

WATER METRING & AUTOMATION

BY A.S.SANDHU

Energy Conservation | Environment | Process Efficiency

FORBES MARSHALL

WITH 60 YEARS OF EXPERIENCE

- 4 INDIAN LEADERS IN STEAM ENGG AND CONTROL INSTRUMENTATION
- 4 FORBES MARSHALL GROUP DESIGN, DEVELOP, MANUFACTURE AND MARKETS PRODUCTS AND OFFERS SOLUTIONS TO THE INDUSTRIES AND ENGINEERING INDUSTRIES
- 4 WORKFORCE : OVER 1100 EMPLOYEES
- 4 TURNOVER 2009 -10: RS.600 CRORE
- 4 27 BRANCHES IN INDIA
- 4 15 INTERNATIONAL BRANCHES
- 4 3 MANUFACTRING PLANTS IN INDIA



WHY WATER METERING

BIGGEST CRISIS LOOKING AT FUTURE IS DMNISHING WATER.WATER IS CURRENCY OF LIFE, IF IT DRIES UP

WE ARE FINSHIED

SO WE NEED TO CONSERVE AND CONTROL USE OF WATER

“TO CONTROL WE NEED TO MEASURE”

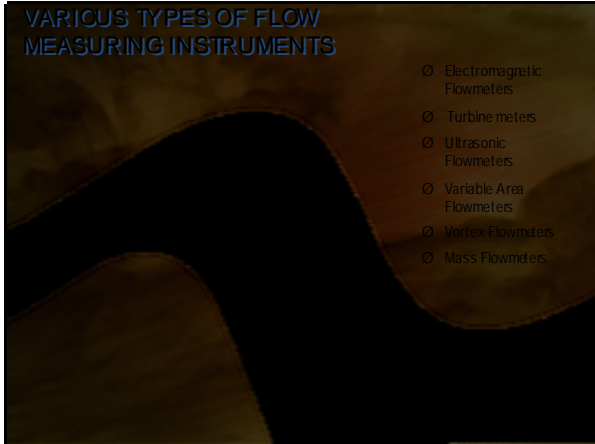
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METERING OBJECTIVES:

- Ø REDUCE NON REVENUE WATER
- Ø EFFECTI VE WATER & WASTE WATER MANAGEMENT
- Ø CUSTOMER AWARENESS ON CONSERVATION OF WATER
- Ø TO KNOW THE LEAKAGES/PILLFIRAGE
- Ø EFFICIENT BILLING
- Ø UNIFORM SUPPLY AT TIMES OF SCARCITY
- Ø RECYCLING AND REUSE
- Ø IMPROVE EFFICIENCY OF EQUIPMENTS
- Ø REDUCE MAINTENAN CE COST

VARIOUS TYPES OF FLOW MEASURING INSTRUMENTS

- Ø Electromagnetic Flowmeters
- Ø Turbine meters
- Ø Ultrasonic Flowmeters
- Ø Variable Area Flowmeters
- Ø Vortex Flowmeters
- Ø Mass Flowmeters



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UFM

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The Universal Flowmeter

Easy to engineer
Easy to install
Easy to operate & maintain
For a Sharp Price

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7

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Product Portfolio Optimass 7000



Available in 7 sizes
and 3 materials



Ast
MANUFACTURING TECHNOLOGY

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Part D

1

VFM



- Two wire, μ Controller based, intrinsically safe. EMC compatible electronics.
- Ability to handle liquids, gases & steam
- Off-line mass / normal flow computation
- Local display / operator interface
- Built-in electronic totalizer
- HART communication
- Simple power-on diagnostics
- Current & pulse outputs
- Compact and Separated electronics

WHY

MAGNETIC INDUCTIVE FLOWMETERS

Magnetic Flow meters Principle

If a conductive liquid flows through a magnetic field of field strength B, a voltage U will be induced in it. This voltage is directly proportional to the average flow velocity V of the medium and is sensed by two electrodes. From this and the tube diameter D of the signal converter, the signal converter calculates the volumetric flow rate.

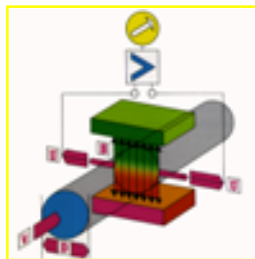
$$U = K \times B \times V \times D$$

K = instrument constant

B = magnetic field strength

V = mean flow velocity

D = electrode spacing



The Electromagnetic Flow Measuring Principle

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Magnetic Flow meter Range



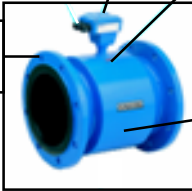
- 4 DN 10 - 3000
- 4 ACCURACY BETTER THAN $\pm 0.3\%$ OF MV
- 4 LINDER HARD RUBBER / PTFE/PI/PFA
- 4 IP67 / IP 68
- 4 MOUNTING LENGTH TO ISO-STANDARD
- 4 FULLY PROGRAMMABLE
- 4 2LINE BACK LIT LCD DISPLAY
- 4 DISPLAYS FLOW RATE & TOTALISED FLOW
- 4 NO WEAR & TEAR, RUGGED AND PROVEN DESIGN
- 4 ECONOMICAL FIT & FORGET SOLUTION

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Flanges as per
ANSI,AWWA
Class D

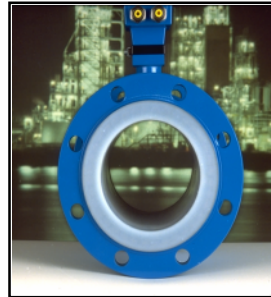
IP 68 protection
SS 304 terminal box



Fully welded SS 304
coil housing provides
complete protection
against aggressive,
corrosive environmental
conditions

Every flow meter
calibrated on the
most accurate
accredited calibration
facility

FULL BORE FLOW THROUGH SECTION - NO MOVING PARTS
NO RESTRICTIONS, NO OBSTRUCTIONS

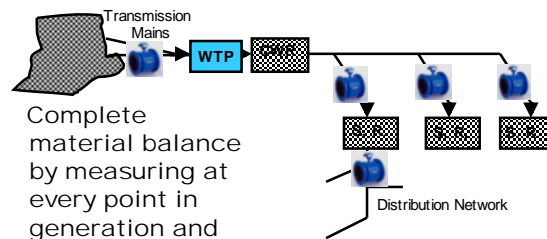


ADVANTAGES OF INLINE FULLBORE MAGNETIC INDUCTIVE FLOWMETERS

ØNO MOVING PARTS - NO WEAR
& TEAR & NO MAINTENANCE

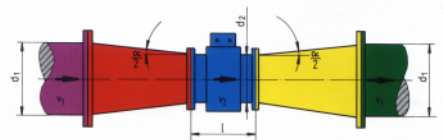
ØFULL BORE FLOW THROUGH
SECTION - NO RESTRICTIONS,
NO OBSTRUCTIONS. HENCE
NEGLIGIBLE PRESSURE DROP &
NO CHOKING

TYPICAL SCHEMATIC OF WATER MANAGEMENT NETWORK



INSTALLATION PICTURES

Electromagnetic Flow meter Installation



Typical Installation Between Reducer & Expander

Magnetic Flow meters for Water Applications

- 4 Water & waste water measuring
- 4 Sea water flow metering

Magnetic Flow meters for Water Applications



Magnetic Inductive Flow meters installed in an Underground Chamber and a Pump House

Large sizes at Water Corporation



At pumping stations

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STANDARDS

ISO 9104 : UNDER THIS , THERE ARE TWO METHODS

- I. VOLUMETRIC – AS PER ISO 8316
- II. GRAVIMETRIC- AS PER ISO 4185

THIRDMETHOD IS CALIBRATION AGAINST MASTER METER, TRACEABILITY DEPENDS ON CALIBRATION OF MASTER METER

STANDARDS

ISO 9104 : MEASUREMENT OF LIQUIDS IN CLOSED CONDUITS – METHODS OF EVALUATING THE PERFORMANCE OF ELECTROMAGNETIC FLOWMETERS FOR LIQUIDS

THIS STANDARD SPECIFIES THAT THE ACCURACY RATING OF THE REFERENCE STANDARD SYSTEM SHOULD BE PREFERABLY **AT LEAST 3 TIMES BETTER** THAN THAT OF THE METER UNDER TEST.

CALIBRATION FACILITIES MUST ENSURE TRACEABILITY TO NATIONAL & INTERNATIONAL STANDARDS

CALIBRATION OF THE METER SHOULD BE DONE PREFERABLY OVER ITS SPECIFIED MEASURING RANGE

CALIBRATION METHODS

- DIRECT VOLUME COMPARISON (ISO 8316) – PRIMARY STANDARD & TRACEABLE.
- GRAVIMETRIC METHOD (ISO 4185) – PRIMARY STANDARD & TRACEABLE BUT VOLUME COMPUTED BY APPLYING DENSITY FACTOR. ACCURACY IS A FUNCTION OF WEIGHING SYSTEM ACCURACY AND DENSITY MEASUREMENT ACCURACY.
- MASTER METER METHOD – SECONDARY STANDARD. TRACEABILITY & ACCURACY DEPENDENT ON CALIBRATION OF THE MASTER

CALIBRATION

CALIBRATION

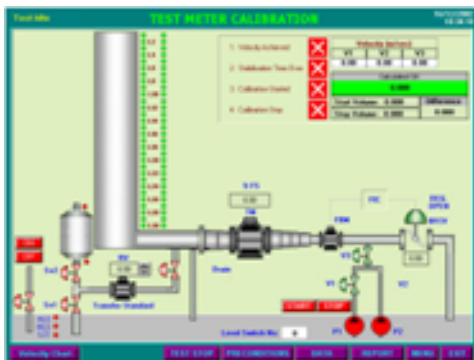
**WORLD'S
2ND LARGEST
CALIBRATION
FACILITY**

Accuracy Inspires Confidence

CALIBRATION FACILITY IN PUNE

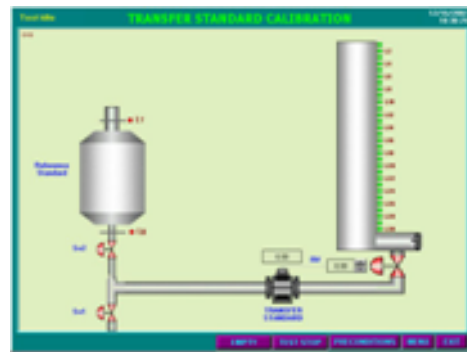


CALIBRATION FACILITY



12May-07

CALIBRATION FACILITY



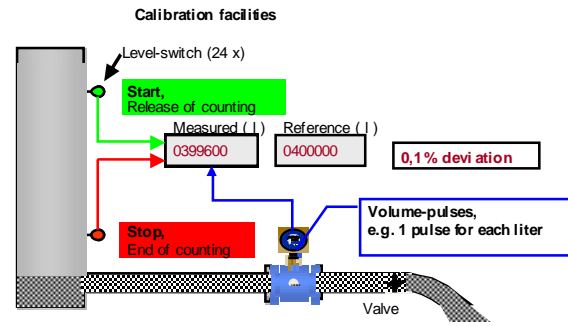
12May-07

CALIBRATION FACILITY



12-May-07

Krohne Marshall India



CALIBRATION FACILITY



DN 3000 METER UNDER CALIBRATION

REFERENCES

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Magnetic Flow meters to Water Applications

- 4 **Municipal Water Supply Boards**
- 4 **Industrial Water Supply Boards**
- 4 **Water Supply Pumping Stations**
- 4 **Agricultural & Irrigation Supply Lines**
- 4 **Water & Waste Water Pipelines**
- 4 **Effluent Treatment Plants**
- 4 **Sewage Pipelines**
- 4 **Main Water Supply to Large Industries**

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REFERENCES IN WATER & WASTE WATER

- DELHI JAL BOARD
- U.P. JAL NIGAM
- CMWSSB, CHENNAI
- BHAV NAGAR MUNICIPAL CORPORATION
- KAR NATAKA WATER SUPPLY & DRAINAGE BOARD
- CHITTAGONG WATER SUPPLY
- ORISSA WATER SUPPLY & SEWERAGE BOARD
- PUNE MUNICIPAL CORPORATION
- BWSSB, BANGALORE
- GWSSB, GUJARAT
- RUIDIP, JAIPUR
- MP ADB FOR BHOPAL, INDORE, GWALIOR
- J & K ADB
- UTTARAKHAND ADB
- PHED, RAJASTHAN
- CHANDIGARH MC
- HARYANA WATER AND SEWERAGE BOARD
- HIMACHAL PRADESH

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WATER METERING HAS FURTHER MOVED TO CONTROL AND MONITORING THROUGH GSM/GPRS BASED SCADA SYSTEMS.

- WE HAVE ALREADY DONE REMOTE MONITORING THROUGH GSM AT HAMIRPUR, H.P. FOR MULTISTAGE PUMPING WATER SUPPLY SCHEME.
- DJB INSTALLED MEASURING & MONITORING SYSTEM FOR 305 ELECTROMAGNETIC FLOW METER IN DISTRIBUTION NETWORK THROUGH GSM NETWORK.

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GUIDE MAP FOR SITE LOCATION

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Stages

- The various stages of the project consists of stages as below:
Stage I
- The water is to be taken from river beas where six percolation tanks are provided and from there the water is pumped to Jakhoo.
- The level of all the percolation tank level is to be monitored on continuous basis using level transmitters and based on the level the pumps operation will be automatically controlled.
- The water flow rate being pumped to Jakhoo Pump house is monitored using Magnetic Flowmeter.

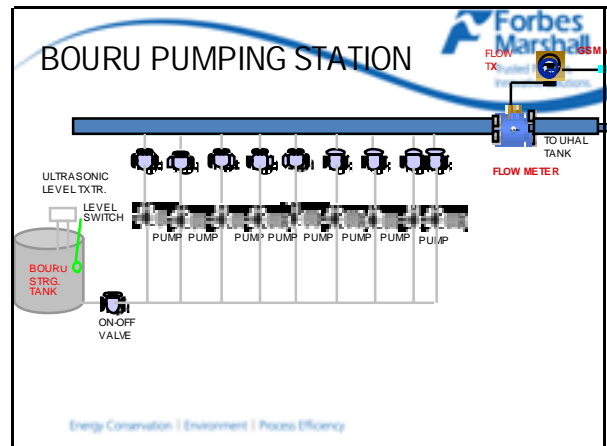
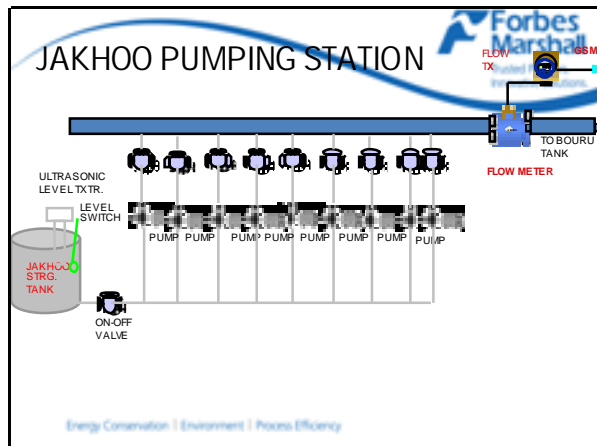
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Jakhoo Pump House

- The tank level at Jakhoo is monitored and controlled automatically by switching the pumps at River Beas. This will protect the spilling of the tank and to also protect the pumps at Bohru for dry running in case of low level.

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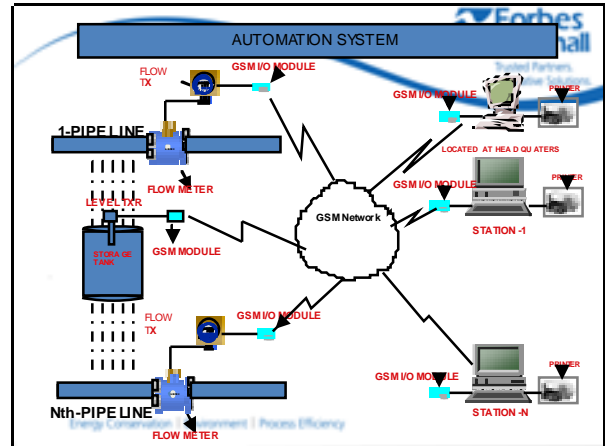


Stage III (Uhal)



- The incoming water flow at Uhal is monitored by magnetic flow meter.
- At Uhal the central control room is used to monitor all the data from various stages and pump houses on SCADA. The data is collected from the individual field instruments using state of the art GSM network.
- The storage tank at Uhal is used to store the incoming water from Bohru and for providing the supply to various distribution lines and at storage tank in Matlana through gravity.
- Uhal Tank High level switching is used to control the switching of pumps at Bohru.
- The Electrical actuated On/Off valves at the pumps are actuated from the SCADA to start the water flow.

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- ✓ Data acquisition
- ✓ Event Management
- ✓ Alarm management
- ✓ Real Time data
- ✓ Data retrieval
- ✓ Histogram
- ✓ Bi-directional Communication
- ✓ Data Logging
- ✓ Security & Data integrity
- ✓ Daily and Monthly reports

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GSM – Global System for Mobile communication
GSM uses a Variation of time division multiple access
GSM digitalize and compresses data and sends it in own timeslot.
Data transmission by SMS– Short Message Service

GPRS – General Packet Radio Services
Packet based wireless communication
Data rates 56K-114 Kbps
Continuous connection to the internet for mobile phones and computer

PSTN – Public Switched Telephone Network
Telephone system based on copper wires carrying analog signals

ISDN – Integrated Service Digital Network
Communication standard for sending voice and data over digital telepho ne lines.
Supports data transfer rates up to 64Kbps

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There are totally 72 user spread across 20 Sq. KM pump their effluent to CETP and also receives treated water from CETP

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Schematic of GPRS data transmission

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Effluent Water Treatment Solutions

EWTS

DATA LOG | EVENT LOG | ALARM SUMMARY | HISTORIC TRENDS | REPORTS | BILLING | LOGOUT

Logged in as: user@domain.com

FACTORY | CETP

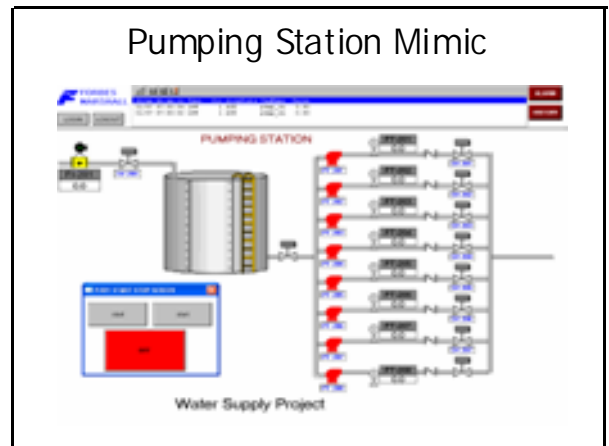
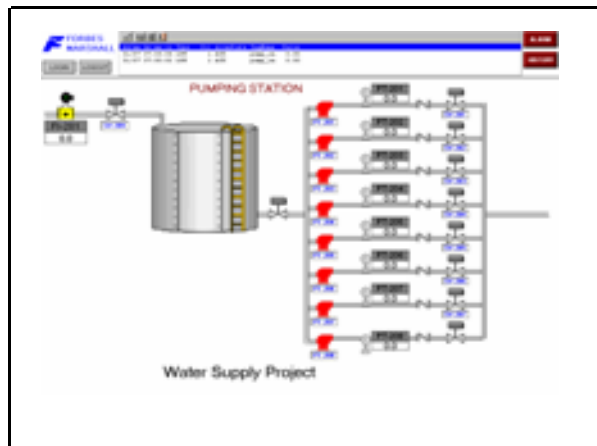
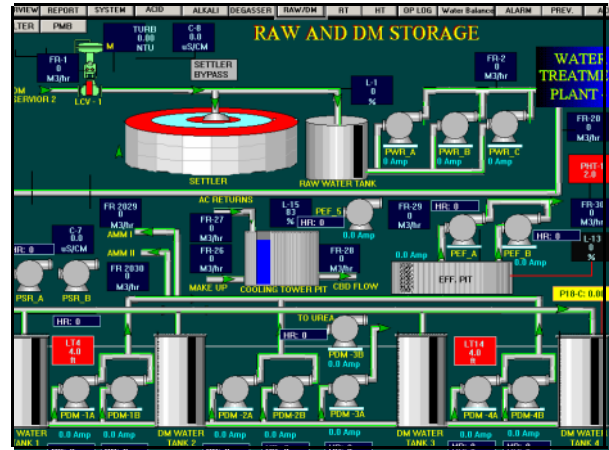
Tue Mar 17 10:17:10T 2009

PUMPING STATION 13/04/2008 05:52:21

EVENT LOGGING

Day	DICL EXPORT	PRINT	PREVIEW
Activity			
13/04/2008 05:47:41 Valve ON			
13/04/2008 05:47:23 Pump release			
13/04/2008 05:47:04 Valve OFF			
13/04/2008 05:46:51 Valve ON			
13/04/2008 05:46:14 Pump release			
13/04/2008 05:45:18 Pump hold			
13/04/2008 05:45:02 Pump hold			
13/04/2008 05:44:33 Pump start			
13/04/2008 05:44:04 Valve ON			
13/04/2008 05:38:27 Pump stop			
13/04/2008 05:38:09 Valve OFF			
13/04/2008 05:27:14 Pump start			
13/04/2008 05:26:48 Valve ON			

LOCATION 1 LOCATION 2 REPORT DAILY REPORT MONTHLY REPORT EXIT



GOVERNMENT IS INVESTING LOT OF FUNDS
THROUGH VARIOUS PROGRAMMES FROM
LAST FEW YEARS

- JNNURM FUND
- ADB FUNDING
- JBIC FUND
- WORLD BANK FUND
- & MANY OTHER

THANKYOU
QUESTIONS ?