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GUIDANCE FOR FLOW COMPUTER SETUP ON THE JET PUMP MOTOR RECIRCULATION FLOW LINE

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Abstract:

This document provides guidance for setting up and operating the flow computer on the PIC skids. The flow computer monitors the flow for the jet pump recirculation line.

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GUIDANCE FOR FLOW COMPUTER SETUP ON THE JET PUMP MOTOR RECIRCULATION FLOW LINE

1. INTRODUCTION

This document provides guidance for the programming, transducer mounting and startup of the flow computer to monitor the recirculation flow on the salt well jet pump. Monitoring of the recirculation flow is for verification that the pump motor has sufficient liquid for cooling the bearings. A portion of the pump's liquid discharge is routed through the pump motor bearing housing to remove heat generated when the motor is running. The routing path is through a half-inch stainless steel tube. Two ultrasonic transducers are mounted to this stainless steel tubing. Coaxial cables run from the two transducers back to the flow computer. The flow computer uses the signal from the transducers to determine the flow. An alarm function on the flow computer activates should the flow drop below a preset level when the pump is running.

2. SCOPE

This guidance only covers the Controlotron 1010 model flow computer and related transducers and mounting hardware. There are three sections to this guidance. Section 1 covers the flow computer initial program setup. Section 2 provides instructions for mounting the two ultrasonic transducers to the stainless steel tubing. Section 3 covers the final setup and operation for flowing monitoring. The field manual for the flow computer is referenced for more detailed information. The data table in the appendix is a summary of the flow computer programming actions that are required.

3. GUIDANCE

SECTION 1: Flow Computer Setup

Chapter 1 of the flow computer field manual provides general instructions for use of the flow computer keypad and menus. It is assumed that the personnel setting up and programming the flow computer have read and are able to navigate through the flow computer menu sets.

Flow Computer programming (initial):

- Go to the "Meter Facilities" menu to set the preferred units to "English", date and time, etc as per the table in the appendix.

- “Clamp on” type needs to be selected in the “Meter Type” menu as shown in the table.
- Go to the following menus and set the parameters as indicated in the table in the appendix.
 - Channel Setup
 - Pipe Data
 - Application Data
 - Flow/Total Units
 - Data Span/Set/Cal
 - Stripchart
 - Datalogger Setup
 - I/O Data Control

SECTION 2: Transducer Installation

- Go to the “Pick/Install” menu. The flow computer will generate a recommended transducer type and mounting method. Record this information so it will be available during transducer mounting. NOTE: If the flow computers recommended transducer type and mounting method are not used, then the selections actually used must be entered into this menu before proceeding with the mounting. Engineering will assist in determining should a change to the flow computer recommendations be made.
- Follow the manufacturer’s recommendations for mounting that are contained in chapter 3 of the field manual, in particular sections 3.1 and 3.4.
- The following are key points to be observed for transducer mounting.
 - Mount the transducers on the sides of the pipe, NOT the top and bottom.
 - Mount the transducers on the BOTTOM portion of the recirculation tube loop. (This is to prevent an empty pipe during no flow conditions.)
 - Follow the vendor’s recommendations for placing coupling compound on the transducers.
 - Reference the skid drawing for shortening the track as needed to fit the tubing run.
- Connect the two coaxial cables to the transducers and to the flow computer. Be sure to that the “Upstream” transducer is at the beginning of the flow direction.
- Return to the “Pick/Install” menu and select “YES” for the “Install Complete?” section. The flow computer will now perform its checks to optimize the installation. NOTE: If a “Direct Mode” method was used for the transducer installation, then the Empty Pipe Set and Zero Flow Adjust routines must be performed. See sections 2.4.9 and 2.4.10 in the field manual for these routines.
- When the flow computer returns a “sonic velocity”, then the settings are completed and flow monitoring is ready.

SECTION 3: Final Steps

- Go to the “Diagnostic Data” menu and under the Test Facilities section select “Graph”. Reference section 2.11.6 in the field manual for assistance. Check for optimal setting of the system on the graph displayed on the screen.
- Return to the flow display. When there is a flow in the recirculation line, a flow reading and a graph of the flow should appear on the screen.
- The “Operational Adjust” menu can be used to make adjustments as necessary for damping control.
- When the pump is placed in the pump pit and waste is circulating through the pump recirculation line, go back to the “Pick/Install” menu and repeat the “Install Complete?” routine. This will optimize for the waste material.
- When the pump is placed in the pump pit and waste is circulating through the pump recirculation line, some adjustments may be required due to the material of the waste. These adjustments would be in the “Applications Data” menu. The “liquid class” could be changed to compensate for the waste material. Could use “sea water” or possible an organic substance selection such as “kerosene” to help improve the readings. NOTE: Any change in the settings of the “Application Data” menu will require going back to the “Pick/Install” menu and repeating the “Install Complete?” routine.

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APPENDIX

FIRST MENU	SECOND MENU	ANSWERS OR THIRD MENU	ANSWERS OR COMMENTS	FIELD MANUAL REF.
FIRST MENU	SECOND MENU	ANSWERS OR THIRD MENU	ANSWERS OR COMMENTS	FIELD MANUAL REF.
METER FACILITIES				
	Preferred Units	English		4.1
	Table Setups			
	Datalogger Control			
	Memory Control			
	Analog Output Trim			
	RTD Calibrate			
	Clock Set	(set to correct date and time)		4.7
	RS-232 Setup			
	Backlight	On		4.9
	System Info			4.10, 4.11
METER TYPE	Single Channel			
		Clamp-on		PG. 1-11, 1-12
CHANNEL SETUP				
	Recall Site Setup			2.1
	Channel Enable			
	Create/Name Site	(U109)	(EX. SITE NAME)	2.1.3
	Site Security		N/A	
	Delete Site Setup			
	Save/Rename Site	(U109)	(EX. SITE NAME)	2.1.6
PIPE DATA				
				2.2
	Select Pipe Class	Manual Entry		2.2.1
	Select Pipe Size			
	Pipe OD	0.5		2.2.3
	Pipe Material	Steel		2.2.4
	Wall Thickness	0.065		2.2.5
	Liner Material		N/A	

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FIRST MENU	SECOND MENU	ANSWERS OR THIRD MENU	ANSWERS OR COMMENTS	FIELD MANUAL REF.
	Liner Thickness		N/A	
APPLICATION DATA				
	Liquid Class	Water 50C/122F*	May try "Others" when used for tank waste	2.3
	Location			
	Temperature Range	(default)		2.3.1
	Pipe Configuration	(field determine by Engineer)		2.3.2
				2.3.3
PICK/INSTALL				
	Transducer Model	1011 Universal		2.4, 3.1, 3.4
	Transducer Size	A1		2.4.1
	Xdcr Mount Mode	?	(Prefer Reflect mode, but can use Direct)	2.4.2
	Spacing Offset	?	(Computer recommends, but can override)	2.4.3
	Number Index	?	(Computer generates value)	2.4.5
	Spacing Method	Track 1012TP		2.4.6
	Ltn Value (in)			
	Install Completed?	Yes	(After transducers installed.)	2.4.7
	Empty Pipe Set		(IF DIRECT MODE IS USED)	2.4.8
	Zero Flow Adjust		(IF DIRECT MODE IS USED)	2.4.9
OPERATIONAL ADJUST				2.4.10
				2.5
	Damping Control	Smartslew (default)		2.5.1
	Deadband Control	Memory		2.5.2
	Memory/Fault Set	?		2.5.3
	Memory Delay (sec)			2.5.3
FLOW/TOTAL UNITS				
	Flow Volume Units	Gallons (US)		2.6
	Flow Time Units	MIN		
	Flow Display Range	Autorange		2.6.1
	Flow Display Scale	GAL/MIN		2.6.2
	Total Volume Units	Gallons (US)		2.6.3
	Totalizer Scale	(default)		2.6.4
	Total Resolution	(default)		2.6.5
				2.6.6
				2.6.7

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FIRST MENU	SECOND MENU	ANSWERS OR THIRD MENU	ANSWERS OR COMMENTS	FIELD MANUAL REF.
DATA SPAN/SET/CAL	Totalizer Mode	NETFLOW		2.6.8
	Batch/Sample Total	(default)		2.6.9
				2.7
	Span Data			2.7.1
		Max Flow	4	
		Min Flow	0	
		Max Vs m/s		
		Min Vs m/x		
	Set Alarm Levels			2.7.2
		High Flow		
STRIPCHART SETUP		Low Flow	0.4	
		Interface Vs m/s		
		Aeration %		
		Makeup Latch		
	Calibrate Flow Rate			N/A
	Calibrate Vs			N/A
	Calibrate Rn			N/A
				2.8
	Select Data	Vfo		2.8.1
	Data Display	(default)		2.8.2
DATALOGGER SETUP	Time Base	5 seconds		2.8.3
	Stripchart Clear			2.8.4
				2.9
	Datalogger Mode	Memory		2.9.1
	Datalogger Data	(+)Site ID		2.9.2, 2.9.4
		(+)Date		
		(+)Time		
		(+)Alarms		
	Log Time Interval	15 seconds		2.9.4
	Datalogger Events	(+)Fault Alarm		
		(+)Empty		
		(+)Aeration		

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FIRST MENU	SECOND MENU	ANSWERS OR THIRD MENU	ANSWERS OR COMMENTS	FIELD MANUAL REF.
	Display Datalogger	(+)Flow Alarm No Line Wrap		2.9.5
I/O DATA CONTROL				2.1
	Analog Out Setup			
	Relay Setup	Relay 1	Low Flow	2.10.2
	Analog Input Setup			
DIAGNOSTIC DATA				2.11
	Energy Data			
	Flow Data	(Check for real time data)		2.11.2
	Application Info			
	Liquid Data			
	Site Setup Data			
	Test Facilities	Makeup	YES (check for optimal setup)	2.11.6
		Graph		
		Tx Up		
		Tx Dn		
		Fixed ALC		
		Tx Up Fixed ALC		
		Tx Dn Fixed ALC		
		Force Transmit		
	Print Site Setup			