Quick-start for MCULOG*X-A Control Units

with Mobrey HART® Transmitters

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Process Management

Introduction

What is this Quick-start?

This **Quick-Start** is for anyone who has to install and commission the **MCULOG** and **MSP900** ultrasonic system, and does not need in-depth information.

For full installation instructions, you **must** refer to the installation (IM) manuals supplied with the equipment.

What are the MCULOG and MSP900 used for?

The MCULOG and MSP900 are used for level, contents, and flow measurement and control systems. Typical applications include wet well level (and pump) control, tank contents measurement, and open channel flow measurement.

The system comprises a mains or DC powered **MCULOG** control unit, an **MSP900*H** ultrasonic transmitter with a mounting kit, and manuals. The MCULOGWX-A is a **wall-mounted** version of the MCULOG, and the MCULOGPX-A is **panel-mounted** MCULOG.

| Figure 1: MCULOGW – wall-mounted | Figure 2: MSP900*H | Figure 3: MCULOGP – panel-mounted |

About the MCULOG Control Unit

The MCULOG unit is a member of the **MCU900 family** of control units. It has:

- Full support for a single MSP900*H ultrasonic transmitter – measuring level by default
- a 4-line LCD display with back light – displays both text and graphical information
- a 6 button keypad
- an LED indicator
- an intuitive menu system – for setting up
- **2** digital inputs (voltage-free contacts) for triggering various activities (e.g. displaying a message)
- **5** relay outputs (e.g. for controlling pumps, indicating alarms, etc.)
- a 4-20mA output
- a 4,800 event logging capability.

All setting up is achieved from the front panel of the MCULOG control unit.

About the MSP900*H Ultrasonic Transmitter

This is a loop-powered transmitter, factory sealed and fitted with cable ready to install on aqueous applications. The transmitter is pre-configured to measure liquid level and communicates values to the MCULOG.

If the level measurement is required to be in feet or inches, navigate the MCULOG menu system to the "Base Units" screen under the MSP900 transmitter's SETUP/SYSTEM menu. Edit the base unit setting to be "Imperial ft" or "Imperial inch". Switch off the power to the MCULOG for five seconds and then switch the power back on. The MCULOG automatically configures itself to the chosen base units of the MSP900 transmitter. For example, the display units will be in feet. Note that this procedure does not lose programmed application information but the MCULOG will re-prompt for the Bottom Reference as described on page 4.

The other manuals

The following manuals are supplied along with this Quick-start manual:

MCULOG:	**MSP900*H:**
Installation manual (IP2030/QS)	Installation manual (IP2040/IM or IP2047/IM)
Safety instructions (IP2030/SI)	Safety instructions (IP2040/SI)

The reference manual IP2030/RM is available to download from the Mobrey brand pages at www.emersonprocess.com.

Installation

> **IMPORTANT** - For hazardous area installations, you must refer to the installation (IM) manuals supplied with the system.

Location of MSP900*H

- Install the transmitter above the liquid surface using the bracket provided. Important instructions for an open channel flow installation are given in IP2040/IM.
- Do **not** mount the MSP900*H on a structure that is subject to vibration, or in a position where impact or thermal stress may cause damage.
- The equipment is **not** intended for use in areas exposed to dust.
- The equipment must **not** be installed directly in any process where the enclosure might be charged by the rapid flow of non-conductive media.

Location of MCULOG

- The MCULOG **must not** be located in a hazardous area. **Do not** mount the MCULOG where it is subject to vibration, or in a position where damage may be caused by impact, thermal stress or liquid ingress.
- The **MCULOGW** is housed in a tough IP65 enclosure. If mounted outside, it is recommended that the unit be protected from direct heavy rain.
- The **MCULOGP** is a standard DIN size designed for direct mounting in a control panel. It is designed for panel mounting in a weatherproof environment.
- Allow sufficient space around the MCULOG for easy connection to the download socket.

Cabling (MCULOGW)

1. Cable the MSP900*H to the MCULOG using the gland provided. (Undo 2 screws and lift cover away to reveal terminals).
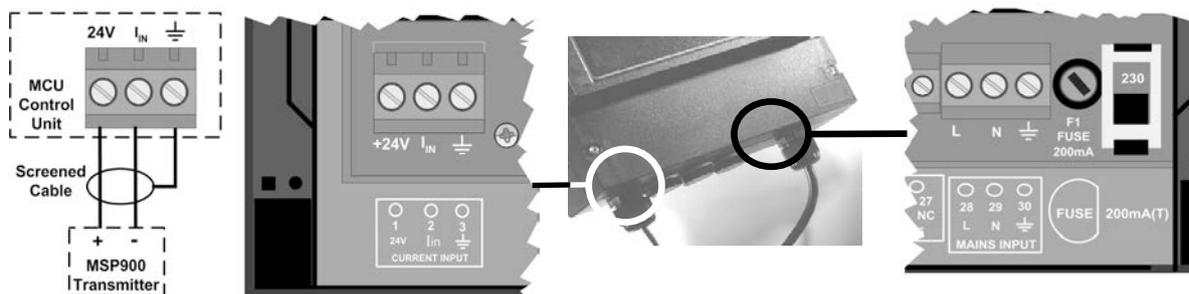

2. For a mains powered MCULOGW:
   (**a**) Check the voltage selector switch (230Vac or 115Vac) and adjust if necessary. (See figure inset, right).
   (**b**) Cable the power lead to the MCULOG using the gland provided. **Do not apply power yet.**
3. For a 24V DC powered MCULOGW:
   (**a**) Connect the negative power wire (–ve) to terminal 31, and the positive power wire (+ve) to terminal 32.
   (**b**) **Do not apply power yet.**
4. Make connections to relay terminals and current output terminals, if required.
5. Seal unused cable entries with the blanking plugs provided.
6. Replace and secure the terminal cover.
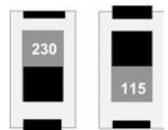
Cabling (MCULOGP)

1. Cable the MSP900*H transmitter to terminals **1**, **2** and **3** on the rear panel of the MCULOG. (See figure inset, right)

2. For a mains powered MCULOGP:
   (**a**) Check the voltage selector switch (230Vac or 115Vac) and adjust if necessary.
   (**b**) Cable the mains power supply to terminals 28 (Live) and 29 (Neutral) on the back of the MCULOG. Note that mains Earth is not required. **Do not apply power yet.**

3. For a 24V DC powered MCULOGP:
   (**a**) Connect the negative power wire (–ve) to terminal 31.
   (**b**) Connect the positive power wire (+ve) to terminal 32. **Do not apply power yet**

4. Connect terminal 30 to an Intrinsically Safe Earth. **This is essential only if the MSP900*H is in located in a hazardous area.**

5. The download socket supplied with the MCULOG should be mounted on the panel to allow easy connection of the download device.
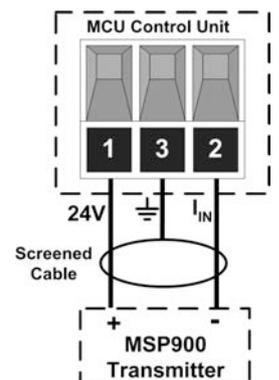
Getting started

After completing the installation of both MCULOG control unit and the MSP900*H transmitter, the next stage is to switch on.

1. Familiarise yourself with the front panel fascia.
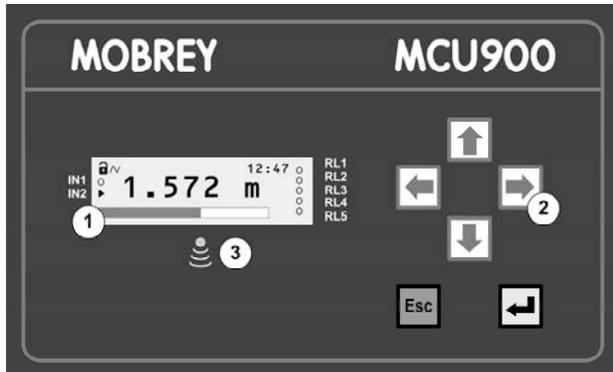
Front Panel Fascia of MCULOGW

Key to figure:

① 4-line LCD with backlight.
② Keypad with 6 function keys.
③ Status LED – flashes once per second if okay.

2. Switch on the MCULOG by applying the power. Wait for the **double-height PV display** to appear. During this time, the MCULOG will read parameters from the MSP900*H transmitter.

If being used for the first time, it will prompt for the **Bottom Reference** of the MSP900*H transmitter and then automatically set-up the 4-20mA output span over this range. **If you do not want to commission the system now, simply switch off the power – the same prompt will then re-appear when switching on the next time.**
(If the MSP900*H has been configured already, this prompt will not appear)

If you are commissioning the system, edit the Bottom Reference with the arrow-keys and then press the yellow key to confirm the value. The Bottom Reference can be changed at a later stage but it is better to get it correct now. Should you press the red (**ESC**) key, the MCULOG will continue and the Bottom Reference prompt will re-appear when switching on the next time.

After the start-up is completed, the **double-height PV display** appears, indicating the measured depth of the liquid in the tank in metres. The value on the display is the P.V. (Primary Variable).

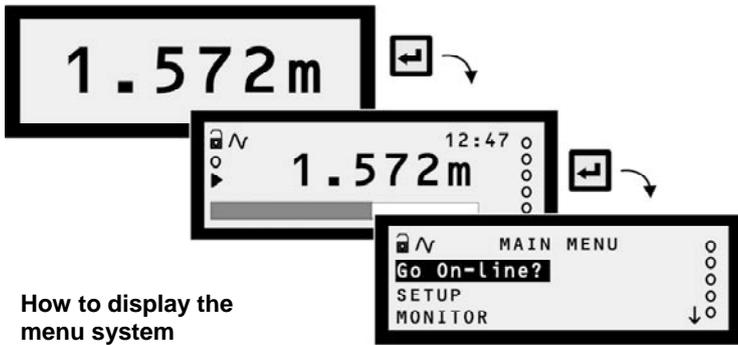**3.** Press the yellow (**ENTER**) key to view the **primary display**.
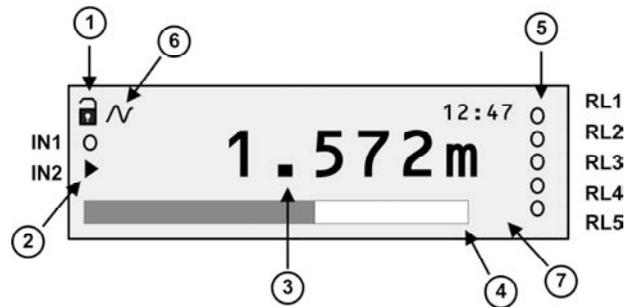
Primary Display

Key to figure:

1. Off-line/on-line status. (Locked padlock = on-line) (See page 10)
2. Digital input status. (o = de-energised, ▶ = energised)
3. Measured variable (P.V.) and units of measurement.
4. Bar graph of 4-20mA output of MCULOG.
5. Relay (RL) status. (o = de-energised, ▶ = energised)
6. Digital communication in progress. (Absent if idle)
7. Shows specific model type.

Note: If a "Find Instrument" screen appears and remains, power off. Check the cabling and then try again. If the problem persists, follow the on-screen prompts until the double-height PV display appears.
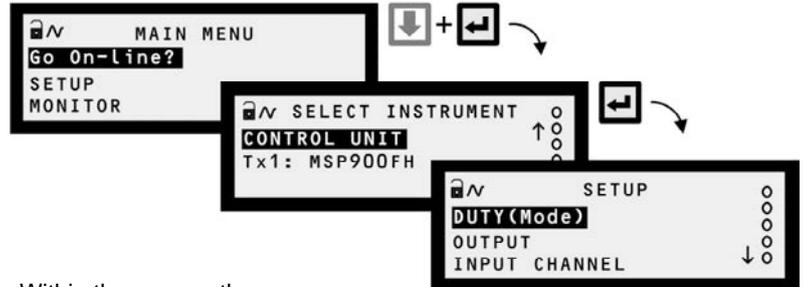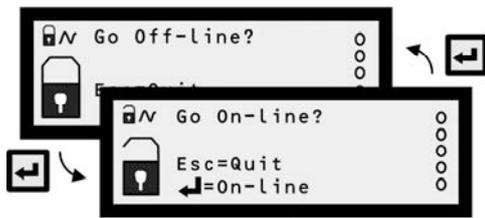
1.572m

4. Press the yellow (**ENTER**) key to display the top-level of the menu system.

The double-height PV display appears automatically if there is no keypad activity for several minutes, if on-line. The primary display appears when pressing the **ESC** key at the top level of the menu system.
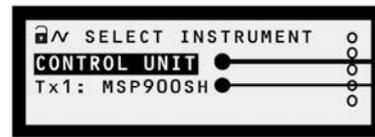
```
a /\               12:47
o
o▶    1.572m
```

```
a /\      MAIN MENU
Go On-Line?
SETUP
MONITOR              ↓o
```

How to display the menu system

5. Navigation of the menu system is achieved by using the **ARROW** keys, the **ENTER** key, and the **ESC** key. (See inset figure, right). The **ESC** key will return you to the previous menu level.

```
a/\       MAIN MENU
Go On-Line?
SETUP
MONITOR
```

```
a/\ SELECT INSTRUMENT
CONTROL UNIT              ↑o
Tx1: MSP900FH
```

```
a/\          SETUP
DUTY(Mode)
OUTPUT
INPUT CHANNEL           ↓o
```

6. The **Main Menu** sits above a series of sub-menus. Within the menus, there are also **parameter screens** for programming – setting up for an application, adjusting default settings, etc. – and for **displaying** information.

Selecting this will bring up the "Set-up" menu for programming the MCULOG.

```
a/\ Go Off-Line?
```

```
a/\ Go On-Line?
Esc=Quit
↵=On-line
```

```
a/\ SELECT INSTRUMENT
CONTROL UNIT
Tx1: MSP900SH
```

Toggles operating mode for MCULOG. An open padlock indicates that the MCULOG is off-line and parameter values can be entered or changed. (See page 10)

```
a/\       MAIN MENU
Go On-Line?
SETUP
MONITOR              ↓o
```

Selecting this will bring up the "Set-up" menu for optional MSP900 programming.

The transmitter Bottom Reference can be changed here.

(x3)   (x3)

```
a/\       MAIN MENU
SETUP                ↑o
MONITOR
DIRECT
```

Selecting this will allow you to monitor live readings and diagnostic information for the MCULOG.

Direct access menu for advanced users to select parameter screens.

```
a/\          DIRECT
Pxxx
Dxxx
```

```
a/\ SELECT INSTRUMENT
CONTROL UNIT
Tx1: MSP900SH
```
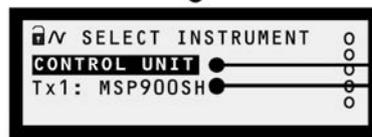
Selecting this will allow you to monitor live readings and diagnostic information from the MSP900 transmitter.

7. Programming the MCULOG unit is **best achieved** through easy-to-follow **Wizards**. They are simply a sequence of on-screen prompts, allowing you to easily set-up an individual function or a large application. There is a **collection of Wizards** for most functions and applications. They are all selected and started through the menu system. **On the pages that follow, examples applications show how to use them. Note:** Wizards should not be used for accessing pre-programmed parameters. Some parameter values are reset during Wizard programming.

```
     Duty WIZARD
     Select Duty
       Level ↕
Esc=Prev  ↵=Next
```

Example of a Wizard

8. Additional features, such as password protection, resetting to factory defaults, etc., can found on pages 10/11.

Application/Duty: Flow Measurement

1. With power on and the MSP900*H transmitter giving a 4-20mA signal to the MCULOG unit (see previous pages), you can now program the MCULOG for an application. **This application example is for flow measurements.**
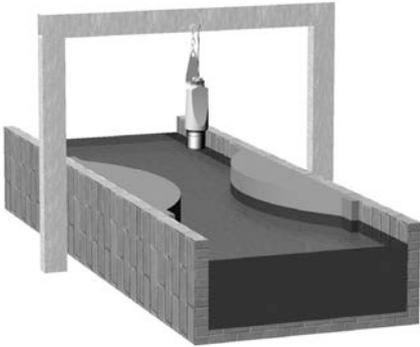
<u>**Requirement**</u>
Live flow measurements in units of cubic metres per second.
Totalised flow in cubic metres per second.

<u>**Input Data**</u>
Channel Shape: Flume
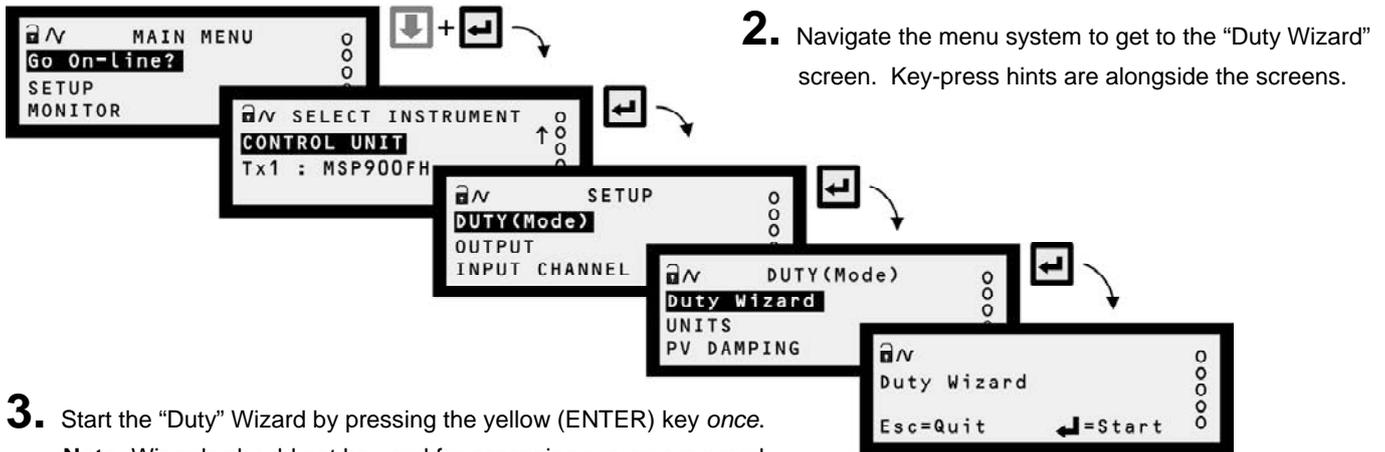Maximum depth: 1 metre
Maximum rate: 1 cubic metre per second

The MSP900*H transmitter supplies live level measurements in units of *metres*.
(If the level measurement is required to be in *feet* or *inches*, see the note on page 2)

<u>**Output Data**</u>
The MCULOG will be calculating the flow rate.
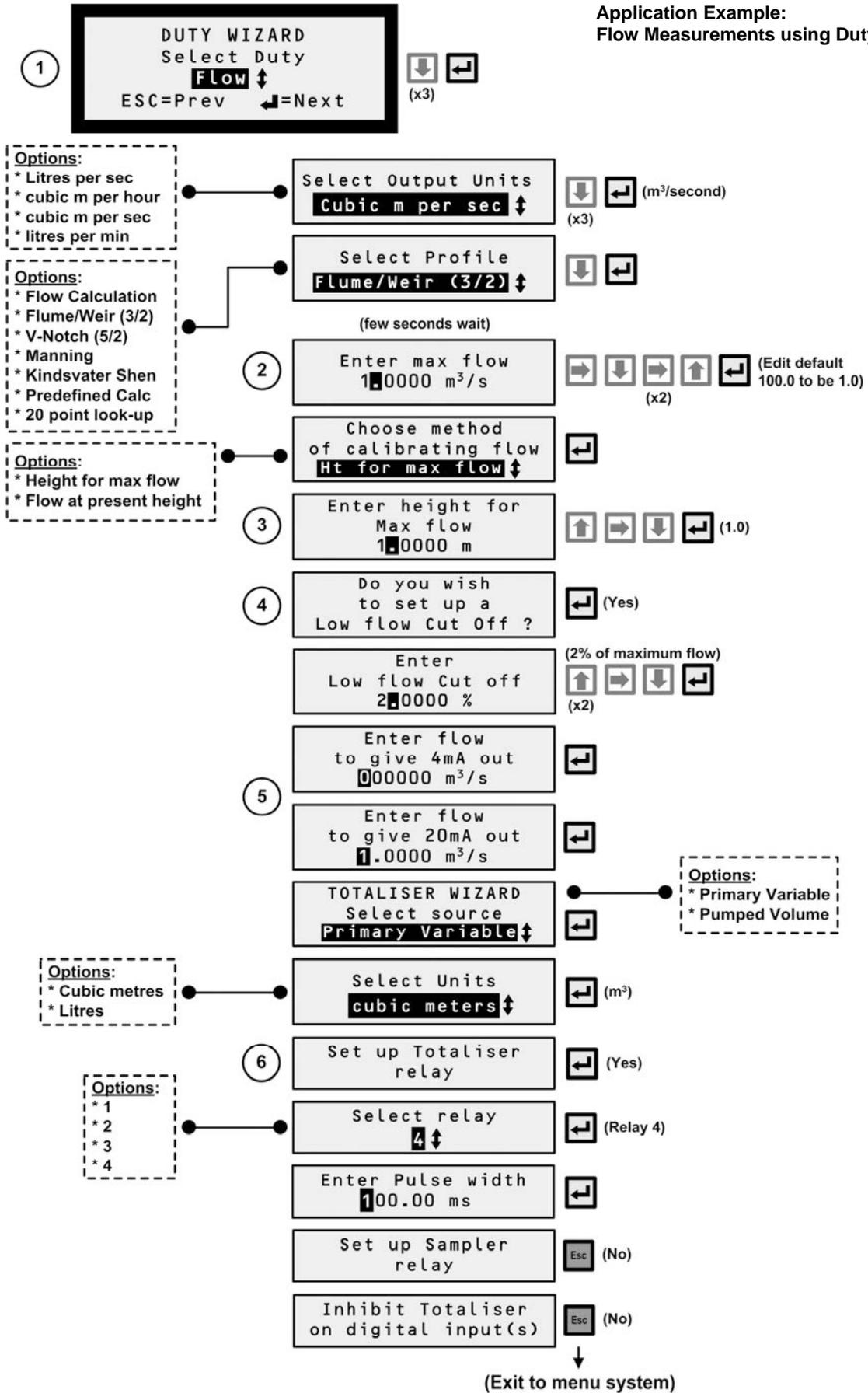
<u>**Logging**</u>
See pages 8/9.

2. Navigate the menu system to get to the "Duty Wizard" screen. Key-press hints are alongside the screens.

3. Start the "Duty" Wizard by pressing the yellow (ENTER) key *once*.
Note: Wizards should not be used for accessing pre-programmed parameters. Some parameter values are reset during Wizard programming.

4. Work through the "Duty" Wizard prompts until completion; this occurs when the menu system re-appears. Keypad hints, for the illustrated Wizard sequence on the next page, are provided alongside the prompts. If applicable, adapt the example to suit your application.

5. Circled numbers in the illustrated Wizard sequence relate to these notes:

① Select "Flow" from the multiple-choice list.

② Enter the maximum rate of flow.

③ Enter the present height of maximum flow in the Flume.

④ Option of registering flow as 0 m^3/s on the MCULOG while the measured flow rate is below a programmed cut off.

⑤ Programme the 4-20mA output span with a flow rate range (e.g. 0 m^3/s to 1 m^3/s)

⑥ Option to set-up a relay to output (100ms) pulses representing the totalised flow.

6. Return to the main menu by holding the **ESC** key for a few seconds, releasing it when the main menu appears. Next, go on-line by selecting the "Go on-line" menu option and then pressing the **ENTER** key *once*. Finally, press the **ESC** key repeatedly until the primary display appears. The flow measurement will be live on the primary display.

```
      DUTY WIZARD
①    Select Duty
       Flow ↕                    ⬇ ↵
   ESC=Prev  ↵=Next             (x3)
```

Options:
* Litres per sec
* cubic m per hour
* cubic m per sec
* litres per min

```
   Select Output Units
   Cubic m per sec ↕          ⬇ ↵  (m³/second)
                              (x3)
```

Options:
* Flow Calculation
* Flume/Weir (3/2)
* V-Notch (5/2)
* Manning
* Kindsvater Shen
* Predefined Calc
* 20 point look-up

```
     Select Profile
   Flume/Weir (3/2) ↕        ⬇ ↵
```

(few seconds wait)

Options:
* Height for max flow
* Flow at present height

```
②    Enter max flow
      1.0000 m³/s             ➡ ⬇ ➡ ⬆ ↵  (Edit default
                              (x2)        100.0 to be 1.0)
```

```
     Choose method
    of calibrating flow       ↵
    Ht for max flow ↕
```

```
③   Enter height for
        Max flow              ⬆ ➡ ⬇ ↵  (1.0)
      1.0000 m
```

```
④     Do you wish
      to set up a             ↵  (Yes)
   Low flow Cut Off ?
```

```
        Enter                 (2% of maximum flow)
   Low flow Cut off           ⬆ ➡ ⬇ ↵
      2.0000 %                (x2)
```

```
      Enter flow
   to give 4mA out            ↵
      000000 m³/s
⑤
      Enter flow
   to give 20mA out           ↵
      1.0000 m³/s
```

```
   TOTALISER WIZARD                 Options:
   Select source              ↵    * Primary Variable
   Primary Variable ↕              * Pumped Volume
```

Options:
* Cubic metres
* Litres

```
     Select Units
    cubic meters ↕            ↵  (m³)
```

```
⑥   Set up Totaliser
        relay                 ↵  (Yes)
```

Options:
* 1
* 2
* 3
* 4

```
     Select relay
        4 ↕                   ↵  (Relay 4)
```

```
   Enter Pulse width
      100.00 ms               ↵
```

```
    Set up Sampler
        relay                 Esc  (No)
```

```
   Inhibit Totaliser
   on digital input(s)        Esc  (No)
                               ↓
              (Exit to menu system)
```

Application/Duty: Logging

Overview

The MCULOG will log up to **4,800** events, where an event is the value of the **Primary Variable** (PV) at regular intervals; the logging interval is user-defined (**P590**). An interval value of 15 minutes will log the PV at 15-minute intervals, which equates to 50 days elapsed time.

If the MCULOG has been set-up to totalise the PV (see pages 6/7), the daily value of the totaliser at midnight is also logged. Up to **60** midnight totalised values will be held in memory. (This is in addition to the 4,800 sample memory).

In addition, the maximum instantaneous value of PV recorded in each 24-hour period is logged.

It is recommended that the Rosemount Measurement's PC software, Mobrey Log-View, is used to download and view data.

Data Logging Indicator

The MCULOG gives a visual indication that logging of data is underway by flashing the "LOG" text in the bottom, right-hand corner of the display.

Fast Log Mode

Should the PV exceed a user-entered value (**P591**), the MCULOG automatically moves to a **fast log mode** and then logs the PV once every minute until the PV falls below that user-entered value. Fast log values are flagged so that they are easily identified when examining logged data via Mobrey Log-View.

Memory Nearly Full Alarm

The user may allocate an alarm to indicate when the memory remaining reaches a user-defined percentage (**P593**). The user must also set the action to be taken when this occurs. A choice of activating a relay, driving the output current to a set level or doing both is available (**P542**).

If no action is taken, the memory will fill up and then either logged data will be overwritten or the logging will stop, as determined by parameter **P592**.

Download of Logged Data

Logged data may be downloaded at any time using the **RS232 data port socket** provided. Users will normally download data using a handheld communicator or a PC loaded with logger software **Mobrey Log-View**.

Starting, stopping and resetting the logger

To start logging, simply change the logging interval (**P590**) from 0 to the interval required. Logging is now activated.

To stop logging, simply change the logging interval (**P590**) back to 0. Note, when the logging interval is re-set, all logged data will be cleared from the logging memory.

The MCULOG can be re-set by changing the log interval from 0 to a logging interval in minutes which will clear all data logged (i.e. clear the 4,800 sample memory plus the 60 midnight totals).
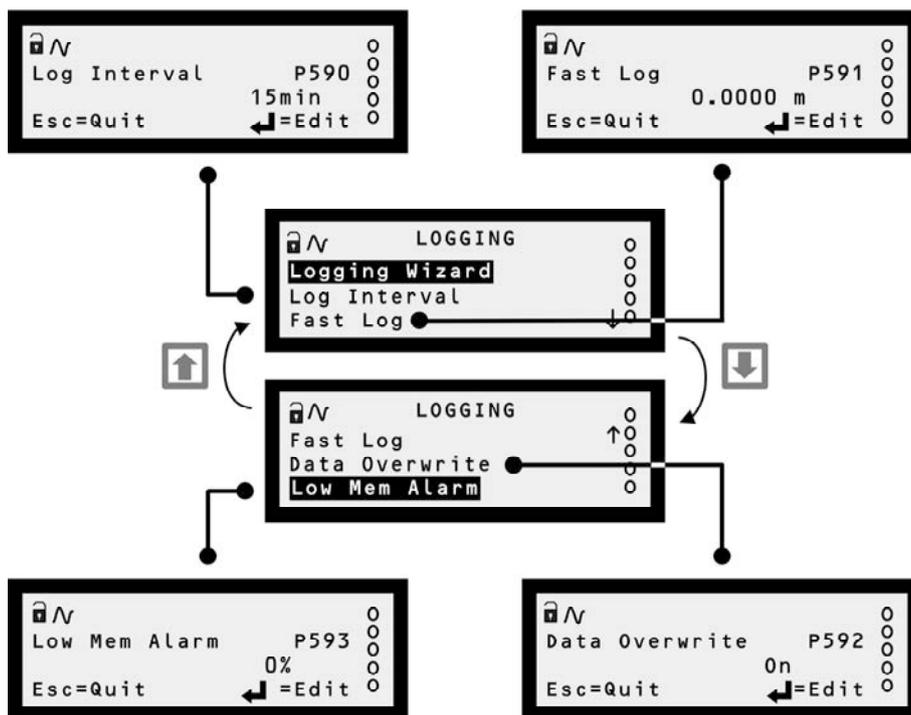
Changing the log interval from a non-zero interval (e.g. 15 minutes) to a **new** non-zero interval (e.g. 5 minutes) will clear the sample data only (i.e. clear the 4,800 sample memory).

Further information

Refer to manual IP2030/OM for full programming and data download details.
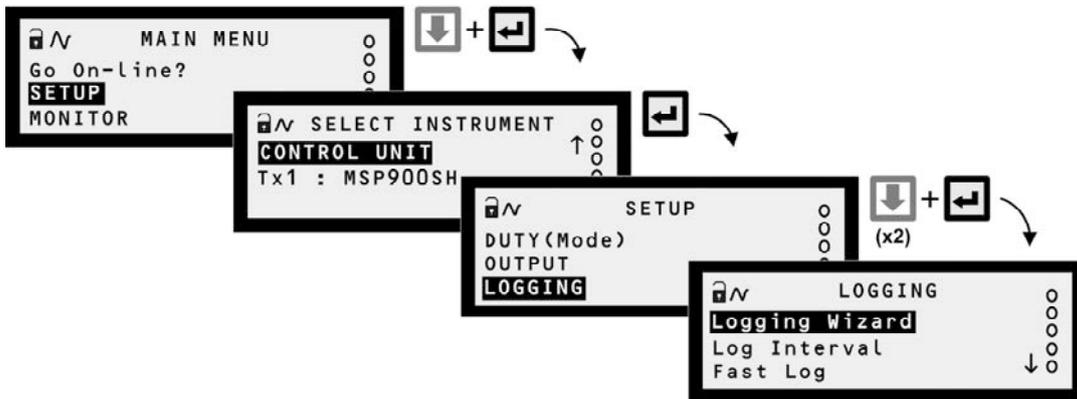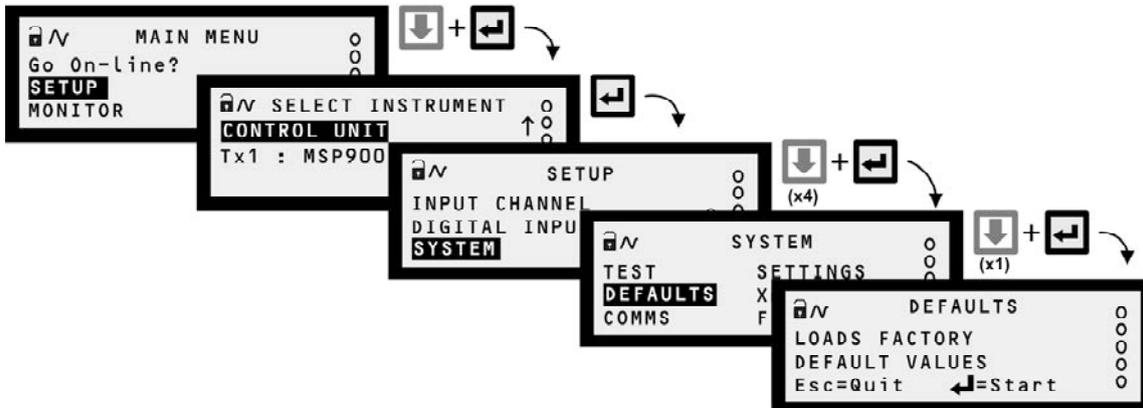
Navigating to the LOGGING Menu

Menu Map for LOGGING screens

Other Features

Restoring factory defaults (Erases all user-entered data)

To re-set the MCULOG unit back to the factory defaults, navigate to the "Load Defaults" screen and press the **ENTER** key *twice*.


Navigating to the LOAD DEFAULTS Screen

PIN Security

Personal Identification Number (PIN) security prevents unauthorised people from programming the MCULOG control unit. Typically, this is set-up when all the other programming has been completed. As with Bankcards, there is one PIN number.

The factory default is for PIN security to be inactive. To activate, navigate the menu system to the **PIN** screen and edit a **4-digit** personal identification number (PIN) that you want. The PIN is edited with the arrow keys and confirmed with the **ENTER** key; the 4-digit PIN will then be replaced by **"- - - -"** to indicate that PIN security is active. (By default, PIN is a 0 if inactive).

Once PIN security is activated, a prompt for the PIN will appear when needed for an activity, such as starting a Wizard. If correctly entered, no further PIN requests are made **unless** the "Cancel Password" option is selected from the MAIN MENU screen. This menu option appears only after correctly entering the PIN; the option disappears when selected, therefore making the MCULOG secure and prompt for the PIN when needed.
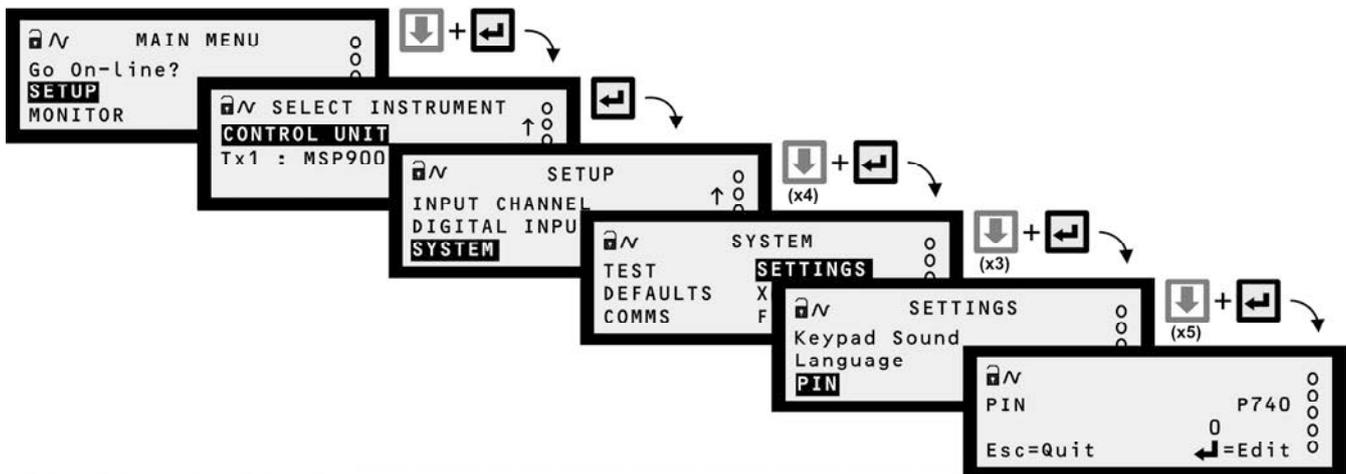
Navigating to the PIN set-up screen

Modes of operation

There are two operating modes for the MCULOG. They are **on-line** and **off-line**.

An open padlock icon indicates the MCULOG is presently in the **off-line** mode. In this mode, the unit can be programmed providing that you know the security PIN (if set-up). Additionally, the 4-20mA output and all relays are frozen, but the MCULOG continues to log data.

A closed padlock icon indicates that the MCULOG is presently in the **on-line** mode. In this mode, most of the unit **cannot be programmed**. However, you will be prompted to go off-line if you attempt to programme whilst in this mode and providing that you know the security PIN (if set-up). Additionally, the 4-20mA output and all relays are **not frozen**.
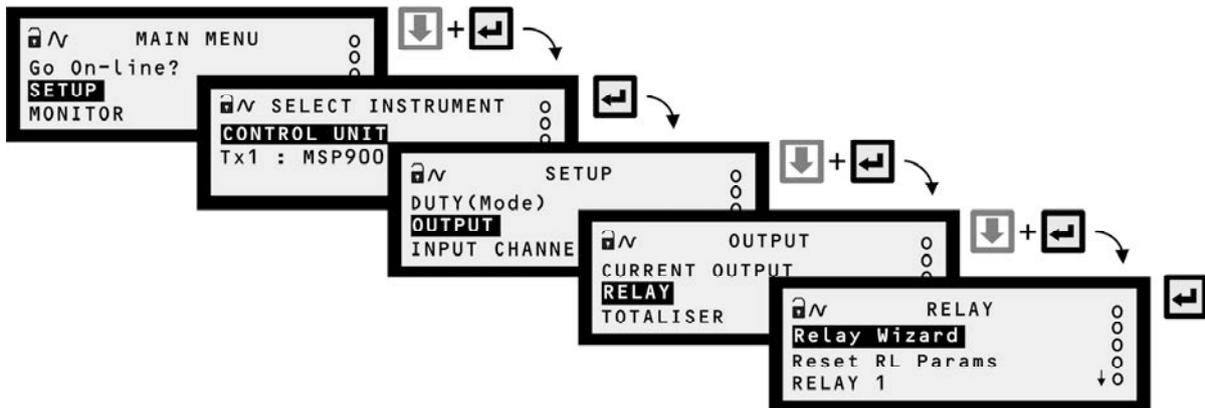
Relays

Relay outputs 1 to 4 are normally On Point/Off Point relays which may be used to start/stop pumps. They normally energise at one level and de-energise at a different level.

Alternatively, they may be programmed as out-of-limits alarms such that they are energised between defined points and will de-energise outside the defined limits. They may also be programmed to perform a variety of auto-sequences and auxiliary functions, such as logging a *memory nearly full* alarm.

Relay output 5 is normally a fail safe fault relay but may be re-allocated to another duty.

Relays can be set-up easily using the **Relay Wizard**, accessible by navigating to the RELAYS menu screen.

Navigating to the RELAY Screen

Relay (RL) Status

The relay status icons on the primary display have the following meanings:

▸	= energised	Relay is presently energised.
0	= de-energised	Relay is presently de-energised.
A	= Alarm	All active alarms can be viewed by parameter D831.
S	= Sampler	Relay is allocated to sampling duty.
T	= Totalising	Relay is allocated to totalising duty.

Comfort (System) Settings

The SETTINGS menu allows adjusting of the time and date, switching off the keyboard sound and changing language.
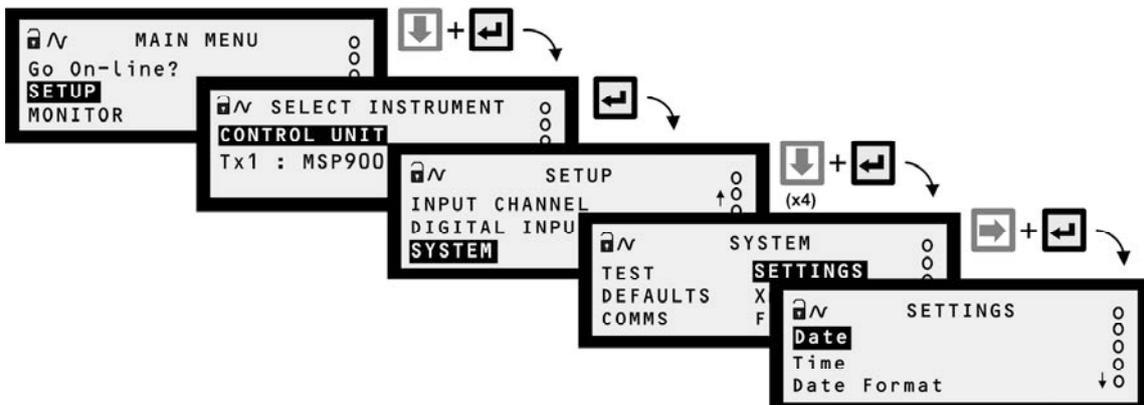
Navigating to the SETTINGS Menu

MCU900 Series

CE

EMERSON.
Process Management