTER. Use the - and + keys to toggle the setting between YES and NO.

6. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

For more information on the Delta²'s advanced ground fault system see [Section 9.2](#).

7.12.9 Changing the Power Output Control Method (OUT) Setting

In hot runner temperature control systems there are two schools of thought in regards to how the power output should be switched to the heaters. The choices are Zero Cross Control or Phase Angle Control. Each method has its own set of pros and cons, but in all practicality they offer very similar results. Only you can decide which method is right for your application.

Delta² gives you the flexibility to run each individual zone in either mode, Zero Cross Control or Phase Angle Control.

NOTE: Make sure the present security level is allowed to make this change.

NOTE: The default setting is Z/C (zero cross) for all zones.

To change the OUT setting:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press WATTS, and then press MORE... to enter the More... page.
3. Using the ARROW keys move the cursor to the zone you want to adjust.
4. Using the ARROW keys, move the cursor to the OUT column. Use the - and + keys to toggle the setting between Z/C (zero cross) and P/A (phase angle).
5. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

7.12.10 Changing the Tip-Time

As an option Delta² can assign a power on time to each zone during Remote Boost. This is a very special option and is only used on certain types of molds. The default setting is 00:00:00.0.

NOTE: Make sure the present security level is allowed to make this change.

To change the tip time:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press the WATTS, and then press MORE... to enter the More... page.
3. Using the ARROW keys move the cursor to the zone you want to adjust.
4. Using the ARROW keys move the cursor to the TIP-TIME column.
5. To enter a new value use the NUMBER keys, and then press ENTER. If you want to change by only a few values you can use the - and + keys.
6. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

NOTE: If your system is not equipped with this option there will be nothing displayed in this column.

7.13 ACTIVE REASONING Technology - The Definition

The science of applying microprocessor based control systems to automatic decision-making. A control method directed at an active or continuous learning process which is tolerant to faulty functions and incorrect operation by intentionally circumventing the incorrect operation or failure.

7.13.1 Background

Active Reasoning is a term we coined to describe what Delta² is doing during operation, which is, actively reasoning. In 1990, we set out to develop the first intelligent hot runner control system. In 1992 the first Active Reasoning Technology (ART) systems were shipped. Throughout the years, we have improved and fine tuned ART, and today it is still the premier heat control technology in the hot runner control industry.

7.13.2 What it does for you

Active Reasoning software combined with integrated hardware disseminates information and makes better process decisions than any modular single input, single output controller is capable of. The ability of all zones to interact with one another and understand the effects of that interaction is paramount. Totally automatic control is one advantage. During Delta² start up, the control looks at all zones individually, then looks at comparisons of all zones and determines any interaction between them. It tests for any ground faults individually and as a whole. It then creates the necessary bake out and soft start routines to successfully and evenly heat the mold.

7.13.3 Control Method

The use of Active Reasoning Technology for control eliminates the tasks of using self-tune or "automatic" tune PID, PIDD or PPID algorithms. ART performs all of these tasks without the need for manual intervention. ART is based on control algorithms which through the use of fuzzy logic, perform all functions as a normal PID control would. ART however is far better due to its ability to see the whole picture and automatically adapt to the individual characteristics of each heater.

7.14 ART/PID Page Overview

The ART/PID page is where you can select and adjust the control algorithm used in the Delta². Here you can view up to 24 heater zones on one page in the text format.

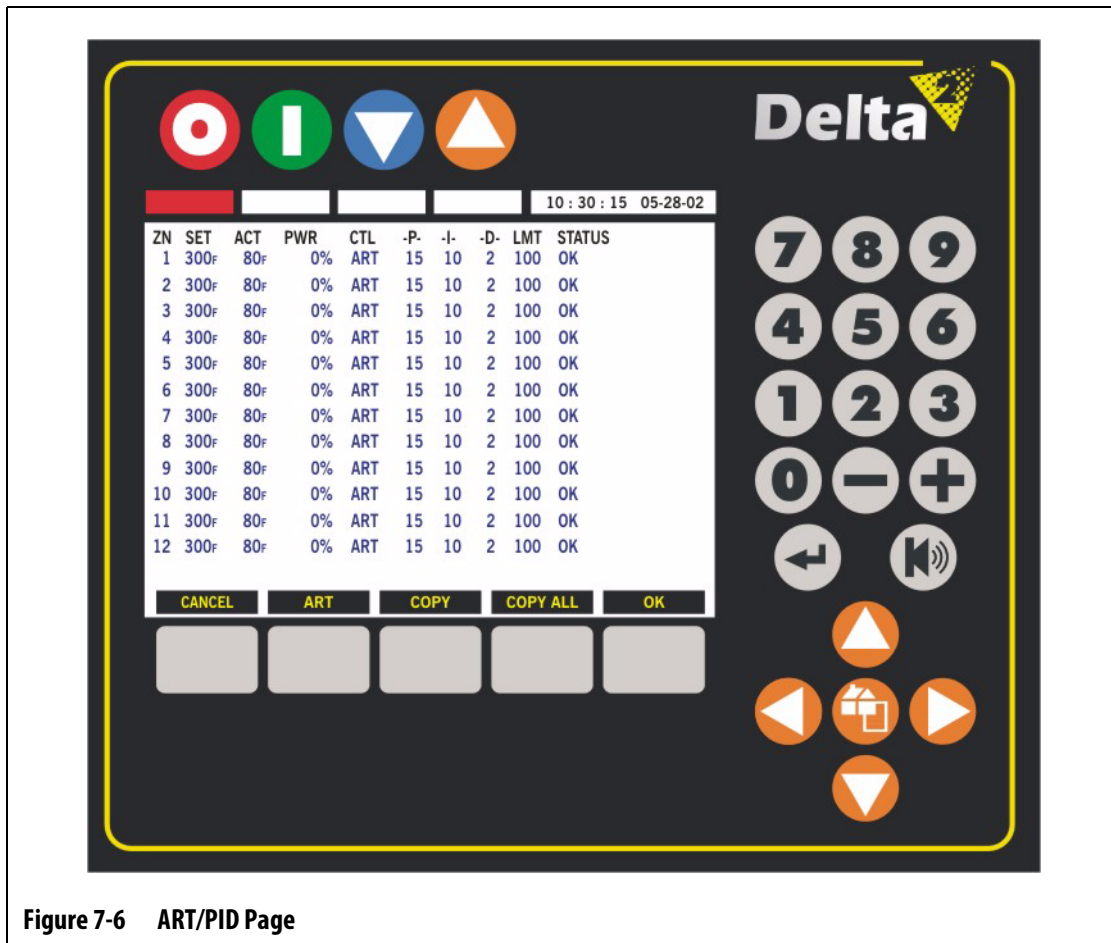


Figure 7-6 ART/PID Page

Table 7-14 ART/PID Page Function Key Descriptions

Function Key	Description
CANCEL	Press this key to Cancel the ART tuning program.
ART	Press this key to start the ART process on the selected zones.
COPY	Press this key to select a certain parameter on 1 zone and copy it to other zone(s).
COPY ALL	Press this key to select all parameters on 1 zone and copy it to other zone(s).
OK	Press this key to go back to the More... page.

Table 7-15 ART/PID Page Item Descriptions

Item	Description
ZN	The zone number. You can view up to 24 on one page. If there are more than 24 zones use the HOME / PAGE key to toggle to the rest of the zones.
SET	The heater setpoint. Here you can change the setpoint while tuning the algorithms.
ACT	The actual temperature being read from the thermocouple by the Delta ²
PWR	The actual power output going out to the heater at any time.
CTL	The method of control currently assigned to the zone. ART or PID.
-P-	The Proportional setting. Refer to Section 7.14.4 for more information.
-I-	The Integral setting. Refer to Section 7.14.4 for more information.
-D-	The Derivative setting. Refer to Section 7.14.4 for more information.
LMT	The maximum power limit (0%-100%) assigned to the zone. If your system is not equipped with this option there will be nothing displayed in this column.
STATUS	The zone status. In the event of an error condition, the error will be displayed here.

7.14.1 Running ART on a Zone

When the Delta² runs a mold setup for the first time it automatically performs the ART process on all zones. If you find that a particular zone is not controlling properly when it has reached its setpoint, you can manually run ART on that zone. The system must be running and ART must be your selection in the CTL column to do this.

NOTE: Make sure the present security level is allowed to make this change.

To run the ART program:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press WATTS, and then press MORE... to enter the MORE... page.
3. Press ART/PID to enter the ART/PID page.
4. Using the ARROW keys move the cursor to the zone you want to ART.
5. Press ART and the ART process will begin on that particular zone.

While the zone is running ART, ART will be displayed in both the ACT and PWR columns. When the zone is finished running ART, the ACT and PWR columns will return to showing actual temperature and power output values. You can ART multiple zones at the same time by moving the cursor to the other zone(s) and pressing the ART key. As the zones complete the ART process the ACT and PWR columns will return to showing actual temperature and power output values.

7.14.2 When To Use The Manual ART Function

Due to a change to a particular zone, such as the replacement of a heating element or thermocouple, you may need to reset the ART parameters for that zone. Poor control of the zone may also lead you to make this decision. For example, the temperatures may be consistently swinging over and under setpoint, yet not triggering an alarm. This is not to be confused with shear heat from the material, which appears as sudden increases in temperature with no undershoot.

When you manually run ART on a zone, Delta² deletes its knowledge base on that zone and "re-thinks" the control process. It then stores this data and uses it to calculate the proper output to control this zone best at setpoint. Use this function sparingly and only permit highly qualified individuals to use it. The molding process may be interrupted if you ART several zones at one time, but this is rare. It is best to run ART on a zone once it is at setpoint.

7.14.3 Changing the Control from ART to PID

Delta² can automatically adjust the control algorithm to suit different heater requirements. This control method is referred to as ART. In some cases, it may be necessary to switch from the automatically adjusted ART algorithm to an algorithm you can manually adjust. This control method is referred to as PID. When switching a zone from ART control to PID control you will be able to manually enter values for the Proportional, Integral and Derivative parameters. The default setting is ART on all zones.

NOTE: Make sure the present security level is allowed to make this change.

To change the control:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press WATTS, and then press MORE... to enter the More... page.
3. Press ART/PID to enter the ART/PID page.
4. Using the ARROW keys move the cursor to the zone you want to adjust.
5. Using the ARROW keys move the cursor to the CTL column. Use the + / - keys to toggle the setting between ART and PID.
6. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

7.14.4 Changing PID Values

If you have tried to run ART on a zone and it just will not control the way you think it should, you can switch the zone over to PID (in the CTL column) and adjust the individual PID parameters to achieve the control you desire.

NOTE: Make sure the present security level is allowed to make this change.



IMPORTANT!

If for some reason you happen to make matters worse, you can switch the zone back to ART and you've lost nothing. The default setting for the PID is P-15, I-10 and D-2 on all zones.

To change the PID settings:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press the WATTS, and then press MORE... to enter the More... page.
3. Press the ART/PID key to enter the ART/PID page.
4. Using the ARROW keys move the cursor to the zone you want to adjust.
5. Using the ARROW keys move the cursor to the -P-, -I-, or -D- column.
6. To enter a new value use the NUMBER keys, and then press ENTER. If you want to change by only a few values you can use the - and + keys.
7. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

7.14.5 Changing the Power Limit (LMT) Values

The Power Limit setting allows you to set the maximum amount of power that can be delivered to the heaters. This feature is an option. This only applies to zones set to run in Automatic control mode. The default setting for the LMT is 100 on all zones.

NOTE: Make sure the present security level is allowed to make this change.

NOTE: If your system is not equipped with this option there will be nothing displayed in this column.

To change the LMT settings:

1. From the Graphs page, press TEXT to enter the Text page.
2. Press WATTS, and then press MORE... to enter the More... page.
3. Press the ART/PID key to enter the ART/PID page.
4. Using the ARROW keys move the cursor to the zone you want to adjust.
5. Using the ARROW keys move the cursor to the LMT column.
6. To enter a new value use the NUMBER keys, and then press ENTER. If you want to change by only a few values you can use the - and + keys.
7. To change another zone, move the cursor to that zone and repeat the process or use the COPY function.

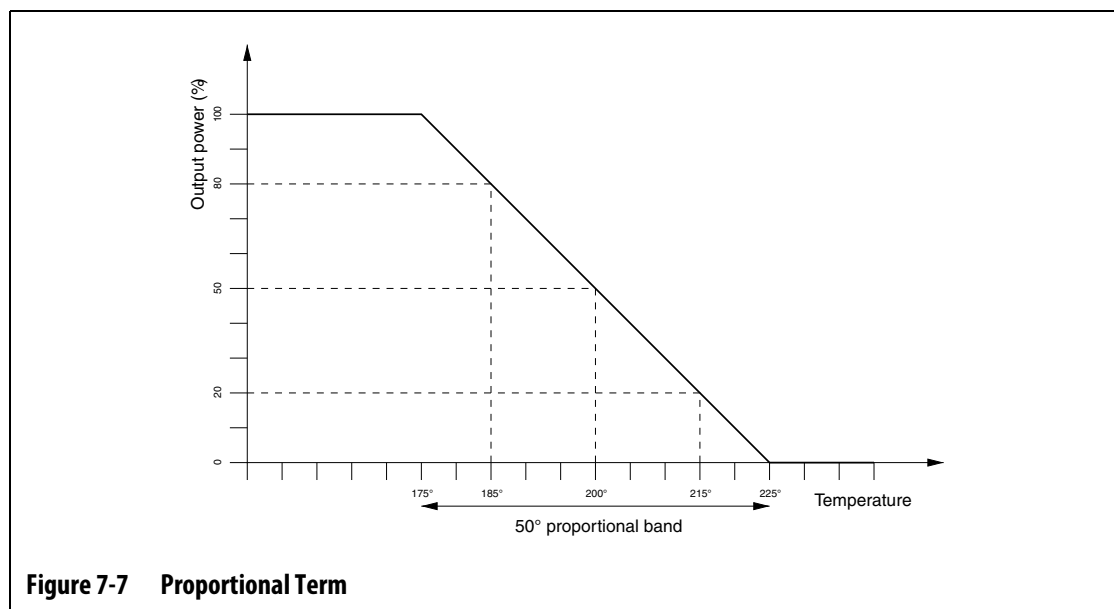
7.15 PID Control

Delta² gives you the choice of using ART (automatic tuning), or PID (manual tuning). If you want to use PID on a zone or zones, the following provides a simple explanation of each parameter (P, I, and D).

7.15.1 Proportional (P) Term

The primary objective of the Proportional term of the control algorithm is to balance the amount of energy input against that which is being lost in the process and the outside world. This is achieved by adjusting the output power to equal that required by the process. If the process temperature rises, the power output will fall and, consequently, if the process temperature falls, the power output will rise. Delta² operates in this manner, known as a reverse acting controller.

The proportional band is generally placed symmetrically about the setpoint, that is, at 50% output power (see Figure 7-7). Consequently, if the process temperature requires anything other than 50% power to remain stable, the process temperature will not equal the setpoint.



NOTE: The Proportional term is NOT attempting to maintain the actual temperature on the setpoint, only to achieve a stable process.

The proportional term is defined as a percentage power change per degree Celsius, which is the inverse of the proportional band and is termed gain. Each P digit represents 0.25% of power change per degree.

For example, if a P value of 10 is selected, for every degree of movement of the process temperature away from the setpoint, 2.5% (10 x 0.25) power will be added or subtracted from the existing power output value.

Therefore, the larger the number, the more power is gained or lost for a given temperature change.

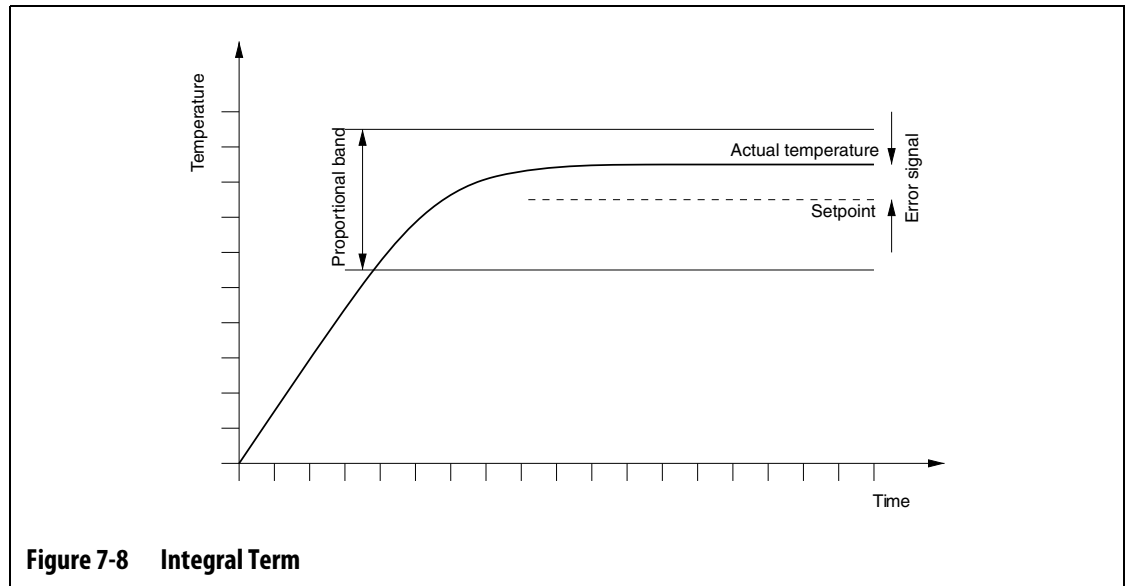
If the gain is too high, small temperature changes cause large power output changes, which then cause larger temperature changes and so on, ultimately resulting in the process temperature becoming unstable and oscillating. If the gain is too low, small changes in temperature produce insufficient power output to modify them and the temperature arbitrarily meanders.

7.15.2 Integral (I) Term

The primary objective of the integral term is to maintain the actual temperature on the setpoint. This is achieved by moving the position of the proportional band relative to the setpoint, so that the correct amount of power output is delivered to maintain a stable process at the setpoint.

In order to move the proportional band, Delta² calculates the difference between the actual temperature and the setpoint. This value (error signal) is then used to reposition the proportional band relative to the setpoint.

The proportional band is not moved instantaneously but is moved gradually (integrated) over a given time period. It is important that this time is long enough to ensure that the process can follow the effects of this power output change.



The integral term is specified as repeats per minute with each digit representing 0.25 repeats per minute.

For example, assuming a fixed error signal and selecting an I value of 10 which is equivalent to 2.5 (10 x 0.25) repeats per minute, the output power will be modified by a value equivalent to the error signal 2.5 times per minute and repeated every minute thereafter, or once every 24 seconds. Therefore, the larger the I value, the more repeats per minute and consequently the faster the reaction of the system to changes in actual temperature.

If the I value is too high, the output power will be modified more quickly than the process can follow. Therefore, when the process temperature arrives at the setpoint, the proportional band will be incorrectly positioned. This causes a further temperature error in the opposite direction and the output power will be modified, ultimately resulting in the process temperature oscillating and becoming unstable.

If the I value is too low, the process temperature may be stable at the setpoint, as it will be too slow to follow the normal process variations.

7.15.3 Derivative (D) Term

The function of the derivative term is to arrest any rapid changes in the process temperature and it is designed to minimize overshoot and undershoot. This is achieved by changing the output power to oppose the direction of temperature change.

The derivative term is only active during process temperature changes and has a greater effect the higher the rate of change of temperature.

The derivative term is specified as the percentage of power change per °C per second. Each D digit is equivalent to 0.25% power per °C per second.

For example, assuming a fixed changing temperature of 1°C per second and a D value of 100, an instantaneous output power change of 25% (100 x 0.25% per °C per second) would occur. Therefore, the higher the D value the greater the output power change to a given rate of change of temperature.

If the D value is set too high, any small fluctuations in temperature produce large changes in output power which produce larger changes in temperature, and so on.

If the D value is too low, unacceptable overshoot or undershoot may occur.

7.15.4 Typical PID Values

The following is a list of some typical PID values.

Table 7-16

P	I	D	Type	Example
015	010	002	Fast	Probes or heaters with internally located thermocouples
050	020	000	Fast	
020	010	000	Fast	
015	015	000	Fast	
020	007	100	Medium	Probes or heaters with internally located thermocouples (larger mass)
020	005	200	Medium	
100	003	000	Slow	Manifolds or heaters with externally located thermocouples
075	003	150	Slow	

7.15.5 Possible Causes of Oscillation

It is possible to set the control terms incorrectly, inducing an oscillation. The following are the most common causes:

Table 7-17 Possible Causes of Oscillation

Cause	Description
"P" too large	Power change too great per °C of temperature change.
"I" too large	Power changing too quickly for the process to follow it.
"D" too large	Stepped power change too large for the rate of change of temperature.
Shear	An important issue often overlooked is the effect of shear in the material as it passes through the gating area. This can cause rises in temperature in excess of 33 °C (60 °F) under severe conditions. Therefore, if large temperature variations occur during molding, it is worth plotting this variation against the molding cycle time. As the controller cannot initiate additional cooling, it is only possible to minimize this effect with properly selected PID terms.

7.16 System Page Overview

The SYSTEM page is where parameters like time and date, printer settings, options and timers can be adjusted.



Figure 7-9 System Overview Page

Table 7-18 System Overview Page Function Key Descriptions

Function Key	Description
PRINT	Press this key to print the selected mode now.
SYSTEM	Press this key to print the system information now. After pressing this key, all parameters located in the System page will be printed.
CANCEL	Press this key to cancel a print job.
OK	Press this key to go back to the Graphs page.

Table 7-19

Item	Description
RELEASE AR X.X	The software release number. When calling Husky you may be asked for this number.
UNIT	The temperature units, F (Fahrenheit) or C (Celsius).

Table 7-19

Item	Description
TIME	The time of day.
DATE	The date.
STANDBY TIMERS	
MAN	The manual standby time.
REM	The remote standby time. This selection will not appear if your system is not equipped with this option.
DLY	The remote standby delay time. This selection will not appear if your system is not equipped with this option.
MODE	The remote standby mode. This selection will not appear if your system is not equipped with this option.
BOOST TIMERS	
MAN	The manual boost time.
REM	The remote boost time. This selection will not appear if your system is not equipped with this option.
DLY	The remote boost delay time. This selection will not appear if your system is not equipped with this option.
MODE	The remote boost mode. This selection will not appear if your system is not equipped with this option.
CODE	There are some factory pages that are used for setup and troubleshooting. To aid in troubleshooting, Husky may ask you to enter a code here to gather information.
PRINTER	
FREQ	The print frequency setting, how often you want the system to print. The default is --:-- which means no frequency. Minimum setting is 5 minutes.
MODE	The print mode. Available settings are TEMPS, ALL, or SEQ (sequential). The default is TEMPS. Refer to Table 7-24 .
ON	The setting to turn the printing function ON or OFF. Available settings are YES and NO. The default is NO.
PORT	The printer port setting. Changing this will allow you to use the Serial or Parallel ports on the back of the Delta ² . Available settings are COM (serial) and LPT (parallel). The default is COM.
BAUD	The baud rate setting. Available settings are 2400, 4800, 9600, 19.2k. The default is 9600. This setting disappears in LPT mode.
PRTY	The parity setting. Available settings are NONE, EVEN and ODD. The default is NONE. This setting disappears in LPT mode.
DATA	The data bits setting. Available settings are 7 and 8. The default is 8. This setting disappears in LPT mode.

Table 7-19

Item	Description
STAT	The current print status. It will show IDLE when there is nothing to print and WAIT when there is a print job spooling.
SPI	
NOTE: This column will not appear unless you have purchased the SPI option on the system.	
BAUD	The SPI baud rate setting. Available settings are 1200, 2400, 4800, 9600, and 19.2k. The default is 9600.
ADDR	The SPI address. Available settings are 032 to 254. The default is 032.
ON	The setting to turn SPI ON or OFF. Available settings are YES and NO. The default is NO.
ID	The SPI device ID. The default is 26. You cannot change this number.
SNXXXXXX	The system serial number. When calling Husky you may be asked for this number.

7.16.1 Setting the Temperature Units (Fahrenheit or Celsius)

Delta² allows you to display temperature in either Fahrenheit or Celsius for all zones.

NOTE: Make sure the present security level is allowed to make this change.

NOTE: If your system is forced to a specified setting, °F or °C you will not be able to change this value.

To change the units:

1. From the Graphs page, press SYSTEM to enter the System page.
2. Using the ARROW keys move the cursor to the UNIT row.
3. Hold down the - or + key for 5 seconds to toggle between °F and °C.

7.16.2 Setting the System Time and Date

Delta² displays the present time and date on all pages.

NOTE: Make sure the present security level is allowed to make this change.

To change the time and date:

1. From the Graphs page, press SYSTEM to enter the System page.
2. Using the ARROW keys move the cursor to the parameter you want to adjust.
3. Use the NUMBER keys to enter the new values.

7.16.3 Setting the Standby Timers

To reduce the temperatures in the mold for a certain period of time, you can set the Standby timers associated with each standby function. Once the system enters standby, the timer will start. When the timer finishes, the temperatures will return to the normal setpoint.

NOTE: Make sure the present security level is allowed to make this change.

NOTE: If the system is not equipped with Remote Standby, only the MAN row will appear.

To change the standby timers:

1. From the Graphs page, press SYSTEM to enter the System page.
2. Using the ARROW keys move the cursor to the parameter you want to adjust.
3. Use the NUMBER keys to enter the new values. Once the system enters standby the timer will start. When it times out the temperatures will return to the normal setpoint. The MODE row determines how the system reacts when it receives the Remote Standby input.

For more information refer to [Section 7.12](#).

7.16.3.1 Standby Operation Description

Table 7-20 Manual Standby Operational Description

Manual Time	Delay Time	Remote Time	Input Mode	Cycle Enabled	Operation - STANDBY Key Select
0:00:00	----	----	----	----	System enters Standby indefinitely.
X:XX:XX	----	----	----	----	System remains in Standby until the timer expires.

Manual Standby can be cancelled at any time by touching STANDBY or STOP keys.

Table 7-21 Remote Standby Operational Description

Manual Time	Delay Time	Remote Time	Input Mode	Cycle Enabled	Operation - STANDBY Key Select
----	0:00:00	0:00:00	Trigger	----	System will not enter Standby since no timers are set.
----	0:00:00	X:XX:XX	Trigger	----	System immediately enters and remains in Standby until the timer expires.
----	X:XX:XX	X:XX:XX	Trigger	No	System delays for specified time and then enters Standby until the timer expires.
----	X:XX:XX	0:00:00	Trigger	No	System delays for specified time and then enters Standby indefinitely.
----	X:XX:XX	X:XX:XX	Trigger	Yes	System delays for specified time and then enters Standby until the timer expires. If the input signal changes state while delay timer is active, the delay timer is reset to the specified value.
----	X:XX:XX	0:00:00	Trigger	Yes	System delays for specified time and then enters Standby indefinitely. If the input signal changes state while the delay timer is active, the delay timer is reset to the specified value.
----	0:00:00	0:00:00	ON/OFF	----	System enters Standby until the input signal is not active.
----	0:00:00	X:XX:XX	ON/OFF	----	System enters Standby until the input signal is not active or the timer expires.
----	X:XX:XX	X:XX:XX	ON/OFF	----	System delays for specified time and then enters Standby until the signal is not active or the timer expires
----	X:XX:XX	0:00:00	ON/OFF	----	System delays for specified time and then enters Standby until the input signal is not active.

Remote Standby can be cancelled at any time by touching the STANDBY or STOP keys.

7.16.4 Setting the Boost Timers

To increase the temperatures in the mold for a certain period of time, you can set the Boost timers associated with each boost function. Once the system enters boost, the timer will start. When the timer finishes, the temperatures will return to the normal setpoint.

NOTE: Make sure the present security level is allowed to make this change.

NOTE: If the system is not equipped with Remote Boost, only the MAN row will appear.

To change the boost timers:

1. From the Graphs page, press SYSTEM to enter the System page.
2. Using the ARROW keys move the cursor to the parameter you want to adjust.
3. Use the NUMBER keys to enter the new values. Once the system enters boost the timer will start. When it times out the temperatures will return to the normal setpoint. The MODE row determines how the system reacts when it receives the Remote Boost input.

For more information refer to [Section 7.12](#).

7.16.4.1 Boost Operation Description

Table 7-22 Manual Boost Operational Description

Manual Time	Delay Time	Remote Time	Input Mode	Cycle Enabled	Operation - BOOST Key Select
0:00:00	----	----	----	----	System enters Boost indefinitely.
X:XX:XX	----	----	----	----	System remains in Boost until the timer expires.

Manual Boost can be cancelled at any time by touching BOOST or STOP keys.

Table 7-23 Remote Boost Operational Description

Manual Time	Delay Time	Remote Time	Input Mode	Operation - Boost Key Select
----	0:00:00	0:00:00	Trigger	System will not enter Boost since no timers are set.
----	0:00:00	X:XX:XX	Trigger	System immediately enters and remains in Boost until the timer expires.
----	X:XX:XX	X:XX:XX	Trigger	System delays for specified time and then enters Boost until the timer expires.
----	X:XX:XX	0:00:00	Trigger	System delays for specified time and then enters Boost indefinitely.
----	0:00:00	0:00:00	ON/OFF	System enters Boost until the input signal is not active.
----	0:00:00	X:XX:XX	ON/OFF	System enters Boost until the input signal is not active or the timer expires.
----	X:XX:XX	X:XX:XX	ON/OFF	System delays for specified time and then enters Boost until the input signal is not active or the timer expires.
----	X:XX:XX	0:00:00	ON/OFF	System delays for specified time and then enters Boost until the signal is not active.

Remote Boost can be cancelled at any time by touching BOOST or STOP keys.

NOTE: If a TIP Timer is set for a zone, the TIP time is used instead of the system Boost time. The other zones use the system Boost time. Remote Boost mode will not end until all TIP timers and Boost timer have expired.

7.16.5 Printing

Delta² is equipped with a Serial printer port (male 9D-Pin, RS-232) and a Parallel printer port (female 25D-pin, LPT) installed as standard equipment. The system supports either a serial or parallel printer.

7.16.5.1 Using a Serial Printer

Before printing:

1. Verify that the printer cable is connected to the male 9D pin serial connector on the back of the Delta² display and the printer is on-line.
2. Confirm PORT is set to COM.
3. Confirm Baud, Parity and Data settings match those required by your printer.
4. Confirm ON is set to YES.
5. Select the print mode, and then press PRINT.

NOTE: Make sure the present security level is allowed to make this change.

To change the print parameters:

1. From the Graphs page, press SYSTEM to enter the System page.
2. Using the ARROW keys move the cursor to the parameter you want to adjust.
3. Use the NUMBER keys to enter the new values or the +/- keys to toggle between values.

To print based on a frequency; for example, every 10 minutes, change the FREQ row to 10.

To print the system information, press SYSTEM.

7.16.5.2 Using a Parallel Printer

Before printing:

1. Verify that the printer cable is connected to the 25D pin parallel connector on the back of the Delta² display and the printer is on-line.
2. Confirm PORT is set to LPT.
3. Confirm ON is set to YES.
4. Select the print mode, and then press PRINT.

NOTE: Make sure the present security level is allowed to make this change.

To change the print parameters:

1. From the Graphs page, press SYSTEM to enter the System page.
2. Using the ARROW keys move the cursor to the parameter you want to adjust.
3. Use the NUMBER keys to enter the new values or the +/- keys to toggle between values.

To print based on a frequency; for example, every 10 minutes, change the FREQ row to 10.

To print the system information, just press the SYSTEM key.

7.16.5.3 Print Modes

Below is a description of the various printing capabilities of Delta². These can be selected in the MODE row. A print header listing the Mold Name, Time and Date will be automatically added each time a job is sent to the printer (except in SEQ. Mode). These apply to both the Serial and Parallel printer ports.

Table 7-24 Print Mode Descriptions

Row	Description
TEMPS	Selecting TEMPS will print the temperature data for all zones. This includes the Zone Number, Setpoint, and Actual Temperature for all zones in the system.
ALL	Selecting ALL will print all the data for all zones. This includes the Zone Number, Setpoint, Actual Temperature, Power Output, Amps, Alarm and Abort Limits, Regulation, Slave, Standby and Boost settings, Sensor assignment, PCM, AMC, Ground Fault, Control method and the PID values for all zones in the system.
SEQ	Selecting Sequential, will print the same information as TEMPS but in a header/column format.

7.17 SPI PROTOCOL Option

The Delta² supports the Society of Plastics Industry communications protocol, available as an option. If your system is not equipped with this option, no SPI settings will appear.

To change the SPI parameters:

1. From the Graphs page, press SYSTEM to enter the System page.
2. Using the ARROW keys move the cursor to the parameter you want to adjust.
3. Use the NUMBER keys to enter the new values or the +/- keys to toggle between values.

Refer to [Chapter 11–SPI Protocol Option](#) for further information.

Chapter 8 Mold Diagnostics

Throughout the history of hot runner molding, diagnosing problems in the mold has been a tedious, painstaking job. If done incorrectly or completely ignored, poor diagnostics result in a high probability of failure when the mold is placed into the machine.

8.1 Automated Mold Diagnostics (TEST)

Before beginning the automated mold diagnostics test please follow the steps below:

1. Before connecting any power to the controller or the mold, CLEAN UP. Remove any debris or fluids from the surrounding area.

CAUTION!

Risk of damage to the equipment — Do not rely on the possibility of a ground in the mold cables. Using a piece of grounding wire and attach it to the mold ground connector on the Altanium mainframe.

2. For your safety, make sure the controller and mold share the same ground.
3. Check all mold wiring one more time to make sure there are no bare wires, frayed ends or cut insulation.
4. If you have thermocouple and power cables, connect them from the controller to the mold, checking them for a clean fit.
5. Connect the Altanium mainframe to the main input power and turn it ON via the main disconnect.
6. Load a mold setup before entering the TEST (diagnostics) program.
7. Verify the zones you want to test are turned ON. Any zones turned OFF will not be tested.
8. From the Graphs page press TEST to enter the Diagnostics (Test) page.



IMPORTANT!

The START key is a dual function key, in the Test page it starts the test, and in any other page it starts the system, heating up the entire mold.

9. Once in the Test page, press START and the diagnostics test will begin.

8.2 Test Page Overview

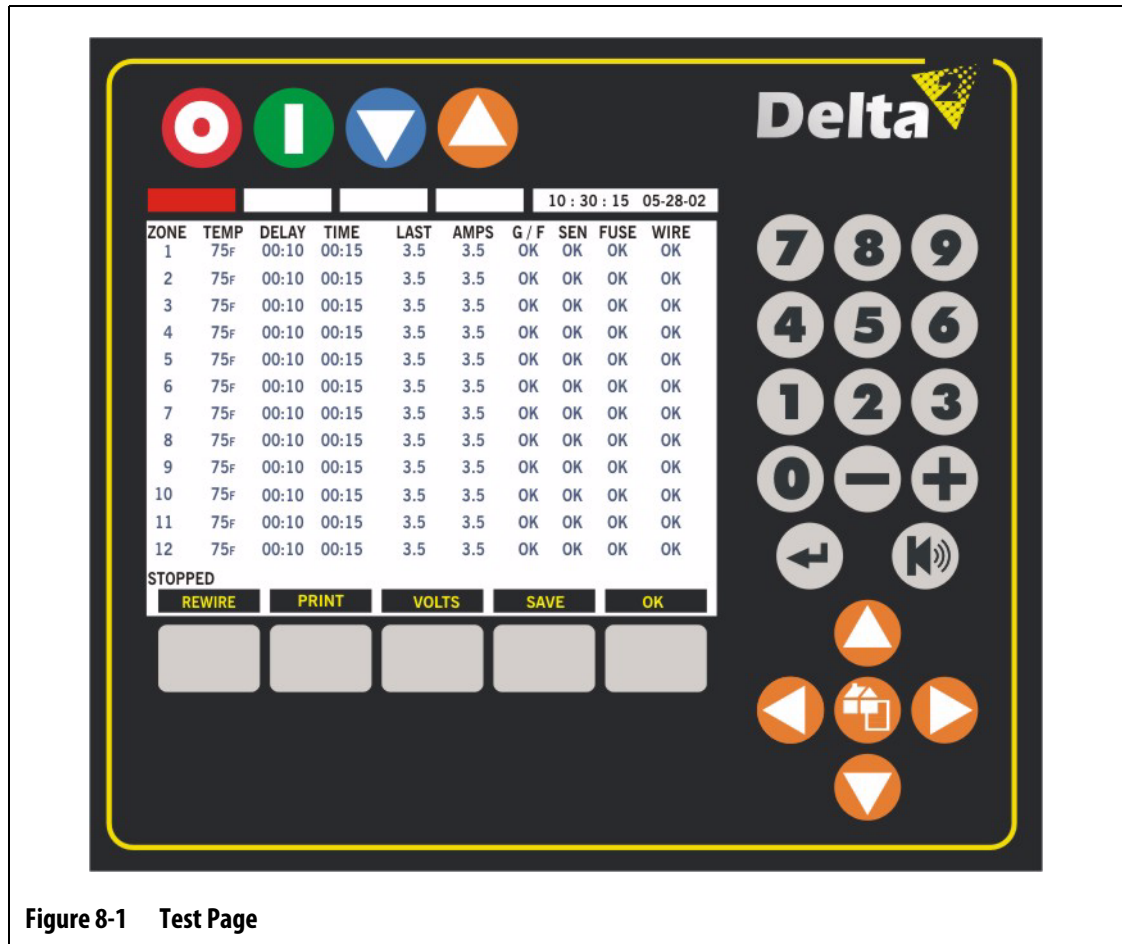


Figure 8-1 Test Page

Table 8-1 Test Page Function Key Descriptions

Function Key	Description
REWIRE	During TEST, if the Delta ² finds any thermocouples wired incorrectly, hold down this key for 10 seconds to rewire the thermocouples to the correct location.
PRINT	Press this key to print the diagnostics information now.
VOLTS	Press this key to select the information displayed in the AMPS column. Each time you press this key, the information displayed will toggle from AMPS to VOLTS to WATTS to OHMS to 220V WATTS. The VOLTS key will automatically change to show the next selection.
SAVE	Press this key to save the AMPS, VOLTS, WATTS, OHMS and 220V WATTS readings on all zones into the LAST column for future reference.
OK	Press this key to exit out of TEST and go back to the Graphs page.

Table 8-2 Test Page Item Descriptions

Item	Description
ZONE	The zone number. You can view up to 24 zones on one page. If there are more than 24 zones use the HOME / PAGE key to view the rest of the zones.
TEMP	The actual zone temperature being read from the thermocouple in the mold by the Delta ² .
DELAY	Used to set a delay time between zones to allow for cooling. The default is 10 seconds.
TIME	The zones elapsed test time.
LAST	The AMPS, VOLTS, WATTS, OHMS and 220V WATTS readings that were saved the last time you ran diagnostics and hit the SAVE button.
AMPS	The actual AMPS, VOLTS, WATTS, OHMS and ADJ WATTS readings of each tested zone. The column header will change based on the information being displayed (see VOLTS function key description).
G/F	The ground fault status for each zone.
SEN	The thermocouple sensor test results for each zone.
FUSE	The fuse test results for both fuses on each zone.
WIRE	The thermocouple wiring test results.
STOPPED	The current status of the TEST program.

8.2.1 Setting the Delay Time

Delta² can wait for a certain period of time before moving on to test the next zone. This is necessary in some molds because sometimes a heater will continue to heat up long after power has been removed. This is very common with large manifolds. If the Delta² started testing the next zone before the previous zones temperature stopped increasing this could affect the test results. The default setting is 10 seconds. Each mold can have its own set of delay times.

8.2.2 Saving Test Data for Future Reference

You can save the test results of a mold to compare them to another test at a later date. To do this you can print the test results by pressing PRINT or save them to the internal memory of the Delta².

NOTE: Each mold setup can store its own set of saved Test data.

To save the Amps, Volts, Watts, Ohms and Adj. Watt data to the internal memory:

- Press SAVE following the completion of the Test. You will notice the values for all zones will be transferred to the LAST column.

After saving the test results, the Ohms value will be displayed on the Watts page for reference.

8.2.3 Automatic Thermocouple Rewiring

Often thermocouples can be inadvertently cross-wired in the mold, where the thermocouple for one heater ends up connected with another heater, and vice versa.

The Delta² TEST checks the thermocouple/heater wiring and determines if it is correct or not. When the Test is complete it will provide you with a possible re-wiring solution and ask for confirmation. You may choose to ignore or accept its findings. If the TEST program finds a mis-wired zone, it will ask you if you want the controller to re-wire the thermocouples to where it thinks they belong. If the Test determines that a thermocouple is wired to the wrong heater, the Delta² will display the information under the WIRE column.

For example, if the thermocouple for heater number 5 was wired to heater number 1 and vice versa, the Delta² would display a 5 on zone 1 and a 1 on zone 5 under the WIRE column.

If you do not have time to physically re-wire the mold:

- Press and hold REWIRE for 5-10 seconds and the Delta² will automatically reassign the thermocouples to the correct location.
- If you want to do nothing press OK to exit this page. This information is saved for each mold setup.

8.2.4 Viewing AMPS, VOLTS, WATTS and OHMS Data

During the Diagnostics Test, the Delta² measures the amperage for each heater and displays the value under the AMPS column. It also measures Volts, calculates Watts and Ohms for each heater in the mold.

To view the Volts, Watts or Ohms data:

1. Press VOLTS and the AMPS column will change from displaying Amps to displaying Volts. When the Volts data is displayed the VOLTS key changed to WATTS.
2. Press WATTS and the VOLT column will change from displaying Volts to displaying Watts. When the Watts data is displayed the WATTS key changed to OHMS.
3. Press OHMS and the WATT column will change from displaying Watts to displaying Ohms.

Not all factories are equipped with the same supply voltage (240VAC) but most heater wattage specs are based on 240 volts. If you want to know what the wattage of the heater would be based on 240VAC. The data displayed in the WATTS column is an accurate representation of the actual wattage of the heater based on its supply voltage.

To see what the wattage would be at 240 volts:

- Press ADJ WATT and the OHMS column will change from displaying Ohms to displaying 240 Volt Watts.

8.2.5 Printing TEST Results

Delta² is equipped with a serial printer port (male 9D-Pin, RS-232) and a parallel printer port (female 25D-pin, LPT) installed as standard equipment.

To print a hard copy of the test data:

1. Connect either a serial or parallel printer to the appropriate port.
2. Press PRINT.

Chapter 9 Heating the Mold

This chapter describes how to start the Delta² system and check for any errors, and alarm conditions if any errors occur.



IMPORTANT!

Please read this entire manual before attempting the startup of the system. Call your nearest Husky Regional Service and Sales office if you have any questions.

9.1 Starting the Delta²

With all Altanium/Delta² to mold connections made and the mold cooling turned on, start the Delta² by pressing START in the upper left-hand area of the display. Following this the Delta² will enter into its startup routine to heat the mold to its setpoint.

9.2 Ground Fault / Wet Heater Bake Out System

Delta² is equipped with an advanced Ground Fault / Wet Heater Bake Out system. From the moment the system is started Delta² constantly checks for ground fault conditions on every heater in the mold simultaneously. When necessary, it will initiate a low voltage bake out on the faulty zone(s) to try and bake the moisture out of the heater(s).

There are two types of ground faults, which are described below.

1. If a zone measures 3.0 amps or higher, this is considered a severe ground fault situation. In this scenario, because the current is so high, it would be pointless for the system to enter into an automatic Bake Out procedure and therefore requires the intervention of operational personnel.

If any severe ground faults are detected, Delta² will switch the power off to all zones in the system, initiate the audible and visual alarms and display GROUND FAULT in the STATUS column of the faulty zone(s) in the Zone Status screen. The system will not allow you to start heating the mold. The system will continue to alarm until the error is corrected.

NOTE: Make a note of the zone(s) that are displaying GROUND FAULT and turn the system's main breaker off as soon as possible so you can fix the problem.

2. If a zone measures 0.5 amps to 2.9 amps, this is considered a less severe ground fault. Once START is touched, the system begins an automatic Bake Out procedure. Delta²

applies a low voltage to the faulty heater(s) for five minutes in an attempt to bake out any moisture that has accumulated in the heater(s).

In the event of a less severe ground fault situation the Delta² will display the following:

- After pressing START the Bake Out process will begin on the faulty zone(s). The Red area under the STOP key and the Green area under the START key will begin to blink.
- A 5:00 minute timer will appear in the Red area under the STOP key. When this timer times out, the system will begin the Soft Start process which brings all zones up to setpoint at the same rate.

The Delta² allows you to turn the Ground Fault check ON or OFF for the entire system. The default setting is ON for all zones. Turning Ground Fault off is only necessary under special circumstances. If you want to turn the Ground Fault check off please call your nearest Husky Regional Service and Sales office.

9.3 Soft Start Routine

For many years hot runner molders started their molds by turning on the manifold zones (larger mass, longer time required to heat up) first. Once the manifolds were hot, they would turn on the probes (small mass, fast time to heat up) and wait for them to reach setpoint. The manifold has the potential to grow and shift first and in some cases can misalign itself to the probes. Also, the material in the manifold channel now has a varied residence heat time to the material internal to the probes. In each case you are adding to the possibility of a mold leak or gate misalignment.

With the Delta² all zones warm up simultaneously, rising in temperature at the same rate to ensure even thermal expansion and identical residence time on the material.

During the Soft Start routine the Delta² will display the following:

1. After pressing START, Delta² begins the Bake Out process if necessary.
2. Following this, the ART process begins if it has not already been run.
3. Then the Green area under the START key will begin to blink. The power applied to the heaters varies from the probes to the manifold zones, the probes receiving less power and the manifolds receiving more. All of the zones increase in temperature at the same rate to ensure a smooth even thermal transfer within the mold. This helps to eliminate mold leakage.
4. Once all temperatures are close to their setpoint the green area under the START key will remain solid and no longer flash.

Chapter 10 System Options

The Altanium/Delta² has a host of optional features available for an additional cost to assist you in your molding process. Some are hardware, some are software and some are both hardware and software.

10.1 Auxiliary Output

The system comes standard equipped with one auxiliary output. The connector is located on the rear of the operator interface and labeled AUX OUTPUT. The mating cable is not included with the system, however, it is a standard Conxall 4-pin connector that can be found at most electronics retailers (part number 6-282-4SG-522). The cable can be purchased from Husky for a minimal charge. Any output can be assigned to the AUX OUTPUT position. The default selection is Comm Error. To assign a different output to the AUX OUTPUT connector refer to [Section 10.2.5](#).

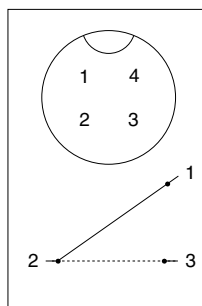


Figure 10-1 Connection Detail Diagram

10.2 Altanium I/O Box

The addition of any hardware inputs and outputs requires an Altanium I/O (Input/Output) box. This box connects to Delta² via an 8-pin communications cable. It can also be mounted remotely at the location of your choice.

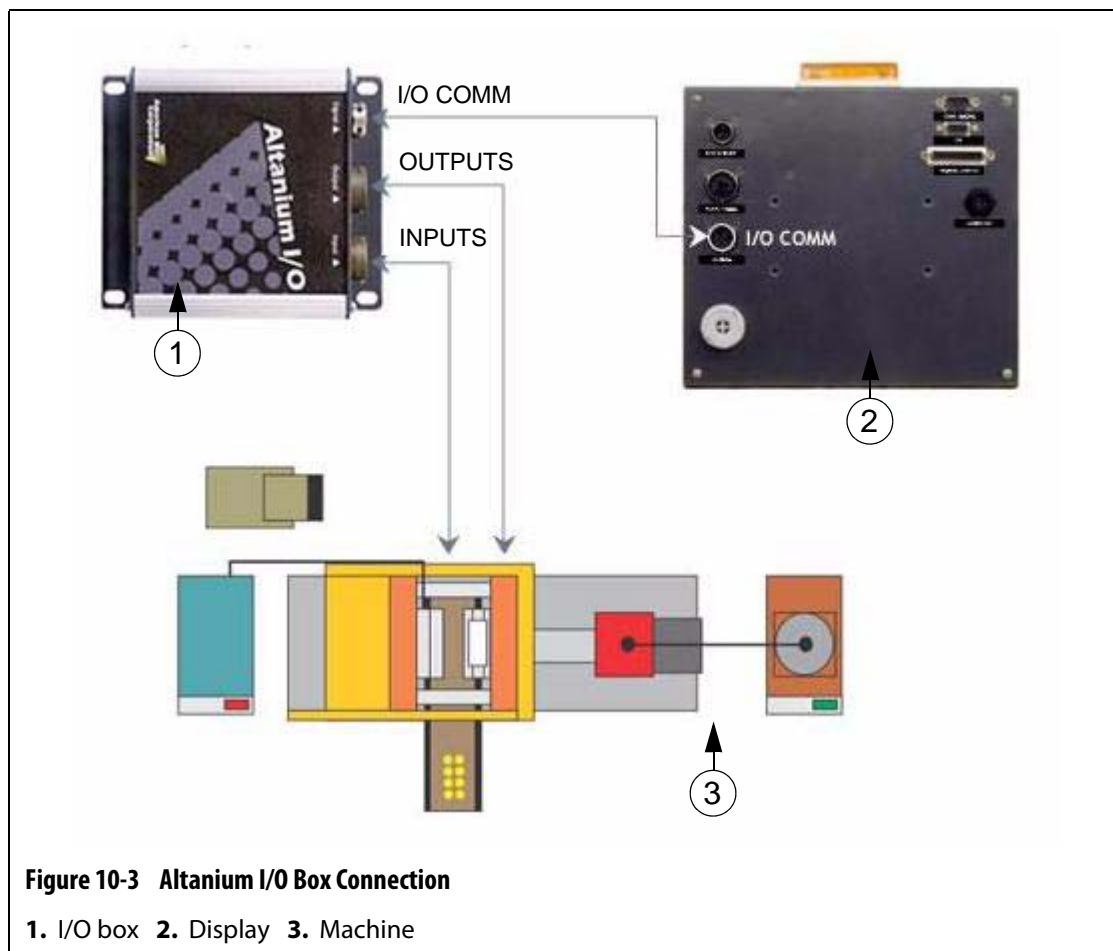


Figure 10-2 Altanium I/O Box

1. Front view 2. Side view

10.2.1 Connecting the Altanium I/O Box to the Delta² Display

1. Before you can use any of the hardware I/O options, you must connect an 8-pin communications cable between the Altanium I/O Box and Delta².
 2. You must also connect the appropriate wires in the Input and Output cables to the required location (for example, the injection molding machine).
 3. Connect the I/O box to the I/O COMM Port on Delta².
- To connect the I/O box to the Delta², refer to [Figure 10-3](#).



10.2.2 Enabling The Altanium I/O Box

Once you connect the I/O box to the Delta² you must also enable the communications.

To enable the communications:

1. From the Graphs page, press SYSTEM and move the cursor down to the CODE:---- row.
2. Enter the code 1248 and you will be taken to the Advanced System Setup page.
3. Move the cursor to the DIG I/O selection and use the +/- keys to toggle the selection from 0 to 1.

You should now notice the TX and RX lights flashing on the I/O box.

10.2.3 Hardware Options (Inputs)

Below is a list of the Input hardware options that can be purchased for your Altanium/Delta² along with a description of each. To activate any input, all that is required is the closure of two contacts on the Input connector. Refer to [Section 10.2.6](#) for connection details.



WARNING!

Do not apply a voltage to any of the Inputs. Doing so may damage the I/O Box or the Delta².

Table 10-1 Hardware Options (Inputs)

Option Name	Description
Remote Standby Input	If the Remote Standby digital input option is turned on, it will place all zones that have a Remote Standby setpoint set into the Standby mode whenever this input signal gets activated.
Remote Boost Input	If the Remote Boost digital input option is turned on, it will place all zones that have a Remote Boost setpoint set into the Boost mode whenever this input signal gets activated.
Remote Start Input	If the Remote Start digital input option is turned on, it will START the system whenever this signal is remotely activated. This state will remain until the STOP key is selected or Remote Stop is activated.
Remote Stop Input	If the Remote Stop digital input option is turned on, it will STOP the system whenever this signal is remotely activated. This state will remain until the START key is selected or Remote Start is activated. NOTE: You cannot start the system when this input is active.
Remote Manual Boost Input	If the Remote Manual Boost digital input option is turned on, it will place all zones that have a Manual Boost setpoint set into the Boost mode whenever this input signal gets activated. This acts just like selecting the BOOST key in Delta ² .

10.2.4 Hardware Options (Outputs)

Below is a list of the Output hardware options that can be purchased for your Altanium/Delta² along with a description of each. All outputs are dry contacts; whatever you put in you will get out when the output is activated. Refer to [Section 10.2.6](#) for connection details.

CAUTION!

DO NOT apply a voltage greater than 120 VAC/VDC (1amp) to any of the Outputs. Doing so may damage the I/O Box or the Delta².

Table 10-2 Hardware Options (Outputs)

Option Name	Description
Alarm Error Output	If the Alarm Error Output dry contact output option is turned on, it will be activated when an Alarm or Abort condition occurs. This state will remain until the alarm condition is CLEARED or RESET.
PCM Output	If the PCM dry contact output option is turned on, it will get activated whenever a Abort condition occurs in the mold and the PCM setting in the More page is set to SYS. This state will remain until the alarm condition is CLEARED or RESET.
At-Temperature Output	If the At-Temp dry contact output option is turned on, it will be activated ONLY when all zones are above the Under Temperature alarm limit (in the green area). This state will remain until any zone drops below the Under Temperature alarm limit.
At-Boost Temp Output	If the At-Boost Temp dry contact output option is turned on, it will be activated ONLY when all zones are above the under temperature alarm limit (in the green area) while in BOOST mode. This state will remain until any zone drops below the under temperature alarm limit. If any or all zones go above the over temperature alarm limit the state will remain.
Run Light Output	If the Run Light Output dry contact output option is turned on, it will be activated whenever the system is running. This state will remain until the system is stopped.
CAN Comm Error Output	If the CAN Comm Error Output dry contact output option is turned on, it will get activated if Delta ² stops communicating with any of the Control Cards. This state will remain until communications are restored.

10.2.5 Configuring the Inputs and Outputs

The Altanium/Delta² has a host of optional Inputs and Outputs available to assist you in your molding process. These options are sold in packages of 2, 4 and ALL options. If you purchased one of these packages you will be able to select which options are used from the following page. For example, if you purchased the 4 option package you will be able to turn ON up to 4 options in any combination of inputs or outputs.

To enter the Option Configuration page:

1. From the Graphs page, press SYSTEM to enter the System page.

2. Using the ARROW keys move the cursor to the CODE row.
3. Use the NUMBER keys to enter the code 3333 to enter the Option Configuration page.

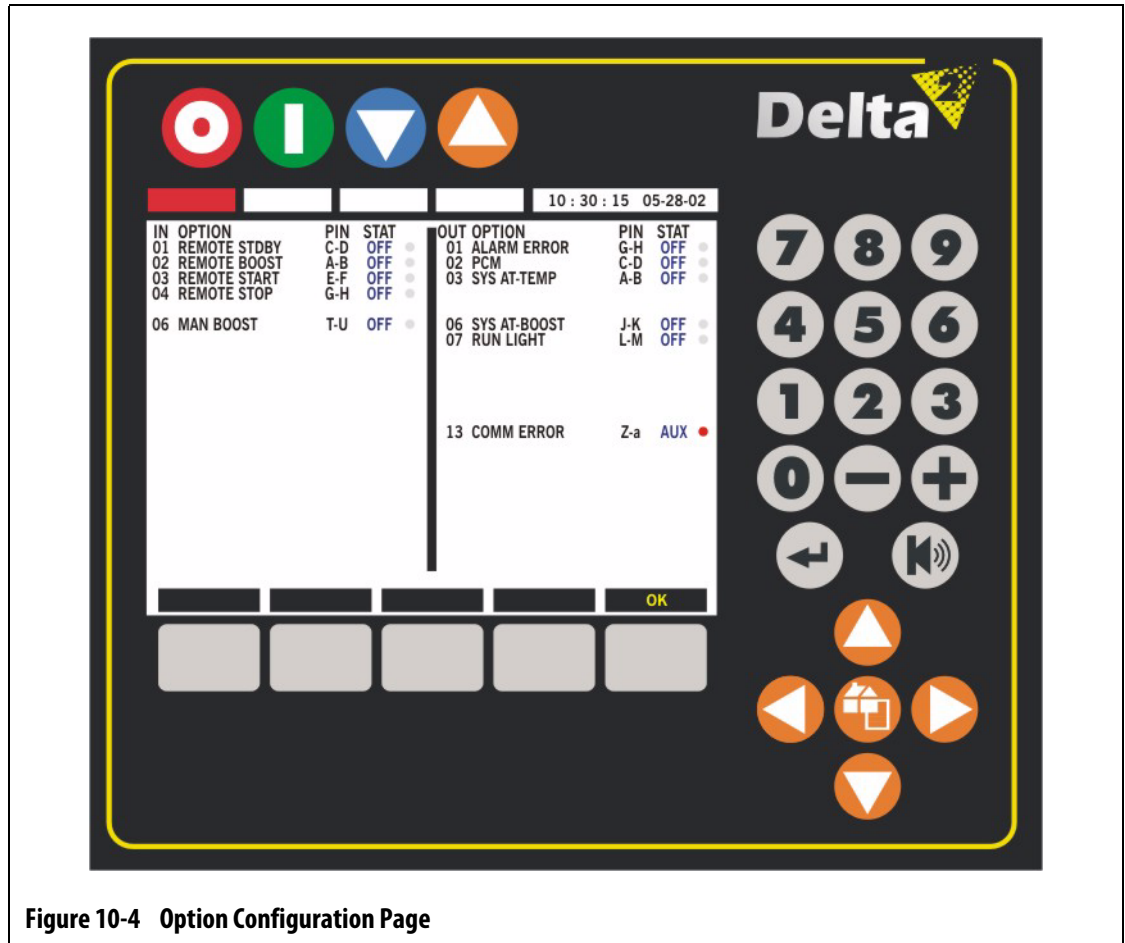


Figure 10-4 Option Configuration Page

Table 10-3 Option Configuration Page Function Key Descriptions

Function Key	Description
OK	Press this key to exit out of OPTION CONFIGURATION and go back to the System page.

Table 10-4 Option Configuration Page Item Descriptions

Item	Description
IN / OUT	Displays the input and output numbers. These correspond with the input and output numbers on the I/O Box.
OPTION	The names of the inputs and outputs.
PIN	The connector pins associated with each input and output.
STAT	The ON/OFF status of each input or output.
I/O STATE INDICATOR	A visual representation of each input and output state that corresponds to the LED's on the I/O box. These indicators will change color to match the I/O box.

10.2.5.1 Turning an Option On or Off

If you have ordered one of the option packages on this system you must turn on the options you want to use.

NOTE: Make sure the present security level is allowed to make this change.

To turn an option on or off:

1. From the Graphs page press SYSTEM to enter the System page.
2. Using the ARROW keys move the cursor to the CODE row.
3. Use the NUMBER keys to enter the code 3333.
4. In the Option Configuration page, use the ARROW keys to move the cursor to the option you want to activate.
5. Using the- and + keys, toggle the setting from OFF to ON.

NOTE: The system will only allow the number of options purchased to be turned on. If you have reached the limit and want to try a different option, you must turn one of the options to the OFF position to free one up.

Any ONE output can be set to AUX, even if no options were purchased with the system.

10.2.6 Input/Output Option Connector Pin-Out Description

Below is the connection detail for all of the optional Inputs and Outputs

Table 10-5 Optional Inputs

OPTION INPUTS (female)	PINS	WIRE COLORS
Remote Standby Input	C - D	red, blue/red
Remote Boost Input	A - B	green, orange/green
Remote Start Input	E - F	orange, orange/black
Remote Stop Input	G - H	black, blue/black
Remote Manual Boost Input	T - U	black/red, red/black

Table 10-6 Optional Outputs

OPTION OUTPUTS (male)	PINS	WIRE COLORS
Alarm Error Output	G - H	black, blue/black
Priority Control Mode Output	C - D	red, blue/red
System At Temperature Output	A - B	green, orange/green
System At Boost Temperature Output	J - K	white, blue/white
Run Status Light Output	L - M	red/green, orange/red
CAN Communications Error Output	Z - a	white/red/black, red/white/black

10.3 Software Options

10.3.1 SPI Communications Protocol Option

If the SPI protocol option was purchased with your system you will be able to remotely control and monitor some of the parameters in the Delta². For an outline of the protocol operation and the items supported by the system refer to [Chapter 11—SPI Protocol Option](#).

Chapter 11 SPI Protocol Option

The system communicates with any central network or molding machine that supports the Society of Plastics Industry (SPI) standard protocol.

The system assumes a device ID of 26h on the SPI communications channel. This ID has been assigned to general-purpose temperature controllers with multiple zones. The system supports a subset of the commands that have been defined for this ID. The commands for this ID that are not supported by the system do not have equivalent functions in the system.

11.1 SPI Command Summary

The SPI commands supported by the system are listed below. The system supports the defined poll and select functions for each command. If a selected command is directed to all zones in the system, the error requirements must be satisfied for every zone before an ACK is returned.

- Echo.
- Version.
- Process Setpoint 1.
- Process Value.
- Alarm Active Status.
- Alarm 1 Setpoint.
- Alarm 2 Setpoint.
- Alarm 1 Reset.
- Controller Status.
- Manual Percentage Output.
- Open/Close Loop Control.

11.1.1 Echo

Summary	SPI controller integrity command.
Errors	If the data length for the selected function is incorrect, the system will return a NAK.
Version Summary	The system transmits the device ID (26h) and SPI software version number.
Errors	None.

11.1.2 Process Setpoint

Summary	This command is used to set and read the temperature setpoint for an automatically controlled zone. It is valid even if the selected zone is running in MANUAL or VIEW regulation mode.
Errors	<p>The following conditions result in a NAK response with an invalid data error for the select function:</p> <ul style="list-style-type: none"> • Incorrect data length. • Invalid zone number. • A value less than the minimum allowed setpoint. • A value greater than the maximum allowed setpoint. <p>The following conditions result in an invalid data error in response to a polled function:</p> <ul style="list-style-type: none"> • Invalid zone number.

11.1.3 Process Value

Summary	This command is used to read the actual temperature of a specified zone. It is valid for zones in all regulation modes. If the zone does not have a thermocouple input or thermocouple type assigned, or if the thermocouple is disconnected, 0.0 is returned. Otherwise a value between 32 °F and 932 °F is returned.
Errors	<p>The following conditions result in an invalid data error in response to a polled function:</p> <ul style="list-style-type: none"> • Invalid zone number.

11.1.4 Alarm Active Status

Summary	This command is used to read error status for a single zone. A value of 0 is returned if no errors are active. It is valid for all zones in all regulation modes.
Errors	<p>The following conditions result in an invalid data error in response to a polled function:</p> <ul style="list-style-type: none"> • Invalid zone number.

11.1.5 Alarm 1 Setpoint

Summary	This command is used to set and read the alarm window value for a single zone. The alarm window is used only for zones with Auto or View regulation.
Errors	<p>The following conditions result in a NAK response with an invalid data error for the select function:</p> <ul style="list-style-type: none"> • Incorrect data length. • Invalid zone number. • A value less than 0 °F or greater than 900 °F. • A value greater than the abort window value. <p>The following conditions result in an invalid data error in response to a polled function:</p> <ul style="list-style-type: none"> • Invalid zone number.

11.1.6 Alarm 2 Setpoint

Summary	This command is used to set and read the abort window value for a single zone. The abort window is used only for zones with Auto or View regulation.
Errors	<p>The following conditions result in a NAK response with an invalid data error for the select function:</p> <ul style="list-style-type: none"> • Incorrect data length. • Invalid zone number. • A value less than 0 °F or greater than 900 °F. • A value greater than the abort window value. <p>The following conditions result in an invalid data error in response to a polled function:</p> <ul style="list-style-type: none"> • Invalid zone number.

11.1.7 Alarm 1 Reset

Summary	This command is used to clear the errors for all the zones in the system. The system does not have the ability to clear an error for an individual zone.
Errors	<p>The following conditions result in a NAK response with an invalid data error for the select function:</p> <ul style="list-style-type: none"> • Incorrect data length. • Invalid zone number.

11.1.8 Controller Status

Summary	This command is used to read the condition of a single zone. The definition of the status bits is given below:		
	BIT	SPI DEFINITION	SYSTEM DEFINITION
	0	Heater Power	Power to heater is not zero
	1	Soft Start	Soft start is active
	2	Manual Control	Manual regulation (Not Auto or View)
	3	Low Alarm 1	Alarm under temperature
	4	High Alarm 1	Alarm over temperature
	5	Low Alarm 2	Abort under temperature
	6	High Alarm 2	Abort over temperature
	7	Open T/C Alarm	Lost thermocouple
	8	Reverse T/C Alarm	Reversed thermocouple
	9	Shorted T/C Alarm	Not supported
	10	Open Output Device	Fuse blown
	11	Shorted Output	Not supported
	12	Ground Fault	Not supported
	13	Low Current Alarm	Not supported
14	High current	Not supported	
15	Out Of Control	Not supported	
Errors	<p>The following conditions result in an invalid data error in response to a polled function:</p> <ul style="list-style-type: none"> Invalid zone number. 		

11.1.9 Manual Percent Output

Summary	This command is used to set and read the manual percent output for a manually-regulated zone. It is valid even if the zone is running in the Auto or View regulation mode.
Errors	<p>The following conditions result in a NAK response with an invalid data error for the selected function:</p> <ul style="list-style-type: none">• Incorrect data length.• Invalid zone number.• A value less than the minimum allowed percentage.• A value greater than the maximum allowed percentage. <p>The following conditions result in an invalid data error in response to a polled function:</p> <ul style="list-style-type: none">• Invalid zone number.

11.1.10 Open/Closed Loop

Summary	This command is used to set the regulation mode of a zone to either Manual or Automatic only. No provision is made for setting the regulation to View.
Errors	<p>The following conditions result in a NAK response with an invalid data error for the selected function:</p> <ul style="list-style-type: none">• Incorrect data length.• Invalid zone number. <p>The following conditions result in an invalid data error in response to a polled function:</p> <ul style="list-style-type: none">• Invalid zone number.• Zone regulation is set to View.

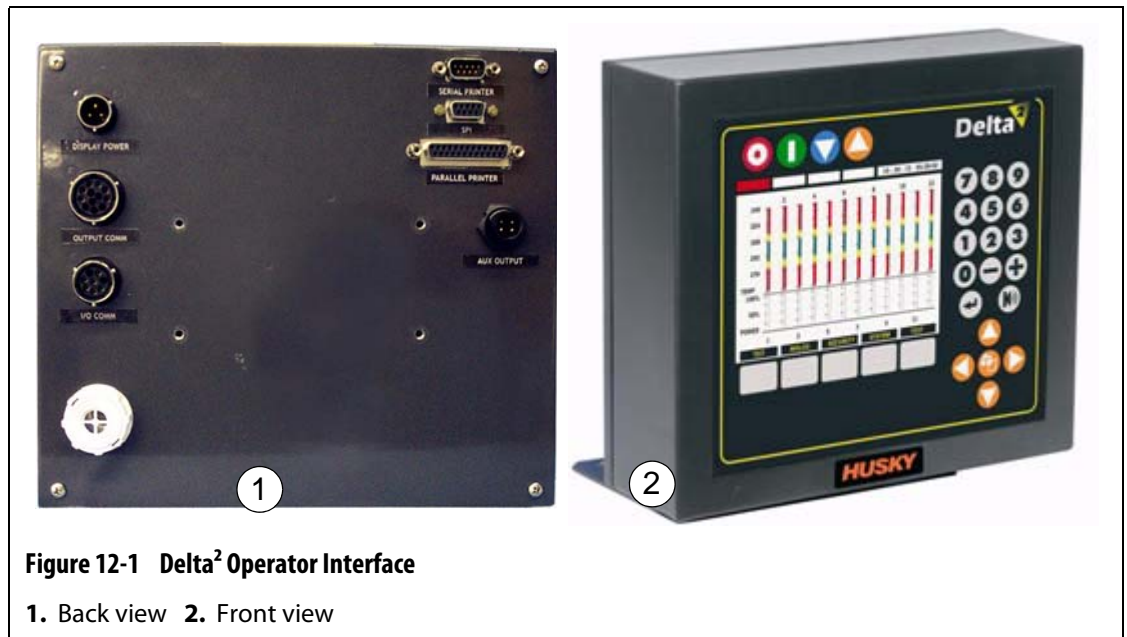
Chapter 12 User Service

This chapter provides instructions for servicing the Altanium/Delta² system, including the following:

- Replacing an ICC² (Intelligent Control Card). Refer to [Section 12.2.2](#).
- Replacing a blown fuse on an ICC² (Intelligent Control Card). Refer to [Section 12.2.3](#).
- Replacing a Delta² display. Refer to [Section 12.3](#).
- Cleaning the system. Refer to [Section 12.5](#).

12.1 Altanium/Delta² System

The Altanium/Delta² X-Series system is based around a modular concept. The two major components for the X-Series are the Delta² operator interface and the 12 - zone card cage which houses 6 ICC² (Intelligent Control Cards).



The Delta² display is used to enter and display molding parameters. There are no user-serviceable parts inside a Delta² display.

12.2 Servicing the Altanium System

The X-Series card cage contains everything needed to run 1 to 12 heaters in the mold. This consists of a green Passive Backplane and 1 to 6 green ICC² (Intelligent Control Cards) which are plugged into the Passive Backplane. The number of passive backplanes and ICC² your system contains is based on the number of zones ordered with the system. All ICC² are the same and can be interchanged with other ICC². The Passive Backplanes contain CAN communications address switches and can be interchanged with other Passive Backplanes if the switches are set properly.



WARNING!

Do not work on mold or Altanium without locking out and tagging the Altanium Main switch.

12.2.1 Altanium X-Series Card Cage

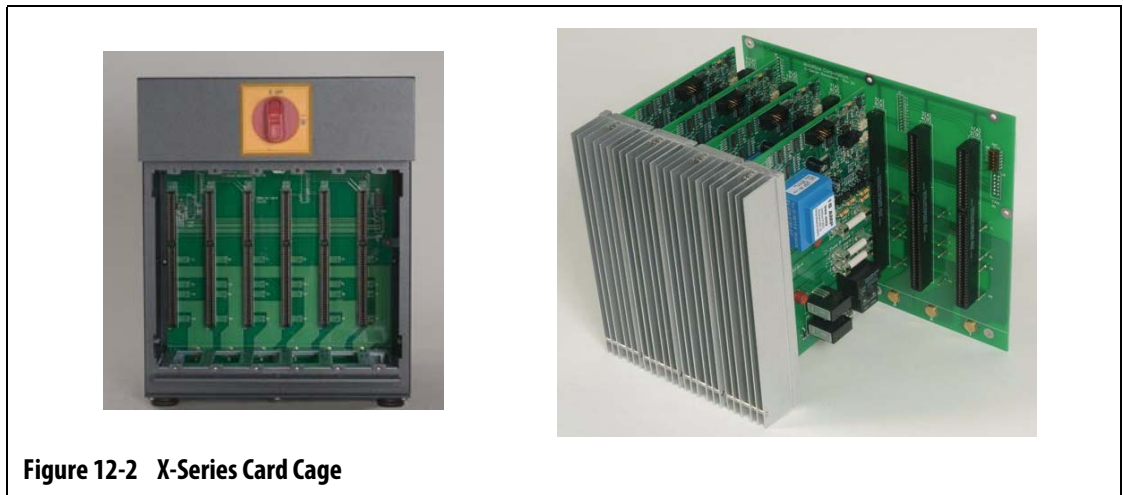


Figure 12-2 X-Series Card Cage

Access all user-serviceable parts, including fuses and circuit boards, by loosening the upper and lower slotted screws on each heat sink assembly and then sliding your screwdriver between the horizontal silver post and the ledge on the cabinet and prying the board out.

Located inside each card cage are 1 to 6 two-zone ICC² (Intelligent Control Cards) and a single Passive Backplane.



IMPORTANT!

You must have an ICC² (Intelligent Control Card) present in the position labeled 1 in all card cages for the system to function properly.

12.2.2 Replacing an ICC² (Intelligent Control Card)



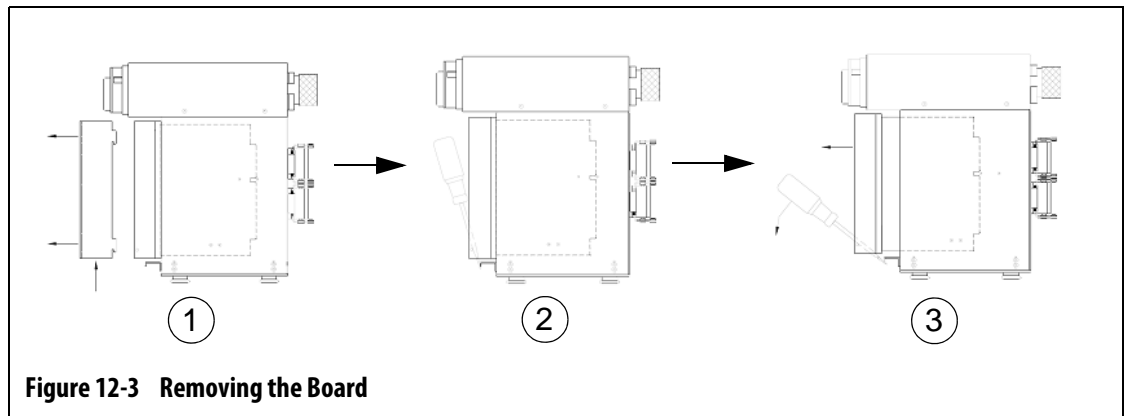
WARNING!

Turn off all power to the system and disconnect it completely from the main input power.

Use a ground strap when handling any of the Altanium components.

To replace an ICC²:

1. Locate the Card Cage that contains the faulty ICC² (Intelligent Control Card).
2. Remove the Lexan Altanium heat sink cover by lifting it up and out.
3. Loosen the upper and lower slotted screws on the heat sink. These two screws are captive so they do not fall into the system or get lost on the floor.
4. Slide your screwdriver between the silver post and the ledge on the cabinet and gently pry the board out. (Figure 12-3).



CAUTION!

Do not, under any circumstances, place any PCB on carpets, rugs, or other material that is likely to create a static charge.

5. Carefully place the PCB on an earthed/grounded surface.
6. Slide the new card into to the slot and push the card slowly and firmly back into place. A wrongly oriented card will not seat properly.
7. Tighten the upper and lower slotted screws on the heat sink.

12.2.3 Replacing a Blown Fuse on an ICC² (Intelligent Control Card)



WARNING!

Turn off all power to the system and disconnect it completely from the main input power.

Use a ground strap when handling any of the Altanium components.

If Delta² informs you that there is a blown fuse in the system, make a note of the error (which fuse is blown) before proceeding.

To replace a blown fuse:

1. Locate the Card Cage that contains the faulty ICC² (Intelligent Control Card).
2. Remove the Lexan Altanium heat sink cover by lifting it up and out.
3. Loosen the upper and lower slotted screws on the heat sink. These two screws are captive so they do not fall into the system or get lost on the floor.
4. Slide your screwdriver between the silver post and the ledge on the cabinet and gently pry the board out. (see [Figure 12-3](#))

CAUTION!

Do not, under any circumstances, place any PCB on carpets, rugs, or other material that is likely to create a static charge.

5. Carefully place the PCB on an earthed/grounded surface.
6. Remove and replace the faulty fuse with one of identical type and rating. Husky recommends Bussmann ABC or equivalent fuses. Make sure the fuse is fully seated. Poor seating will cause a hot spot, which can cause problems for the system.
NOTE: A 30 Amp card will only have two fuses.
7. Slide the new card into to the slot and push the card slowly and firmly back into place. A wrongly oriented card will not seat properly.
8. Tighten the upper and lower slotted screws on the heat sink.

12.3 Replacing a Delta² Display

In some cases the Delta² will not come on if the display module is defective. If the display input power is correctly connected, all three phase indicators are lit; the display module is a suspect.



WARNING!

Turn off all power to the system and disconnect it completely from the main input power.

Use a ground strap when handling any of the Altanium components



IMPORTANT!

There are no user serviceable parts inside this Display Module and all warranties are void if it is opened by anyone other than factory personnel.

To replace the display module,

1. Face the rear of the system, disconnect the Power and Input Comm. cables from the mainframe.



IMPORTANT!

You may need some assistance here.

2. Facing the front of the controller, locate the four 1/4"-20 button head cap screws that hold the Delta² stand to the mainframe.
3. Remove these four screws using the 5/32" hex wrench that is provided with the controller.
4. Carefully lift the Delta² Display module off the mainframe.
5. Disconnect all cables attached to the display.
6. Install the new display module by reversing the above steps.

12.4 Calibrating the Thermocouple Inputs

The system has been factory-calibrated and in most cases it is not necessary to recalibrate until Delta² has been running for one year. If calibration is necessary, please contact your nearest Husky Regional Service and Sales office for calibration instructions.

12.5 Cleaning the System

- Use a damp sponge or cloth. No abrasives should ever be used on the surface. The labels should also be wiped and no cleaners or solvents should be used.
- If a cleaner of any type must be used, window cleaner sprayed onto a cloth, not directly onto the cabinet, is recommended.