Brennan Engineering

BEPOC

MODBUS MAP

RPC APPLICATION

DATE: 1/23/2025

POC PCB FIRMWARE VERSION: 2.64

Revision History

Revision	Date	Description
0.01	10/31/12	Created
2.2	08/15/16	1. Added valve testing functionality (just load verses time graph) (HMI) 2. Added 99 day min max rod load, PIP, Prod hp, run time, prod history (HMI) 3. Added Analog shut down on casing & tubing (POC & HMI) 4. Fixed POC ver reset from factory restore
2.3	04/25/17	1. Added AO1 min max scale and vfd min max scale. 2. Added AO1 output mode 0-20mA/4-20mA 3. Added AO1-AO6 mA ouput and Raw values to modbus table 4. Added HG Pumping Units
2.31	05/25/17	1. Clear USER RAM 2 on boot so that unpopulated cards would be all 0s
2.32	12/07/18	1. Changed IPA Calc.vi to use the lower 25% of the pumpcard nose to calc pump fillage
2.4	12/26/18	1. Added linear pumping unit 2. Filtered AI values added 40044 as filt TC in ms adj from 1-10,000ms else 2000ms
2.41	02/05/19	1. Added Pump force correction for fiberglass rod
2.42	04/18/19	1. Added MB regs 42760-42899 as writable area for customer use (volatile memory)
2.43	04/30/19	1. Revised communication response data line hold low after message time
2.44	05/18/19	1. Tilted pump card Fo and fillage calculation adjustment 2. Added clear all memories on "Factory Parameter Restore" request
2.45	06/17/19	1. Fixed DI and AI fault reset would prempt the power on delay time
2.46	10/15/19	1. Made DI1-DI3 User selectable NO/NC inputs
2.47	11/29/19	1. Change Linear Pumping Unit Kinematics 2. Added Redhead unit dims 3. Change P-Unit Kinematics calc for Conv,Air Bal,Mark II 4. Save Parms to Batt Ram after Fact Restore (no 5min wait) 5. No RPM to 90 secs
2.48	01/27/20	1. Limited T1TC latency check to stop high freq noise causing No RPM Trip 2. Added Linear Pumping Unit postion control 3. Added Gear Reducer Torque Calc 4. Added Structure Loading Calc 5. Added Rod String Loading Calc 6. VFD Load Limiting
2.49	05/08/20	1. Fixed CCW peak gearbox loading calc 2. Added POR,EXTR,WDTR & BODR reset indication with EPOC time
2.5	06/03/20	1. Set rec com time out to 1ms, with 50ms rec time out for MB Cmd 16 2. Added com port receive byte counts, all 4 ports
2.51	06/17/20	1. Added support for inclinometer input (Flintec Position) 2. Limited Netstroke to <= Gross Stroke
2.52	10/22/20	1. Fix Modbus network reply being used as a incoming message for slave IDs of 3,4,6,16...
2.53	05/10/21	1. Added Crank Arm Sensor Offset from Bottom of Stroke (-50% to 50%) 2. Added DOx POC Faulted Digital Output Select for DO5 - DO16
2.54	12/21/21	1. Added DOx Unable to stop fault DO select for DO5-DO16 with NO or NC mode
2.55	03/30/22	1. Modified Failed to stop with selectable disable, crank detect, motor detect or both 2. Added energy management with 2 periods times of day to either stop or run min spd 3. Fixed any DI fault that is reset from clearing Hi Press & Hi Vib latched faults. 4. Included external faults in the shut down card generation. (well states > 79)
2.56	09/20/22	1. Set Modbus poll to a max of 127 registers and deprecated ELAM to prevent WDT reset due to over run of the Modbus data register array into Program execution RAM.

2.57	10/03/22	1. Added Com port disable (puts Xceiver inTx mode) to stop all receivce activity on port 2. Added Malfunction Set Point function on rod load only (no Position)
2.58	01/08/23	1. Added Filters to Analog Position(inclineometer),Pump Force, and Rod Load 2. Fixed the % position offset discontinutiy 3. Added Fill Base for user defined fillage calculation 4. Added Modbus area for VFD status registers
2.59	04/21/23	1. Added new Redhead Pump Jacks RH2560 and 2-RH1824 2. Fixed Mark II gearbox load calculation error 3. Changed Last stroke SPM, Min and Max load to update only in Pumping States 4. Fixed current day production oil and water update while stopped during gauge off
2.6	07/28/23	1. Fixed Malf No Crank random fault while using Analog position instead of Hall Effect.
2.61	02/20/24	1. Added rod loads fault limits enable for Timed Mode
2.62	08/08/24	1. Added Malfunction High SPM well state and functionality
2.63	11/19/24	1. Added 4-31 register arrays for live surface and pump card polling
2.64	01/23/25	1. Added Modbus TCP to Gen 2 2. Fixed Bug in Unable to Stop Fault function for Gen 2

00000 Registers

Common Command Functions 00001 - 00002

Note: Use Function Code 01 to Read these bits. Code 05/15 to Write these bits

REGISTER	# Coils	NAME	DESCRIPTION
1	1	RESET_MAL	Reset Malfunctions
2	1	CLEAR	Clear Alarms Flag

Motor Control Command Functions 00100-00102

Note: Use Function Code 01 to Read these bits. Code 05/15 to Write these bits

REGISTER	# Coils	NAME	DESCRIPTION
100	1	Global Off	Global Off
101	1	Stop Motor Host	Host Stop Motor
102	1	Start Motor Host	Host Start Motor

Application Specific Command Functions 00103-00200

Load Card Buffers

Note: Use Function Code 01 to Read these bits. Code 05 to Write these bits

103	1	Load Stored	Load Stored Cards into 5 Card Buffers
104	1	Load Shutdown 1	Load Shutdown Cards Set 1 Into 5 Card Buffers
105	1	Load Shutdown 2	Load Shutdown Cards Set 2 Into 5 Card Buffers
106	1	Load Standard	Load Standard Card into Single Card Buffer
107	1	Load Start	Load Start Card into Single Card Buffer
108	1	Load Pump Up	Load Pump Up Card into Single Card Buffer
109	1	Load Last Stroke	Load Last Stroke into Single Card Buffer

Digital Outputs 00225 - 00002

Note: Use Function Code 01 to Read these bits. Code 05/15 to Write these bits

REGISTER	# Coils	NAME	DESCRIPTION
229	12	DO5 - DO16	Physical Digital Outputs 5-16

10000 Registers

Digital Input Status 00225 - 00002

Note: Use Function Code 02 to Read these bits.

REGISTER	# Coils	NAME	DESCRIPTION
10321	10	DI1 - DI10	Physical Digital Inputs 1-10 Status

30000 Registers

POC Firmware Version — 30001 — # Registers 1

Use Function Code 04 to Read this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
30001	1				POC PCB Firmware Version x100	
30002	1				POC PCB Reset source b0=POR, b1=EXTR, b2=WDTR, b3=BODR	
30004	2		x		POC PCB Reset Time in secs since Jan 1, 1970	
30008	1				POC PCB Generation Value	

Analog Input Status — 30033 - 30352 — # Registers 320

Use Function Code 04 to Read this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
30033	10					

Reg	#	F	L	A	Name	Description
30033	2	X			CUR_SCALED_AI2	Current Scaled Reading Analog 2
30035	2	X			CUR_DAY_AVE_AI2	Current Scaled Daily Average Analog 2
30037	2	X			Reserved	Reserved
30039	2		X		CUR_RAW_AI2	Current Raw Reading Analog 2
30041	2	X			Current 8 Minute Avg	Current Scaled 8 Minute Average

30043	10				AI3 Status	
30053	10				AI4 Status	
30063	10				AI5 Status	
30073	10				AI6 Status	
30083	10				AI7 Status	

Analog Output Status — 30353 - 30452 — # Registers 100

Use Function Code 04 to Read this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
30353	10					

Reg	#	F	L	A	Name	Description
30353	1				CUR_AO1_mA_x100	Current Output Analog 1 mA x 100
30354	2				Reserved AO1	
30356	2				Reserved AO1	
30358	1				Reserved AO1	
30359	1				CUR_RAW_AO1	Cur Raw Output Analog 1 0-1000

30363	10				AO2 Status	
30373	10				AO3 Status	
30383	10				AO4 Status	
30393	10				AO5 Status	
30403	10				AO6 Status	

Pump & Polish Rod Status — 31848 - 31907 — # Registers 60

Use Function Code 04 to Read this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
31848	12			x	Pump Position (in) x 100	x100 S16
31860	12			x	Pump Load (lb)	U16
31872	12			x	Polished Rod Position (in) x 100	x100 U16
31884	12			x	Polished Rod Load (lb)	U16
31896	12			x	Scan Rate (ms)	U16

Linear Pump Status — 32356 — # Registers 1

Use Function Code 04 to Read this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
32356	1				Output Ratio	

POC Status Registers — 32501 - 32527 — # Registers 29

Use Function Code 04 to Read this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
32501	1				Well State	Controller's Current State 0 - Invalid State 1 - Loss of Configuration 2 - Initialization State 3 - Power On Delay State 4 - Start Alert State 5 - Starting State 6 - Minimum Pump Strokes State 7 - Pumping Normal State 8 - Pumping Host State 9 - Pumping Timed Mode State 10 - Pumping HOA State 11 - Unable To Run State 12 - Pumping Bad Load State 13 - Pumping Bad Position State 14 - Stopping State 15 - Stopped State 16 - Unable To Stop State 17 - Load Recalibration State 18 - Load Not Calibrated State 19 - Programming Fault State 20-26 Reserved 27 - Valve Check State 28 - Main Board Diagnostic State 29 - Bottom Of Stroke Calibration State 30 - Reserved 31 - Downtime Pumpoff Setpoint State 32 - Downtime Malfunction State 33 - Downtime Peak Load State 34 - Downtime Minimum Load State 35 - Downtime HOA Off State 36 - Downtime Host Mode State 37 - Downtime Timed Mode State 38 - Downtime Pumping Bad Position State 39 - Downtime Pumping Bad Load State 40 - Downtime Low RPM State 41 - Downtime Global Off State 42 - Downtime Lost Power State 43 - Downtime Valve Check State 44 - Downtime Logic Expression State 45 - Reserved

						46 - Downtime Low Fluid Load State 47 - Downtime Peak Torque State 48 - Downtime Low Power State 49 - Downtime NO RPM State 50 - Downtime No Crank State 51 - Downtime Peak Energy Management State 52 - Downtime Operator Stop 53 - Downtime IPA Cutoff 54-69 Reserved 70 - Malfunction Peak Load State 71 - Malfunction Min Load State 72 - Malfunction Malfunction Setpoint State 73 - Malfunction Low RPM State 74 - Malfunction Logic Expression State 75 - Malfunction No RPM State 76 - Malfunction No Crank State 77 - Malfunction Peak Torque State 78 - Malfunction High SPM 79 - Malfunction Low Fluid Load State 80 - High Pressure Fault 81 - High Vibration Fault 82 - Brake Switch is Off 83 - AI2 Fault 84 - AI3 Fault 85 - AI4 Fault 86 - AI5 Fault 87 - AI6 Fault 88 - AI7 Fault 89 - DI4 Fault 90 - DI5 Fault 91 - DI6 Fault 92 - DI7 Fault 93 - DI8 Fault 94 - DI9 Fault 95 - DI10 Fault
32502	1				Elapsed Time Hour	Elapsed Time (Hours) in current state
32503	1				Elapsed Time Min and Sec	High Byte: Elapsed Time(Minutes) in Low Byte: Elapsed Time(Seconds) in
32506	1				Stroke Period	Number of seconds per stroke x100
32508	1				Current Load	Current Scaled Load
32509	1				Current Position	Current Scaled Position x100
32510	1				Current RPM	Current Motor RPM
32511	2	X			Current Torque	Current Torque
32513	2	X			Current HP	Current HP
32515	1				Minimum Stroke Counter	Number of Strokes in the Minimum Pump
32516	2		X		Rodometer	Number of Strokes since Commission
32518	2		X		Pumpometer	Number of Strokes since Last Pump
32520	1				Gear Reducer % Load	0-100%
32521	1				Structure % Load	0-100%
32522	1				Rod String % Load	0-100% of the most loaded taper
32525	1				Strokes per Minute	SPMx100

Consecutive Violations 32528 - 32546 # Registers 19

Use Function Code 04 to Read this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
32530	1				Consecutive Peak Load	Consecutive Peak Load Violations
32531	1				Consecutive Min Load	Consecutive Min Load Violations
32532	1				Consecutive Malfunction Load Set Point	Consecutive Malf SP Violations

Historical Peak And Min Data 32567 - 32602 # Registers 36

Use Function Code 04 to Read this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
32569	1				Last Stroke Peak Load	Scaled Last Stroke Peak Load.
32572	1				Last Stroke Min Load	Scaled Last Stroke Min Load.

Inferred Production 32603-32607 # Registers 5

Use Function Code 04 to Read this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
32603	2	X			Total Inferred Production	Scaled Inferred Production x100 since
32605	1				Yesterday Inferred Production	Scaled Inferred Production x10 for Yesterday. Updated at Gage Off Time.
32606	1				Current Inferred Production	Scaled Inferred Production x10 since Gage Off
32607	1				Reserved	Reserved

Percent Run Time 32608 - 32611 # Registers 4

Use Function Code 04 to Read this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
32608	1				Yesterday Cycle Counter	Number of Pump Cycles Yesterday
32609	1				Current Cycle Counter	Number of Pump Cycles since Gauge Off (start stop cycles)
32610	1				Yesterday Percent Run	Yesterday Percent Runtime Updated at Gauge Off
32611	1				Current Percent Run	Percent Runtime Since Gage Off

Pump Card Status Registers 32612 - 32668 # Registers 30

Use Function Code 04 to Read this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
32612	1				NREVS	# Of Motor Revolutions Per Stroke
32613	1				Fluid Load	
32614	1				Pump Fillage	x 100
32615	1				Pump Card Peak Load	S16

32616	1				Pump Card Min Load	S16
32617	1				Net Stroke	
32618	1				Gross Stroke	
32619	2	X			Polished Rod HP Ave/Stroke	
32621	2	X			Pump HP Ave/Stroke	
32638	1				Todays Total Strokes	Since Gauge Off
32639	1				Yesterdays Total Strokes	
32640	1				Bouyed Rod Weight	lbs
32659	1				Current Pump Position	inches x 100
32660	1				Current Pump Load	lbf S16
32661	1				Damping Coefficient calculated	c X 1000
32662	1				Current Stroke Motor Revolutions	X 100
32663	1				Current SPM	X 100
32664	1				POC Continous Run Time Minutes	
32665	1				Calculated Surface Stroke Length	inches x 100
32666	1				Force Correction Factor	lbx10000 U16

Dynograph Cards 32669 - 36624 # Registers 3696

Use Function Code 04 to Read this Data

*NOTE: The following sections must be loaded before they are read. This can be accomplished with the command functions in the 0XXXX range. (Registers 103 - 109)

If POC is configured for downhole control, then the cards in the pump card buffer will correspond with the cards in the surface card buffer.

Register	# Regs	F	L	A	NAME	DESCRIPTION
32669	2035			X	Surface 5 Card Buffer	5 Card Buffer

Each Card is Organized As:

	#	F	L	A	Name	Description
Header	2		X		TimeStamp	Seconds Since Jan 1, 1970
	1				Num Points	Low Byte - Number of Points
	1				Scaled Max Load	Scaled Max Load Of Card
	1				Scaled Min Load	Scaled Min Load Of Card
	1				Stroke Length	Stroke Length x 100
	1				Stroke Period	Stroke Period x 100
Card				X	200 Point Pairs	
	1				Position x 100	Scaled Position x 100
	1				Scaled Load	Scaled Load

34704	1045			X	Pump 5 Card Buffer	5 Card Buffer

Each Card is Organized As:

	#	F	L	A	Name	Description
Header	2		X		TimeStamp	Seconds Since Jan 1, 1970
	1				Scaled Max Load	Scaled Max Load Of Card (S16)
	1				Scaled Min Load	Scaled Min Load Of Card (S16)
	1				Num Points	Low Byte - Number of Points
	1				Gross Stroke	
	1				Net Stroke	Net Stroke Length x100
	1				Pump Fillage	x 100
	1				Fluid Load	
Card				X	100 Point Pairs	
	1				Position x 100	Scaled Position x 100
	1				Scaled Load	Scaled Load (S16)

35749	407				Single Surface Card Buffer	

Each Card is Organized As:

	#	F	L	A	Name	Description
Header	2		X		TimeStamp	Seconds Since Jan 1, 1970
	1				Num Points	Num Points
	1				Scaled Max Load	Scaled Max Load Of Card
	1				Scaled Min Load	Scaled Min Load Of Card
	1				Stroke Length	Stroke Length x 100
	1				Stroke Period	Stroke Period x 100
Card				X	200 Point Pairs	
	1				Position x 100	Scaled Position x 100
	1				Scaled Load	Scaled Load

36156	209				Single Pump Card Buffer	

Each Card is Organized As:

	#	F	L	A	Name	Description
Header	2		X		TimeStamp	Seconds Since Jan 1, 1970
	1				Scaled Max Load	Scaled Max Load Of Card (S16)
	1				Scaled Min Load	Scaled Min Load Of Card (S16)
	1				Num Points	Num Points
	1				Gross Stroke	
	1				Net Stroke	Net Stroke Length x 100
	1				Pump Fillage	x 100
	1				Fluid Load	
Card				X	100 Point Pairs	
	1				Position x 100	Scaled Position x 100
	1				Scaled Load	Scaled Load (S16)

Pump & Polish Rod Status — 38100 - 38224 — # Registers 124

Use Function Code 04 to Read this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
38100	31			x	Pump Position (in) x 100	x100 S16
38131	31			x	Pump Load (lb)	U16
38162	31			x	Polished Rod Position (in) x 100	x100 U16
38193	31			x	Polished Rod Load (lb)	U16

Pump Card Status Registers — 39703 - 39753 — # Registers 50

Use Function Code 04 to Read this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
39703	2	X			Pump Intake Pressure (psi)	
39748	1				Yesterday Oil Production (bbls)	x 10
39749	1				Yesterday Water Production (bbls)	x 10
39752	1				Current Oil Production (bbls)	x 10
39753	1				Current Water Production (bbls)	x 10

40000 Registers

Analog Inputs Config — 40002 - 40043 — # Registers 42

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
40002	6				AI1 Config	Analog Input 1 Configuration Registers

Register	#	F	L	A	Name	Description
40002	2	X			FMAX	Analog Input Channel 1 engineering value @ full scale
40004	2	X			FMIN	Analog Input Channel 1 engineering value @ min scale
40006	1				RANGE	Range 0 - 0 to 5 V 1 - 1 to 5 V 2 - 0 to 20 mA 3 - 4 to 20 mA 4 - 0 to 10 V 5 - 2 to 10 V
40007	1				UNITS	Analog Input Channel Units 0 - psi 1 - deg F 2 - gpm 3 - bpd

40008	6				AI2 Config	
40014	6				AI3 Config	
40020	6				AI4 Config	
40026	6				AI5 Config	
40032	6				AI6 Config	
40038	6				AI7 Config	

Analog Output Control (Modbus Contro — 40642 - 40650 — # Registers 12

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
40642	1				AO2 Output (set mA via Modbus)	0=0mA 1000=20mA U16
40644	1				AO3 Output (set mA via Modbus)	0=0mA 1000=20mA U16
40646	1				AO4 Output (set mA via Modbus)	0=0mA 1000=20mA U16
40648	1				AO5 Output (set mA via Modbus)	0=0mA 1000=20mA U16
40650	1				AO6 Output (set mA via Modbus)	0=0mA 1000=20mA U16

Real Time Clock (RTC) 41425 - 41444 # Registers 20

Note: Use Function Code 03 to Read this Data. Use Function Code 6 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
41425	1				RTC YEAR	Current Year 1970 - XXXX
41426	1				RTC MONTH	Current Month 1-12
41427	1				RTC DAY	Current Day 1-31
41428	1				RTC HOUR	Current Hour 0-23
41429	1				RTC MINUTE	Current Minute 0-59
41430	1				RTC SECOND	Current Second 0-59
41431	1				RTC Day of Week	Current Day of week 0-6, 0=Mon
41433	1				Gauge Off Hour	Prod Roll Over Hours 0-23
41434	1				Gauge Off Minute	Prod Roll Over Mins 0-59
41435	1				Energy Management Control	0-Disabled, 1-Stop Enbl, 2-Min Speed Enbl
41436	1				Energy Management 1 Suspend Hour	0-23
41437	1				Energy Management 1 Suspend Minute	0-59
41438	1				Energy Management 1 Resume Hour	0-23
41439	1				Energy Management 1 Resume Minute	0-59
41440	1				Energy Management Day Selection	b0-Mon,b1-Tue,b2-Wed…b5-Sat,b6-Sun
41441	1				Energy Management 2 Suspend Hour	0-23
41442	1				Energy Management 2 Suspend Minute	0-59
41443	1				Energy Management 2 Resume Hour	0-23
41444	1				Energy Management 2 Resume Minute	0-59

Load Transducer Config 42151 - 42158 # Registers 26

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42151	1				Load Transducer Type	Load Transducer Type 0 - Non Calibrated 1 - Calibrated 50 K 2 - Calibrated 30 K 3 - Horse Shoe 4 - Other
42153	1				Load Maximum Weight	Calibrated Load Transducer Max Weight Scaled
42154	1				Load Transducer Gain	Load Transducer Gain
42155	1				Load Transducer Polarity	0 - Bipolar 1 - Unipolar
42156	1				Load Transducer Bridge Output Compensation	0=Disabled 1=Enabled (default=1)
42157	1				RESERVED	Reserved
42158	1				Load Transducer Offset (A/D counts)	512 is default

Position Transducer Config 42174 - 42178 # Registers 5

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42174	1				Position Transducer Type	Position Transducer Type 0 - Hall Effect Digital Position 1 - Analog Position Inclinometer AI7
42177	1				Stroke Length (Calculated & overwritten by POC)	Stroke Length x100

Inferred Production 42188 - 42193 # Registers 6

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42188	1				Pump Diameter	Pump Diameter x100
42189	1				IPA K Factor	X 100
42193	1				IPA Water Cut	X 100

Control Registers 42195 - 42216 # Registers 22

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42195	1				Control Mode	Control Mode 0 - Surface 1 - Downhole 2 - Motor 3 - VFD - Surface 4 - VFD - Downhole
42196	1				Operation Mode	Operation Mode 0 - Normal Mode 1 - Timed Mode 2 - Host Mode
42197	1				Host Switch	Host Switch 0 - Host Off 1 - Host On
42198	2				Time Mode On	Time Mode On Hours: Minutes

Reg	#	F	L	A	Name	Description
42198	1				Hour	Time On Hours
42199	1				Minute	Time On Minutes

42200	2				Time Mode Off	Time Mode Off Hours: Minutes

Reg	#	F	L	A	Name	Description
42200	1				Hour	Time Off Hours
42201	1				Minute	Time Off Minutes

42202	1				Power On Delay	Power On Delay in Seconds
42203	1				Start Alert	Start Alert in Seconds
42204	1				Minimum Pump Strokes	Number of Strokes in Minimum Pump State
42205	1				Downtime Mode	Downtime Mode 0 - Manual Downtime 1 - Auto Downtime
42206	2				Downtime Period	

Reg	#	F	L	A	Name	Description
42206	1				Hour	Downtime Period Hours
42207	1				Minute	Downtime Period Minutes

42215	1				HMI Start	1 = Start/Run 0 = Stop
42216	1				HMI Reset	1 = Reset

Violation Configuration 42217 - 42260 # Registers 44

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42217	2				Violation Enable/Disable Config - Host Mode	Host Mode

0-Disable	*1 - Enable*

Bit	Function
0 - 15	Reserved
16	Peak Load
17	Min Load
18 - 20	Reserved
21	No RPM
22	No Crank
23	Belt Slippage
24 - 31	Reserved

42219	2				Timed Mode	Timed Mode

0-Disable	*1 - Enable*

Bit	Function
0 - 15	Reserved
16	Peak Load
17	Min Load
18	Logic Expression
19	Peak Torque
20	Low Motor RPM
21	No RPM
22	No Crank
23	Belt Slippage
24 - 31	Reserved

42221	2				Normal Mode	Same structure as 42217

0-Disable	*1 - Enable*

Bit	Function
0 - 15	Reserved
16	Peak Load
17	Min Load
18	Logic Expression
19	Peak Torque
20	Low Motor RPM
21	No RPM
22	No Crank
23	Belt Slippage
24	Malfunction Setpoint
25	Pumpoff Setpoint
26	Low Fluid Load
27	Pump Fillage Setpoint
28	Peak Power
29 - 31	Reserved

42222	1				Pump off SP select =bit9 Pump Fillage select =b1	Pump off selection fillage or set point
42223	1				Low RPM Limit	
42224	1				Consecutive Low RPM Allowed	
42225	1				Low RPM Start Delay	
42226	1				Peak Load Limit	
42227	1				Consecutive Peak Load Allowed	load checked every 2 milliseconds
42228	1				Minimum Load Limit	

42229	1				Consecutive Min Load Allowed	load checked every 2 milliseconds
42237	1				Timed Mode Load Limits Enable	0-disable 1-enable
42241	1				Load Pumpoff Setpoint	Scaled
42242	1				Position Pumpoff Setpoint	Scaled x100
42243	1				Consecutive Pumpoff Strokes Allowed	
42244	1				Load Malfunction Setpoint	Scaled lbf
42246	1				Consecutive Malfunction Strokes Allowed	Stroke Count 0=function disabled
42248	1				High SPM Malfunction Enable	1 = enabled
42249	1				High SPM Malfunction Set Point	x100
42250	10				Reserved	Reserved

Downhole Configuration 42262-42272 # Registers 9

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42262	1				Enable Fill Base	0-disable 1-enable
42263	1				Fill Base	Fill Base (1-99%)
42264	2	X			Reference Pump Fillage	Pump Fillage Set Point
42268	2	X			Damping Factor (Calc & Overwritten by POC)	Damping Factor
42271	1				Tubing Head Pressure	Tubing Head Pressure
42272	2	X			Tubing Gradient	Tubing Gradient

Pumping Unit Dimensions 42274-42288 # Registers 16

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42274	1				Pumping Unit Type	Pumping Unit Type 0 - Conventional 1 - Mark II 2 - Reverse Mark 3 - Torque Master 4 - Air Balance 5 - Beam Balance 6 - HG Bent Beam 7 - Linear Pumping Unit
42275	1				Crank Rotation	Crank Rotation 0 - Clockwise 1 - Counter Clockwise
42276	1				Unit API Size (BEI database see Appendix A)	replace counter balance angle
42277	2	X			R Dimension	only writeable if 42276 = 0 (Custom Unit)
42279	2	X			K Dimension	only writeable if 42276 = 0 (Custom Unit)
42281	2	X			C Dimension	only writeable if 42276 = 0 (Custom Unit)
42283	2	X			P Dimension	only writeable if 42276 = 0 (Custom Unit)
42285	2	X			A Dimension	only writeable if 42276 = 0 (Custom Unit)
42287	2	X			I Dimension	only writeable if 42276 = 0 (Custom Unit)
42289	1				Crank Hole #	Crank Hole Number 0 - Hole # 1 (furthest from crankshaft) 1 - Hole # 2 2 - Hole # 3 3 - Hole # 4

Rod Taper Information 42289-42337 # Registers 24

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42290	6			X	Rod Types	Rod Types 0 - Steel 1 - Fiberglass
42296	6			X	Taper Intervals	6 Rod Taper Intervals
42302	12	X		X	Taper Diameter	6 Rod Taper Diameters

Pumping Unit Parameters 42340-42344 # Registers 4

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42340	1				Phase Angle Degrees	degrees 0-360
42341	1				Structral Unbalance	lbs
42343	1				Gear Reducer API rating	in-lbs / 1000
42344	1				Structure API Rating	lbs / 100

Linear Pump Configuration 42351-42357 # Registers 5

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42351	1				Linear Pump Distance Between Sprockets	inches
42353	1				Linear Pump Sprocket Radius	inches
42355	1				Linear Pump Malfunction Digital Out Channel	not in use
42356	1				Linear Pump Output Ratio x 100	not in use
42357	1				Linear Pump Position Control Enable	b0=enable,b1=jog up,b2=jog down

PIP Calculations 42389 # Registers 1

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42389	1				Tubing Head Pressure Source Select	0-Constant, 1-Analog

Advanced Settings 42400 - 42409 # Registers 10

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42400	1				Pump Card Rotation Correction Enable	0 = Disabled 1 = Enabled
42401	1				Pump Card Rotation Correction Factor	Slope cor for tilted card lbf/inch (signed)
42402	1				Pump Card Rotation Correction Offset	Offset the card up and down lbf (signed)
42404	1				Crank Arm Sensor Offset %	-50.0% to 50.0%
42408	1				Unable to Stop Mode	0=disabled, 1=motor&crank, 2=motor only, 3=crank only
42409	1				Unable to Stop Time in Seconds	min: 15 max: 300

Controller Specific DI Fault Config 42410 - 42412 # Registers 3

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42410	1				DI1 Normally Open Mode (High Pressure Fault)	0 = N.C. 1 = N.O.
42411	1				DI2 Normally Open Mode (High Vibration Fault)	0 = N.C. 1 = N.O.
42412	1				DI3 Normally Open Mode (Brake Switch)	0 = N.C. 1 = N.O.

Digital Output Fault Config 42430 - 42431 # Registers 2

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42430	1				DOx POC Faulted Output Select (DO5-DO16)	0 = Not Used, 1=DO5,2=DO6,…,12=DO16
42431	1				DOx Unable to Stop Output Select (DO5-DO16)	0 = Not Used, 1=DO5,2=DO6,…,12=DO16

Digital Output Fault Config DO Mode 42451 # Registers 1

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42451	1				DOx MODE Unable to Stop Out Sel (DO5-DO16)	0 = N.C. 1 = N.O.

Rod / Pump Counters 42496 - 42449 # Registers 4

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42496	2		X		Rodometer	Rodometer
42498	2		X		Pumpometer	Pumpometer

VFD Configuration 42501 - 42517 # Registers 4

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42501	1				VFD Dead Band	VFD +/- dead band of pump off setpoint
42504	1				VFD Min Scaling	Min Speed Scaled x10
42505	1				VFD Max Scaling	Max Speed Scaled x10
42507	1				VFD Speed Increase	VFD Speed Increase, Percent of Full Scale
42508	1				VFD Speed Decrease	VFD Speed Decrease, Percent of Full Scale
42509	1				VFD Analog output 1 mode	AO1 output mode 0 = 0-20mA, 1 = 4-20mA
42517	1				VFD Speed Constant	VFD Speed Override Value
42518	1				VFD Max Working Speed	VFD Max Working Speed x10
42519	1				VFD Min Working Speed	VFD Min Working Speed x10
42520	1				VFD Speed Reference out	0-100% x 10
42521	1				VFD Load Limit (to reduce speed)	lbs default=60,000 (disabled)
42522	1				VFD Load Limit Gain	%/lb x 100 default = 0 (disabled)

Communication Control Registers	42530 - 42554	# Registers	15

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42526	2		x		Com Port 3 receive byte count	Com 3 received byte count
42530	1				RTU Address	Com 0 used for Wifi or Spare
42531	1				Baud Rate	see table
42532	1				Data Bits	5 = 5 data, 6=6 data, 7=7 data, 8=8 data
42533	1				Stop Bits	1 = 1 stop, 2 = 2 stop, 3 = 1.5 stop
42534	1				Parity	0 = none, 1 = Even, 2 = Odd
42535	1				Com Port 0 Enable	0=Disabled, 1=Enabled
42536	2		x		Com Port 0 receive byte count	Com 0 received byte count
42540	1				RTU Address	Com 1 wired to TB1
42541	1				Baud Rate	see table
42542	1				Data Bits	5 = 5 data, 6=6 data, 7=7 data, 8=8 data
42543	1				Stop Bits	1 = 1 stop, 2 = 2 stop, 3 = 1.5 stop
42544	1				Parity	0 = none, 1 = Even, 2 = Odd
42545	1				Com Port 1 Enable	0=Disabled, 1=Enabled
42546	2		x		Com Port 1 receive byte count	Com 1 received byte count
42550	1				RTU Address	Com 2 Spare
42551	1				Baud Rate	see table
42552	1				Data Bits	5 = 5 data, 6=6 data, 7=7 data, 8=8 data
42553	1				Stop Bits	1 = 1 stop, 2 = 2 stop, 3 = 1.5 stop
42554	1				Parity	0 = none, 1 = Even, 2 = Odd
42555	1				Com Port 2 Enable	0=Disabled, 1=Enabled
42556	2		x		Com Port 2 receive byte count	Com 2 received byte count

Baud Rate Designation
0 - 300
1 - 1200
2 - 2400
3 - 4800
4 - 9600
5 -19200
6 - 38400
7 - 57600
8 -115200

VFD Speed vs Position — 42560 - 42573 — # Registers 14

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42560	1				Speed Change Position 1 %	x 10
42561	1				Speed Change Position 2 %	x 10
42562	1				Speed Change Position 3 %	x 10
42563	1				Speed Change Position 4 %	x 10
42564	1				Speed Change Position 5 %	x 10
42565	1				Speed Change Position 6 %	x 10
42566	1				Speed Change Position 7 %	x 10
42567	1				SPM 1 % for Position 1	x 10
42568	1				SPM 1 % for Position 2	x 10
42569	1				SPM 1 % for Position 3	x 10
42570	1				SPM 1 % for Position 4	x 10
42571	1				SPM 1 % for Position 5	x 10
42572	1				SPM 1 % for Position 6	x 10
42573	1				SPM 1 % for Position 7	x 10
42576	1				VFD Speed Mode 0= Spd vs Pos 1=Const spd	
42577	1				VFD Constant Speed %	x 10

Ethernet IP Config — 42600 - 42610 — # Registers 11

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42600	1				IP Address most significant octet	192
42601	1				IP Address next octet	168
42602	1				IP Address next octet	1
42603	1				IP Address least significant octet	29
42604	1				NetMask Address most significant octet	255
42605	1				NetMask Address next octet	255
42606	1				NetMask Address next octet	255
42607	1				NetMask Address least significant octet	0
42608	1				Gateway Address most significant octet	192
42609	1				Gateway Address next octet	168
42610	1				Gateway Address next octet	1
42611	1				Gateway Address least significant octet	1

Digital Input Fault Config — 42680 - 42693 — # Registers 14

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42680	2				DI4 Fault Configuration	

Register	#	F	L	A	Name	Description
42680	1				DI4 Fault Type	Type 0 - Disabled 1 - High Level 2 - Low Level 3 - High Level with Reset 4 - Low Level with Reset
42681	1				DI4 Fault Status	Status 0 = NO Fault 1 = Faulted

42682	2				DI5 Fault Configuration	
42684	2				DI6 Fault Configuration	
42686	2				DI7 Fault Configuration	
42688	2				DI8 Fault Configuration	
42690	2				DI9 Fault Configuration	
42692	2				DI10 Fault Configuration	

Analog Input Fault Config — 42710 - 42745 — # Registers 36

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42710	6				AI2 Fault Configuration	

Register	#	F	L	A	Name	Description
42710	2	X			AI2 Fault Level	AI2 scaled value trip level if Fault Type is
42712	2	X			AI2 Fault Reset	AI2 scaled value reset level if Fault Type is set to 3 or 4
42714	1				Fault Type	Type 0 - Disabled 1 - High Level 2 - Low Level 3 - High Level with Reset 4 - Low Level with Reset
42715	1				Fault Status	Status 0 = NO Fault 1 = Faulted

42716	6				AI3 Fault Configuration	
42722	6				AI4 Fault Configuration	
42728	6				AI5 Fault Configuration	
42734	6				AI6 Fault Configuration	
42740	6				AI7 Fault Configuration	

Customer Use Registers — 42800 - 42899 — # Registers 100

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42800	100				Customer Use Volitale Modbus Registers	

VFD Values	42900 - 42999	# Registers	100

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42900	1				Motor Current (A)	U16 x10
42901	1				Motor Torque (%)	S16
42902	1				Motor Power (%)	U16 x100
42903	1				VFD Load (%)	U16 x100
42904	1				Motor Speed (rpm)	U16
42905	1				Output Frequency (Hz)	U16 x100
42906	1				Motor Volts (V)	U16 x10
42907	1				DC Bus Volts (V)	U16
42908	1				VFD Ambient Temp (F)	U16 x10
42909	1				VFD Heat Sink Temp (F)	U16 x10
42910	1				Last Fault Code	U16
42911	1				VFD Capacity Code	U16

POC Factory Restore	49999	# Registers	1

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
49999	1				Factory Restore	61957 = Restore all factory settings

Appendix A --- API Unit Number Database

Pumping Unit Dimensions 42276 # Registers 1

Note: Use Function Code 03 to Read this Data. Use Function Code 6/16 to Write this Data

Register	# Regs	F	L	A	NAME	DESCRIPTION
42276	1				Unit API Size (BEI database see Appendix A)	0 = Custom Unit
					1 =	C-57D-76-42
					2 =	C-57D-89-42
					3 =	C-57D-95-48
					4 =	C-57D-109-48
					5 =	C-57D-76-54
					6 =	C-80D-109-48
					7 =	C-80D-133-48
					8 =	C-80D-119-54
					9 =	C-80D-133-54
					10 =	C-80D-119-64
					11 =	C-114D-133-54
					12 =	C-114D-173-54
					13 =	C-114D-143-64
					14 =	C-114D-173-64
					15 =	C-114D-143-74
					16 =	C-114D-119-86
					17 =	C-160D-143-64
					18 =	C-160D-173-64
					19 =	C-160D-143-74
					20 =	C-160D-173-74
					21 =	C-160D-200-74
					22 =	C-160D-173-86
					23 =	C-160D-173-100
					24 =	C-228D-173-74
					25 =	C-228D-200-74
					26 =	C-228D-213-86
					27 =	C-228D-246-86
					28 =	C-228D-173-100
					29 =	C-228D-213-100
					30 =	C-228D-213-120
					31 =	C-320D-246-74
					32 =	C-320D-213-86
					33 =	C-320D-246-86
					34 =	C-320D-256-100
					35 =	C-320D-305-100
					36 =	C-320D-213-120
					37 =	C-320D-256-120
					38 =	C-320D-256-144
					39 =	C-456D-256-100
					40 =	C-456D-213-120
					41 =	C-456D-256-120
					42 =	C-456D-305-120
					43 =	C-456D-365-120

44 =	C-456D-256-144
45 =	C-456D-305-144
46 =	C-456D-305-168
47 =	C-640D-305-120
48 =	C-640D-365-120
49 =	C-640D-256-144
50 =	C-640D-305-144
51 =	C-640D-365-144
52 =	C-640D-305-168
53 =	C-640D-365-168
54 =	C-912D-305-144
55 =	C-912D-365-144
56 =	C-912D-427-144
57 =	C-912D-305-168
58 =	C-912D-365-168
59 =	C-912D-427-168
60 =	C-912D-305-192
61 =	C-912D-365-192
62 =	C-912D-427-192
63 =	C-912D-305-240
64 =	C-912D-365-240
65 =	C-912D-427-240
66 =	C-912D-470-240
67 =	C-1280D-427-168
68 =	C-1280D-305-192
69 =	C-1280D-365-192
70 =	C-1280D-427-192
71 =	C-1280D-305-240
72 =	C-1280D-365-240
73 =	C-1280D-427-240
74 =	C-1280D-470-240
75 =	C-1824S-365-192
76 =	C-1824S-427-192
77 =	C-1824S-470-192
78 =	C-1824D-365-216
79 =	C-1824D-427-216
80 =	C-1824D-470-216
81 =	C-1824D-305-240
82 =	C-1824D-365-240
83 =	C-1824D-427-240
84 =	C-1824D-470-240
85 =	M-114D-143-64
86 =	M-114D-173-64
87 =	M-114D-143-74
88 =	M-114D-173-74
89 =	M-114D-143-86
90 =	M-160D-173-74
91 =	M-160D-200-74
92 =	M-160D-173-86
93 =	M-160D-213-86
94 =	M-228D-173-74
95 =	M-228D-200-74

96 =	M-228D-213-86
97 =	M-228D-246-86
98 =	M-228D-173-100
99 =	M-228D-256-100
100 =	M-228D-213-120
101 =	M-228D-256-120
102 =	M-320D-256-100
103 =	M-320D-305-100
104 =	M-320D-213-120
105 =	M-320D-256-120
106 =	M-320D-305-120
107 =	M-320D-256-144
108 =	M-456D-256-120
109 =	M-456D-305-120
110 =	M-456D-365-120
111 =	M-456D-256-144
112 =	M-456D-305-144
113 =	M-456D-365-144
114 =	M-456D-305-168
115 =	M-456D-305-192
116 =	M-640D-305-120
117 =	M-640D-256-144
118 =	M-640D-305-144
119 =	M-640D-365-144
120 =	M-640D-305-168
121 =	M-640D-365-168
122 =	M-640D-305-192
123 =	M-912D-305-144
124 =	M-912D-365-144
125 =	M-912D-305-168
126 =	M-912D-365-168
127 =	M-912DS-427-168
128 =	M-912D-305-192
129 =	M-912DS-427-192
130 =	M-912D-305-216
131 =	M-912DS-365-216
132 =	M-1280D-427-192
133 =	M-1280D-427-216
134 =	M-1824D-427-216
135 =	RM-228D-173-74
136 =	RM-228D-200-74
137 =	RM-228D-213-86
138 =	RM-228D-246-86
139 =	RM-228D-173-100
140 =	RM-228D-213-100
141 =	RM-228D-256-100
142 =	RM-228D-213-120
143 =	RM-320D-246-86
144 =	RM-320D-256-100
145 =	RM-320D-305-100
146 =	RM-320D-213-120
147 =	RM-320D-256-120

148 =	RM-320D-305-120
149 =	RM-320D-256-144
150 =	RM-456D-256-120
151 =	RM-456D-305-120
152 =	RM-456D-365-120
153 =	RM-456D-256-144
154 =	RM-456D-305-144
155 =	RM-456D-365-144
156 =	RM-456D-305-168
157 =	RM-640D-256-120
158 =	RM-640D-305-120
159 =	RM-640D-256-144
160 =	RM-640D-305-144
161 =	RM-640D-365-144
162 =	RM-640D-427-144
163 =	RM-640D-305-168
164 =	RM-640D-365-168
165 =	RM-640D-305-192
166 =	RM-912D-305-144
167 =	RM-912D-365-144
168 =	RM-912D-427-144
169 =	RM-912D-305-168
170 =	RM-912D-365-168
171 =	RM-912D-427-168
172 =	RM-912D-305-192
173 =	RM-912D-365-192
174 =	RM-912D-427-192
175 =	RM-1280D-365-168
176 =	RM-1280D-427-168
177 =	RM-1280D-365-192
178 =	RM-1280D-427-192
179 =	RM-1824D-365-168
180 =	RM-1824D-427-168
181 =	RM-1824D-365-192
182 =	RM-1824D-427-192
183 =	TM-228D-173-74
184 =	TM-228D-200-74
185 =	TM-228D-213-86
186 =	TM-228D-246-86
187 =	TM-228D-173-100
188 =	TM-228D-213-100
189 =	TM-228D-256-100
190 =	TM-228D-213-120
191 =	TM-320D-246-86
192 =	TM-320D-256-100
193 =	TM-320D-305-100
194 =	TM-320D-213-120
195 =	TM-320D-256-120
196 =	TM-320D-305-120
197 =	TM-320D-256-144
198 =	TM-456D-256-120
199 =	TM-456D-305-120

200 =	TM-456D-365-120
201 =	TM-456D-256-144
202 =	TM-456D-305-144
203 =	TM-456D-365-144
204 =	TM-456D-305-168
205 =	TM-640D-256-120
206 =	TM-640D-305-120
207 =	TM-640D-256-144
208 =	TM-640D-305-144
209 =	TM-640D-365-144
210 =	TM-640D-427-144
211 =	TM-640D-305-168
212 =	TM-640D-365-168
213 =	TM-640D-305-192
214 =	TM-912D-305-144
215 =	TM-912D-365-144
216 =	TM-912D-427-144
217 =	TM-912D-305-168
218 =	TM-912D-365-168
219 =	TM-912D-427-168
220 =	TM-912D-305-192
221 =	TM-912D-365-192
222 =	TM-912D-427-192
223 =	TM-1280D-365-168
224 =	TM-1280D-427-168
225 =	TM-1280D-365-192
226 =	TM-1280D-427-192
227 =	TM-1824D-365-168
228 =	TM-1824D-427-168
229 =	TM-1824D-365-192
230 =	TM-1824D-427-192
231 =	A-114D-173-64
232 =	A-160D-200-74
233 =	A-228D-246-86
234 =	A-228D-173-100
235 =	A-320D-305-100
236 =	A-320D-256-120
237 =	A-456D-256-120
238 =	A-456D-365-120
239 =	A-456D-305-144
240 =	A-640D-365-120
241 =	A-640D-305-144
242 =	A-640D-427-144
243 =	A-640D-305-168
244 =	A-912D-427-144
245 =	A-912D-305-168
246 =	A-912D-427-192
247 =	A-912D-427-216
248 =	A-912D-470-240
249 =	A-1280D-305-168
250 =	A-1280D-427-192
251 =	A-1280D-427-216

252 =	A-1280D-470-240
253 =	A-1824D-427-192
254 =	A-1824D-427-216
255 =	A-1824D-470-240
256 =	A-2560D-470-240
257 =	B-25-53-30
258 =	B-25-67-30
259 =	B-25-56-36
260 =	B-25-67-36
261 =	B-40-89-36
262 =	B-40-76-42
263 =	B-40-89-42
264 =	B-40-76-48
265 =	B-50-89-42
266 =	B-50-89-48
267 =	B-50-89-54
268 =	B-57-109-42
269 =	B-57-109-48
270 =	B-57-76-54
271 =	B-80-109-42
272 =	B-80-109-48
273 =	B-80-76-54
274 =	B-80-76-64
275 =	B-80-119-64
276 =	B-114-143-64
277 =	B-114-133-74
278 =	B-114-119-86
279 =	B-114-119-100
280 =	HG C-80119-64
281 =	HG C-114-143-74
282 =	HG C-160-173-86
283 =	HG CW-228-173-100
284 =	HG CW-228-213-100
285 =	HG CW-320-256-144
286 =	HG CW-456-256-144
287 =	HG CW-456-305-168
288 =	HG CW-640-305-168
289 =	HG CW-640-365-192
290 =	HG CW-912-365-192
291 =	HG CW-912-427-168
292 =	HG CW-1280-427-192
293 =	HG CW-1280-427-216
294 =	RH-80-119-64
295 =	RH-114-119-100
296 =	RH-114-119-86
297 =	RH-114-143-74
298 =	RH-114-173-64
299 =	RH-160-133-100
300 =	RH-160-173-100
301 =	RH-160-173-74
302 =	RH-160-173-86
303 =	RH-160-200-74

304 =	RH-228-173-100
305 =	RH-228-173-120
306 =	RH-228-200-74
307 =	RH-228-213-100
308 =	RH-228-213-120
309 =	RH-228-213-86
310 =	RH-228-246-120
311 =	RH-228-246-74
312 =	RH-228-246-86
313 =	RH-320-256-100
314 =	RH-320-256-120
315 =	RH-320-256-144
316 =	RH-320-256-168
317 =	RH-320-305-100
318 =	RH-320-305-120
319 =	RH-456-305-144
320 =	RH-456-305-168
321 =	RH-456-365-120
322 =	RH-456-365-144
323 =	RH-640-305-144
324 =	RH-640-305-168
325 =	RH-640-365-144
326 =	RH-640-365-168
327 =	RH-640-365-192
328 =	RH-912-365-168
329 =	RH-912-365-192
330 =	RH-912-427-144
331 =	RH-912-427-168
332 =	RH-912-427-192
333 =	RH-1280-365-192
334 =	RH-1280-365-240
335 =	RH-1280-427-192
336 =	RH-1280-427-216
337 =	RH-1824-365-240
338 =	RH-1824-365-300
339 =	RH-1824-427-216
340 =	RH-1824-427-240
341 =	RH-1824-427-300
342 =	RH-1824-427-300a
343 =	RH-1824-500-300
344 =	RH-2560-500-320