



**Weatherford®**

Production Optimization

**K-Series Products  
Technical Training  
Course Offerings**

**2010 Schedule**

**Kingwood, TX - February 23-26**

**Farmington, NM - March 16-19**

**Pittsburg, PA - April 13-16**

**Grand Junction, CO - July 13-16**

**Oklahoma City, OK - October 12-15**

## Overview

For effective operation of the Weatherford SCADA Systems, it is beneficial for a company to implement and provide employees periodic training to enhance their knowledge and proficiency to maximize the company's return on investment. To this end, Weatherford is pleased to offer a variety of training programs designed to educate and enhance the benefits of your automation system.

## Course Descriptions

### ***DACC RTU Course Series***

#### **K-Series Product Training Course (school date)**

This four day course builds on a basic understanding of RTU operation and use and covers the system overview, detailed RTU components, RTU configuration, and instrumentation hookup, calibration concepts, Weatherford PROControl concepts, and advanced troubleshooting.

This course will prepare the student for the Calibration, PROcontrol, and Application course.

A detailed course outline is attached.

## Training Schedule

Each of the courses listed below require a laptop computer. Typically for a full class, two students will share an RTU, so only one laptop computer between them will be required. Only one laptop will be necessary for each two students from the same company. If the student cannot bring a laptop, please notify us so arrangements can be made.

### **K-Series Course (4 days, Tuesday - Friday)**

Class time:	8:00am - 5:00pm, Tuesday-Thursday 7:30am - 2:00 Friday
Class Location:	Weatherford Engineering Facility in Oklahoma City
Fee	\$1,500 before deadline
Enrollment Size:	Min: 5 Max: 15
Enrollment Deadline:	2 weeks before school Kingwood, TX - February 8, 2010 Farmington, NM - March 1, 2010 Pittsburg, PA - March 29, 2010 Grand Junction, CO - June 28, 2010

Oklahoma City, OK - September 27, 2010

Requirements: A laptop with an RS-232 serial port is need to attend this class.

## For Your Information

### Cost

The fee includes the cost of the course and course materials. Purchase orders, Mastercard, Visa or American Express are accepted. Existing Weatherford customers that have existing credit approved can be billed. Participants are responsible for all other expenses including; meals, lodging, and travel.

### What is provided?

Each training class participant is provided with an **enrollment package** that includes directions to the training facilities, recommended local hotels, detailed course description and schedule. Your **course materials packet** will include paper, pen and all necessary manuals. Snacks are provided during breaks when the class is held in Oklahoma City or Kingwood.

### Classes

Seating is limited and reserved to insure quality training. You will be notified if the location is changed.

An enrollment deadline applies for all Weatherford classes. We are always happy to accept a late enrollment, space permitting.

A minimum class enrollment applies to all classes. Please refer to the class schedule for these minimums. If the minimum class enrollment is not met by the enrollment deadline, the class may be canceled or rescheduled accordingly. The enrollment deadline is always at least two-weeks before the scheduled class date to reduce your travel expenses. We will notify you as soon as possible when a class has been canceled due to low attendance. Weatherford is not liable for travel, meals or lodging expenses.

### Local Cities and On-Sites Training

On-Site training is always available. We are willing to create a custom curriculum that meets your company's individual needs. Our standard fee structure is shown below

Training held at customer facility

Daily fee:	\$1,500 per day Plus, \$500 per travel day
Travel cost:	\$1.00 per mile for vehicle or, airline and rental car costs
Expenses:	instructor expenses billed to customer
Lunch expenses:	provided by customer or, cost billed to customer

Custom training held at Weatherford's Oklahoma City or Kingwood, TX offices for a specific customer

Daily fee: \$1,300 per day  
Travel cost: none  
Expenses: lunch cost each day for the class

### **Certificates of Completion**

Students are provided a certificate of completion for each student that successfully completes the course for your record keeping.

### **What should I bring to the sessions?**

Each class may have specific requests for items that should be brought with you to the training sessions. If you are not able to bring the requested items to the training sessions, please let us know. We can't guarantee that we can provide the items, but we will try.

### **What happens if I have to cancel my enrollment?**

In order to provide effective training it is necessary to schedule Instructors in advance. Therefore, cancellations that are received before the enrollment deadline will be fully refunded. Cancellations that occur after the deadline are refunded at the following rates:

10 to 14 days notice	85%
5 to 9 days notice	75%
1 to 4 days notice	50%
<1 days notice	0%

### **Registration**

To register please call, email, FAX, or write:

Weatherford  
Production Optimization  
Attention: John Mortensen  
3826 N. Maney Street, Suite 100  
Oklahoma City, OK 73112  
(405) 445-3372  
(281) 404-3213 (fax)  
[john.mortensen@weatherford.com](mailto:john.mortensen@weatherford.com)

For your convenience we have included a training class enrollment form. Please duplicate as often as necessary as we need one form for each participant.



**Weatherford®**

# K-Series Product Training Enrollment Form

**2010 Classes**

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NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

COMPANY: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE: \_\_\_\_\_

ZIP: \_\_\_\_\_

PHONE: \_\_\_\_\_

FAX: \_\_\_\_\_

CELL PHONE: \_\_\_\_\_

E-MAIL: \_\_\_\_\_

OTHER: \_\_\_\_\_

Select the class(s) for which you are enrolling

\_\_\_ Kingwood, TX - February 23-26

\_\_\_ Farmington, NM - March 16-19

\_\_\_ Pittsburg, PA - April 13-16

\_\_\_ Grand Junction, CO - July 13-16

\_\_\_ Oklahoma City, OK - October 12-15

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**1. SYSTEM OVERVIEW**

- 1) Well site equipment
- 2) RTU system
- 3) Instrumentation
- 4) Control
- 5) Communications
- 6) Production equipment
- 7) Host system



**2. WELL SITE EQUIPMENT (basic review)**

- 1) Gas Flow Meter – orifice, V-Cone, turbine, PD
- 2) Liquid Flow Meter – turbine, PD, V-Cone
- 3) Dehydrator – reboiler temperature, glycol level, glycol flow, pump strokes
- 4) Tank – level, temperature – analog, digital probe, switch, radar, ultrasonic, float, head pressure
- 5) Compressor – run status, rpm, suction & discharge pressure, shutdown control, Modbus communications interface
- 6) Pump – flow, discharge pressure, start/stop control, bypass control, run time
- 7) Separator – pressure, level, dump valve failure, liquid flow
- 8) Control – valve control, valve position, upstream & downstream pressure, pressure & time intermit
- 9) Flow Control -
- 10) Well Head - casing pressure, tubing pressure, control valve
- 11) Plunger lift – arrival switch, vent valve, control valve, plunger release
- 12) Volume control – daily or monthly volume
- 13) SWD (salt water disposal) – pressure control, rate control, tank level control, pump control
- 14) Water injection – Valve control, water meter, injection pressure monitoring and control, flow rate monitoring and control
- 15) CDP (central delivery point) – split flow control, summing flow rates, volume control
- 16) POW (pressure observation well) – downhole pressure & temperature, digital and analog interface
- 17) Pump-off-control – flow switch & timer
- 18) Chemical injection – proportional to flow computer volume
- 19) Sampler control – proportional to flow computer volume
- 20) Hurricane timer
- 21) Environmental – tank level, pressure, alarms, well ESD
- 22) Analyzers – O<sub>2</sub>, CO<sub>2</sub>, N<sub>2</sub>, BTU, specific gravity
- 23) Device interface – VSD, PLC, other flow computers and RTUs
- 24) Wireless monitoring and control

# K-Series Training Course Outline

## 2010 Courses

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### 3. RTU SYSTEM

- 1) K-3512, 3102, 2000, 1000, 500, & 202 RTUs – Overview
- 2) New K-5000 RTU System
- 3) MIM Module
- 4) Differences between RTUs
- 5) Multi-Variable transmitter (MVT), standard and low cost
- 6) RTU components – mounting, enclosure, LOS jack, power supply
- 7) RTU board layout – I/O, LEDs, com ports, power, fuses
- 8) Display
- 9) LOS jack & cable
- 10) Power Supply – Solar, AC, TEG, Wind Turbine
- 11) Batteries
- 12) Accessories - RS232 - RS485 converter, pulse amp & CIM
- 13) Communication – radio, cellular, CDMA, GPRS, satellite, LEO, Space Data, port sharing
- 14) Grounding system – ground rod, CADWELD
- 15) Antenna System – Yagi, omni, polyphasor, operating frequency

### 4. Software tools

- 1) IMI –Intelligent Machine Interface (Weatherford, no cost)
- 2) Hyperterminal (Windows, no cost)
- 3) Procomm (purchased from Symantec)
- 4) VbTerm (eP/Weatherford, no cost)
- 5) VbFlash (eP/Weatherford, no cost)
- 6) VbPoll (eP/Weatherford, no cost)
- 7) VbCIM (eP/Weatherford, no cost)
- 8) VbModbus (eP/Weatherford, no cost)
- 9) KWinCom for Windows (Weatherford, \$125 each copy)
- 10) KComm for DOS (Weatherford, no cost)
- 11) SaveRec for DOS (Weatherford, no cost)
- 12) TREND for DOS (Weatherford, no cost)

### 5. RTU CONFIGURATION

- 1) Computer interface – LOS, cable, VT-100 terminal, IMI Program
  - 2) Menu system description
    - Keyboard navigation
    - Passwords
    - Short cut keys
    - Must complete record editing
    - Can't back up for correction
  - 3) Firmware types & versions
  - 4) Hardware channel & software record concepts
- a) RTU Setup Procedure**
- 1) Board replacement
  - 2) Firmware upgrade

## K-Series Training Course Outline

### 2010 Courses

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- 3) Extract RTU history
  - 4) Extract RTU trends
  - 5) Clear & test memory (return to factory default)
  - 6) See RTU setup procedure document
- b) RTU CIM interfaces**
- 1) Multi-Variable Transmitter
  - 2) I/O CIM
  - 3) Honeywell PPT-R
  - 4) Pulse CIM
- c) Reset menu**
- 1) History settings
  - 2) Communications
  - 3) Analog fail
  - 4) Cryout (report on alarm)
  - 5) Clear and test memory
- d) IMI Program**
- 1) Program overview
  - 2) Installation
  - 3) Database concepts, installation path, renaming
  - 4) Administration concepts, tool, utilities, functions
  - 5) Navigation
  - 6) Data retrieval
  - 7) Reports
  - 8) Excel data reporting and graphing
- e) Digital inputs**
- 1) Input circuitry
  - 2) Channel numbering
  - 3) N/O & N/C definition
  - 4) Typical wiring techniques
  - 5) Failsafe configuraton
  - 6) Hardware channel vs. software record display
  - 7) Digital Input record configuration
  - 8) Display hardware channel & software records
  - 9) Example setups
- f) Digital Output**
- 1) Connection definition
  - 2) Channel numbering
  - 3) N/O & N/C definition
  - 4) Typical wiring techniques – relay, EPC, EPVP, solenoid, latching solenoid
  - 5) Typical wiring techniques – solid state, open collector
  - 6) Failsafe configuration
  - 7) Disable switch (K-3512)
  - 8) Record configuration
  - 9) Display hardware channel & software records
- g) Analog inputs**
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## K-Series Training Course Outline

### 2010 Courses

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- 1) Input circuitry
- 2) Channel numbering
- 3) 4-20mA & 1-5volt standards, typical applications
- 4) Internal inputs
- 5) RTDs
- 6) Typical wiring techniques
- 1) Power supply, wiring
- 2) Display hardware channel & software records
- 3) Analog record configuration
- 4) Tank gauging, scaling, and specific gravity correction
- 5) Scaling calculations and examples
- 6) Scaling non-standard transmitter signals
- 7) Display hardware channel & software records
- 8) Example setups
- h) Analog output (setpoints)**
  - 1) Output circuitry
  - 2) Channel numbering
  - 3) 4-20mA & 1-5volt standards
  - 4) Typical wiring techniques
  - 5) Display hardware channel & software records
  - 6) Ways to drive outputs – manual, analog record, procontrol
- i) Accumulator input**
  - 1) Input circuitry
  - 2) Channel numbering
  - 3) Typical wiring techniques
  - 4) Display hardware channel & software records
  - 5) Accumulator record configuration
  - 6) Example setups
- j) Totalizer (tank module) record configuration**
  - 1) Tank gauging – strapping factor, calculation, tank size tables
  - 2) Inputs
  - 3) Review turbine meter concepts
  - 4) Other uses
  - 5) Example setups
- k) Flow computer configuration**
  - 1) What is a flow computer?
  - 2) AGA 3, 1985 & 1992 equations, orifice meters
  - 3) AGA 7, turbine, pulse meters
  - 4) NX19 & AGA8 supercompressibility
  - 5) V-Cone, gas and liquid
  - 6) Review orifice meter concepts
  - 7) Scaling
  - 8) Input types
  - 9) Other uses – water meter, tachometer
  - 10) Example setups

## **K-Series Training Course Outline 2010 Courses**

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### **l) RTU data logging**

- 1) EFM data
- 2) Analog history
- 3) Production history
- 4) Analog record trending

### **m) Special RTU device interfaces**

- 1) Data communications – RS-232, RS485, converters, wiring
- 2) Siemens & Advanced Telemetrys, level probe interface
- 3) Bristol flow computer interface
- 4) Baker FTI downhole instrument interface
- 5) Cooper Entronic PLC interface
- 6) MODBUS RTU interface
  - VSD
  - Motor Saver
  - Total Flow, Fisher, others
  - Micro Motion
- 7) MODBUS ASCII interface
  - CSI Frick Compressor Control Panel
- 8) Firmware types
- 9) Example setups
- 10) Communications tools

### **6. K-2000**

- 1) Differences from K-3000 series
- 2) System specification
- 3) Enclosure system
- 4) I/O

### **7. KD-500 & K-500**

- 1) System specification
- 2) Options
- 3) Enclosure systems
- 4) Power management
- 5) I/O

### **8. CIM Modules**

- 1) I/O
- 2) Functions
- 3) Application

### **9. PRO-CONTROL (brief description)**

- 1) Control concepts
- 2) Overview of modules
- 3) Production valve types
- 4) ESD/TSD

### **10. CALIBRATION (brief description)**

# **K-Series Training Course Outline**

## **2010 Courses**

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- 1) Calibration concepts
- 2) Calibrating the RTU System
- 3) A/D reference
- 4) Re range transmitter
- 5) Impact of RTU replacement

### **11. Other Equipment**

- 1) Kimray EPVP
- 2) Kimray EPC
- 3) Pressure transmitters
- 4) K-series port sharing board
- 5) K-series power supplies
- 6) K-series RS-232 to RS-485 converter
- 7) Solenoid valves
- 8) Level probe, Siemens, Advanced Telemetry
- 9) Instruments

**Instrument hookup and wiring and troubleshooting will be discussed throughout the course**

### **12. INSTRUMENTATION HOOKUP and WIRING**

- 1) Wiring & cable selection
- 2) Hazardous area classification

### **13. TROUBLESHOOTING**

- 1) RTU board operation, display, LED's, visual inspection
- 2) System power, AC, solar, battery
- 3) Fuses, RTU board, power supplies
- 4) Communications, comm viewer, KComm, LED's
- 5) Instrumentation
- 6) Control, valves, actuators