

**OPERATING INSTRUCTIONS**

**DIGISET LEVEL PROBE**

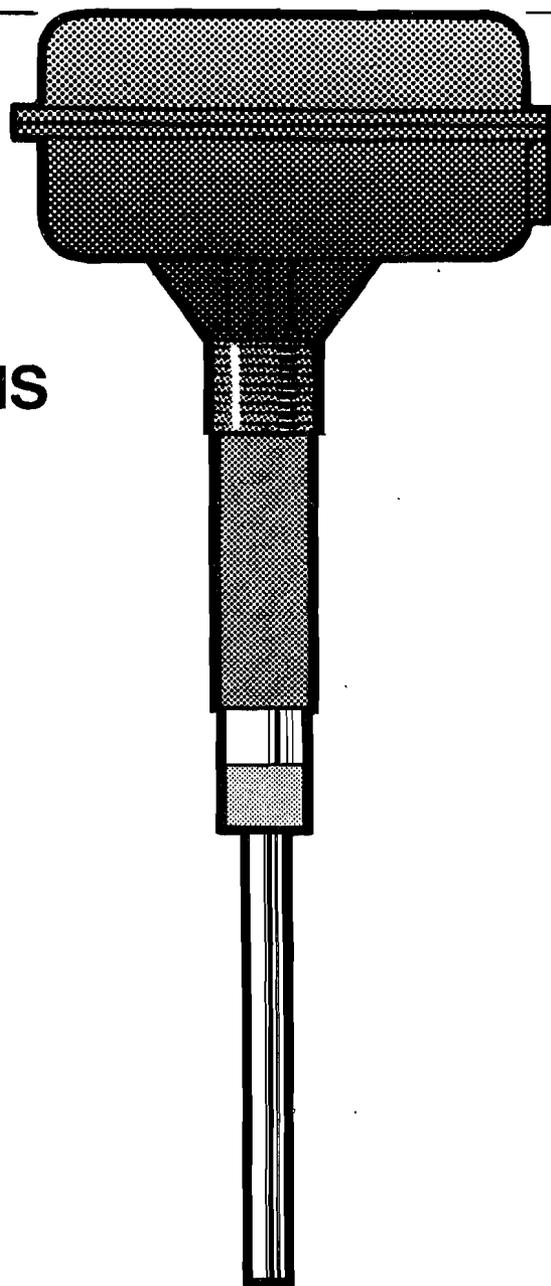
**TYPE LC/DIGI/12**

**and**

**LC/DIGI/REM**

**Factory  
Mutual  
System**

**Approved**



**TECHNICAL INFORMATION**

**MANUAL M60—ISSUE 1 AUGUST 1987**

# OPERATING INSTRUCTIONS

## DIGISET LEVEL PROBE TYPE LC/DIGI/12 AND LC/DIGI/REM

### GENERAL

The DIGISET is a fixed point level controller operating on the Radio Frequency principle and incorporating digital automatic calibration facilities.

The unit is designed to operate in the majority of conductive and non conductive liquids and solids. The probe may be a solid metal rod, wire rope or metal plate.

A power shield is incorporated to virtually eliminate the effects of sticky materials clinging to the probe.

The DIGISET can be supplied either fully self contained or as a separate probe/electronics arrangement. In this form a number of different probe heads are available to suit application needs.

### ASSEMBLY

The self contained DIGISET is supplied with a loose 8" (200mm) stainless steel rod. Solid stainless rods of 39" (1 Metre) and 78" (2 Metres), or suspension wire ropes in lengths of 16 feet (5 Metres) and 32 feet (10 Metres) are also available.

A plastic thread locking device is used to prevent the rod vibrating loose but this should preferably be supplemented by a thread compound such as Loctite.

### SUPPLY

DIGISET will operate on 110/240V AC supplies or 24V DC supply via an intrinsic safety barrier. The unit can be wired in ordinary unscreened cable of any length. A supply earth (ground) is essential.

### CONSUMPTION

110/240V 50/60HZ + 10% - 15%, consumption 2VA  
24V DC±10%, consumption 50ma (relay energised).

### FUSING

(110/240V supplies only)

The unit should be fed from a supply fused at 5A maximum.

### OUTPUT

Single pole changeover rated at 2.5A 240V AC non inductive.

### INSTALLATION

The probe may be installed at any angle, but care must be taken to ensure that the exposed end of the power shield protrudes into the container. See fig. 4. Where sticky materials are present, the probe is best angled downwards to aid material flow.

### WIRING—110/240V UNITS

Connect in accordance with fig. 1 (single point operation), fig. 2 (interlocked operation) and fig. 3 (remote probe), as appropriate.

Cables should have the minimum conductor size permitted by local regulations and should have suitable mechanical protection. This can be achieved by using solid conduit or mineral insulated cable. The conduit/outer must be bonded to ground and ground continuity must be maintained through junction boxes etc. The DIGISET internal earth MUST be connected using a ground wire, or by bonding to the conduit/outer sheath.

### WIRING—24V DC INTRINSICALLY SAFE UNITS—FIG. 5

Unit supply must be wired via MTL 728 Zener Barrier from a 24V DC supply. Relay output must be fed to safe location via an MTL 788 Barrier. Safe location circuits can be fed via a relay. Light loads may be switched directly. Cabling to be in accordance with hazardous area regulations. Solid conduit must be used and installed as shown in Fig. 6.

Sequenced two level operation is not permissible and a link must be fitted between terminals 10 and 11.

### WIRING—ALL UNITS

Two 3/4" NPT cable entries are provided. The unit must be wired and EARTHED (GROUNDED) in accordance with appropriate Electrical Regulations.

Wire to terminal block using the connections shown. Note that if the unit is set for High Level Fail Safe Operation, the relay is de-energised with material present; if set to Low Level Fail Safe, the relay is energised with material present. See note 4 for guidance.

If the container in which DIGISET is installed is non metallic, metal flanges or couplings used to mount the probe should be bonded to earth (ground). This applies also to probes mounted in the wooden or plastic tops of metal bins. If the DIGISET is to be used for single point control ensure that a link is fitted between terminals 10 and 11. Refer to section headed 'Interlocked Operation' if interlocked operation is required.

### COMMISSIONING

Ensure that unit has been installed and wired correctly and apply power.

The unit may be calibrated in one of two ways depending upon whether material is available.

### METHOD 1 MATERIAL AVAILABLE

1. With the container empty, set all the 'empty' switches up and all the 'full' switches down. The 'probe covered' light should be out.
2. Starting from the left, set the first 'empty' switch down. If the 'probe covered' light illuminates return to the up position. If the light remains unlit, leave down.
3. Repeat the procedure for all six 'empty' switches and then note settings obtained.
4. Fill container to cover probe, the 'probe covered' light should be on.
5. Press and hold down the push button. Ensure that the centre screw on the black cover is not touched.
6. Set the left 'full' switch up. If the light goes out, return it to the down position. If the light remains illuminated leave it in the up position.
7. Repeat 6 working from left to right for all the other 'full' switches.
8. Release the button and note settings obtained; the probe is now calibrated.
9. Record the settings in space provided in lid. The 'full' setting may be recorded and reproduced on any other probes in similar material.

10. Carry out steps 1, 2 and 3.
11. Refer to the chart in the DIGISET lid and select nearest 'full' setting. Set 'full' switches to the setting given. The probe is now calibrated and the settings will be accurate in the majority of cases.  
If necessary, reset 'full' switches when material is available.  
The unit operation may be checked prior to filling the container by touching the centre screw on the black cover with the finger; the 'probe covered' light should illuminate.

#### INTERLOCKED OPERATION 110/240V ONLY

Two DIGISETS may be interwired to control filling or emptying, interlocked between two probes.

To use this facility connect as shown in fig. 2. Ensure that existing link between terminals 10 and 11 is removed. Use the relay contacts of the upper probe only, the lower probe relay is not used. Probes may be used in fail safe high or low mode as desired.

Each probe should be commissioned as detailed for single point operation. The 'probe covered' lights will function as normal on both units, but relays will be interlocked.

#### NOTES

- 1) After removal from the probe head, the DIGISET rod may be drilled, tapped, sawn off or welded without affecting its performance. The standard probe should not normally be reduced below 8" (200mm) unless the surface area is increased pro rata; see note 2 below.
- 2) The DIGISET sensitivity is proportional to the surface area of the probe. The standard 8" (200mm) long x 5/8" (16mm) dia. is ideal for the majority of materials and should be treated as the minimum if possible.  
If the probe length needs to be reduced to less than 8" (200mm), the surface area should be maintained. This can be achieved by increasing the diameter, by fitting a metal tube over the probe, or by bending the probe rod. In certain high density materials, it may be possible to reduce the length without compensation. If in doubt, contact 4B.  
In a very few cases, the standard rod length may be inadequate and require extending. This is indicated if during the setting the 'full' switches, all full switches must be left in the down position to keep the 'probe covered' light illuminated. In this case, repeat steps 6 and 7 without pressing the button and contact 4B giving settings obtained. The increase necessary will be calculated for you.
- 3) 4B offer a free product test service. To use this service, supply 1cu.ft. of product in a sealed container (to prevent ingress or loss of moisture), the product will be tested and the correct setting for 'FULL' switches supplied by return. If product presents a health hazard, give full details of necessary precautions.
- 4) The 'high/low' switch sets the fail safe mode. In the 'high' position, the relay is de-energised with material present, in the 'low' position, the relay is energised with material present. Normally, the 'high' position is used for high level probes and 'low' for low level probes. Intermediate probe settings depend upon individual requirements.

#### FAULT DIAGNOSIS

##### SYMPTOM

All empty switches up and light remains on.

All full switches up after calibration.

All full switches down after calibration.

Relay remains in probe covered state after material leaves probe, but indicator goes out.

Relay chatter occurs as material approaches probe.

##### PROBLEM

Standing capacitance too high.

Material is highly conductive or probe/power shield is shorted to earth (ground).

Probe has insufficient sensitivity with standard length rod.

Link not fitted.

Spurious tripping as material approaches and leaves probe.

##### ACTION

Check for short circuit or foreign body between probe or power shield and earth (ground). Check power shield insulation.

Probe will usually operate satisfactorily in most conductive materials. If material is also sticky, probe should be installed vertically.

Repeat steps 6 and 7 without pressing button. Contact 4B giving readings obtained. Fit link between terminals 10 and 11.

Simple timer is fitted accessible by removing black cover. Clockwise rotation increases time.

## DIGISET TYPE LC/DIGI/REM WITH REMOTE PROBE

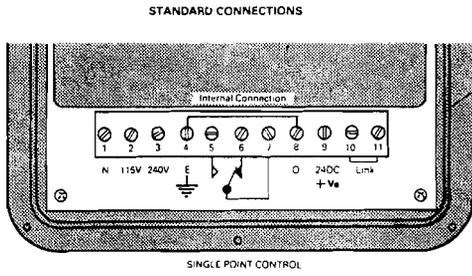
The DIGISET Type LC/DIGI/REM comprises the DIGISET electronics mounted in a separate wall mounted hoseproof enclosure with facilities for connection of remote probe. The remote probe contains no electronics and is intended for special applications where high vibration, high temperature or space limitations exist. A number of different probes are available, with and without power shield.

Mains and output connections should be made in accordance with the LC/DIGI/12 instructions plus additional probe connections as detailed in fig. 3.

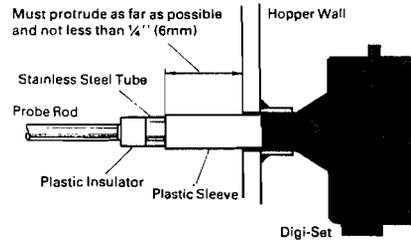
Connections between the remote probe and control unit must be made in single core twin screened cable only with a maximum length of 33 feet (10 metres). The inner screen should be connected to the power shield (if fitted) and the inner to the probe. If no power shield is fitted, the screen should be cut and insulated as near to the probe rod connection as possible. The outer screen should be bonded to ground (earth) at the probe.

The probe should be commissioned as detailed for the LC/DIGI/12.

**Fig. 1**

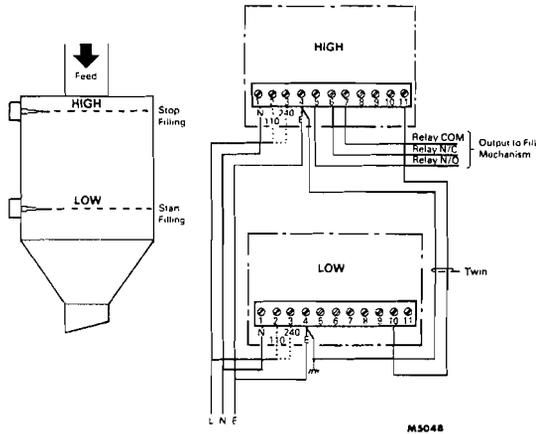


**Fig. 4**



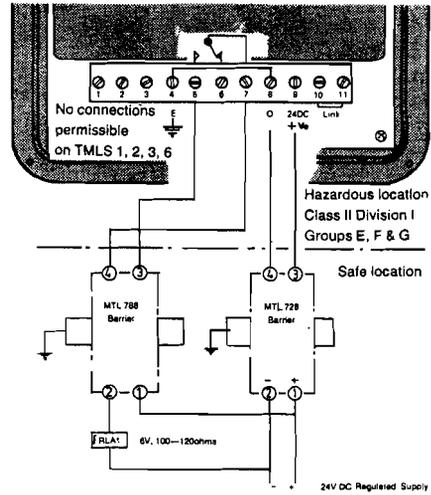
**Fig. 2**

TYPICAL CONNECTIONS SEQUENCED TWO LEVEL



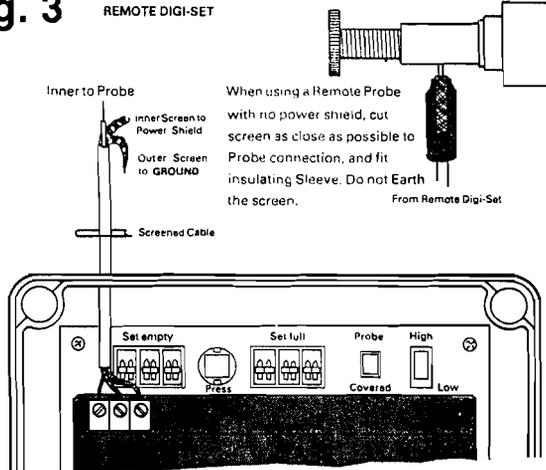
**Fig. 5**

STANDARD CONNECTIONS 24V DC SUPPLY



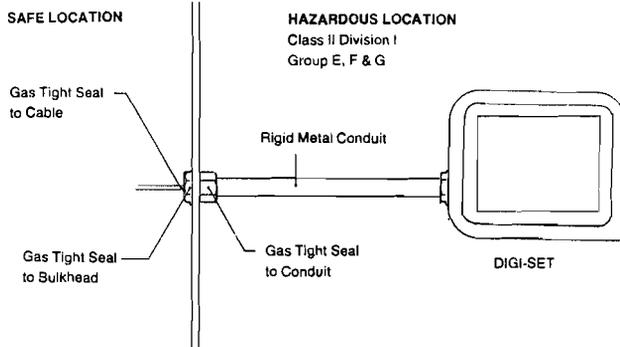
**Fig. 3**

REMOTE DIGI-SET



**Fig. 6**

HAZARDOUS LOCATION INSTALLATION DETAILS



**GUARANTEE**

The DIGISET is guaranteed for one year from date of despatch against problems arising from faulty design, materials or workmanship.

Units suffering from faults arising solely from the above will be repaired/replaced at our discretion free of charge providing they are returned to us carriage paid.