

# **KMT** *Waterjet Systems*



**BALANCING SYSTEM**

# PURPOSE

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- **Ensure consistent operating pressure when machines are connected to a header system**
- **Ensure the load (stroke rate) is evenly distributed among the machines**
- **Maintain pressure at an accuracy of +2,000 psi (+138 bar) to -500 psi (-34 bar)**

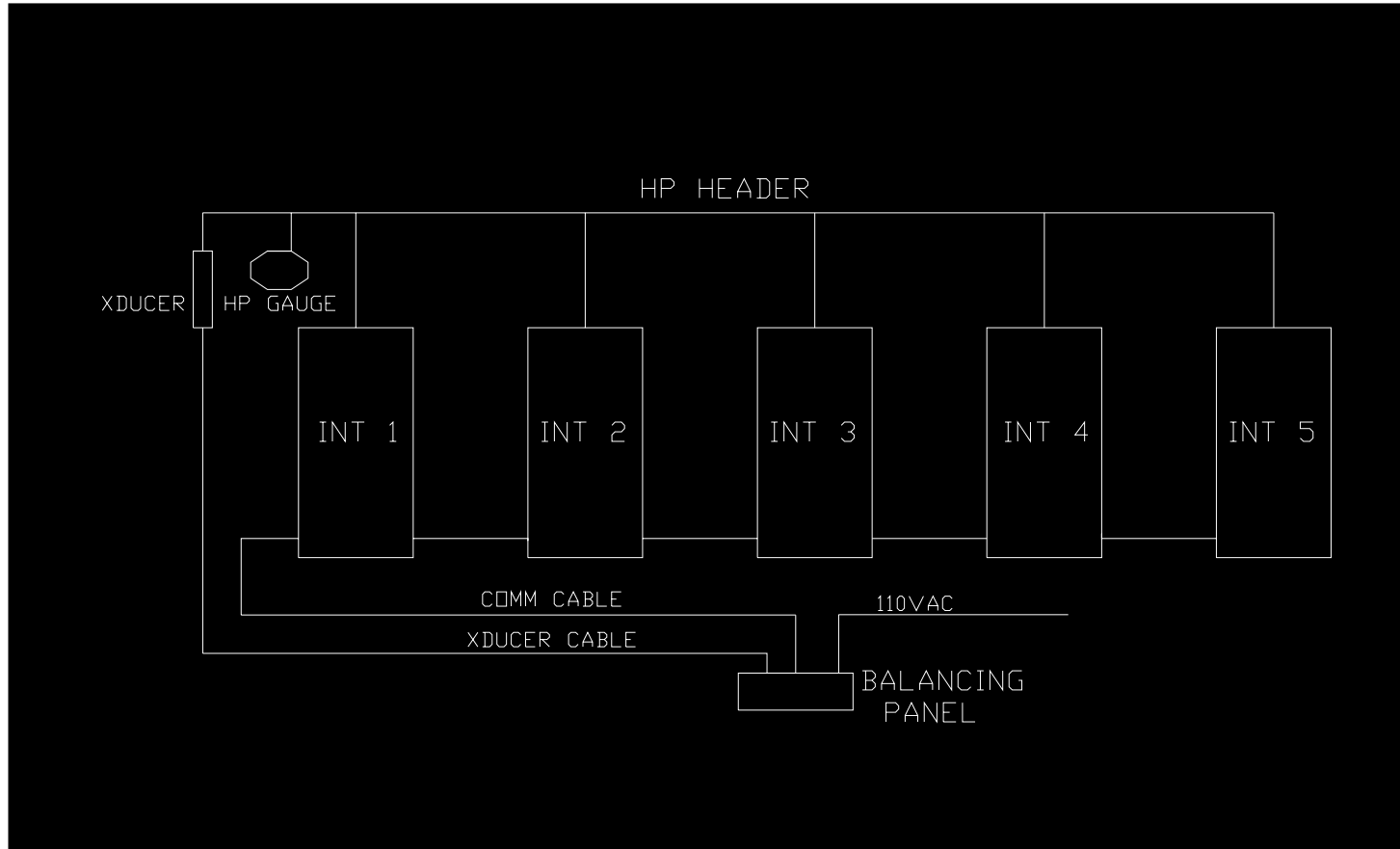
# SYSTEM FLEXIBILITY

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- **Compatible with the complete SL-IV *Plus* Series when equipped with proportional pressure control**
- **Configured with one to five machines in any combination of 30, 50, 60, 75 and 100 horsepower single, redundant or dual models**

# NETWORK CONFIGURATION

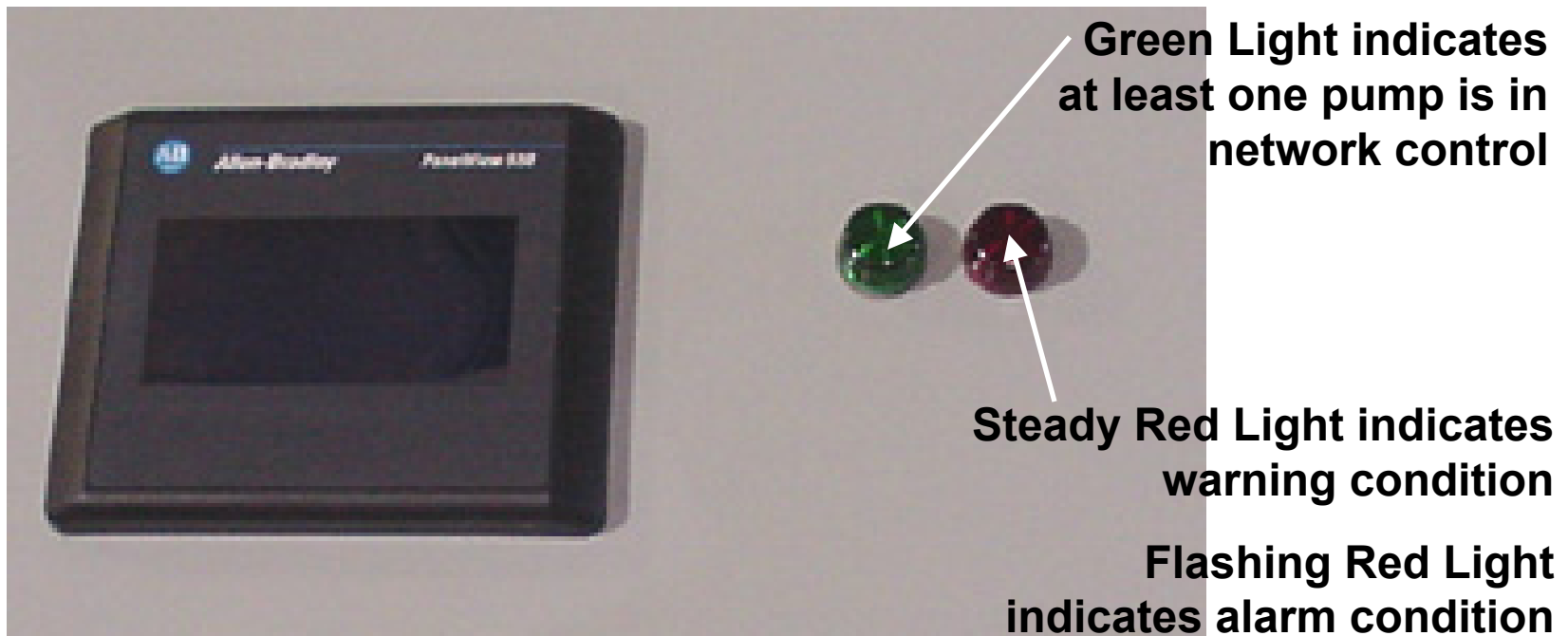
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# OPERATION

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## Control Panel



# LOCAL START-UP

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- **Set proportional pressure control to zero**
- **Set stroke rate allowed to maximum setting**
- **Set pressure switch to high pressure**
- **Make any other local settings as usual**

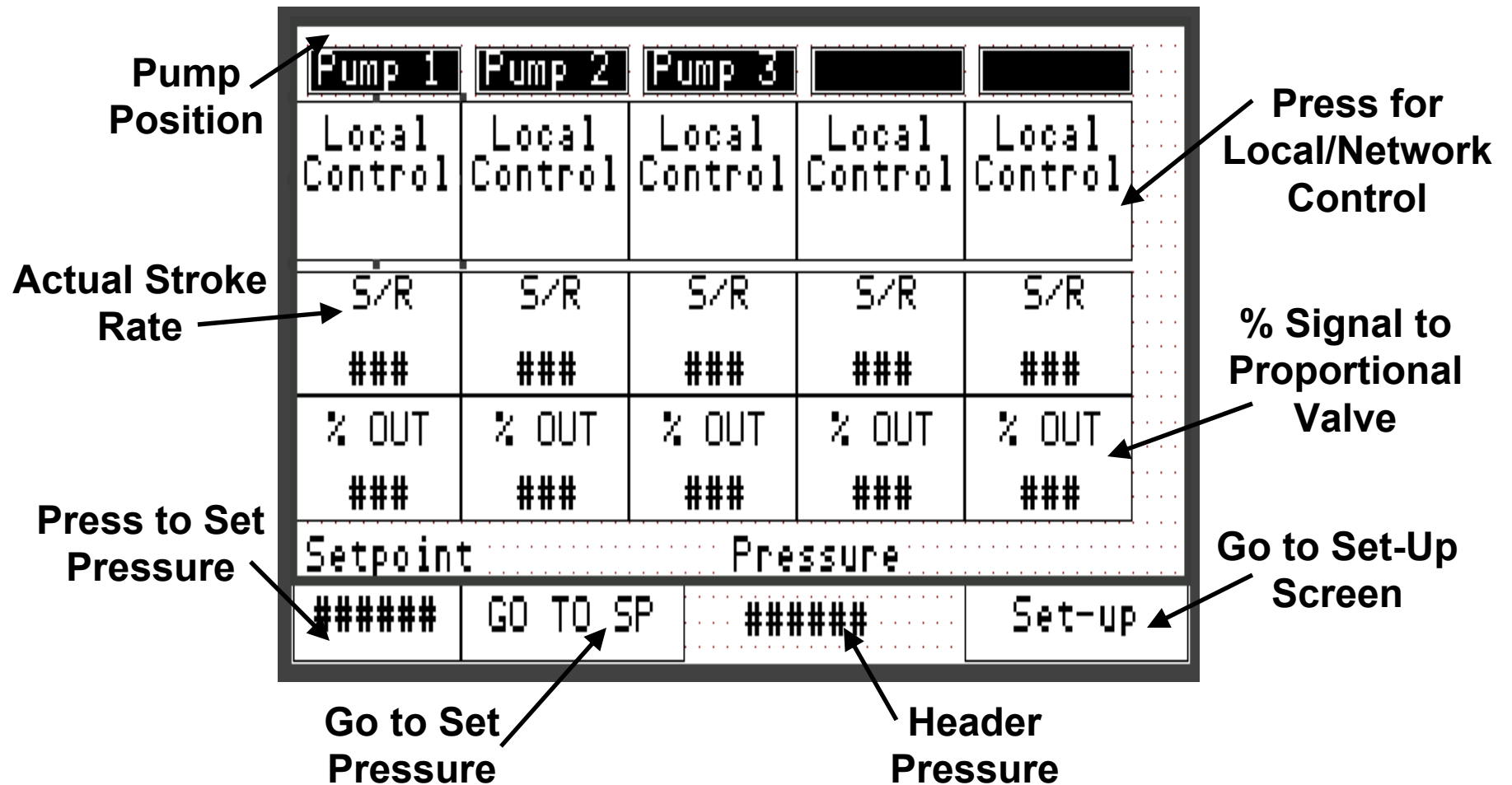
# NETWORK START-UP

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**When the machines are placed in network control, the Balancing System controls the proportional pressure valve and the strokerate.**

**All other settings, alarms, warnings and automatic shutdown conditions remain local and active.**

# MAIN MENU





# SET-UP COMMUNICATIONS SCREEN

The screenshot displays a grid-based interface for pump configuration. The grid is organized as follows:

	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5
Pump On/Off Network	Off	Off	Off	Off	Off
	Set-up Pump 1	Set-up Pump 2	Set-up Pump 3	Set-up Pump 4	Set-up Pump 5
	30 HP	50 HP	75 HP	1000	1005
	% FL ###	% FL ###	% FL ###	% FL ###	% FL ###
Return to Main Menu	Return to Main		Cal Transducer		

Annotations and their corresponding elements:

- Pump On/Off Network:** Points to the 'Off' status for Pump 1.
- Go To Pump Set-up Screen:** Points to the 'Set-up Pump 5' button.
- Pump Model:** Points to the '1005' value for Pump 5.
- % of Full Load:** Points to the '% FL ###' value for Pump 5.
- Return to Main Menu:** Points to the 'Return to Main' button.
- Press to Calibrate Transducer:** Points to the 'Cal Transducer' button.

# PUMP SET-UP SCREEN

The screenshot shows a terminal-style interface for pump configuration. On the left, a list of pump models is displayed: 30 HP (highlighted), 50 HP, 60 HP, 75 HP, 100 HP DUAL, 100 HP SINGLE, and N/A. A 'Return' button is at the bottom left. On the right, the title 'PUMP 1 Set-up' is shown above a gauge labeled '% FL'. The gauge has a needle pointing to approximately 25%. Below the gauge are three hash symbols '###'. A central column contains navigation arrows: an up arrow, a down arrow, and a left arrow.

Select Pump Model

Select N/A for Open Positions

Return to Set-Up Communications Screen

Displays % of Full Load

# KEYPAD

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						30000	
Enter Value: (0 to 60000)							
Ø	1	2	3	4	-	←	
5	6	7	8	9	•	↵	

**Use the Keypad to Enter the Operating Pressure**

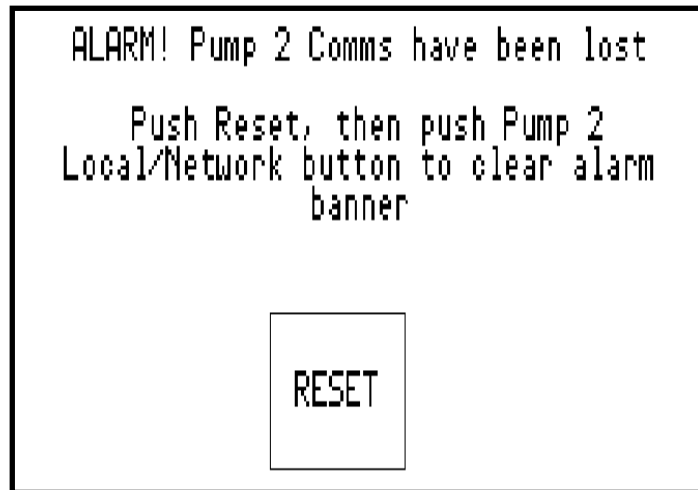
Back space to delete entry

Return to Main Menu

# ALARM BANNERS

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## *Communications Lost*



**The system has lost communication with Pump 2.**

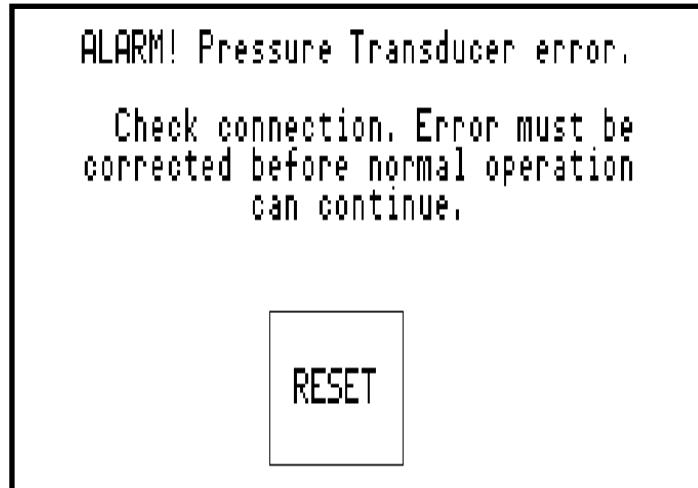
**Operating pressure on Pump 2 will drop to zero or minimal pressure.**

- Pump 2 has been shut down locally
- Local warning or alarm condition has activated automatic shutdown
- Communication cable has come loose or has been cut

# ALARM BANNERS

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## *Transducer Error*



**The signal to the transducer has been lost.**

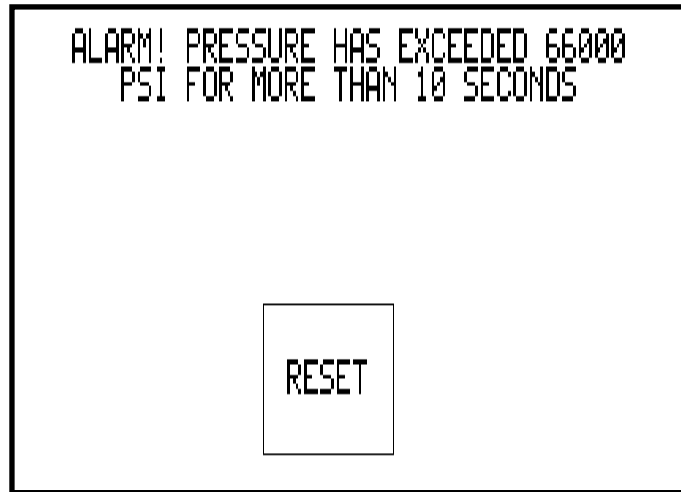
**Fault must be corrected before operation can continue.**

- **Connection to transducer may be bad**
- **Connection from transducer to analog module may be bad**
- **Transducer has failed**
- **Analog module has failed**

# ALARM BANNERS

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## *High Pressure Alarm*



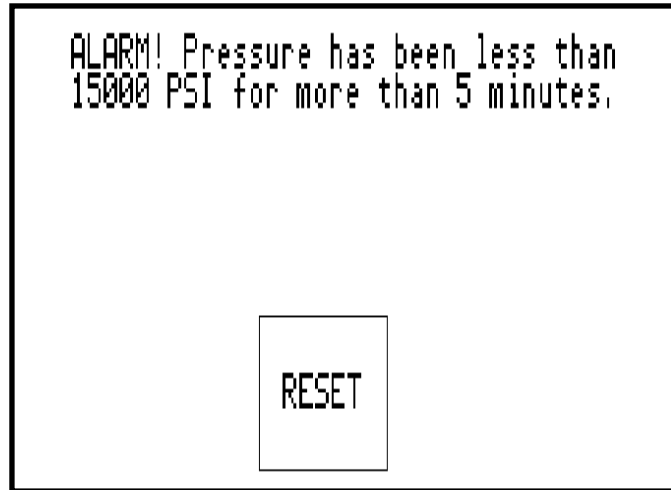
**Pressure at the header has continuously exceeded 66,000 psi (4,550 bar) for more than 10 seconds.**

- One or more pumps are not in network control
- Proportional pressure not set to zero on one or more pumps
- Proportional valve on individual pump has failed or the signal is bad

# ALARM BANNERS

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## *Low Pressure Alarm*



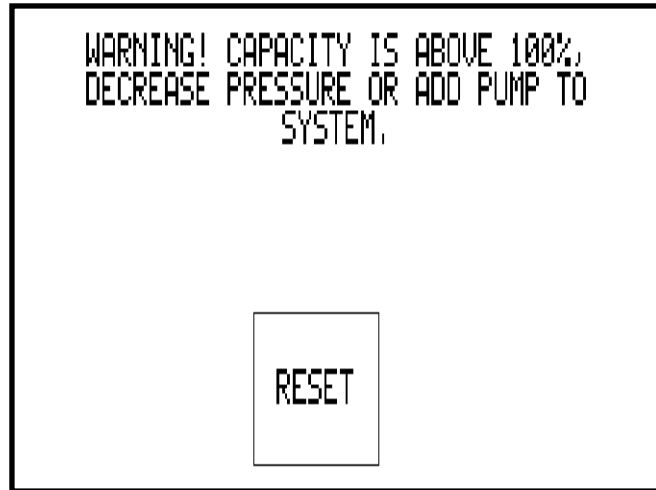
**Pressure at the header has dropped below 15,000 psi (1,034 bar) for more than 5 minutes.**

- **Pressure switch has not been set to high on one or more pumps**

# WARNING BANNERS

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## *High Capacity Warning*



**Stroke rate has exceeded  
100% for 60 seconds.**

**Percent of full load for all  
pumps will be 100% or  
greater.**

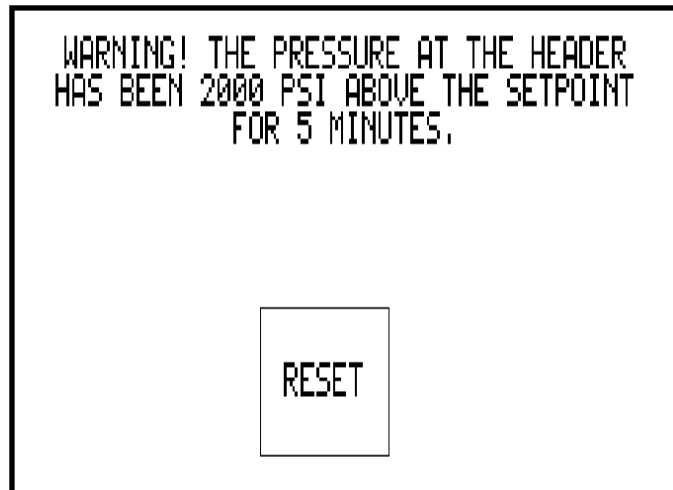
- **Overstroke condition has occurred**
- **Decrease the operating pressure**
- **Add an additional pump to the system**



# WARNING BANNERS

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## *High Setpoint Warning*



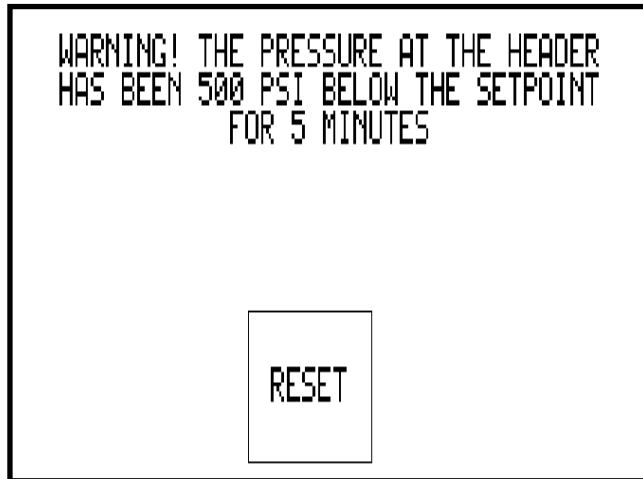
**Pressure at the header has been 2,000 psi (138 bar) above the setpoint for 5 minutes.**

- **Over capacity condition has occurred, too many pumps are running**
- **Header is in a deadhead condition**

# WARNING BANNERS

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## *Low Setpoint Warning*



**Pressure at the header has been 500 psi (34 bar) below the setpoint for 5 minutes.**

- Under capacity, add an addition pump to the system
- Over sized orifices

# INSTALLATION REQUIREMENTS

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## Customer Responsibilities:

- Provide a location for, and install the balancing panel
- Provide and install a 110 VAC power supply to the panel
- Provide and install high pressure water lines from each machine to a header system
- Provide and install a discharge check valve on the outlet of each high pressure line

# INSTALLATION REQUIREMENTS

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## Customer Responsibilities:

- **Install the KMT provided communication cable from the balancing panel to each machine**
- **Install the KMT provided 0-75K pressure transducer and the 0-100 psi pressure gauge**
- **Install the KMT provided 10-foot communication cable from the transducer to the balancing panel**

# INSTALLATION REQUIREMENTS

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## **KMT Waterjet Responsibilities:**

- **Terminate and verify communication cable connections from the panel to each machine**
- **Program the PLCs in each machine to set up the communication interface**
- **Start up and test and the system**

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