Course on

ADVANCED FLOW MEASUREMENT AND INSTRUMENTATION – PRINCIPLES & PRACTICE

4th to 6th March 2020

198 in Series

एफ.सी.आर.आई

FCRI

फ्लूइड कंट्रोल रिसर्च इंस्टिट्यूट

FLUID CONTROL RESEARCH INSTITUTE

(ISO 9001: 2008 Certified, NABL accredited organisation)

(यलात्रंम मद्यठ कनर्जिवास रऔ गोद्यठीराभ, (राकरस तराभ

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Major Calibration & Test Facilities at FCRI

Laboratory Fluid flow NABL C026/T027	Maximum Flow Rate (m^3/h)	Maximum Line Size	Uncertainty in Flow Rate (% reading)	Uncertainty in Volume (% reading)
Water Flow	4500 15000	900mm 2000mm	Upto 200m^3/h : ±0.05% 200 to 2500m^3/h : ±0.10% 2500 to 4500 m^3/h : ±0.15% 5000-15000m^3/h : ±0.5%	2m^3 to 20m^3 : ± 0.05%
Air Flow At Ambient conditions	10000	400mm	0.016 m^3/h to 0.25m^3/h : ±0.3% 0.25 m^3/h to 40m^3/h : ±0.1% 0.7 m^3/h to 400m^3/h : ±0.15% > 400m^3/h 10000m^3h : ±0.25%	0-0.5 m^3 : ±0.1% 2 m^3 : ±0.1%
Closed loop Air Test Facility (20 Bar) *Calibration Loop *Gravimetric Loop Velocity	10- 400m^3/h 4-1000kg/h	150mm 50mm	± 0.3% ± 0.1%	
Oil Flow	650	250mm	0-100m^3/h: ± 0.05% 100-600m^3/h : ± 0.075%	Upto 1.8m^3 : ± 0.03% 1.8m^3 to 9 m^3 : ± 0.04%
Compressed Natural Gas	4500 Kg/hr	1.5"	± 0.1%*	*under-Accreditation

Mechanical Calibration Metrological, Pressure, Noise, Vibration etc. NABL C 056							
	Parameters		Range	Calibration & Measurement Capability	Parameters	Range	Calibration & Measurement Capability
	MASS-Standards Weights		1mg and upto 500kg	0.0048 mg to 1.2g	PRESSURE pressure transducers	1 to 60bar 60 – 1200bar	0.04% of rdg 0.026% of rdg
	MASS-Weighing Balance & Mass Comparator		Various ranges from 0-2 g to 600 Kg	0.005mg to 0.05 Kg	Pressure-gauge pressure transducers (pneumatic)	30mbr to 2000 mbar abs	0.02% of rdg
			600 Kg to 2000 Kg	0.1 Kg		0.25 bar to 20 bar abs	0.038% of rdg
			2000 Kg to 20000Kg	3.53 Kg			
	VOLUME -Specific Gravity bottle, Pipettes, Burettes Measuring Flasks		1 ml – 5000 ml	0.05ml to 0.7ml	Pressure-Low pressure gauge & differential	0.2 mbar to 10 mbar	0.88% rdg
						10mbar to 160mbar	± 0.077%of rdg
	DENSITY - Hydrometers		0.64 g/cc – 1.98 g/cc	±0.0005 g/ml	Pressure-gauge pressure transducer (pneumatic)	30 mbar to 2000 mbar	± 0.02% of rdg
	VISCOSITY	Dynamic	1to 60000 mPas/cSt	± - 1.0% rdg	Pressure-vacuum (gauge)	-100 to 980mbar g	± 0.06 of rdg
		Kinematic	1to 60000 cSt	± - 1.0% rdg	LENGTH- slip Gauges (steel)	0.5 – 100 mm	0.05 µm to 0.16µm
	Acoustic Pressure – Free Field		125 Hz to 20 Hz	≤0.5 dB	Vibration Test Facility	6000 Kgf / 2000Kgf shaker 5 Hz to 2000 Hz	
	Acoustic Pressure – Pressure Field		94 & 114 dB @ 1 kHz 124 dB @ 250 Hz	0.5dB	Acoustic Test Facility	Hemi Anechoic Chamber ISO3745	
	Acoustic Power		125Hz to 16 kHz	2.0dB			
	Vibration Amplitude - Analyzer		0.1 to 15g (acceleration) 1 to 240mm/s(velocity) 0.01 to 10mm(displacement)	2.4 %	Temperature & RH Test Facility	-70 to 180 deg C 10 to 98 % RH	
	Vibration Amplitude –Sensor Linearity		2Hz to 15 kHz Upto 30g pk	≤2.5 % 1.25%		Dust – IP 5X, 6X	
	Speed (Contact)		100 to 10000 rpm	1.6 rpm	* IP Tests		
	Speed (Non-contact)		60 to 100000 rpm	≤2.4 rpm		Water – IP X3 to X8	

Electro Technical Calibration Electro Technical Calibration NABL C 0254						
		±100µV to ±1000 V ±0.1mV to ±1000V 1mV to 1000V 100mV to 1000V	0.60% to 0.001% 0.12% to 0.012% 0.4% to 0.014% 0.04% to 0.03%	DC Current Source Measure AC Current Source Measure	±100µA to ±1000A ±100µA to ±20A 100µA to 700A 100µA to 10A	0.014% to 2.0% 0.013% to 0.05% 0.04% to 1% 0.06% to 0.035%
	Resistance Source Measure	10µΩ 10G Ω 100µΩ 1G Ω	0.6% to 0.02% 0.42% to 0.5%			
	Time	1 Sec – 5400 sec	1.53 µSec to 5.4mSec	Frequency	1 Hz to 1 GHz	10mµHz to 1.2 Hz

Thermal Calibration NABL C					
	Temperature	-70 °C to +1200 °C	±0.07°C to 1.3°C	Fixed Point Cells	-38.8344°C to 961.78°C	2.9m°C to 19.7m°C
	*Temperature & Humidity Chamber	- 70°C to 180°C 10% to 95% RH				

About the Programme

Fluid flow measurements play a very vital role in petrochemical industries, process plants and water distribution net work etc... Flow measurement and control is an essential requirement for assuring the quality as per the relevant standards and the safety operation of the piping network and personnel involved. The course is designed to deal with all the relevant aspects of gas/liquid flow measurement and control and will also cover the new technological developments in the field.

Topics:

- Principles of Flow Meters.
- Linear, Non Linear, Non Intrusive Types.
- Calibration Methods of Flowmeters viz. Gravimetric, Volumetric, Meter Proving.
- Uncertainty Estimation as per ISO/NABL norms.
- Selection and Sizing of Flowmeters for Specific Applications.
- Flow Measurement Techniques in Large Ducts.
- Flare Gas Measurement.
- Auxiliary Measurement Systems - Pressure, Temperature & Density Measurement.
- Domestic Gas Metering.
- Introduction to Multiphase or Polyphase Flow.
- L P G Metering.
- Model Approval Testing of Flow Metering System as per OIML Standard.

Lab Experiments / Demonstration

Calibration of industrial flow meters as per relevant standards in

(1) Gas
(2) Liquid

Target Group:

Technical personnel from Mechanical, Instrumentation, Chemical, Petroleum or Electrical Engineering with a background of industrial instrumentation and control in fluid flow measurement and related field. Participants may be from industries dealing with gas/liquid flow measurement, flow meter manufacturers, other related industries like Refineries, Power Plants, Fertilizers, R&D Organisation or Academic Institutions.

General Information

Venue	:	**FCRI Conference Hall**
Date	:	**4 to 6 March 2020**
Course Timings	:	**9.30 AM to 5.30 PM**

10% discount for nominating 5 or more Participants from same organisation

Fees (Non Residential)

For Participants working in India :
Rs. 15,435/- + 18% GST Rs.2,778/- Total Rs. 18,213/- per participant+1% KFC Rs.154/- (as applicable)

For Participants from abroad:
US $ 908 + GST 18 % US $ 163 + Charge US $ 20 = Total US $ 1,091/- per foreign participant. +1% KFC US$ 9

We accept e-payment only
Bank Details : State Bank of India(SME Branch) Kanjikode west, Palakkad - 678 623
Account Name : Fluid Control Research Institute
Account No. : 10258760349 & IFSC Code : SBIN0006640

Please email GST identification number , invoice address and e-payment details to training@fcriindia.com

(This includes registration fee, course materials, participation certificate, initial & final objective type tests (as per ISO requirement), group photo, lunch & refreshments and local transportation from Hotels to FCRI & back during the course days). FCRI is exempted from payment of income tax. This course is purely Non-residential. Assistance can be provided for booking of accommodation in hotels in and around Palakkad, Kerala.

Recognition of FCRI

Agency	Category
National Accreditation Board for Testing and Calibration Laboratories (NABL)	Calibration/Testing of Flow Products, Mechanical Measurements Thermal Calibration, Electro Technical Calibration
Netherlands Measurement Institute (NMI)	CLATF (20 Bar, 400 m^3/h) of FCRI complies with the criteria for Calibration Laboratories as per ISO/IEC 17025
Department of Science & Technology	Recognized R&D Institute
Department of Weights & Measures (Ministry of Civil Supplies)	Model Approval tests on flowmeter for custody transfer of oil/gas as per OIML Standard
Chief Controller of Explosives, Nagpur	Testing of Safety Relief Valves
Bureau of Indian Standards	Testing of Water Meters, Anemometers etc.
Institution of Fire Engineers, New Delhi	Hydraulic Qualification tests on fire fighting equipments
Central Pollution Control Board	Certification of Petrol, Kerosene and Diesel Generators for type approval
Nuclear Power Corporation	Seismic Studies for Power plant Equipments
Ministry of External Affairs (ITEC) & Ministry of Finance, Dept. of Economic Affairs (Colombo Plan)	Training programmes for Foreign Nationals on Flow Measurement and Instrumentation for Oil Gas & Water utilities/industries
GCAS Quality Certification Pvt. Limited	ISO 9001:2008 Certification in Calibration & testing of fluid flow component, calibration of mechanical, electro technical, thermal instruments, flow calibration & measurements at site, project consultancy & implementation, professional training.

Registration

Registration for the training program can be confirmed by sending the details viz. NAME, DESIGNATION, ORGANISATION, POSTAL ADDRESS / EMAIL / PHONE / FAX / POST (to the address given below). The Course fee is to be remitted in advance through E – Payment only. The registration must be completed **preferably before 2nd March 2020.**

For further information and registration, please contact:
The Head Training, **FLUID CONTROL RESEARCH INSTITUTE,** Kanjikode West, Palakkad - 678 623, Kerala.
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