ForeSite[®] EDGE

Variable Speed Drive RPC Manual



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	Description	Date
А	Initial Release	December 2020
В		July 2024

I. Purpose

1.1 The purpose of this Running Program (RP) is to install reciprocating rod lift (RRL) VSD at a non-conventional well site.

2. Scope

2.1 This running procedure includes instruction to safely install Weatherford ForeSite EDGE VSD on a conventional pumping unit. A mobile gripper unit, cranes, and suitable well control equipment (rated to 10k) will be used.

3. Site Mobilization of VSD Equipment

3.1 Pass Inspection

4. Safety

- 4.1 Statement of Compliance
- 4.2 Specific hazard identification (JHA) shall be conducted prior to commencing work to determine potential hazards which necessitate the implementation of controls including personal protective equipment (PPE).
- 4.3 Document the JHA using Toolbox Safety Meeting/Job Hazard Analysis Form, list the control measures required to reduce remaining hazards to As Low as Reasonably Practicable (ALARP), and identify the personnel responsible for ensuring the controls are in place.
- 4.4 Communicate the work process and JHA with all personnel during the Toolbox Talk
- 4.5 Field HAZID tools (if applicable) can be used as reference materials, pre-completed JHA's in the field are not permitted due to the dynamic environment.
- 4.6 Employees and sub-contractors, regardless of position or qualification, not only have the right but the obligation to stop any work if conditions are deemed to be unsafe or if a hazardous situation arises.
- 4.7 Management of Change (MOC) applies to this TWI/SOP; deviation is prohibited without authorization from an approved MOC.
- 4.8 Personal Protection Requirements (PPE)
- 4.9 Unless a risk assessment determines the need for additional specialized PPE, the following approved equipment is required; steel-toed footwear, safety glasses/eye wear, hardhat/helmet, gloves suitable for the task, coveralls and hearing protection.
- 4.10 Attain necessary permit to work

5. VSD Installation Location

- 5.1 This location should be leveled, secure, and within close proximity to the motor of the pumping unit.
- 5.2 VSD comes already installed on a skid base. Place the VSD front door or RPC HMI facing the pumping unit motor.



6. Electrical Installation

6.1 VSD cabinet main power inlet and outlet are located on the right side of the VSD.



- 6.2 Ensure the VSD circuit breaker is powered off.
- 6.3 Open the high voltage cabinet to access the terminals for VSD inlet and outlet (motor terminals)





- 6.4 Ensure proper energy isolation on the 3 phase power supply that feeds the VSD before wiring the VSD input and output terminals.
- 6.5 Drill holes and install proper sized glands for power cables inlet and motor cable outlet.
- 6.6 Remove the protective cover on the incoming terminals. Connect the 3 phase power inlet 480Vac/60Hz to the incoming terminals.
- 6.7 Connect the VSD ground bus bar to the earth ground bar.
- 6.8 Remove the protective cover on the outgoing terminals. Motor should be wired to the VSD output terminals in Delta connection. Connect the motor leads to the Outgoing terminals are marked. Motor ground wiring terminal is properly terminated on the VSD end.
- 6.9 Add the protective covers once incoming and outgoing terminal wiring is complete.

7. Rod Pump Controller Sensor Installation – Position Sensor

- 7.1 The inclinometer is an accelerometer-based, angular position sensor. The inclinometer needs to be installed in the vertical place.
- 7.2 To assemble the inclinometer, complete the following steps:
- 7.2.1 Remove the position sensor from its packaging.
- 7.2.2 Connect the sensor to the sensor cable.
- 7.2.3 Assemble the sensor with magnets using the screws provided in the packaging.



7.3 The sensors must be installed perpendicular to the walking beam and above or on the saddle bearing of a conventional rod pumping unit.

Inclinometer Sensor



7.4 Set the brake on the pumping unit by firmly, but gradually, pulling down on the brake lever, located toward the rear of most pumping units.



7.5 Using fall protection, mount the sensor on the walking beam or on the saddle bearing in the orientation perpendicular to the beam. Ensure that the sensor has enough slack in the cable to move freely and unhindered once the unit is operational.



7.6 Use beam clamps with hook and zip tie to fasten the sensor cable along the Samson post closest to the ladder or use beam clamps with hooks to route the cable back to the VSD low voltage cabinet.





- 7.7 Drill holes and install proper glands for load cell and position sensor cable entry into the VSD low voltage cabinet.
- 7.8 Below figure shows the position sensor terminals wiring inside the VSD low voltage cabinet.





- 8. Rod Pump Controller Sensor Installation Load Cell Sensor
 - 8.1 Each polished rod load cell possesses a label that shows the model, serial, and lot numbers, which are useful in identifying each load cell (see below for examples of a 30K, 50K).



8.2 The polished rod load cell is attached to the polished rod of an applicable pumping unit between the polished rod clamps and the carrier bar or hanger (see below Figure).



- 8.3 The installation of the polished rod load cell and cable assembly may require two trained personnel, a crane, and a man lift. Always wear fall protection PPE before attempting to work at heights 6' or greater
- 8.4 Stop the unit and apply LOTO (Lockout, Tagout) and Energy Isolation.
- 8.5 Set the brake on the pumping unit by firmly, but gradually, pulling down on the brake lever, located toward the rear of most pumping units.



8.6 Install the appropriately sized polished rod clamp above the stuffing box

- 8.7 Gradually release the brake and re-energize the prime mover of the pumping unit, allowing the horsehead or load belt to move and separate the carrier bar from the upper polished rod clamps.
- 8.8 Turn off the power to the pumping unit, set the brake.
- 8.9 Mark the location of the top of the existing polished rod clamp, and then remove the upper clamp and any polished rod coupling, if available.



8.10 Remove the pony rod, if applicable, from the top of the polished rod, as well as the polished rod coupling.



8.11 Add the alignment bearing, slide the bearing onto the polished rod, allowing it to come to rest on top of the carrier bar.



8.12 Once the alignment bearing is installed on the polished rod, the load cell should be placed on top with the "UP" directional arrow on the load cell facing up and the connector opening facing toward the pumping unit on most units.





8.13 Reinstall the upper polished rod clamps at a distance that is above the previous polished rod clamp mark, in addition to the total height of the load cell and bearing or bearings.



8.14 Remove the load cell cable assembly from its packaging and unwind the entire cable assembly. The end with the exposed wires should be left close to the VSD low voltage cabinet and the connector end can be placed toward the front end of the pumping unit. The load cell cable used will be blue in color marking intrinsic safe cable.



8.15 Disassemble the load cell connector portion of the cable assembly and apply polytetrafluoroethylene (PTFE) thread tape to the threaded connector.



8.16 Insert the threaded connector into the load cell's threaded opening and tighten by hand and/or using an appropriate wrench. Hand tighten the weather tight cap. The use of tools will over torque the cap and cause damage to the grommet.

8.17 Insert the load cell electrical connector plug into the load cell opening. Ensure the orientation of the protruding pins in the load cell's connector is correct to prevent damage to the pins.



8.18 With the load cell cable's connector firmly inserted into the load cell's connector, tighten the weather tight cap over the grommet onto the threaded connector.



8.19 Load cell cables are assembled and packaged with a thimbled portion to assist with strain relief and that portion must therefore be attached to the S-hook on the load cell's arm. Use channel locks to crimp down on the S-hook once the thimble is inserted. If an S-hook is not provided, one must be added to the larger of the two holes on the load cell's arm.



- 8.20 Route the load cell cable around the front cross member of the Samson post
- 8.21 Install a zip tie or beam clamp with hook on the front cross member, and then create a loop in the cable and attach either around the zip tie or beam clamp.



8.22 Using beam clamps, along the base of the pumping unit, and then install two to three evenly spaced beam clamps with hooks up the Samson post closest to the ladder.



- 8.23 Moving from the top of the unit to the bottom of the unit, use the cable/zip ties to fasten load cell cable along the outline of the pumping unit.
- 8.24 Remove the temporary polished rod clamps using appropriate tooling



8.25 Remove energy isolation equipment and LOTO (Lockout, Tagout)

8.26 Release the brake and inspect the load cell cable to ensure that enough length is available to allow the cable to move freely and unhindered as the head of the pumping unit rises. It may be necessary to reenergize the pumping unit to allow movement of the counterweights. Extreme caution must be taken whenever the unit is energized.



8.27 Below figure shows wiring of load cell cable terminals on the VSD low voltage cabinet.



9. Powering Up the VSD

- 9.1 Remove LOTO (Lockout, Tagout) and energy isolation on the 3 phase power supply that powers the VSD.
- 9.2 Prior to energizing the VSD, open the high voltage cabinet and verify that the line voltage on the inlet phase to phase on top side of the circuit breaker does not exceed 480VAC+3%. If it does, the incoming voltage must be lowered at the utility transformer before the VSD.



9.3 Rotate the external breaker handle clockwise to turn on the VSD and POC, and then energize the pumping unit.



9.4 Verify the Rod Pump Controller HMI powers up and drive digital keypad comes ON.



10. Rotaflex Sensor Connection



II. Weatherford Rod Pump Controller Programming

11.1 Quick Guided Setup Menu- Is a basic menu that is primarily used when initially commissioning well. The Quick Guided Setup Menu is also useful in terms of allowing access to settings that are need regular adjustment.

11.2 QUICK GUIDED SETUP MENU STRUCTURE

10.1 Quick Guided Setup	
II.2.I System Setup Page I	II.2.29VSD Control
11.2.2 Press To Sync HMI Time to RTU	II.2.30SPM Min
II.2.3 Time	II.2.3ISPM Max
11.2.4 Date	II.2.32SPM Start-Up
11.2.5 Idle Time	II.2.33VSD Target Fillage
11.2.6 Gauge Off Time	I I.2.34Min Fillage Action
11.2.7 Pump-Up Delay	I I.2.35 Min Fillage
11.2.8 Power on Restart Delay	I I.2.36Min Fillage Strokes
11.2.9 Sensor Setup	II.2.37Surface Tol%
11.2.10Load Input Source	I I.2.38Downhole Tol%
11.2.11Preset Load Gain	II.2.39Enable
11.2.12Load Input Gain	II.2.40Rotaflex Control
11.2.13Position Input Source	11.2.41 Position Min Input
11.2.14Set Top of Stroke	II.2.42Position Max Input
11.2.15Units	II.2.43Pump on Settling Time
11.2.16Surface Control	II.2.44Sensor Failure Action
II.2.17Pump-Off POS%	II.2.45# Cycles to Average
11.2.18Pump-Off Load%	II.2.46Manual Cycle Runtime
11.2.19Pump-Off Strokes	II.2.47Weatherford Rotaflex Model
II.2.20POC Method	II.2.48STA Enable
II.2.2I Pump Fillage Control	II.2.49Trim Speed Diff
II.2.22VSD Target Fillage	11.2.50Max Trans Speed
II.2.23Pump-Off Position Fillage	11.2.51STA Segment Setup
[Min Fillage]	II.2.52Well Setup
II.2.24Pump-Off Strokes [Min Fillage Stroke]	II.2.53Pump Depth
11.2.25Pump-Off Action [Min Fillage Action]	II.2.54Bore Dia
II.2.26Downhole Enable	II.2.55Fluid Depth
11.2.27POC Control Source	II.2.56Surface Stroke
II.2.28Load Violation Setup	II.2.57Fluid Calc Method
	II.2.58Pump Efficiency
	11.2.59Rod Tapers
	II.2.60Pump Intake Pressure (PIP) Setup
	11.2.618500/Modbus Slave
	11.2.62Modbus Scanner
	11.2.63Save and Restart

12/01/2020 admin	04:53:02	Main Men	u	₩ Weatherford
	View Data		Dynagraph	
	System Setup		Alarms	
[Quick Guided Setup		User Defined	
	Controller Diagnostic		Commands	
	Pump Diagnostic		Well Information	
	Main Clea Menu Alarm	r Pump s On	idle Status Time Screen	

05/15/2024 04:22:5	4 Quick Gui	ded Setup	Weatherford
SYSTEM S	ETUP		
	Press to Sync HMI Time to RTU	HMI Time	05/15/24 - 04:22:49
RPC Time	04:22:54	RPC Date	05/15/24
Idle Time	00:01:26	Pump-Up Delay	00:00:30
Gauge Off Tin (Contract Hou	ne 00:00:00	Power On Restart Delay	00:00:00
	Main Clear Pu Menu Alarms C	ump On Time	Status Screen
	Main Clear Pu Menu Alarms (On Idle Time	Status Screen

05/13/2024 07:19:22	Quick Guided Setup	₩ Weatherford
SENSOR SETU	P	
Load Input Source	Load Cell	
Preset Load Gain	Not Selected	
Load Input Gain	2500.00lb/mV	
Position Input Source	Continuous/Inclinometer/Ro	taflex -
Set Top of Stroke	Manual	Units Imperial
◀ Main Menu	Clear Pump Idle Alarms On Time	Status Screen

11.3 Load Input Source

- Load cell Wired Load cell
- Strain Gauge
- Wireless Load cell
- 11.4 Preset Load Gain Allows to choose the load cell gain. Selected load cell gain will be displayed under Load Input Gain.

Preset Load Gain	Not Selected
	Not Selected
	30K 1500lb/mV
	50K 2500lb/mV
	80K 4000lb/mV
	30K-I 2143lb/mV
	50K-I 3571lb/mV
	80K-I 5714lb/mV

- \circ $\,$ Choose 50K-I for load cell connected to RPOC through IS barriers.
- 11.5 Position Input Source Continuous/Inclinometer/Rotaflex when using inclinometer position sensor or Speed Sentry Aux position kit output on Rotaflex.
- 11.6 To operate VSD, position input source should be Continuos/Inclinometer/Rotaflex.

05/13/2024 07:20:15	Quick Guided Setup	₩ Weatherford
SURFACE CON	TROL	
Pump-Off Pos %	70% POC Method	Quadrant -
Pump-Off Load %	30%	
Pump-Off Strokes	2	
 Main Menu 	Clear Pump Idle Alarms On Time	Status Screen

- 11.7 In case of Surface POC method, choose Quadrant when operating in VSD mode. Well will be controlled in Surface Quadrant pump fillage when downhole control fails.
- 11.8 Pump Fillage Control page is dynamic and below is the screen layout when VSD Enable flag is disabled.

05/13/2024 07:32:45	₩ Weatherford	
PUMP FILLAGE	CONTROL	
Pump-Off Pos Fill	85% Downhole Enable	Enabled •
Pump-Off Strokes	2 Pump-Off Action	Idle Time
Downhole Method	Automatic POC Control Source	Pump Fillage 🗸
Main	Clear Pump Idle Statu Alarms On Time Scree	us

11.9 Source of POC control - Downhole or Surface

- 0 = Surface
- I = Pump Fillage (When DH is enabled)
- 11.10 Downhole Method button allows user to choose the right pump fillage method.
- 11.11 Choose "MI:Order" method for downhole cards that show gas interference and downhole friction.
 - Modified Orders Method for severe downhole friction, fluid acceleration and Rotaflex cards with load drop at bottom of stroke running in racetrack mode.
 - To enable Modified orders method.
 - Choose Downhole Method to MI: Order
 - Start: Top stroke
 - End: Qtr. Point

05/13/2024 08:20:53	Pump F	illage	Diagnos	stics	Weatherford
Pump Fillage M	/lethods	ard Sample	es	Surface	weatherioru
M1: Order	81.42	2 23120			
M2: Loads	84.86	6 18634 –			
M3: Position	83.86	6 9662			
Pump Fillage	84.43	3 5176 <u></u> 0	31	63	94 12
Downhole Method	Automatic ·	8696 -		Downhole	
M1: Orders Metho	d	6309	\int		7
Start	Top Of Stroke -	3922 <u> </u>	}		
End	Qtr. Point	-852 <u> </u>	28	57	85 11
	lain Clear Ienu Alarms	Pump On	ldle Time	Refresh	

11.12 Pump Fillage Control page changes to below layout when VSD enable flag is enabled by the drive model under VSD CONTROL page.

05/13/2024 07:30:23 Quick Guided Setup			Weatherford [®]
PUMP FILLAGE	CONTROL		
VSD Target Fillage	85%	Downhole Enable	Enabled -
Pump-Off Position Fillage [Min Fillage]	70%		
Pump-Off Strokes [Min Fillage Strokes]	2	Pump-Off Action [Min Fillage Action]	7
Downhole Method	M1:Order P	OC Control Source	Pump Fillage 🛓
◀ Main Menu	Clear Pump Alarms On	Idle Status Time Screen	

- 11.13 VSD Target fillage Well speed controlled between Min SPM and Max SPM based on the target fillage/
- 11.14 Pump Off Position Fillage When fillage drops below pump off position for the pump off strokes, well can be stopped on idle time and started back by setting pump-off action to4 = Idle time.
- 11.15 Downhole Enable Allows to enable downhole calculation based on the downhole information entered (well depth and rod string information).
- 11.16 POC Control Source
 - Surface Fillage Control the well pump off from Surface Pump-Off Pos & Pump-Off Load in case of fixed speed or standard operation. Control well speed from surface fillage when VSD is enabled.

 Pump Fillage – Control the well pump off from Pump-Off Position Fillage in case of fixed speed or standard operation. Control well speed from VSD Target fillage when VSD is enabled.

05/13/2024 09:36:3	³ Quick Guided Setup	₩ Weatherford	
LOAD VIO	LATION SETUP		
HIGH-HIG	H LOAD LIMIT		
Limit	0 lb Load Last Stroke	22515 lb	
	Load Since Cycle Start	22722 lb	LOAD VIOLATION SETUP
Action 1	3 Load Since Power-Up	23482 lb	HIGH-HIGH LOAD LIMIT → HIGH-HIGH LOAD LIMIT
Action 2	7	Card Area	HIGH LOAD LIMIT LOW LOAD LIMIT
	Main Clear Pump Idle St Menu Alarms On Time Sc	atus	LOW-LOW LOAD LIMIT MINIMUM LOAD SPAN MINIMUM AVERAGE LOAD

- 11.17 High-High Load Limit Well shutdowns on Off/Reset when load value goes above the limit set under High-High Load limit page.
- 11.18 Load Last Stroke, Load Since Cycle Start and Load Since Power up shows the peak load captured.
- 11.19 High Load Limit Well keeps running with RPOC fault lamp ON when value goes above the limit set under High Load Limit page.
- 11.20 Low Load Limit Well keeps running with RPOC fault lamp ON when value goes below the limit set under High Load Limit page.
- 11.21 Low-Low Load Limit Well shutdowns on Off/Reset when load value goes below the limit set under High-High Load limit page.
- 11.22 Load Last Stroke, Load Since Cycle Start and Load Since Power up shows the minimum load captured.
- 11.23 Minimum Load Span Allows to detect malfunctioning downhole pump valves.
- 11.24 Card Area Allows to detect delayed travelling valve closure and pump issues.



ACTIONS					3
0=Lamp Only 1=Soft Time 2=Cntl Xfer	ELamp Only 8=Pulse DO1 Soft Time 9=Pulse DO2 Cntl Xfer 10=DO1 Off Off/Reset 11=DO2 Off Idle Time 12=DO1 On Idle+Alm 13=DO2 On Start Pump x6=Pulse DOx No Action x7=DOX Off	1	2	3	+
3=Off/Reset 4=Idle Time		4	5	6	-
6=Start Pump 7=No Action		7	8	9	Esc
	x8=DOx On	•	0	En	ter

05/13/2024 09:49:52	Quick Guid	Weatherford [®]		
VSD CONTROL				
SPM Min	2.00	Surface Tole	erance	5 %
SPM Max	6.90	Downhole T	olerance	5 %
SPM Startup	4.30	Enable	Disabled	•
VSD Target Fillage	85%	Min Fillage		70 %
Min Fillage Action	7	Min Fillage	Strokes	2
◀ Main Menu	Clear Pum Alarms On	ip Idle Time	Status Screen	

11.25 VSD Enable (PI250) • 1 = WFT VSD



05/13/2024 09:53:14	Quick C	Guided Setup	₩ Weatherford
ROTOFLEX	CONTROL		
Position Min Input	-0.250∨	Sensor Failure Action	3=Off/Reset
Position Max Input	8.000∨	# Cycles to Average	6
Pump On Settling Time	120sec	Manual Cycle Runtime	00:00:00
Weatherfor	d Rotaflex Model	1 = RF700 / 700-EX	< -
STA Enable	Disable -		
Trim Speed Diff	0.5	STA Segmen Setup	t
Max Trans Speed	3		
	ain Clear enu Alarms	Pump idle S On Time S	Status Screen

11.26 Rotaflex Control Page – Above page setup can be skipped for beam pumps

12/01/2020 06:18:22 admin	Quick Guided Setup	Weatherford [®]
WELL SETUP		
Pump Depth	5070.00 ft Surface Stroke	125.50 in
Bore Diam	1.50 in Fluid Calc Method	Downhole -
Fluid Depth	4700.00 ft Pump Efficiency	80.0 %
Main Menu	Clear Pump Idle Sta Alarms On Time Scr	een

11.27 Fluid Stroke Calculation Method

0= Disabled

- 1 = Short Method (Used in surface control)
- 2 = Long Method (used in surface control)
- 3 = Downhole stroke (Should be set when downhole enabled)

05/13/2024 10:08:56	Quick Guided Setup	Weatherford	Rod Taper Setup
Rod Taper Set	up.	vygaliigi ivi u	Rod Taper 1 -
Rod Taper 1			Rod Taper 1
	_		Rod Taper 2
Rod Type	Steel - Pump Depth	5070.00 ft	Rod Taper 3
			Rod Taper 4
Rod Count	68 Total Rod Length	5050.00 ft	Rod Taper 5
Rod Diameter	1 000 in		Rod Taper 6
Rod Diameter	1.000		Rod Taper 7
Rod Length	25.00 ft	Total Rod	Rod Taper 8
		Tapero	Rod Taper 9
Main Menu	Clear Pump Idle Sta Alarms On Time Scr	een	Rod Taper 10

*

11.28 Total Rod Tapers screen shows the complete list of each rod tapers with count, diameter, length and total Rod Length of each taper.

05/13/2024 10:0	08:27	²⁷ Total Rod Tapers					ord
Page 1/4						WGGLIIGI I	UI U
Pump Depth	5070	5070.00 ft		Total Rod Length		5050.00	ft
Rod Taper	Rod Count	Rod Diameter		Rod Length	Т	otal Rod Leng	gth
1	68	1.000	in	25.00	ft	1700.00	ft
2	68	0.875	in	25.00	ft	1700.00	ft
3	66	0.750	in	25.00	ft	1650.00	ft
4	0	0.000	in	0.00	ft	0.00	ft
5	0	0.000	in	0.00	ft	0.00	ft
	Main Menu	Clear Pun Alarms Or	np 1	Idle S Time S	Status Screei	n 🕨	

11.29 Alert pop-up will show up when total rod length exceeds the pump depth. Verify each taper inputs with the well design downhole information.



- 11.30 Tubing pressure and casing pressure transmitters analog points can be reference under AI selection.
- 11.31 Example: Tubing pressure is connected to RPOC AII, set AI selection to AII.
- 11.32 If the location doesn't have a transmitter and has a murphy gauge, then set the AI selection to override and under Override value enter the manual gauge value read at field site.
- 11.33 Fluid Load Factor is a manual input that represents the fluid load taken into PIP calculation considering downhole friction.

Main

Menu

Clear

Alarms

12/01/2020 17:44:49 admin	Quick Gui	Quick Guided Setup					
8500/MODBUS	SLAVE						
Address	1	Line Mode	RS232 -				
Data Format	8D 1S 🛛 -	Port	Serial -				
Baud Rate	19.2k •	Radio ON Delay	0				
Protocol	8500 -	Radio OFF Delay	0				
12/01/2020 17:45:39 admin	Quick Gui	ded Setup	₩ Weatherford				
MODBUS SCA			weather for u				
Stop Bits	1 Stop Bit -	Line Mode	RS485 -				
Data Format	8 Data Bit -	Radio ON Delay	2				
Baud Rate	9600 -	Radio OFF Delay	2				
Protocol	RTU -						

12/01/2020 17:50:20 admin	Quick	Guided Setup	Weatherford
SAVE AND RE	START		
System Save requ	ired after co	mpleting Quick Guided Se	etup.
Force Save		Data save comple	ete.
After System Save	e is complete	e, perform RPOC Software Commuication between the RPOC temporarily be lost during the RPC Reset is complete when communi	e Reset. : and HMI will C Software Reset. :ation is restored.
Main	Clear	Pump	Status

Or

Status

Screen

12. Weatherford VSD Programming

12.1 Below figure shows the Weatherford A1000 & U1000 model VSD's keypad

DIGITAL OPERATOR JVOP-18	00 MILLING
- MODE - Fref Ref (A	DRV Rdy
U1-02 0.00Hz U1-03 0.00A JOG FWD	RSEQ RREF
F1	F2
	and the second
ESC	LO RE
ESC A PRESET V	

1.1.1 Begin by accessing the programming menu, using the Up Arrow key (), followed by the ENTER key ().

- MODE - PRG	-PRMSET- PRG
Programming	
	A1-01= 2 *2*
	Select Language
HELP FWD DATA	\leftarrow FWD \rightarrow

1.1.2 Use the RESET key (and the Up Arrow key to first perform a two-wire initialization of the VSD.

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1.1.3 Locate the motor name plate from the motor in use. Access the Auto-Tuning menu by pressing the ESC key () until the main menu displays, and then using the Up Arrow key, followed by the ENTER key. Enter the values located in **Error! Reference source not found.** in Section **Error! Reference source not found.** Additional Resources for the T parameters using the data found on the motor name plate.

12.2 It may be helpful to take a photograph of the name plate for reference (see example reference)

A1000				
AUTO TUNE AFTER VSD IS SET UP			AUTO TUNE	
T1-01	1	1	TUNING MODE/W/ BELTS ON	
T1-02	KW	KW	HP X 0.746=KW	
T1-03	**	**	RATED VOLTAGE	
T1-04	AMPS	AMPS	GET OFF OF MOTOR PLATE	
T1-05	50	50	HERTZ	
T1-06	**	**	# of poles = (Hz X 120)/ revolutions per minute (RPM)	
T1-07	RPM	RPM	GET OFF OF MOTOR PLATE	
	HIT RUN	I FOR AUTO TU	JNE	

** - Enter information from Motor plate

VFD Programming Menu (settings to be changed)					
	CONVENTIONAL	ROTAFLEX			
B1-03	1	1	MOTOR STOPPING METHOD		
C1-01	5	3	MOTOR ACCELERATION TIME		
C1-02	5	3	MOTR DECELERATION TIME		

SLIP FREQUENCY(F- base frequency, n-motor rpm, p - motor (Motor E2-03 (F-(n*p)/120) poles) (Motor FLA)/3 FLA)/3 MOTOR NO LOAD CURRENT H1-05 4 4 AUTO SWITCH INPUT H2-01 E E DIGITAL OUTPUT M1-M2 FUNCTION H2-02 E E DIGITAL OUTPUT M3-M4 FUNCTION H2-03 NA 37 RPC SPEED GAIN (ANALOG 1) H3-03 100 100 HAND MODE SPEED GAIN (ANALOG 1) H3-03 100 100 HAND MODE SPEED GAIN (ANALOG 2) H4-01 109 109 FM ANALOG OUT H5-06 15 15 TRANSMIT WAIT TIME H5-01 7 7 RTU ADDRESS H5-01 1 1 POWER LOSS RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-02 100 100 MAX REV TORQUE (COUNTER - CLOCK WISE CRANK ROTATION)	E1-04	90	90	MOTOR MAX SPEED (Set 1.5* Motor Hertz, 1.5*60 =90Hz)
E2-02 (f-(n*p)/120) (f-(n*p)/120) poles) (Motor FLA)/3 (Motor FLA)/3 MOTOR NO LOAD CURRENT H1-05 4 4 AUTO SWITCH INPUT H2-01 E E DIGITAL OUTPUT M3-M4 FUNCTION H2-02 E E DIGITAL OUTPUT M3-M4 FUNCTION H2-03 NA 37 1B823-0X80) H3-03 100 100 HAND MODE SPEED GAIN (ANALOG 1) H3-03 3 RPOC SPEED REFERENCE (ANALOG 2) H4-01 109 109 FM ANALOG OUT H5-06 15 15 TRANSMIT WAIT TIME H5-01 7 7 RTU ADDRESS H5-02 2.1 2.1 RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH L2-03 1 1 POWER LOSS RIDETHROUGH L2-04 1 1 POWER LOSS NIDETHROUGH L2-05 0 NO OF STARTS L7-01 L7-03 15 100 MAX REV TORQUE (COUNTER - CLOCK WISE CRANK ROTATI				SLIP FREQUENCY(f- base frequency, n-motor rpm, p - motor
E2-03 (Motor FLA)/3 FLA)/3 MOTOR NO LOAD CURRENT H1-05 4 4 AUTO SWITCH INPUT H2-01 E E DIGITAL OUTPUT M3-MA FUNCTION H2-02 E E DIGITAL OUTPUT M3-MA FUNCTION H2-03 NA 37 IBB23-0X80) H3-03 100 100 HAND MODE SPEED GAIN (ANALOG 1) H3-10 3 3 RPOC SPEED REFERENCE (ANALOG 2) H3-01 10 100 HAND MODE SPEED GAIN (ANALOG 1) H3-10 3 3 RPOC SPEED REFERENCE (ANALOG 2) H3-10 1 7 RTU ADDRESS H5-06 15 15 TRANSMIT WAIT TIME H5-11 1 1 COMMUNICATION ENTER FUNCTION L2-01 1 1 POWER LOSS RIBETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-01 100 100 MAX REV TORQUE (COUNTER - CLOCK WISE CRANK ROTATION) L7-03 15 <td>E2-02</td> <td>(f-(n*p)/120)</td> <td>(f-(n*p)/120)</td> <td>poles)</td>	E2-02	(f-(n*p)/120)	(f-(n*p)/120)	poles)
E2-03 (Motor FLA)/3 FLA)/3 MOTOR NO LOAD CURRENT H1-05 4 4 AUTO SWITCH INPUT H2-01 E E DIGITAL OUTPUT M1-M2 FUNCTION H2-02 E E DIGITAL OUTPUT M3-M4 FUNCTION H2-03 NA 37 1B823-0800) H3-03 100 100 HAND MODE SPEED GAIN (ANALOG 1) H3-10 3 3 RPOC SPEED REFERENCE (ANALOG 2) H4-01 109 109 FM ANALOG OUT H5-06 15 15 TRANSMIT WAIT TIME H5-11 1 1 COMMUNICATION ENTER FUNCTION L2-01 1 1 POWER LOSS RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO GF STARTS L7-01 100 100 MAX REV TORQUE (CLOCK WISE CRANK ROTATION) L7-03 15 100 MAX BRAING (CLOCK WISE CRANK ROTATION) L7-04 15 100 MAX BRAING (CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 <t< td=""><td></td><td></td><td>(Motor</td><td></td></t<>			(Motor	
H1-05 4 4 AUTO SWITCH INPUT H2-01 E E DIGITAL OUTPUT M1-M2 FUNCTION H2-02 E E DIGITAL OUTPUT M3-MA FUNCTION H2-03 NA 37 IBB23-0X80) H3-03 100 100 HAND MODE SPEED GAIN (ANALOG 1) H3-10 3 3 RPOC SPEED REFERENCE (ANALOG 2) H4-01 109 109 FM ANALOG OUT H5-06 15 15 TRANSMIT WAIT TIME H5-11 1 COMMUNICATION ENTER FUNCTION 12-01 L2-01 1 1 POWER LOSS RIDETHROUGH 12-02 L2-11 11 POWER LOSS RIDETHROUGH 12-02 2.1 2.1 L2-01 1 1 POWER LOSS RIDETHROUGH 12-02 100 100 MAX REV TORQUE (CLOCK WISE CRANK ROTATION) L2-01 1 1 POWER LOSS RIDETHROUGH 12-02 100 100 MAX REV TORQUE (CLOCK WISE CRANK ROTATION) L2-02 2.1 2.1 RIDETHROUGH TIME 15 <td< td=""><td>E2-03</td><td>(Motor FLA)/3</td><td>FLA)/3</td><td>MOTOR NO LOAD CURRENT</td></td<>	E2-03	(Motor FLA)/3	FLA)/3	MOTOR NO LOAD CURRENT
H2-01 E DIGITAL OUTPUT M1-M2 FUNCTION H2-02 E E DIGITAL OUTPUT M3-M4 FUNCTION H2-03 NA 37 18623-0X80) H3-03 100 100 HAND MODE SPEED GAIN (ANALOG 1) H3-10 3 3 RPOC SPEED GAIN (ANALOG 2) H4-01 109 109 FM ANALOG OUT H5-06 15 15 TRANSMIT WAIT TIME H5-06 15 15 TRANSMIT WAIT TIME H5-01 7 7 RTU ADDRESS H5-02 2.1 2.1 RIDETHROUGH TIME L2-01 1 1 POWER LOSS RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-02 100 100 MAX FWD TORQUE (COCK WISE CRANK ROTATION) L7-02 100 100 MAX BRAKING TRANSISTOR L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING	H1-05	4	4	AUTO SWITCH INPUT
H2-02 E E DIGITAL OUTPUT M3-M4 FUNCTION M3-M6 /ROTAFLEX - POWER CYCLE SPEED SENTRY AUX POS PLC KIT (ONLY ON OLD AUX POSITION KIT model - 6ES7 212- 18823-0X80) H3-03 100 100 HAND MODE SPEED GAIN (ANALOG 1) H3-01 3 3 RPOC SPEED REFERENCE (ANALOG 2) H4-01 109 109 FM ANALOG OUT H5-06 15 15 TRANSMIT WAIT TIME H5-11 1 1 COMMUNICATION ENTER FUNCTION L2-01 1 1 POWER LOSS RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-02 100 100 MAX REV TORQUE (COUNTER - CLOCK WISE CRANK ROTATION) L7-03 15 100 Max Braking (CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L7-04 15 <td>H2-01</td> <td>E</td> <td>E</td> <td>DIGITAL OUTPUT M1-M2 FUNCTION</td>	H2-01	E	E	DIGITAL OUTPUT M1-M2 FUNCTION
M5-M6 / ROTAFLEX - POWER CYCLE SPEED SENTRY AUX POS PLC KIT (ONLY ON OLD AUX POSITION KIT model - 6ES7 212- 1823-0X80) H3-03 100 100 HAND MODE SPEED GAIN (ANALOG 1) H3-03 100 100 HAND MODE SPEED GAIN (ANALOG 1) H3-01 3 3 RPOC SPEED REFERENCE (ANALOG 2) H4-01 109 109 FM ANALOG OUT H5-06 15 15 TRANSMIT WAIT TIME H5-11 1 1 COMMUNICATION ENTER FUNCTION L2-01 1 1 POWER LOSS RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-01 100 100 MAX REV TORQUE (CLOCK WISE CRANK ROTATION) L7-02 100 100 MAX BRAKING TRANSISTOR L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 UI-01 DI	H2-02	E	E	DIGITAL OUTPUT M3-M4 FUNCTION
PLC KIT (ONLY ON OLD AUX POSITION KIT model - 6ES7 212- 18B23-0X80) H3-03 100 100 HAND MODE SPEED GAIN (ANALOG 1) H3-10 3 RPOC SPEED REFERENCE (ANALOG 2) H4-01 109 109 FM ANALOG OUT H5-01 7 7 RTU ADDRESS H5-06 15 15 TRANSMIT WAIT TIME H5-01 1 1 COMMUNICATION ENTER FUNCTION L2-01 1 1 POWER LOSS RIBETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-01 100 100 MAX FWD TORQUE (CLOCK WISE CRANK ROTATION) L7-02 100 100 MAX BRAKING (CLOCK WISE CRANK ROTATION) L7-03 15 100 Max Braking (CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10				M5-M6 /ROTAFLEX - POWER CYCLE SPEED SENTRY AUX POS
H2-03 NA 37 1BB23-0XB0) H3-03 100 100 HAND MODE SPEED GAIN (ANALOG 1) H3-10 3 3 RPOC SPEED REFERENCE (ANALOG 2) H4-01 109 109 FM ANALOG OUT H5-01 7 7 RTU ADDRESS H5-06 15 15 TRANSMIT WAIT TIME H5-11 1 1 COMMUNICATION ENTER FUNCTION L2-01 1 1 POWER LOSS RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-02 100 100 MAX REV TORQUE (CLOCK WISE CRANK ROTATION) L7-03 15 100 MAX BRAKING (COUNTER - CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1				PLC KIT (ONLY ON OLD AUX POSITION KIT model - 6ES7 212-
H3-03 100 100 HAND MODE SPEED GAIN (ANALOG 1) H3-03 3 RPOC SPEED REFERENCE (ANALOG 2) H4-01 109 109 FM ANALOG OUT H5-01 7 7 RTU ADDRESS H5-06 15 15 TRANSMIT WAIT TIME H5-11 1 1 COMMUNICATION ENTER FUNCTION L2-01 1 1 POWER LOSS RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-01 100 100 MAX FWD TORQUE (CLOCK WISE CRANK ROTATION) MAX REV TORQUE (COUNTER - CLOCK WISE CRANK ROTATION) NO OF STARTS L7-02 100 100 MAX REV TORQUE (COUNTER - CLOCK WISE CRANK ROTATION) L7-03 15 100 Max Braking (CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 U1-01 DISPLAY UNIT DECIMAL DISPLAY 01-11 1 1 U1-01 DISPLAY UNIT DECIMAL DISPLAY <	H2-03	NA	37	1BB23-0XB0)
H3-10 3 3 RPOC SPEED REFERENCE (ANALOG 2) H4-01 109 109 FM ANALOG OUT H5-06 15 15 TRANSMIT WAIT TIME H5-06 15 15 TRANSMIT WAIT TIME H5-11 1 1 COMMUNICATION ENTER FUNCTION L2-01 1 1 POWER LOSS RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-01 100 100 MAX FWD TORQUE (COUNTER - CLOCK WISE CRANK ROTATION) L7-02 100 100 MAX REV TORQUE (COUNTER - CLOCK WISE CRANK ROTATION) L7-03 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1 11 U1-01 DISPLAY UNIT DECIMAL DISPLAY P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 A1 SPEED REF<	H3-03	100	100	HAND MODE SPEED GAIN (ANALOG 1)
H4-01 109 109 FM ANALOG OUT H5-01 7 7 RTU ADDRESS H5-06 15 15 TRANSMIT WAIT TIME H5-11 1 1 COMMUNICATION ENTER FUNCTION L2-01 1 1 POWER LOSS RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-01 100 100 MAX FWD TORQUE (CLOCK WISE CRANK ROTATION) W ROTATION) ROTATION) ROTATION) L7-02 100 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L7-03 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 U1-01 DISPLAY (900 IF E1-04 = 90Hz) 01-11 1 1 U1-01 DISPLAY (900 IF E1-04 = 90Hz) 01-11 1 1 U1-01 DISPLAY (900 IF E1-04 = 90Hz) 01-11 1 1 U1-01 DISPLAY (900 IF E1-04 = 90Hz)	H3-10	3	3	RPOC SPEED REFERENCE (ANALOG 2)
H5-01 7 RTU ADDRESS H5-06 15 15 TRANSMIT WAIT TIME H5-11 1 1 COMMUNICATION ENTER FUNCTION L2-01 1 1 POWER LOSS RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-01 100 100 MAX FWD TORQUE (CLOCK WISE CRANK ROTATION) MAX REV TORQUE (COUNTER - CLOCK WISE CRANK ROTATION) L7-02 100 100 ROTATION) L7-03 15 100 Max Braking (CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1 1 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1 1 U1-01 DISPLAY (900 IF E1-04 =90Hz) P1-07 5 0 SPEED/TORQUE RESTARTS P3-03 1	H4-01	109	109	FM ANALOG OUT
H5-06 15 15 TRANSMIT WAIT TIME H5-11 1 1 COMMUNICATION ENTER FUNCTION L2-01 1 1 POWER LOSS RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-01 100 100 MAX FWD TORQUE (CLOCK WISE CRANK ROTATION) L7-02 100 100 MAX REV TORQUE (COUNTER - CLOCK WISE CRANK L7-02 100 100 ROTATION) L7-03 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 U1-01 DISPLAY (90 IF E1-04 =90Hz) 01-11 1 U1-01 DISPLAY UNIT DECIMAL DISPLAY P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 A1 SPEED REF HARMOVIC FILTER ON FRONT END HARMOVIC FILTER ON FRONT END <td>H5-01</td> <td>7</td> <td>7</td> <td>RTU ADDRESS</td>	H5-01	7	7	RTU ADDRESS
H5-11 1 COMMUNICATION ENTER FUNCTION L2-01 1 1 POWER LOSS RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-01 100 100 MAX FWD TORQUE (CLOCK WISE CRANK ROTATION) MAX REV TORQUE (COUNTER - CLOCK WISE CRANK MAX REV TORQUE (COUNTER - CLOCK WISE CRANK L7-02 100 100 ROTATION) L7-03 15 100 Max Braking (CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1 U1-01 DISPLAY UNIT DECIMAL DISPLAY P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 Vait between restarts P3-03 1 1 A1 SPEED REF HARMONIC FILTER ON FRONT END Incruit L4-01 8 8 in circuit IL4-02 5 <t< td=""><td>H5-06</td><td>15</td><td>15</td><td>TRANSMIT WAIT TIME</td></t<>	H5-06	15	15	TRANSMIT WAIT TIME
L2-01 1 1 POWER LOSS RIDETHROUGH L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-01 100 100 MAX FWD TORQUE (CLOCK WISE CRANK ROTATION) MAX REV TORQUE (COUNTER - CLOCK WISE CRANK ROTATION) MAX REV TORQUE (COUNTER - CLOCK WISE CRANK ROTATION) L7-02 100 100 ROTATION) L7-03 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1 U1-01 DISPLAY (900 IF E1-04 =90Hz) P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 A1 SPEED REF HARMONIC FILTER ON FRONT END V Pump Jack Rotaflex L	H5-11	1	1	COMMUNICATION ENTER FUNCTION
L2-02 2.1 2.1 RIDETHROUGH TIME L5-01 5 0 NO OF STARTS L7-01 100 100 MAX FWD TORQUE (CLOCK WISE CRANK ROTATION) MAX REV TORQUE (COUNTER - CLOCK WISE CRANK MAX REV TORQUE (COUNTER - CLOCK WISE CRANK L7-02 100 100 ROTATION) L7-03 15 100 Max Braking (CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 U1-01 DISPLAY (900 IF E1-04 = 90Hz) 01-11 1 1 U1-01 DISPLAY (900 IF E1-04 = 90Hz) 01-11 1 1 U1-01 DISPLAY (NIT DECIMAL DISPLAY P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 Wait between restarts P3-03 1 1 A1 SPEED REF HARMONIC FILTER ON FRONT END L4-01 8 8 in circuit L4-01 8 5	L2-01	1	1	POWER LOSS RIDETHROUGH
L5-01 5 0 NO OF STARTS L7-01 100 100 MAX FWD TORQUE (CLOCK WISE CRANK ROTATION) L7-02 100 100 ROTATION) L7-03 15 100 Max Braking (CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1 U1-01 DISPLAY (900 IF E1-04 =90Hz) P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 Wait between restarts P3-03 1 1 A1 SPEED REF HARMONIC FILTER ON FRONT END L4-01 8 8 in circuit	L2-02	2.1	2.1	RIDETHROUGH TIME
L7-01 100 100 MAX FWD TORQUE (CLOCK WISE CRANK ROTATION) L7-02 100 100 ROTATION) L7-03 15 100 Max Braking (CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1 U1-01 DISPLAY (900 IF E1-04 =90Hz) P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 Max Breking CLOUR RESTARTS P3-03 1 1 A1 SPEED REF HARMONIC FILTER ON FRONT END I4-01 8 8 in circuit <	L5-01	5	0	NO OF STARTS
L7-02 100 100 ROTATION) L7-03 15 100 Max Braking (CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR O1-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) O1-11 1 1 U1-01 DISPLAY (900 IF E1-04 =90Hz) O1-11 1 1 U1-01 DISPLAY UNIT DECIMAL DISPLAY P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 Max Speed Restarts P3-03 1 1 A1 SPEED REF HARMONIC FILTER ON FRONT END Pump Jack Rotaflex L4-01 8 8 14-02 5 5 DO will open when speed (L4-01) minus (L4-02) is detected H2-03 5 5 DO closes when speed set in L4-01 is detected	L7-01	100	100	MAX FWD TORQUE (CLOCK WISE CRANK ROTATION)
L7-02 100 100 ROTATION) L7-03 15 100 Max Braking (CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1 U1-01 DISPLAY UNIT DECIMAL DISPLAY P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 Wait between restarts P3-03 1 1 A1 SPEED REF HARMONIC FILTER ON FRONT END Pump Jack Rotaflex Speed detection level to close DO to bring the harmonic caps in circuit L4-01 8 8 in circuit L4-02 5 5 DO will open when speed (L4-01) minus (L4-02) is detected H2-03 5 5 DO closes when speed set in L4-01 is detected				MAX REV TORQUE (COUNTER - CLOCK WISE CRANK
L7-03 15 100 Max Braking (CLOCK WISE CRANK ROTATION) L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR 01-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1 1 U1-01 DISPLAY (900 IF E1-04 =90Hz) 01-11 1 1 U1-01 DISPLAY UNIT DECIMAL DISPLAY P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 Wait between restarts P3-03 1 1 A1 SPEED REF HARMONIC FILTER ON FRONT END L4-01 8 8 in circuit L4-02 5 5 V205 5 DO will open when speed (L4-01) minus (L4-02) is detected H2-03 5 5 DO closes when speed set in L4-01 is detected	L7-02	100	100	ROTATION)
L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR O1-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) O1-11 1 U1-01 DISPLAY UNIT DECIMAL DISPLAY P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 Wait between restarts P3-03 1 1 A1 SPEED REF HARMONIC FILTER ON FRONT END Pump Jack Rotaflex L4-01 8 8 14-02 5 5 DO will open when speed (L4-01) minus (L4-02) is detected H2-03 5 5 DO closes when speed set in L4-01 is detected	L7-03	15	100	Max Braking (CLOCK WISE CRANK ROTATION)
L7-04 15 100 Max Braking (COUNTER - CLOCK WISE CRANK ROTATION) L8-55 0 0 INTERNAL BRAKING TRANSISTOR O1-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) O1-11 1 U1-01 DISPLAY (900 IF E1-04 =90Hz) O1-11 1 U1-01 DISPLAY UNIT DECIMAL DISPLAY P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 Wait between restarts P3-03 1 1 A1 SPEED REF HARMONIC FILTER ON FRONT END Pump Jack Rotaflex L4-01 8 8 L4-02 5 5 DO will open when speed (L4-01) minus (L4-02) is detected H2-03 5 5 DO closes when speed set in L4-01 is detected				
L8-55 0 0 INTERNAL BRAKING TRANSISTOR O1-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) O1-11 1 U1-01 DISPLAY UNIT DECIMAL DISPLAY P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 Wait between restarts P3-03 1 1 A1 SPEED REF HARMONIC FILTER ON FRONT END Pump Jack Rotaflex L4-01 8 8 I4-02 5 5 DO will open when speed (L4-01) minus (L4-02) is detected H2-03 5 5 DO closes when speed set in L4-01 is detected	L7-04	15	100	Max Braking (COUNTER - CLOCK WISE CRANK ROTATION)
O1-10 900 900 U1-01 DISPLAY (900 IF E1-04 =90Hz) O1-11 1 U1-01 DISPLAY UNIT DECIMAL DISPLAY P1-07 5 0 SPEED/TORQUE RESTARTS P3-01 1 1 Wait between restarts P3-03 1 1 A1 SPEED REF HARMONIC FILTER ON FRONT END Pump Jack Rotaflex Speed detection level to close DO to bring the harmonic caps in circuit L4-01 8 8 H2-03 5 5 DO will open when speed (L4-01) minus (L4-02) is detected	L8-55	0	0	INTERNAL BRAKING TRANSISTOR
O1-111U1-01 DISPLAY UNIT DECIMAL DISPLAYP1-0750SPEED/TORQUE RESTARTSP3-0111Wait between restartsP3-0311A1 SPEED REFHARMONIC FILTER ON FRONT ENDSpeed detection level to close DO to bring the harmonic caps in circuitL4-0188H2-0355DO will open when speed (L4-01) minus (L4-02) is detected	01-10	900	900	U1-01 DISPLAY (900 IF E1-04 =90Hz)
P1-0750SPEED/TORQUE RESTARTSP3-0111Wait between restartsP3-0311A1 SPEED REFHARMONIC FILTER ON FRONT ENDImage: Speed detection level to close DO to bring the harmonic capsL4-0188L4-0255DO will open when speed (L4-01) minus (L4-02) is detectedH2-0355	01-11	1	1	U1-01 DISPLAY UNIT DECIMAL DISPLAY
P3-0111Wait between restartsP3-0311A1 SPEED REFHARMONIC FILTER ON FRONT ENDUPUMP JackRotaflexPump JackRotaflexSpeed detection level to close DO to bring the harmonic capsL4-0188L4-0255DO will open when speed (L4-01) minus (L4-02) is detectedH2-0355	P1-07	5	0	SPEED/TORQUE RESTARTS
P3-0111Wait between restartsP3-0311A1 SPEED REFHARMONIC FILTER ON FRONT ENDSpeed detection level to close DO to bring the harmonic capsL4-0188L4-0255DO will open when speed (L4-01) minus (L4-02) is detectedH2-0355				
P3-0111Wait between restartsP3-0311A1 SPEED REFHARMONIC FILTER ON FRONT ENDPump JackRotaflexPump JackSpeed detection level to close DO to bring the harmonic capsL4-0188L4-0255DO will open when speed (L4-01) minus (L4-02) is detectedH2-0355				
P3-0311A1 SPEED REFHARMONIC FILTER ON FRONT ENDPump JackRotaflexPump JackSpeed detection level to close DO to bring the harmonic capsL4-0188L4-0255DO will open when speed (L4-01) minus (L4-02) is detectedH2-0355	P3-01	1	1	Wait between restarts
HARMONIC FILTER ON FRONT ENDPump JackRotaflexL4-01Speed detection level to close DO to bring the harmonic caps in circuitL4-0255H2-0355DO will open when speed (L4-01) minus (L4-02) is detectedH2-0355DO closes when speed set in L4-01 is detected	P3-03	1	1	A1 SPEED REF
Pump JackRotaflexL4-018Speed detection level to close DO to bring the harmonic caps in circuitL4-0255DO will open when speed (L4-01) minus (L4-02) is detectedH2-0355DO closes when speed set in L4-01 is detected			HARMO	ONIC FILTER ON FRONT END
L4-018Speed detection level to close DO to bring the harmonic caps in circuitL4-0255DO will open when speed (L4-01) minus (L4-02) is detectedH2-0355DO closes when speed set in L4-01 is detected		Pump Jack	Rotaflex	
L4-01 8 in circuit L4-02 5 5 DO will open when speed (L4-01) minus (L4-02) is detected H2-03 5 5 DO closes when speed set in L4-01 is detected				Speed detection level to close DO to bring the harmonic caps
L4-0255DO will open when speed (L4-01) minus (L4-02) is detectedH2-0355DO closes when speed set in L4-01 is detected	L4-01	8	8	in circuit
H2-03 5 5 DO closes when speed set in L4-01 is detected	L4-02	5	5	DO will open when speed (L4-01) minus (L4-02) is detected
	H2-03	5	5	DO closes when speed set in L4-01 is detected

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Program the correct DO wired into Harmoic Filter when used with Rotaflex

U1000 Programming							
A1-03	2220	INITIALIZES VFD					
AUTO TUNE AFTER VFD IS CONNECTED TO MOTOR							
AUTO TUNE MENU - PARAMETERS							
T1-01	4	TUNING MODE with BELTS ON					
T1-02	KW	HP X 0.746=KW					
T1-03	460(U.S.)	Motor RATED VOLTAGE					
T1-04	AMPS	GET OFF OF MOTOR PLATE					
T1-05	60(U.S.)	Motor HERTZ					
T1-06	6	# of poles = (Hz X 120)/RPM					
T1-07	RPM	GET OFF OF MOTOR PLATE					
T1-09	No - load current	(Motor FLA)/3					
		(f-(n*p)/120). Where f- base frequency, n-motor rpm,					
T1-10	T1-10 Motor Rated Slip p - motor poles						
HIT RUN FOR AUTO TUNE							

VFD Programming Menu (settings to be changed)

	CONVENTIONA		
	L	ROTAFLEX	
B1-03	1	1	MOTOR STOPPING METHOD
C1-01	5	3	MOTOR ACCELERATION TIME
C1-02	5	3	MOTR DECELERATION TIME
C7-60	1	1	Output Voltage Limit Selection. 1 = High Voltage mode
E1-04	90	90	MOTOR MAX SPEED (Set 1.5* Motor Hertz, 1.5*60 =90Hz)
E2-02	(f-(n*p)/120)	(f-(n*p)/120)	SLIP FREQUENCY(f- base frequency, n-motor rpm, p - motor poles)
E2-03	(Motor FLA)/3	(Motor FLA)/3	MOTOR NO LOAD CURRENT
H1-06	F	F	Not Used
H1-05	4	4	AUTO SWITCH INPUT
H1-08	25	25	TVSS FAULT INPUT (Normally closed)
H2-01	E	E	DIGITAL OUTPUT M1-M2 FUNCTION
H2-02	E	E	DIGITAL OUTPUT M3-M4 FUNCTION
H2-03	NA	37	M5-M6 /ROTAFLEX - POWER CYCLE SPEED SENTRY AUX POS PLC KIT (ONLY ON OLD AUX POSITION KIT model - 6ES7 212-1BB23-0XB0)
H3-03	100	100	HAND MODE SPEED GAIN (ANALOG 1)
H3-10 3 3		3	RPOC SPEED REFERENCE (ANALOG 2)

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WEATHERFORD VSD INSTALLATION PROCEDURE - ROD LIFT SURFACE UNIT 2024	4
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H4-01	109 109		FM ANALOG OUT
H5-11	1	1	COMMUNICATION ENTER FUNCTION
L2-01	1	1	POWER LOSS RIDETHROUGH
L2-02	2.1	2.1	RIDETHROUGH TIME
			MOMENTORY POWER LOSS MINIMUM
L2-03	4	4	BASEBLOCK TIME
L3-04	1	0	STALL PREVENTION
L5-01	5	0	NO OF STARTS
L7-01	100	100	MAX FWD TORQUE (CLOCK WISE CRANK ROTATION)
			MAX REV TORQUE (COUNTER - CLOCK WISE
L7-02	100	100	CRANK ROTATION)
L7-03	15	100	Max Braking (CLOCK WISE CRANK ROTATION)
			Max Braking (COUNTER - CLOCK WISE CRANK
L7-04	15	100	ROTATION)
N2-01	1	1	AFR GAIN
01-10	900	900	U1-01 DISPLAY (900 IF E1-04 =90Hz)
01-11	1	1	U1-01 DISPLAY UNIT DECIMAL DISPLAY
P3-01	1	1	Wait between restarts
		VFD Programmiı	ng Default Settings
	CONVENTIONAL	ROTAFLEX	
A1-02	2	2	CONTROL METHOD
B5-01	0	0	PID MODE
B5-19	0	0	PID LOOP SETPOINT
			DRIVE OUTPUT SELECTION: HEAVY/NORMAL
C6-01	1	1	DUTY
H1-06	85	85	HAND CONTROL INPUT
H3-02	24	24	HAND SPEED REF (ANALOG 1)
H3-11	100	100	A2 MAX SPEED
H3-12	0	0	A2 MIN. SPEED
H4-07	0	0	FM SIGNAL
01-03	3	3	DRIVE KEYPAD DISPLAY U1-01 (Hz)
02-01	1	1	LOCAL/REMOTE KEY SELECTION
02-06	0	0	DIGITAL OP DISCONNECT STATE
P1-08	2	2	LOW SPEED RESTART TIME

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