

Mobrey open channel flow measurement systems



Comprising:
MCU Flow log datalogging control unit
MSP900** Ultrasonic level transmitter

Mobrey MCU/MSP ultrasonic systems have a long and successful history in open channel flow measurement and logging. The MCU90F is the latest addition to this family and is a dedicated open channel flowmeter and control unit based upon the highly successful MCULOG.

A system comprises an MCU90F datalogging control unit and a 4-20mA/HART loop powered MSP900 Series ultrasonic transmitter. May also be used with 9700 hydrostatic transmitter.

The MCU90F has an integral programming keypad, eliminating the need for handheld programmers. It communicates digitally with the ultrasonic transmitter to give improved resolution and accuracy, and is available in wall or panel mounting options.

The whole system carries an ATEX II (1) G certificate for use in Zone 0 areas, reducing installation and wiring costs.

The MCU90F includes many features designed specifically with the requirements of open channel flow and logging in mind, including:

- Calculates flow in an open channel in accordance with BS3680 Pt. 4, ISO14381/1 and ISO4359
- Clear local display of
 - instantaneous flow
 - daily totalised flow
 - cumulative totalised flow
- On-board logging of up to 7000 flow values
- On-board logging of up to 365 daily totalised flow values

In OCF applications, the level transmitter is mounted upstream of the channel restriction or obstruction in accordance with the recommended standards. These standards also define the relationship between the liquid level at that point and the flow through the channel.

The popular V-notch weir 5/2 and Venturi flume 3/2 (see overleaf) flow laws which have been used for many years are pre-programmed in the MCU90F control unit, along with other popular flow laws. Where flow measurement has to be in accordance with BS3680 or the Environmental Agency requirements (EA consented flows), the MCU90F has a 20 point look-up table which can be programmed with a dedicated stage discharge curve for the flow structure.

If the user does not have the curve available, we offer to calculate the curve for certain structures based on dimensional and flow data provided by the user. A data sheet is produced detailing all of the MCU90F parameters and their values which require programming, together with a projection of the uncertainty for the specific application. Structures for which discharge curves can be provided include:-

- V-Notch
- Venturi flumes:
 - Rectangular
 - Semi-circular
 - Trapezoidal
- Triangular profile (Crump) weirs
- Broad crested weirs
- Flat V weirs
- Parshall flumes
- Manning formula:
 - Round pipe
 - Rectangular channel



Operation

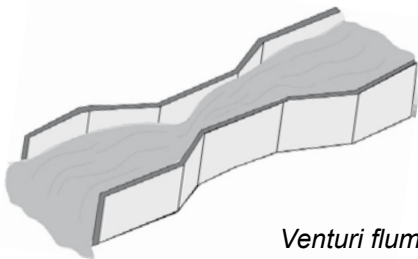
The flow in an open channel may be derived by measuring the liquid level upstream of a weir or flume of a standard design.

MCU90F Log system

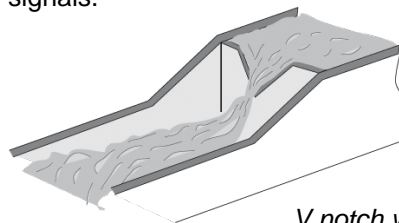
It is a regular requirement that the flow and totalised flow be logged for download at a later date.

The MCU90F has an on-board logger which can log up to 7000 samples at user definable intervals. In the event of flow exceeding a limit value, fast logging is automatically triggered until the flow reverts to normal. In addition, 365 midnight totalised flow values are also logged along with the maximum instantaneous flow during each 24 hour period. All data is real time stamped and stored for download via an RS232 connection on the control unit.

Data can be collected using a portable PC, and is easily stored and manipulated using the Mobrey LogView windows software.



*Venturi flume
Typical 3/2 power law*



*V notch weir
Typical 5/2 power law*

Functionality

The MCU90F control relays may be allocated as flow rate alarms or may be selected to operate as a pulse output to an external totaliser. There is also the facility to allocate a relay as a low-flow cut off so that totalisation errors are avoided in very low flow conditions. The current output is proportional to instantaneous flow rate and is used for remote monitoring, telemetry or local recorders. Alternatively, the user may select the current output to be proportional to a rolling average of flow over a user defined averaging period.

The system will totalise flow and show both instantaneous flow and totalised flow on the display, in different units of measurement if required. Up to 365 daily flow totals are stored and may be recalled at any time.

There is also the facility to connect up to two digital (voltage free contact) inputs to the system which may be used to inhibit measurement or force alarms or other routines to start upon external signals.



MCU90FW wall mount MCU90FP panel mount

Features summary

- 240V, 110V ac or 24V dc models
- Clear back-lit display of instantaneous and logged data
- Five field adjustable control relays
- 4-20mA Isolated output proportional to instantaneous or averaged flow (rolling average)
- 7000 Event logging
- 365 Daily total flow logging
- On screen display and recall of logged data
- ATEX IS output for field transmitter
 - no external barriers required
- Operates with 4-20mA or HART loop powered transmitters

MCU90FW Series wall mount control units

Housed in a tough polycarbonate enclosure, the control unit can be mounted either inside or outside. Easy to use keypad and HMI - easy set up. Built-in programming wizards make det-up and commissioning simple and fast, guiding the user through data entry in easy steps. All wiring terminals and mains selector switch for AC model are accessed by removing the lower terminal box lid, leaving the main electronics compartment undisturbed.

The enclosure is pre-drilled with 5 cable entries (M20 / 3/4") and glands and blanking plugs are supplied reducing installation time and cost.

MCU90FP Series panel mount control units

All of the MCU functionality is available in this small panel mounting format. Extending just 165mm / 6.5" into the panel, connection is made to two part terminal blocks on the rear of the unit.

Mobrey LOG-VIEW Communication software for use with Mobrey datalogger control unit

Description

Mobrey LOG-VIEW is a Windows based package for use on stand-alone PCs. Data is downloaded from the Mobrey MCU90F and the LOG-VIEW software will automatically add new data to data already stored, concatenating data in the correct sequence.

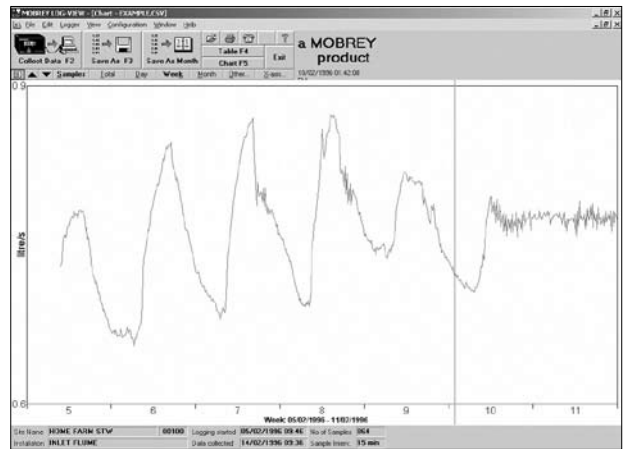
Mobrey LOG-VIEW is designed to operate on portable or desktop PCs provided there is 1MB hard disc space available. It is suitable for use on all Windows operating systems up to and including Windows XP.

Data collection can be direct to a portable PC (all leads supplied), or collected via a Mobrey Hand Held Communicator and downloaded back at base.

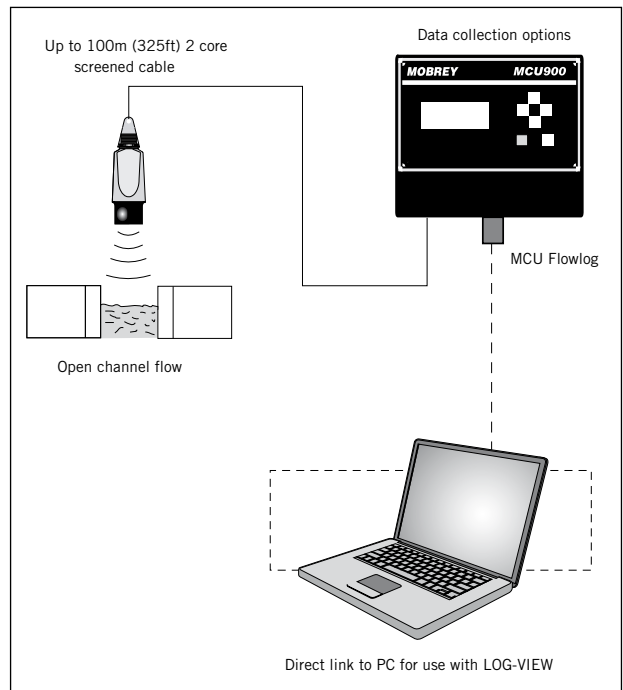
- PC based software
- Simple collection & clear display of logged data
- All connecting leads supplied

Data Display

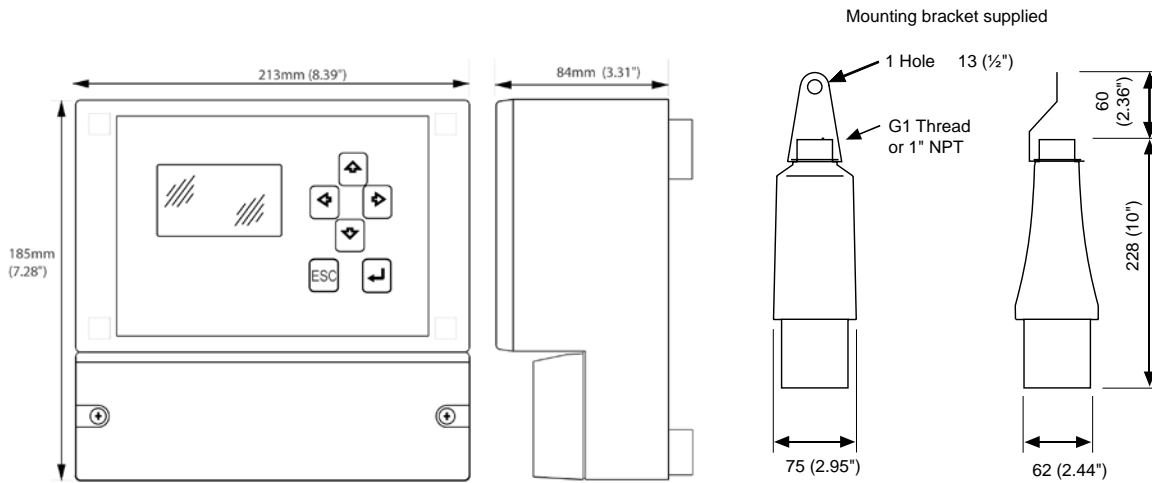
- Tabular listing of samples, showing date, time, actual flow, totalised flow and any out-of-limits alarms
- Display by day, week, month or year
- Allows search for maximum and minimum flows
- Allows search for data on any specified day at any time
- Display of data as a graph of flow against time
- Time period may be specified i.e. daily, weekly, monthly
- Totalised flow as a bar graph may be displayed



Transfer of logged data

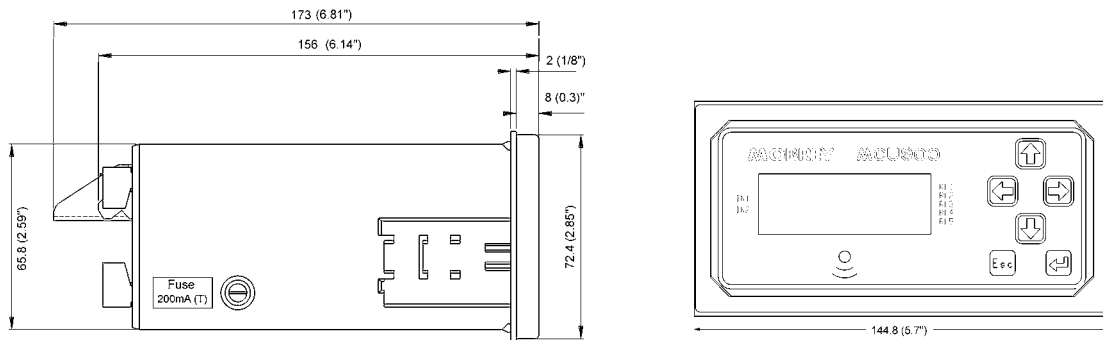


Dimensions



Datalogging control unit: wall mount

Transducer



Datalogging control unit: panel mount

Ordering information

MCU	Mobrey Control Unit	
	90F	Open channel flow
	WX	Wall mounting enclosure
	PX	Panel mounting enclosure
	-A	ATEX certified, mains powered
	-U	UL certified, mains powered
	-A24	ATEX certified, 24V dc powered
	-U24	FM certified (pending), 24V dc
t	t	t
MCU90F WX -A Typical model number		

MSP	Mobrey ultrasonic level transmitter	
	900	UPVC construction, 12m (39ft) operating range
	SH	Factory sealed transmitter, HART communications
	-A	ATEX/CSA certified I.S. (Zone 0)
	-U	FM certified
	/3	Fitted with 3m (10ft) two core shielded cable
	/20	Fitted with 20m (65ft) two core shielded cable
	/50	Fitted with 50m (163ft) two core shielded cable
t	t	t
MSP 900 SH -A /20 Typical model number		

Technical specification: Control unit

Electrical

Supply and power consumption	ac 98V ac - 132V ac, 50/60Hz/18VA max, 198V ac - 254V ac 50/60Hz/18VA max dc 15V dc to 30V dc / 9W max.
Current input	4-20mA and/or HART Digital communications (Rev. 5) Supplies 23V from 400Ω source resistance
Trigger inputs	2 voltage free contact closures
Current output	4-20mA isolated into 1 Kohm (12 bit)
Relays	5 SPCO, 5A at 240V ac
Cable entry	5 positions pre-drilled. 2 glands and 3 blanking plugs provided
Cable connection	<i>Wall mount:</i> Cage clamp terminal blocks in separate terminal compartment <i>Panel mount:</i> 2 part cage clamp terminal blocks at rear

Mechanical

Material	<i>Enclosure and keypad:</i> Polycarbonate
Dimensions	<i>Wall mount:</i> 213mm wide x 185mm high x 84mm (8.39" x 7.28" x 3.31") deep <i>Panel mount:</i> Cut out 139 wide x 69 (5.47 x 2.72") high. Allow 165mm clearance behind panel
Enclosure rating	<i>Wall mount:</i> IP65 (NEMA 4) indoor/outdoor <i>Panel mount:</i> IP42 (NEMA 5) indoor mount; IP65 (NEMA 4) Hood kit available
Environmental	Installation category: 115V: Cat.III, 230V: Cat.II Pollution degree: 2 Altitude: 2000m (6500ft) max. Relative humidity: 100%
Temperature	-40°C to +55°C. (-40°F to +131°F) Use of an air circulation fan is recommended if 3 or more panel mounting units are installed in the same cabinet
Approvals	ATEX coding II (1) G [EEx ia] IIC UL Pending

Technical specification: Ultrasonic transmitter

Range	0.3 to 12m (11.8" to 39ft)
Power supply	24V dc 2 wire loop powered
Output	4-20mA
Digital Communications	HART
Ambient temperature	-40°C to +60°C (-40°F to +140°F)
Maximum temperature	-40°C to +60°C (-40°F to +140°F)
Operating pressure	0bar to +3bar (0psi to 43.5psi)
Material of construction	UPVC (Stabilised)
Rating	IP68 (15m) NEMA 6P
Cable	2 core screened
Cable sheath	PVC
Cable length	3, 20 or 50m (10ft, 65ft, 163ft) All cables may be shortened or extended on site.
Mounting	ATEX models: 1" BSPP FM models: 1" NPT mounting
Certification	ATEX II 1 G EEx ia IIC T6, FM IS CL 1 Zn0, A Ex ia IIC, IS CL 1 DIV1 Grp. ABCD

Level

MSP900SH Series ultrasonic level transmitters

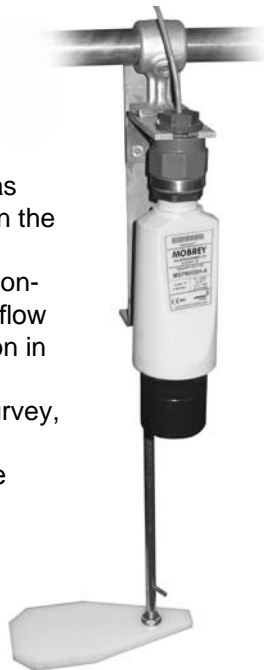
These 24V dc loop powered transmitters are factory sealed and fitted with cable ready to install on aqueous applications. Manufactured from UPVC, the transmitter is designed to give a 4-20mA HART output proportional to liquid level in the channel. Power is supplied by the MCU90F, and the transmitter is easily configured with the application details using the control unit keypad. All communications with the MCU90F is digital using the HART digital protocol.



MSP900SH transmitter

Site services

Rosemount Measurement has built considerable expertise in the area of open channel flow measurement, and offers an on-site service to verify existing flow structures and instrumentation in accordance with BS3680. The service includes a full survey, report, remedial works, final certification and maintenance thereafter if required.



Head verification device with MSP900SH style transmitter fitted

Mobrey head verification device

To ensure continued accuracy of instrumentation and allow fast on-site calibration checks at any time, the Mobrey head verification device is available. Easily mounted on standard unistrut or similar, the HVD comprises a target on a stainless steel swivel arm, and supports the ultrasonic transmitter at a fixed distance above the target plate. When the instrument is to be checked for accuracy, the target is swung under the head and the simulated flow reading checked against a certified value for that installation.

MSP-HVD is easily retro-fitted to most existing OCF installations.

For further information about the range of on-site services offered, visit the Mobrey brand pages at www.emersonprocess.com or contact Rosemount Measurement for details.

Mobrey HVD order information

MSP-HVD	Use with Mobrey MSP900SH style transmitters
MSP-HVD1	Use with Mobrey MSP400RH style transmitters

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