

Controls and Instrumentation



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WORLDWIDE OILFIELD MACHINE

TABLE OF
CONTENTS





Advance Control System.....	4
Quality Policy	5
Industry Standars	5
Advanced Control System Software	6
Standard Drilling Choke Control Panel	9
Emergency Shutdown System.....	10
Flowhead Control Panel	10

Controls and Instrumentation

ADVANCED CONTROL SYSTEMS

WOM's Advanced Control System is Copyright protected and patent pending.

Application

- Choke and Kill System
- Buffer Manifold Control
- Managed Pressure Drilling (MPD)
- MPD Interlocking System
- PRV Control System
- Single Set Point Choke Control System
- ESD Systems
- Wellhead Control System
- Flowhead Control System
- Liquid Seal Monitoring System

PLC/HMI Features

- 15"/19" HMI
- Widescreen-TFT-Display
- 16 Million Colors
- Proficient Interface, MPI/profibus DP Interface
- Panel Mount Design
- Dual Power Supplies with Redundancy Module
- DP/DP Coupler
- Integrated Display on PLC Faceplate for Controller Status
- Driller Interface
- Data Logging and transfer



Quality Policy

The primary purpose of Worldwide Oilfield Machine, Inc. is to provide products and services that meet the customer's needs and provide them with value. This philosophy will create gainful work for our employees and a profit for our stakeholders. Worldwide Oilfield Machine, Inc. is dedicated to providing the best possible product and/or service to its customers by having well-trained, enthusiastic employees and the effective implementation of this management system.

It is the POLICY of Worldwide Oilfield Machine, Inc. to :

- Operate in a safe, consistent and economical manner
- Maintain conformance to the documented quality management system, including the applicable industry codes, standards and/or specifications and customer-specified requirements
- Maintain compliance to statutory and regulatory requirements
- Prevent nonconformities at all stages of design and manufacturing by implementing the requirements of this manual and supporting procedures
- Ensure customer satisfaction
- Foster an environment of continual improvement
- Communicate this policy throughout Worldwide Oilfield Machine, Inc. and ensure that it is understood
- Aggressively pursue the Mitigation of Systemic Risk™ through the implementation of this management system
- Monitor and periodically review the management system, including stated objectives, and this policy for suitability and effectiveness

Industry Standards

- API 16C Monogram License
- DNV-OS-E101
- ABS CDS
- ATEX
- IECEx
- CSA
- Norsok



Remote Panel



Local Panel

Advanced Control Systems Software

The WOM Control System software is equipped with intelligence that allows mechanization of the well control manifolds. The software's diagnostic configuration resides inside the WOM PLC/HMI. The software (PLC/HMI) is written using Siemens TIA portal and includes the following features:

- **Intergrated System Diagnostics**
- **Fast error localization and error analysis**
- **Identical visualization of error messages in the TIA Portal, on HMI, on the Web server and on the PLC CPU in plain text format**

There are six features remarkably distinguished by the use of the WOM Control System software.

- **Alarm/diagnostics Processing**
- **Calibration**
- **Datalogging**
- **Interlocking Valves**
- **Dynamic Gauges**
- **LQS Monitor**



Remote Control Panel

Features

- **Dynamic pressure/ temperature gauges**

WOM offers dynamic gauges with the ability to switch between Psi/Bar and °F/°C, ability to change scale for higher resolutions when needed, alarms, high and low operational ranges are displayed via copyright protected graphics

- **Pump stroke Counter Monitor**

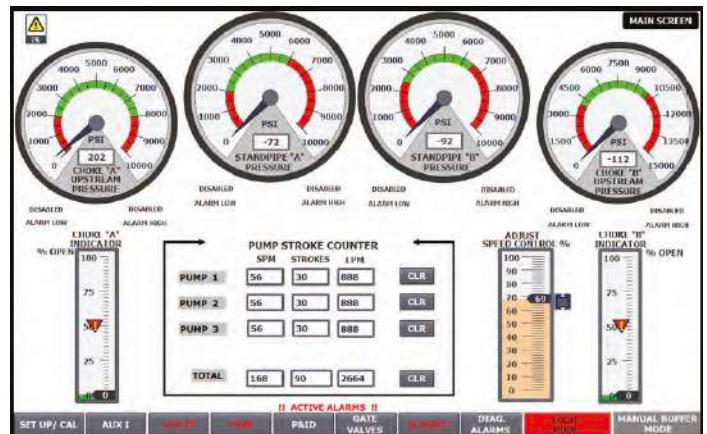
The pump stroke counter (PSC) indicates the stroke count, strokes per minute, and flow rate in GPM/LPM/BPM for each mud pump. Additionally, for each pump, the stroke count can be cleared back to zero by pressing the corresponding CLR button. There is also a TOTAL section in the PSC display.

- **Datalogging**

In real-time, data is logged from the PLC to the HMI SD Card(s). Data logging is uninterrupted even during data transfer to a USB memory stick.

- **Choke speed control slider**

Virtual speed control slider via touchscreen HMI allows the driller to manipulate choke actuation speed during a well control event.



Advanced Control Systems Software

Features

- **Liquid Monitoring System (LQS)**

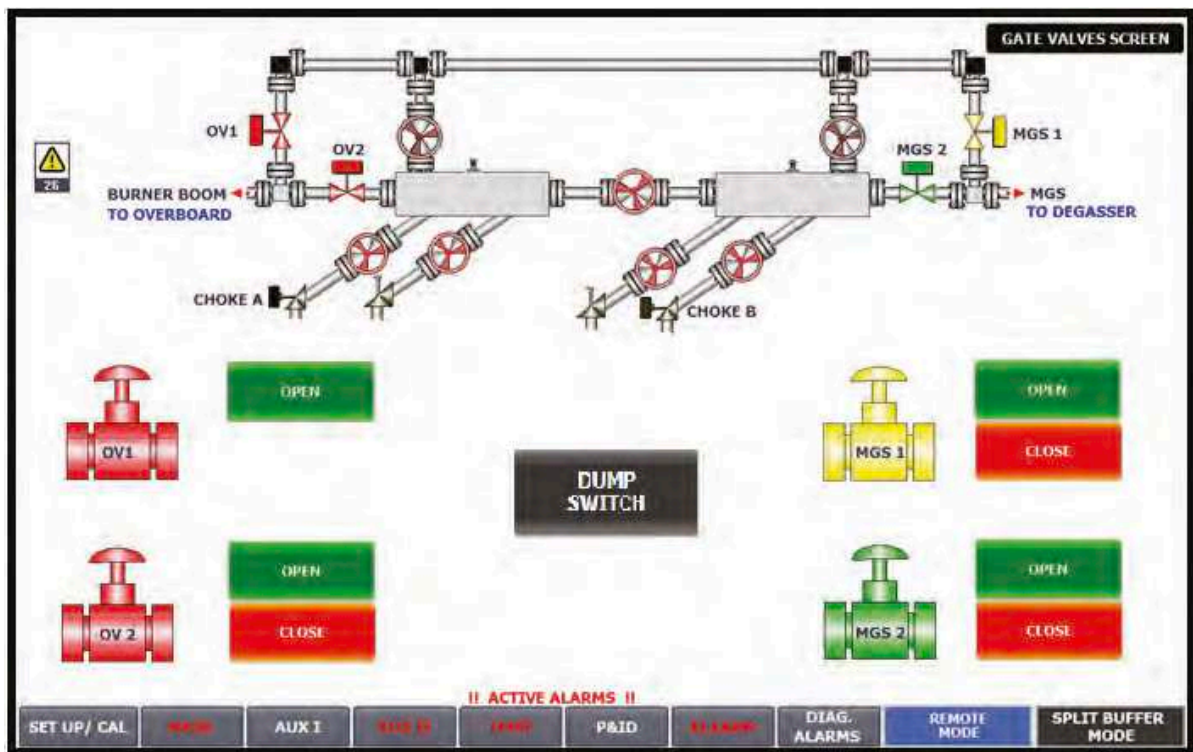
The system monitors the differential pressure between the liquid seal and the mud gas separator. The WOM control system software notifies the operator via internal and external audible/ visual alarms when the liquid seal is in danger of being breached. As an option, WOM offers a controlled automated “dump” sequence.

- **Gate valve control graphics**

The top half of the screen displays the state of the gate valves. The bottom half of the screen displays the automated valve control OPEN/CLOSE buttons.

- **Automated valve sequence**

As an option, WOM can provide automated sequences for opening/ closing valves on selection of particular operational modes. In addition, an automated “dump” sequence is provided to assist the operator in redirecting well returns from the MGS to the overboard flow lines.



Advanced Control Systems Software

Features

- **Alarms Graphics**

Alarms are displayed via split screen and color coded to represent severity/status. Upper half (Alarm History Screen) Shows historical record of all alarms regardless of its current state. Lower half (Active Alarm Screen) shows active alarms only. All alarms are displayed with time/day stamp.

- **As a minimum, WOM displays the following on choke control systems:**

- Manifold Pressures and temperatures
- Visual indicator(s) for all Alarms
- Strip Tank Level Indication
- Choke(s) Position (% Open)
- Pump Stroke Count (PSC), SPM, and flow rate
- Low Hydraulic HPU reservoir Level Indicator
- Operational Mode – Local/ Local Interlock/ Remote Mode

- **Interface with drillers control system**

No.	Time	Date	Status	Text
46	11:43:29 AM	7/14/2016	(DA)	POWER LOSS DETECTED
50	11:43:29 AM	7/14/2016	(DA)	Wirebreak: CHOKE B POSITION INDICATOR (AI-1; Ch 3)
49	11:43:29 AM	7/14/2016	(DA)	Wirebreak: CHOKE A POSITION INDICATOR (AI-1; Ch 2)
61	11:43:29 AM	7/14/2016	(DA)	Wirebreak: CHOKE A UPSTREAM TEMPERATURE (AI-2; Ch 6)
59	11:43:29 AM	7/14/2016	(DA)	Wirebreak: LIQUID SEAL PRESSURE (AI-2; Ch 4)
46	11:40:36 AM	7/14/2016	I	POWER LOSS DETECTED
50	11:40:36 AM	7/14/2016	I	Wirebreak: CHOKE B POSITION INDICATOR (AI-1; Ch 3)
49	11:40:36 AM	7/14/2016	I	Wirebreak: CHOKE A POSITION INDICATOR (AI-1; Ch 2)
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Standard Drilling Choke Control Panel

Configurations/ Options:

- Stand Alone/Floor Mount
- Blind HPU
- Remote Wall Mount

API 16C Drilling Conformance

- **Emergency Operation Provisions**
 - Nitrogen Connection
 - Hand Pump
- **Rig Air Connection**
- **Choke Pressure**
- **Stand Pipe Pressure**
- **Choke Position Indicator**
- **PSC**
- **Primary and Back Up Pump**
- **Accumulator**
 - Increase Choke Speed
 - Smooth Choke Operation
 - Emergency Power Source
- **Choke Speed Control**
- **Power to close Choke from fully open within 30 seconds**

Stainless Steel Cabinets Type 316SS
316SS Internal Hard Tubing
Suitable for Zone 1 and Zone 2



Floor Mount Local Panel



Wall Mounted Remote Panel

Emergency Shutdown (Esd) System

WOM's ESD system provides a fast acting functional safety shutdown in case of a hydrocarbon escape or other safety issues. This system located on the rig floor is designed to actuate SSV valves installed on or near the flowhead. The control panel includes:

- **One ESD local control; installed on the control panel face**
- **Maximum five (5) Remote ESD control stations**
- **Hi-pilot pressure set point; pilot device**
- **Low-pilot pressure set point; pilot device**
- **Fusible plug**
- **One High Pressure hydraulic hose 100 feet, rated for 6,000 psi**
- **Air Hose(s) for Remote Stations, 100 feet**

Custom configurations available upon request.



ESD System

Flowhead Control Panel

WOM's Flowhead Control Panel located on the rig floor allows for remote shut-in of the well at the flowhead. The system is designed to actuate a maximum of two (2) double acting hydraulic gate valves and two (2) failsafe actuated valves as follows:

- **Two (2) hydraulic operated fail-safe actuated wing valves**
- **One (1) hydraulic operated swab valve**
- **One (1) hydraulic operated master valve**

Custom configurations available upon request.



Flowhead Control System



WORLDWIDE OILFIELD MACHINE



VALVES & CONTROLS
A WOM group company



Magnum Technology Center
A WOM Group Company

We are Worldwide Oilfield Machine (WOM) - a global company pioneering Flow Control Solutions for the Surface & Subsea sectors of the oil & gas industry. Headquartered in Houston, Texas, we have manufacturing facilities, engineering centers, sales offices and assembly/testing workshops all over the world.

Our strength is our robust infrastructure that allows us complete control over quality, costs and delivery. With more than 20 patents and noted accreditations, our very own R&D facilities and 24x7 service centers across the globe we have the required capabilities & resources to deliver all your manufacturing needs for the industry.

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