



Weatherford®

Production Optimization

CS7X™ Electro-Hydraulic Safety Shutdown System

Weatherford's CS7X electro-hydraulic safety shutdown system is a low power, highly reliable, microprocessor based, integrated wellhead control system. By providing operation of wellheads and other production functions using standard application modules the system achieves a high level of safety and control.

The system is optimized for controlling offshore platforms. Low power requirements are ideal for production applications where conventional power sources are not available. Integrated hydraulic/pneumatic logic provides quick dedicated safety monitoring. SCADA systems easily link with the system to allow for remote monitoring and control.

Each electro-hydraulic safety shutdown system is assembled and tested to the latest CENELEC standards for use in hazardous areas.

Integrate well control and ESD with field management automation goals

- Distributed process systems and subsystems
- Remote and/or local interface availability
- Modbus® remote terminal unit (RTU) and Modbus TCP/IP protocols for convenient system integration
- Integrated web and telnet servers for quick access

Reduce maintenance/operating costs

- Extremely low power consumption
- Self reporting of system errors
- Allows for bypassing controls while performing maintenance on equipment

Increase system reliability/availability

- Highly reliable, microprocessor based architecture
- Wide temperature range, low power CMOS technology
- Redundant CPUs available



Modbus is a registered trademark of Modicon.



CS7X Electro-Hydraulic Safety Shutdown System

Features

- Integrated wellhead process control and SCADA
- Low power remote operation
- Scalable system design
- Easily programmable ESD logic
- Intelligent diagnostics and alarming

Interfaces

The CS7X electro-hydraulic safety shutdown system is a communication center at the well site. The system allows for multiple SCADA applications to access data from the RTU as well as a number of slave devices. SCADA applications can access the system via TCP/IP, RS485 and RS232 links. The CS7X RTU can use these same links to scan and control many slave devices. SCADA applications can access any data in the slave devices using the RTU's pass-through capabilities.

Scalability

The CS7X electro-hydraulic safety shutdown system can be scaled for your company's requirements. From single level to a multi-level system with up to four distributed control modules. At each level of the system, RTU redundancy is an option. With the ability to add hundreds of input/outputs (I/O), complete platforms can be monitored and controlled from one central location.

The multi-level solution is designed to allow individual wells to be controlled closely by a dedicated RTU while still being part of a complete control package. The master control module (MCM) is at the top level and interacts with each of the slot control modules (SLOM). The MCM handles emergency shutdown (ESD) commands and interacts with the SCADA host and other shared resources. The SLOM controls a single or a group of wells while communicating status back to the MCM.

I/O control modules are added to meet the requirements of each system. Individual analog input, analog output, digital input and digital output modules supply the interface with the platform's instruments.



CS7X Electro-Hydraulic Safety Shutdown System

Typical SCADA Operations

- Monitor safety valve and surface equipment statuses
- Adjust chokes to maintain production
- Open/close safety valves
- Issue remote shut-in of the platform

In conjunction with SCADA support the RTU has embedded TCP/IP access. The web server can access HTML or Flash programs residing on the RTU. The database can be accessed via Telnet or Weatherford's **Phoebus Explorer™** configuration program. The 40 channels of logged data points can be downloaded automatically via the RTU's FTP access.

Specifications

Physical Specifications	
Size	9.1 x 8.6 in. (6U x 220 mm)
Mounting type	Compact rack mount
Coating	Conformal type

Ambient Specifications	
Operating temperature (°F/°C)	-40 to 185 (-40 to 85)
Storage temperature (°F/°C)	-40 to 185 (-40 to 85)
Humidity	100% condensing (with coating)

CPU Card	
Power required	8 to 34 VDC, 1.25 Watts @ 25 MHz
Processor type	32-bit, ColdFire®
Processor speed	25 MHz/33 MHz
Data rate (CPU to CPU)	1 Mbps

Communications	
Two serial ports	RS232C
Two serial ports	RS485 or RS232C
Two ports	Controller area network (plug and header screw terminal)

ColdFire is a registered trademark of Freescale Semiconductor, Inc.



CS7X Electro-Hydraulic Safety Shutdown System

Specifications (continued)

Design Standards	
Surge protection	Withstand IEEE 472-1974
Certified	EEX'd IIB T6 SIRA Certification No. EX 93C1006 EEXn pending

Indicators	
I/O Channel	
Selection LED	Indicates active channel
Self-check status LED	Flashing indicates successful self-test
Digital	
Input status LEDs	16 input point LEDs
Output point status LEDs	16 output point LEDs

Analog Input (AI) Card	
Power required	5 V, ± 15 VDC nominal, 1.4 Watts
Analog input type	4 to 20 mA current loop or 1 to 5 V
Analog input points	16
Accuracy	$\pm 0.1\%$ of full scale
Resolution	16-bit (65536 counts)
4 to 20 mA Loop Switching Calibration—Zero and Span	Automatic

Analog Output (AO) Card	
Power required	5 V, ± 15 VDC nominal, 1 Watt
Analog output points	4
Analog output type	0 to 5 VDC, 0 to 20 mA, 0 to 5 mA, 4 to 20 mA
Resolution	12-bits
4 to 20 mA Loop Switching Calibration—Zero and Span	Automatic



CS7X Electro-Hydraulic Safety Shutdown System

Specifications (continued)

Digital Input (DI) Card	
Power required	5 VDC nominal, .35 Watts
Digital input points	16
Circuit type	Two-wire optically isolated
Contact wetting voltage	+24 VDC
Typical input current	8 mA
Input contact bounce filter	10 mSec

Digital Output (DO) Card	
Power required	5 VDC nominal, .35 Watts
Digital output points	16
Output type	Form "A" solid state relay
Contact power rating	100 VA
Contact open circuit withstand volts	60 VDC
Leakage current	1 mA @ 60 VDC
Maximum current	2 Amps
Isolation	4000 VRMS

