



Electrical Solutions Corporation

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Greetings,

The following pages are screen shots from a Wonderware application in the early stages of development. The core structure of the application has been built, but the actual “process” pages have not yet been added. To see examples of “process” pages, visit our website at:

<http://www.frogstarenergy.com/processHMIScreenShots.html>

These pages illustrate:

- **Navigation**
- **Process Summary**
- **Communication Status**
 - PLC identification
 - Good polls
 - Bad polls
 - PLC fault status
- **PC and PLC Clock Synchronization**
 - Update speeds
- **PID Loop Tuning, Monitoring and Control**
- **Security**
- **Alarm Notification and Acknowledgement**
- **Real-time Trending**
- **Historical Trending**
- **Alarm Summary**
- **Alarm History**

Rick Hurdle
Electrical Solutions Corporation

Buttons at the top of the screen are always visible and navigate to other windows or perform the indicated function.

The **Overview** screen opens when Wonderware starts up. If a Process Flow Diagram is desired, it will be shown on this screen. Right now, this screen shows the summary info for the analog inputs from the PLC and some of the PID loop controller information.

A green lightning bolt indicates that communication between the PC and the PLC is good.

Capsule summary of the plant process.

C100 - PID Loop		
SIC-VSD	75.0	Controller Output
SP 130.0	0.0	Process Variable
PV 0.0	130.0	Setpoint
MANUAL		

Analog Summary	
0.0	C100 Suction Pressure - psi
0	Sales Gas Flow Rate - mcf/d
0.0	Lean Amine Flow Rate - gpm
0.0	Reflux Flow Rate - gpm
0.0	Reboiler Temperature - °F

Operator	10/20/04 19:28:54	FROGSTAR		C100 0.0 psi	FT3 0 mcf/d	FT100 0.0 gpm	FT102 0.0 gpm	E103 0.0 °F
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OVERVIEW

C100 - PID Loop

SIC-VSD	75.0	Controller Output
SP 130.0	0.0	Process Variable
PV 0.0	130.0	Setpoint
MANUAL		

Common - Communications

Communication Summary

PLC	IP Address	OK	BAD	%OK	COMM STATUS	PLC FAULT STATUS
Amine Plant PLC	192.168.1.100	448070	0	100.0	NORMAL	NORMAL

Reset Counters Close

Log Summary

100 Suction Pressure - psi
ales Gas Flow Rate - mcf/d
ean Amine Flow Rate - gpm
eflux Flow Rate - gpm
boiler Temperature - °F

Clicking on the lightning bolt opens the **Communication Summary** window.

This window shows the status of the PLCs on the network. (The number of good and bad poles, the comm status and the PLC fault status.)

OVERVIEW

C100 - PID Loop

SIC-VSD	75.0	Controller Output
SP 130.0	0.0	Process Variable
PV 0.0	130.0	Setpoint
MANUAL		

Clicking on the clock opens the **PLC Clocks** window

This window shows the PLC and the PC clocks so you can tell what the PLC update time is and whether the clocks are synchronized.

Clicking on the clock within the window will manually set the PLC clock to the PC time.

Common - Clock

PLC Clocks

PLC	DATE	TIME
Amine Plant PLC	10/20/2004	19:37:58
Merton01	10/20/04	19:38:03

Restart IO Close

Log Summary

- 100 Suction Pressure - psi
- ales Gas Flow Rate - mcf/d
- ean Amine Flow Rate - gpm
- efflux Flow Rate - gpm
- boiler Temperature - °F

Print ESD Reset Overview Trends Alarms ACK
 Log On Trends Annunciator PID

OVERVIEW

Common - PID Faceplate 1
 PID_C100_VSD

SP psi	PV psi	CV %Out
130.0	0.0	75.0

MANUAL

Tune

Close

KP KP

Clicking on the *PID* button at the top of the screen or the PID block at the right, will open the **PID Controller Faceplate** (to the left).

Here, the PID loop can be placed in Manual or Auto, and the desired setpoint can be entered.

If the loop is in Manual, the controller output can also be selected.

Setpoint (SP) and Output (CV) values can be entered manually through the keypad (KP) or they can be changed using the slider or the up and down arrows.

C100 - PID Loop

SIC-VSD	75.0	Controller Output
SP 130.0	0.0	Process Variable
PV 0.0	130.0	Setpoint
MANUAL		

Analog Summary

0.0	C100 Suction Pressure - psi
0	Sales Gas Flow Rate - mcf/d
0.0	Lean Amine Flow Rate - gpm
0.0	Reflux Flow Rate - gpm
0.0	Reboiler Temperature - °F

Operator 10/20/04 19:58:39 FROGSTAR C100 0.0 psi FT3 0 mcf/d FT100 0.0 gpm FT102 0.0 gpm E103 0.0 °F

Print ESD Reset Overview Trends Alarms ACK
 ESD Log On Trends Annunciator PID

OVERVIEW

Common - PID Faceplate 1
PID_C100_VSD

SP psi	PV psi	CV %Out
130.0	0.0	75.0

MANUAL

Tune

Close

Common - Controller 1 Trend

58:00 59:00

Close

Common - Controller 1 Tuning

Tuning Constants

PID Main Compressor VSD

Proportional: 2.00 KP

Integral: 99.00 KP

Derivative: 0.00 KP

Close

C100 - PID Loop

SIC-VSD: 75.0 Controller Output

Sales Gas Flow Rate - mcf/d: 0

Lean Amine Flow Rate - gpm: 0.0

Reflux Flow Rate - gpm: 0.0

Reboiler Temperature - °F: 0.0

Log On

Please enter your name and password

Operator:

Password:

Close

Clicking on the *Real-time Trend* button, opens a 2-minute **Real-time Trend**.

Clicking on the *Tune* button opens the **Controller Tuning** window where the tuning constants can be changed if the user is logged on as a supervisor.

Pressing the *Log On* button will open the **Log On** pop-up window which will allow the user to log on as a Supervisor to change tuning constants. (The supervisor is automatically logged out every 5 minutes.) The default user is "Operator."

Operator 10/20/04 19:59:16 FROGSTAR C100 0.0 psi FT3 0 mcf/d FT100 0.0 gpm FT102 0.0 gpm E103 0.0 °F

OVERVIEW

When new alarms are detected, the **New Alarm** window opens and shows the status of the last 8 alarms.

Alarms which have been acknowledged appear in purple, unacknowledged alarms appear in red. Unacknowledged alarms also cause the *Ack* button to flash red.

When the *Ack* button is pressed the alarm is acknowledged and the **New Alarm** window closes.

C100 - PID Loop

SIC-VSD	75.0	Controller Output
SP 130.0	0.0	Process Variable
PV 0.0	130.0	Setpoint
MANUAL		

Analog Summary

0.0	C100 Suction Pressure - psi
0	Sales Gas Flow Rate - mcf/d
0.0	Lean Amine Flow Rate - gpm
0.0	Reflux Flow Rate - gpm
0.0	Reboiler Temperature - °F

Currently logged-on user, date, time, and node name.

A red lightning bolt indicates a PC-PLC communication failure.

Common - Alarm New

Date	Time	State	Name	Comment	Group	Value
20 Oct	17:49:05	ACK	ESD2_Alm	Combustible Gas - Alarm	Safeties	Shutdown
20 Oct	17:49:05	ACK	ESD3_Alm	H2S - Alarm	Safeties	Shutdown
20 Oct	17:49:05	ACK	ESD4_FD1_Alm	Flame Detector 1 - Alarm	Safeties	Shutdown
20 Oct	17:49:05	ACK	ESD4_FD2_Alm	Flame Detector 2 - Alarm	Safeties	Shutdown
20 Oct	17:49:05	ACK	C100_PT_XF	Main Comp - Suction Pressure - Transmitter Failure	Compressor	Xmtr Fail
20 Oct	17:49:05	ACK	C100_Aux	Main Comp is Not Running	Compressor	Stopped
20 Oct	17:49:05	ACK	F100_Aux	Main Compressor Fan is Not Running	Compressor	Stopped
20 Oct	19:44:32	UNACK	Comms_PLC_Alarm	Comm Fail between KEPDirect and PLC	GroupComm	7

Real-Time Trends

1 hr Trends

- Sales Gas Flow Rate
- Amine Circulation Rate
- Reflux Rate
- Reboiler Temp
- Comp Suction Pressure

24 hr Trends

- Sales Gas Flow Rate
- Amine Circulation Rate
- Reflux Rate
- Reboiler Temp
- Comp Suction Pressure

7 day Trends

Pressing the *Real-time Trend* button, opens the **Real time Trend** window where 1-hr or 24-hr trends can be selected for the analog process variables for which historical data are being logged.

Print	ESD Reset	<i>Overview</i>	Trends	Alarms	ACK
	ESD	<i>Log On</i>	Trends	Annunciator	PID

TrendsRT - 1hr - Sales Gas Rate

Close

TrendsRT - 24hr - Mine Rate

Close

Pressing buttons from the previous screen will open either a **1-hr Trend** or a **24-hr trend** for the selected process variable.

Operator	10/20/04 19:48:19	FROGSTAR	C100 0.0 psi	FT3 0 mcf	FT100 0.0 gpm	FT102 0.0 gpm	E103 0.0 °F
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Print	ESD Reset	<i>Overview</i>	Trends	Alarms	ACK
	ESD	<i>Log On</i>	Trends	Annunciator	PID

OVERVIEW

Pressing the *Historical Trend* button at the top of the window opens the **Historical Trend** window (next page)..

Clicking the Historical Trend button on the overview screen opens the same trend, but with the key analog process variables already loaded into the trend.

C100 - PID Loop

SIC-VSD	75.0	Controller Output
SP 130.0	0.0	Process Variable
PV 0.0	130.0	Setpoint
MANUAL		

Analog Summary

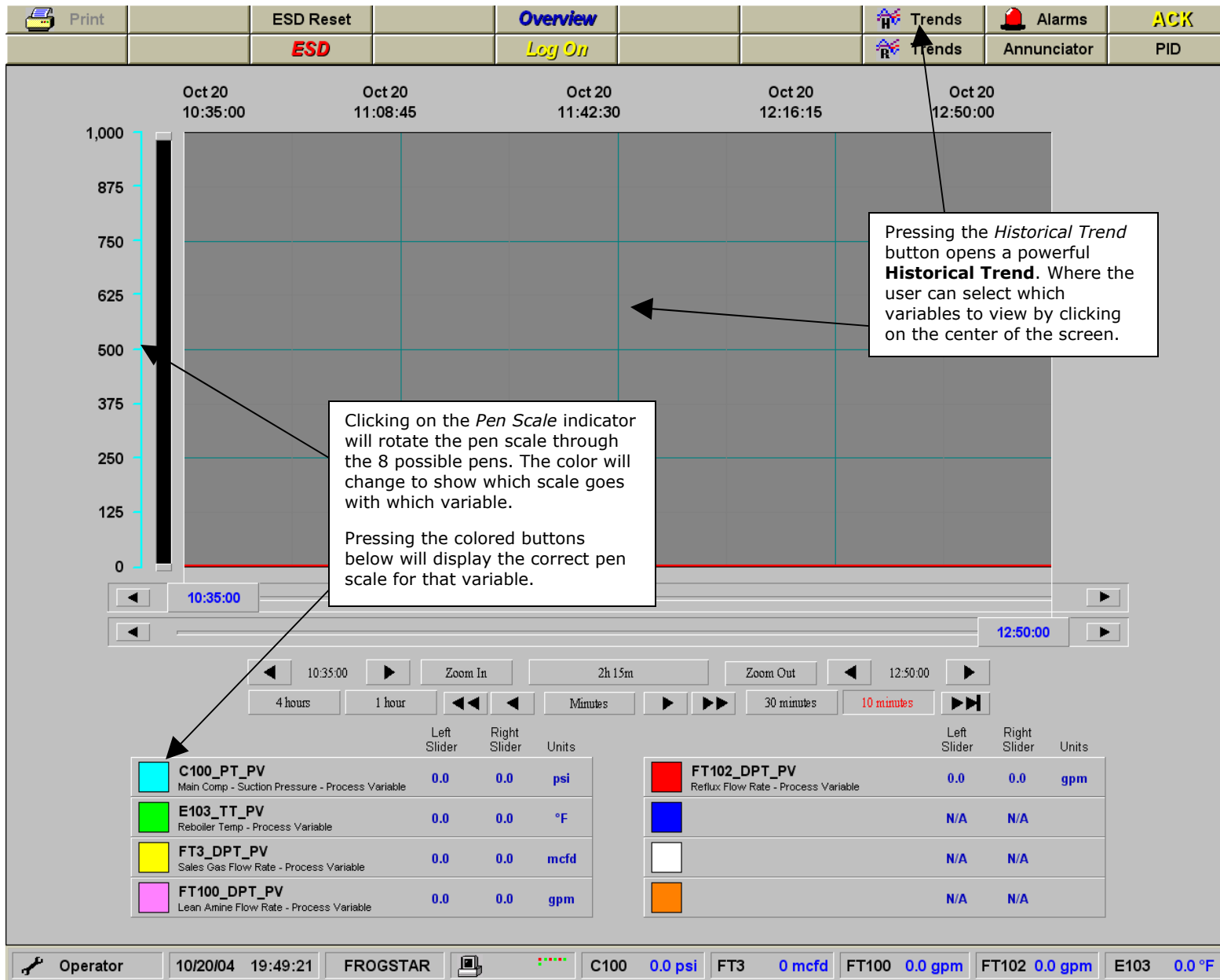
0.0	C100 Suction Pressure - psi
0	Sales Gas Flow Rate - mcf/d
0.0	Lean Amine Flow Rate - gpm
0.0	Reflux Flow Rate - gpm
0.0	Reboiler Temperature - °F

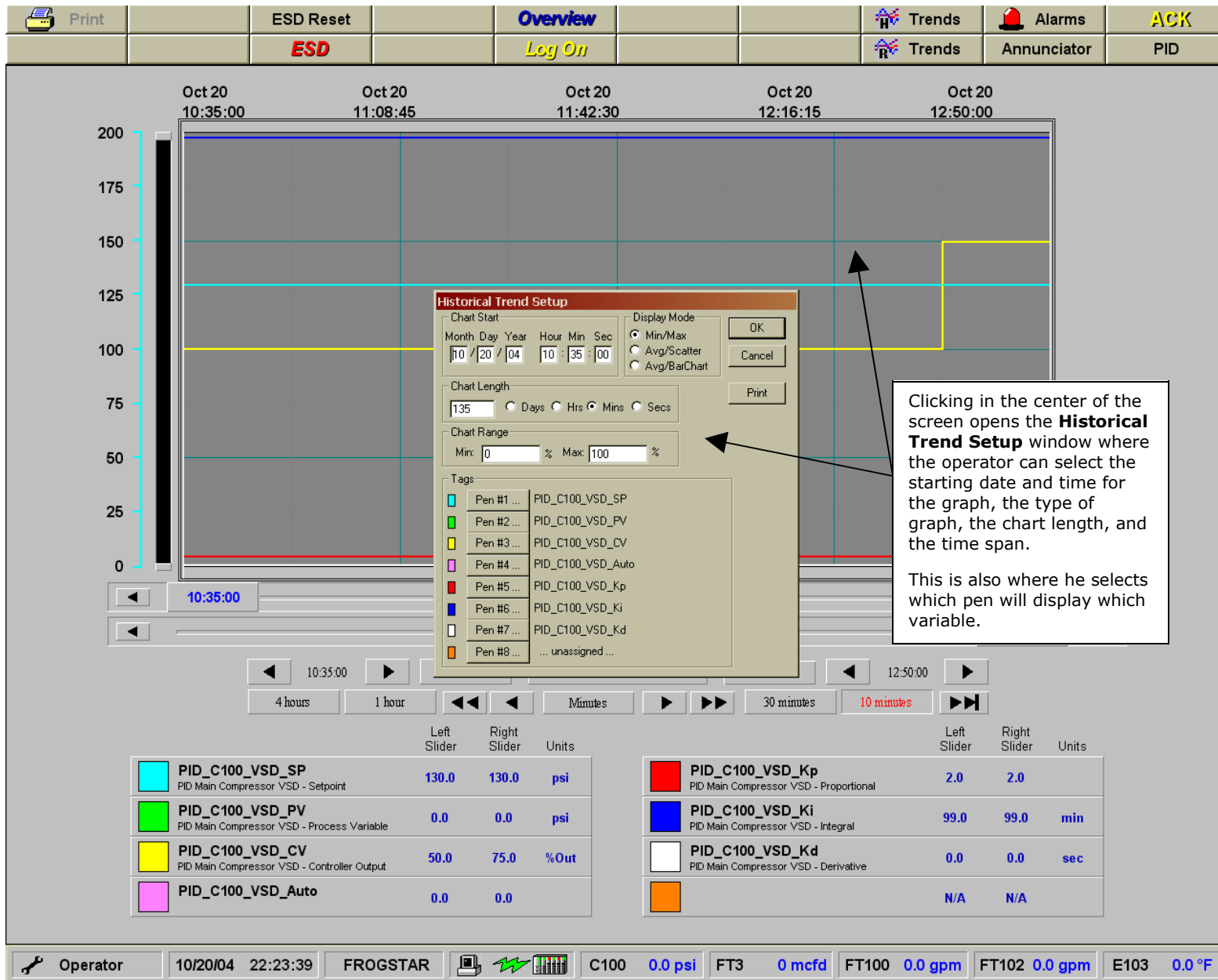
Operator	10/20/04 22:50:34	FROGSTAR	C100 0.0 psi	FT3 0 mcf/d	FT100 0.0 gpm	FT102 0.0 gpm	E103 0.0 °F
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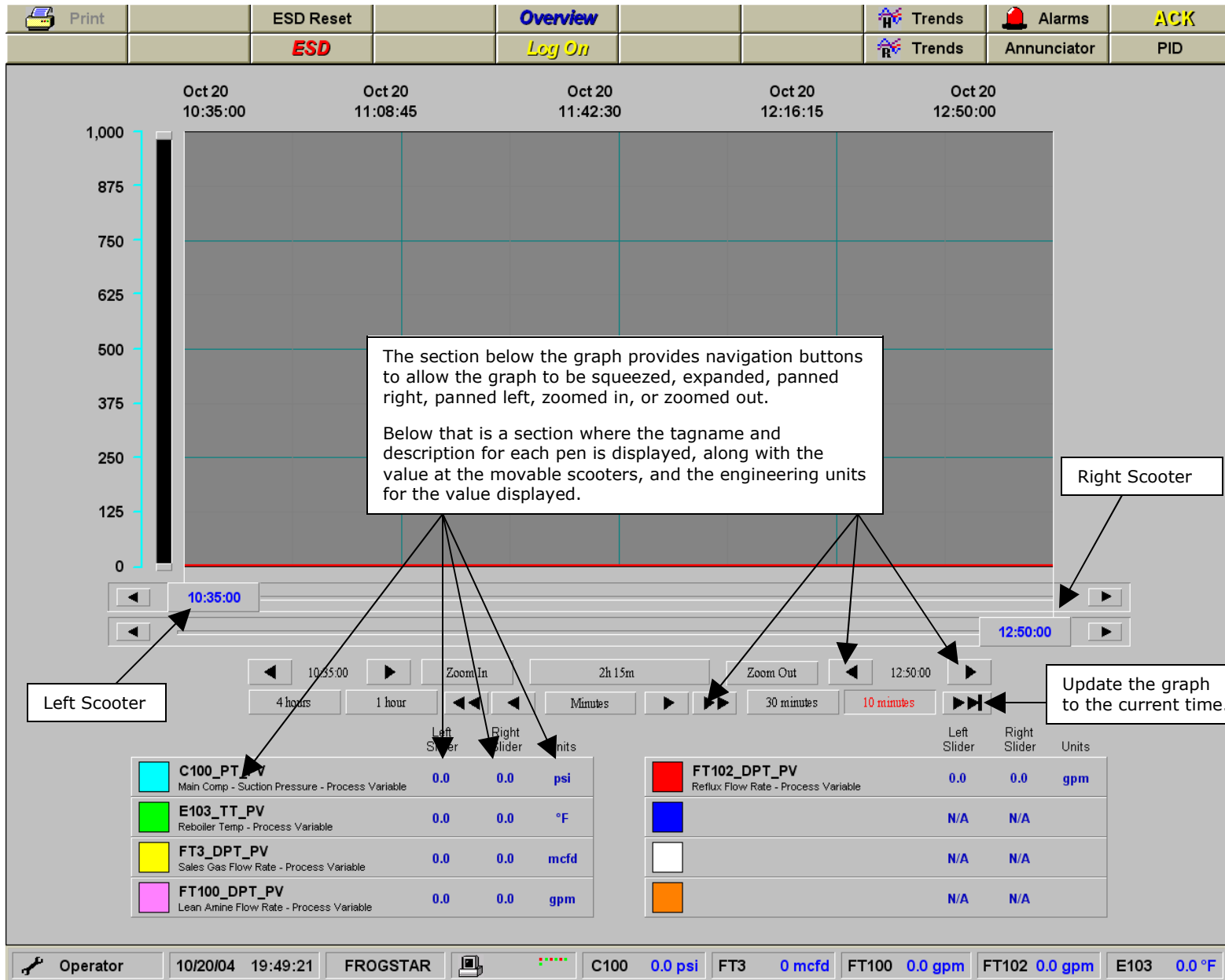
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Page 10 of 18

10/20/04







ANNUNCIATOR

Startup Bypass for Plant Shutdowns 20 secs
 Startup Bypass for C100 Shutdowns 10 secs
 C100 Startup Bypass for BDV-1 5 secs

Clicking on a motor 'light box' will open the **Motor Controller** pop-up window where the motor can be started or stopped.

Note: the motor will only be allowed to start if there are no shutdown conditions present.

C-100 Main Comp TSH-3	C-100 Main Comp VSH-1	C-100 Main Comp TSH-1A	C-100 Main Comp TSH-1B	C-100 Main Comp TSH-2	C-100 Main Comp TSH-3	C-100 Main Comp PSL-1		
C-100 Main Comp PSH-3	C-100 Main Comp PSL-0	C-100 Main Comp TSH-W	C-100 Main Comp FSL-0	T-101 Contactor LSL-91	T-101 Contactor LSL-92	T-101 Contactor H2S-1		
E-103 Reboiler LAL	E-103 Reboiler LSL	P-105 Amine Pump PSL	C-1 Air Comp PSL			T-101 Contactor H2S-1-SD		
	Safety Manual #1 ESD1-B1	Safety Manual #2 ESD1-B2	Safety Manual #3 ESD1-B3	Safety H2S SD3	Safety Flame Det #1 ESD4-FD1	Safety Flame Det #2 ESD4-FD2	Safety Wonderware ESD5-HMI	
					Phase Loss Relay	Comm Failure	Autodialer Status	
C-100 Main Comp Stopped	F-100 Main Comp Fan Stopped	E-103 Reboiler Stopped	C-400A Acid Gas A Stopped	C-400B Acid Gas B Stopped	F-400 Acid Gas Fan Stopped	P-102A Booster A Stopped	P102B Booster B Stopped	
P-103A Reflux Pump A Stopped	P103B Reflux Pump B Stopped	P-105A Amine Pump A Stopped	P-105B Amine Pump B Stopped	F-102 Amine Fan Stopped	C-1 Air Comp Stopped	EF-1 Em Fan 1 Stopped	EF-2 Em Fan 2 Stopped	
				BDV-1 Blow Down Open	SDV-1 Inlet Valve Closed	SDV-2 Disch Valve Closed	SDV-3 Fuel Valve Closed	SDV-4 Acid Gas Inj Closed

Common - Motor Select 1

C100 Main Compressor Stopped

Start

Stop

Close

The screenshot displays a control room interface with a top navigation bar containing buttons for 'Print', 'ESD Reset', 'Overview', 'Trends', 'Alarms', and 'ACK'. Below the navigation bar, the main area is titled 'OVERVIEW' and features a large red dialog box with the text: 'Are you sure you want to SHUTDOWN the Amine Plant?'. At the bottom of the dialog are 'ESD' and 'CANCEL' buttons. A tooltip points to the 'ESD' button, stating: 'Pressing the ESD button will open the ESD pop-up window which will allow the operator to manually shutdown (ESD) the plant... or to change his mind. Any ESD condition will require that the ESD Reset button be pressed before the plant can be restarted.' The bottom status bar shows 'Operator', '10/20/04 23:23:05', 'FROGSTAR', and various process parameters like 'C100 0.0 psi', 'FT3 0 mcf', 'FT100 0.0 gpm', 'FT102 0.0 gpm', and 'E103 0.0 °F'.

Print ESD Reset Overview Trends Alarms ACK
 ESD Log On Trends Annunciator PID

Alarm Summary

Alarm Group:

Alarm History
 Previous Next

Date	Time	State	Na	Group	Value	
20 Oct	19:53:47	UNACK	ES	Safeties	Shutdown	
20 Oct	19:53:47	UNACK	ES	Safeties	Shutdown	
20 Oct	19:53:47	UNACK	C	Compressor	Shutdown	
20 Oct	19:54:03	UNACK	V			
20 Oct	19:54:03	UNACK	V			
20 Oct	19:54:03	UNACK	E			
20 Oct	19:54:03	UNACK	P			
20 Oct	19:54:03	UNACK	T			
20 Oct	19:54:03	UNACK	C1_PSL_Alm	Air Compressor - Pressure Safety Low		
20 Oct	19:54:03	UNACK	T101_LSL92_Alm	Amine Contactor - Level Safety Low 92		
20 Oct	19:54:09	ACK	ESD2_Alm	Combustible Gas - Alarm		
20 Oct	19:54:09	ACK	FD1_Alm	Amine Reboiler - Flame Detector 1 Alarm		
20 Oct	19:54:09	ACK	ESD1_B3_Alm	Manual ESD - Button 3 - Alarm		
20 Oct	19:54:09	ACK	ESD1_B2_Alm	Manual ESD - Button 2 - Alarm		
20 Oct	19:54:09	ACK		Safeties	Shutdown	
20 Oct	19:54:09	ACK		Safeties	Shutdown	
20 Oct	19:54:09	ACK		m - Alarm	Safeties	Alarm
20 Oct	19:54:09	ACK		In	Safeties	First In
20 Oct	19:54:09	ACK		Low	Reboiler	Alarm
20 Oct	19:54:09	ACK		Low	Reboiler	Shutdown
20 Oct	19:54:09	ACK		ty Low 92	Contactor	Shutdown
20 Oct	19:54:09	ACK		ty Low 91	Contactor	Shutdown
20 Oct	19:54:09	ACK		Safety Low	Circulation	Shutdown
20 Oct	19:54:09	ACK		fety Low	Surge_Tank	Shutdown
20 Oct	19:54:09	ACK		fety Low	Flash_Tank	Shutdown
20 Oct	19:54:09	ACK		fety Low	Utilities	Alarm
20 Oct	19:54:09		\$System_Ack	\$System	\$System	ON
20 Oct	19:54:09	ACK	C100_LSH2_Alm	Main Comp - Level Safety High 2	Compressor	Shutdown
20 Oct	19:54:09	ACK	ESD4_FD2_Alm	Flame Detector 2 - Alarm	Safeties	Shutdown
20 Oct	19:54:09	ACK	ESD4_FD1_Alm	Flame Detector 1 - Alarm	Safeties	Shutdown
20 Oct	19:54:09	ACK	ESD3_Alm	H2S - Alarm	Safeties	Shutdown
20 Oct	19:54:09	ACK	C100_LSH1_Alm	Main Comp - Level Safety High 1	Compressor	Shutdown
20 Oct	19:54:09	ACK	C100_VSH1_Alm	Main Comp - Vibration Safety High 1	Compressor	Shutdown
20 Oct	19:54:09	ACK	C100_LSH3_Alm	Main Comp - Level Safety High 3	Compressor	Shutdown
20 Oct	19:54:24	UNACK	Comms_PLC_Alm	Comm Fail between KEPDirect and PLC	GroupComm	7
20 Oct	19:54:57	UNACK_RTN	Comms_PLC_Alm	Comm Fail between KEPDirect and PLC	GroupComm	0

Update Successful

All Alarms Compressor Amine Plant Safeties Utilities PLC

Operator 10/20/04 19:55:01 FROGSTAR C100 0.0 psi FT3 0 mcf FT100 0.0 gpm FT102 0.0 gpm E103 0.0 °F

Pressing the *Alarms* button, opens the **Alarm Summary** window, where current alarms are displayed.

Unack'ed alarms are in red, Ack'ed alarms are in purple, and alarm conditions which have automatically cleared are shown in green. (These still require the operator to acknowledge them, however.)

Sometimes it is more useful to look at the alarms from only one group at a time. The buttons below provide that functionality.

Blue text on a button indicates that the alarms being viewed are from only that one group.

A red background indicates that there are Unack'ed alarms from that group, while yellow indicates that there are Ack'ed alarms from that group.

Pressing the *Alarm History* button opens the **Alarm History** window (next page).

If there are too many alarms to list on one page, you can stroll through the alarms by pressing the *Previous* and *Next* buttons.

Alarm History

Alarm Group:

Alarm Summary

Date	Time	State	Name	Comment	Group	Value
20 Oct	19:53:47	UNACK	C100_LSH1_Alm	Main Comp - Level Safety High 1	Compressor	Shutdown
20 Oct	19:54:03	UNACK	V101_LSL_Alm	Amine Flash Tank - Level Safety Low	Flash_Tank	Shutdown
20 Oct	19:54:03	UNACK	V102_LSL104_Alm	Amine Surge Tank - Level Safety Low	Surge_Tank	Shutdown
20 Oct	19:54:03	UNACK	E103_LSL_Alm	Amine Reboiler - Level Safety Low	Reboiler	Shutdown
20 Oct	19:54:03	UNACK	P105_PSL_Alm	Amine Main Pump - Pressure Safety Low	Circulation	Shutdown
20 Oct	19:54:03	UNACK	T101_LSL91_Alm	Amine Contactor - Level Safety Low 91	Contactor	Shutdown
20 Oct	19:54:03	UNACK	C1_PSL_Alm	Air Compressor - Pressure Safety Low	Utilities	Alarm
20 Oct	19:54:03	UNACK	T101_LSL92_Alm		Contactor	Shutdown
20 Oct	19:54:09	ACK	ESD2_Alm		Safeties	Shutdown
20 Oct	19:54:09	ACK	FD1_Alm		Safeties	Shutdown
20 Oct	19:54:09	ACK	ESD1_B3_Alm		Safeties	Shutdown
20 Oct	19:54:09	ACK	ESD1_B2_Alm		Safeties	Shutdown
20 Oct	19:54:09	ACK	ESD1_B1_Alm		Safeties	Shutdown
20 Oct	19:54:09	ACK	H2S_1_Alm		Safeties	Alarm
20 Oct	19:54:09	ACK	ESD1_B1_FI		Safeties	First In
20 Oct	19:54:09	ACK	E103_LAL_Alm		Reboiler	Alarm
20 Oct	19:54:09	ACK	E103_LSL_Alm		Reboiler	Shutdown
20 Oct	19:54:09	ACK	T101_LSL92_Alm		Contactor	Shutdown
20 Oct	19:54:09	ACK	T101_LSL91_Alm		Contactor	Shutdown
20 Oct	19:54:09	ACK	P105_PSL_Alm		Circulation	Shutdown
20 Oct	19:54:09	ACK	V102_LSL104_Alm		Surge_Tank	Shutdown
20 Oct	19:54:09	ACK	V101_LSL_Alm		Flash_Tank	Shutdown
20 Oct	19:54:09	ACK	C1_PSL_Alm		Utilities	Alarm
20 Oct	19:54:09		\$System.Ack		\$System	ON
20 Oct	19:54:09	ACK	C100_LSH2_Alm	Main Comp - Level Safety High 2	Compressor	Shutdown
20 Oct	19:54:09	ACK	ESD4_FD2_Alm	Flame Detector 2 - Alarm	Safeties	Shutdown
20 Oct	19:54:09	ACK	ESD4_FD1_Alm	Flame Detector 1 - Alarm	Safeties	Shutdown
20 Oct	19:54:09	ACK	ESD3_Alm	H2S - Alarm	Safeties	Shutdown
20 Oct	19:54:09	ACK	C100_LSH1_Alm	Main Comp - Level Safety High 1	Compressor	Shutdown
20 Oct	19:54:09	ACK	C100_VSH1_Alm	Main Comp - Vibration Safety High 1	Compressor	Shutdown
20 Oct	19:54:09	ACK	C100_LSH3_Alm	Main Comp - Level Safety High 3	Compressor	Shutdown
20 Oct	19:54:24	UNACK	Comms_PLC_Alm	Comm Fail between KEPDirect and PLC	GroupComm	7
20 Oct	19:54:57	UNACK RTN	Comms_PLC_Alm	Comm Fail between KEPDirect and PLC	GroupComm	0
20 Oct	19:55:27	ACK RTN	Comms_PLC_Alm	Comm Fail between KEPDirect and PLC	GroupComm	0
20 Oct	19:55:27		\$System.Ack		\$System	ON

The **Alarm History** screen works just like the **Alarm Summary** screen, except, of course, that the history of when the alarm came in, when it was Ack'ed, and when it cleared is displayed. The last 1000 alarm records are kept in memory (or back until the application was last restarted, whichever is less).

Both of these screens may take a few seconds to populate. The status bar at the bottom will show "Update Successful" when the all the records have been retrieved. The status bar is green during update and blue when finished.

Update Successful