

Micro NOC Application

Customer: Weatherford

End User: Repsol, Thailand

Year: 2015

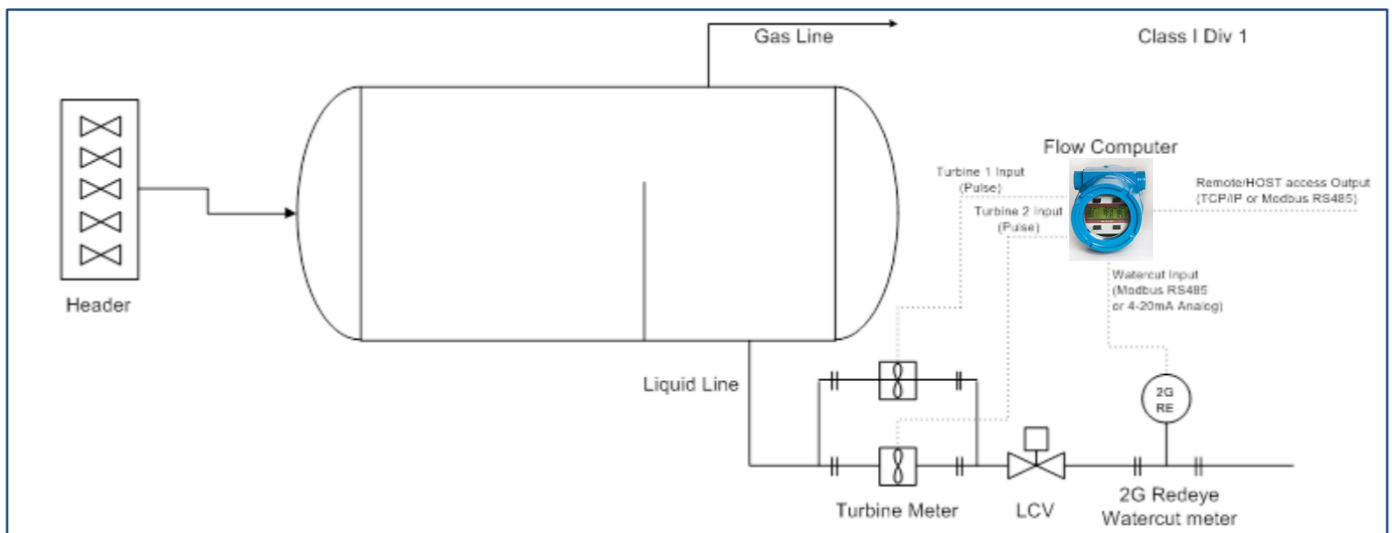


Net Oil Computer Application

1. Overview

- Main Capabilities
 1. Net Oil calculation
- flow line
 - 1 flowmeter + 1 water-cut meter, *or*
 - 2 flowmeters (parallel) + 1 water-cut meter
- Flowmeter connection
 - pulse (volumetric flowrate)
- water cut meter connection:
 - 4-20mA
 - well-selection directly at the water-cut meter
- Remote host RS485 access
- Hazardous Area, Class I Div I

Initial deployment (Thailand) as described below



2. Features/Capabilities

2.1. Well Test

- Test configuration prior to test
 - well-number, purge time, test time etc
 - shrinkage, density etc
- Test Modes
 - 'Single' mode: well-test runs once and stops
- During the test, 'live' registers contain Results from current Well-test such as Test State (Idle, Purge, and Test), Water-cut, Oil/Water Volumes and Volume-Rates.
- At the end of the test, save Well-test Results to History, such as Start & Stop Time stamp, Purge Duration [mins], Test Duration [hours], Water Cut [%], Oil, Water and Liquid Volumes [bbl or m3] and Volume Rates [bbl/d or m3/d].
 - the system saves *only* the latest well-test. The user has to download the well-test data to the laptop before starting the next well-test

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2.2. Well monitoring

- Hourly reports are available for the last 1 to 8 hours per user request (via custom software).
- Daily reports are available for the last 1 to 35 days per user request (via custom software).
- Information captured for each meter:
 - Start & Stop Time stamp
 - Water Cut, [%] (hourly or Daily)
 - Liquid Volume, [bbl or m3] (hourly or daily)

2.3. User Interface

- Basic FC configuration via integrated display
 - Monitor information such as time, date, volumes and water cut.
 - Select how the information is made available on the screen, continuously or intermittently.
- Custom software on a laptop for configuration, data downloads and report generation.
 - Configure meter settings, analog input signal and well parameters
 - Configure information made available on local display
 - Perform well test and monitor hourly and daily well activities
 - Retrieve well-test data (real-time and archived), hourly, daily reports etc
 - Software updates capability in the field.
- Well test report
 - Well test reports include the time (start & stop), volumes and water-cut measured during the testing period for each flow meter. Sample report below.

HISTORICAL WELL TEST REPORT				
Company Name	DFC	Unit ID	1	
Well End Date	03/31/16	Well Start Date	03/31/16	
Well End Time	16:55:33	Well Start Time	15:55:33	
Well No.	1	Name	w1name	
Location	w1location	Lease ID	w1lease	
Oil Shrinkage Factor	0.91001	Water Salinity Factor	0.91501	
Base Dens. gm/cc (Oil)	0.92001	Base Dens.gm/cc (Water)	1.19502	
	Meter #1		Meter #2	
Meter ID	Meter1		Meter2	
Meter Type	Frequency		Frequency	
K Factor (BLL)	1000.000		1000.000	
Pipe ID (Inches)	0.00000		0.00000	
Orifice ID (Inches)	0.00000		0.00000	
	Meter #1		Meter #2	
	Test Totals	Projected Daily	Test Totals	Projected Daily
Gross (BBL)	3600.0	86400.0	3600.0	86400.0
Gross (Water) (BBL)	810.6	19455.6	810.6	19455.6
Gross (Oil) (BBL)	2789.4	66944.4	2789.4	66944.4
Net (Water) (BBL)	811.4	19474.6	811.4	19474.6
Net (Oil) (BBL)	2555.6	61334.4	2555.6	61334.4
Mass Combined (MLB)	1164.0	27935.7	1164.0	27935.7
	Meter #1		Meter #2	
Averaged Value				
DP Ext. (H2O)	0.0000		0.0000	
Temperature (°F)	49.94		49.94	
Pressure (PSIG)	249.69		249.69	
Combined Flowing Dens. gm/cc	0.92246		0.92246	
Combined Base Dens.gm/cc	0.98194		0.98194	
K/CD/LMF	1.000000		1.000000	
BS&W	22.52		22.52	
CTLW	1.00098		1.00098	
CTPL (OIL)	1.00680		1.00680	
Combined API	21.7		21.7	
Combined Base API	12.5		12.5	
Y Factor	0.000000		0.000000	

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Micro NOC Technical Data

POWER	
VOLTAGE RANGE	7-28 VDC
POWER CONSUMPTION	0.5 WATT
OPERATING CONDITIONS	
TEMPERATURE	- 40 TO 185 °F
HUMIDITY	100%
HOUSING	NEMA 4X CLASS 1 DIV. 1
FEATURES	
DISPLAY	PLASMA 4 LINES 20 CHARACTERS BACKLIT DISPLAY WITH 4 INFRARED REFLECTIVE SENSORS
PROCESSOR	32-BIT MOTOROLA 68332 @ 16.7 MHZ
FLASH ROM	4 MBITS @ 70 NANO SECONDS
RAM	2 MBITS
FREQUENCY INPUT	3 CHANNELS CHANNELS 1 & 2 ARE SINE/SQUARE WAVE CAPABLE CHANNEL 3 IS SQUARE WAVE ONLY SQUARE WAVE RANGE 0 - 6000 HZ SINE WAVE RANGE 0 - 1200 HZ SIGNAL > 40 mV FOR SINE WAVE SIGNAL > 3 VOLTS FOR SQUARE WAVE
ANALOG INPUT	4 INPUTS STANDARD EXPANDABLE UP TO 9 ANALOG INPUTS OR 7 WITH ADDITIONAL 3 WIRE RTD.
MULTIVARIABLE	BUILT-IN ROSEMOUNT MULTIVARIABLE TRANSMITTER WITH DIRECT SPI DIGITAL CONNECTION. MAXIMUM UPDATE SPEED ONCE EVERY 109 MILLISECONDS.
ANALOG OUTPUT	ONE (1) OPTICALLY ISOLATED 16 BITS EXPANDABLE TO FOUR (4)
DIGITAL I/O	4 DIGITAL INPUTS OR OUTPUTS. DIGITAL OUTPUTS HAVE 0.25 AMPS RATING.
SERIAL	2 RS485 @ 9600 BAUDS VARIABLE 1 RS232 @ 9600 BAUDS VARIABLE 1 PRINTER OUTPUT
COMMUNICATION PROTOCOL	MODBUS