MICRO-SX
Remote Terminal Unit

Technical Description and Installation Guide

Supplement to the Micro RTU Handbook

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1 INTRODUCTION

1.1 Description

The Lee-Dickens Micro-SX is a low cost, low-power Remote Terminal Unit (RTU) that can read analogue and digital values and communicate status and alarms via 'Mobile Data' and/or SMS.

The smallest Lee-Dickens Micro RTU, as standard, offers just one Analogue Input channel for use, but does include an expansion interface. This larger Micro-SX takes the standard Micro RTU and via its terminals offers an interface to the expanded set of the Micro's signals.

This handbook supplements the Micro RTU Handbook which details the operation of unit.

The Micro-SX is in a wall-mounting polycarbonate enclosure. It contains the standard Micro RTU along with a DIN terminal rail which offers all of the available Micro signals (both standard and expanded). The GSM antenna is included inside the enclosure but extension cables are available allowing mounting on top of a pole assembly for maximum signal strength.

A suitable SIM card ('standard' size) must be provided, including SMS and 'Mobile Data' services as required for intended operation.

1.2 Features

- Small
- Low cost
- Low powered
- Robust
- Reports directly to users' phone by SMS
- Reports to Servers (e.g. Lee-Dickens' Sitewatch Data-Centre) by 'Mobile Data'
- Single 4-20mA Analogue Input Channel
- Single 0 to 2.30V Analogue Input Channel
- Monitoring of DC supplementary charging supply
- Three Digital Input Channels
- Built-in Ambient Temperature measurement
- Real Time Clock

1.3 Electrical Specification

- Single 4-20mA Analogue Input – 0.5% resolution
  - Loop voltage drop of less than 5V
- Powered by either:
  - Current Loop signal
  - DC supplementary charging supply
- Integral Rechargeable 'Reservoir Battery'

1.3.1 Maximum Ratings

Parameter	Terminals	Ratings	Notes
V1	V1+ to V1-	I_{Pos} = 200 mA I_{Neg} = -20 mA	Current Loop signal. +20mA is V1 full scale *200mA fuse installed.*
C1	C1 to 0V	V_{max} = 19.8 Vdc[1]	DC Charger signal. +16.56 is C1 full scale.
D1	D1	V_{max} = 3.0V V_{Hi} = 2.0 to 2.755V V_{Lo} = 0.0 to 0.4V	D1, D2, D3 are internally pulled up, so are by default High. Users should typically us volt-free contacts to GND to send the input to the Low state
D2	D2		
D3	D3		
V2 [2]	V2+ to V2-	Vmax = 2.75V	+2.30V is V2 full scale.
B1 V_{CC}	Micro C03.9	V_{Min} = 3.2V V_{Max} = 4.3V	Voltage of Micro Reservoir Battery. 3.2V = 0%; 4.3V = 100%

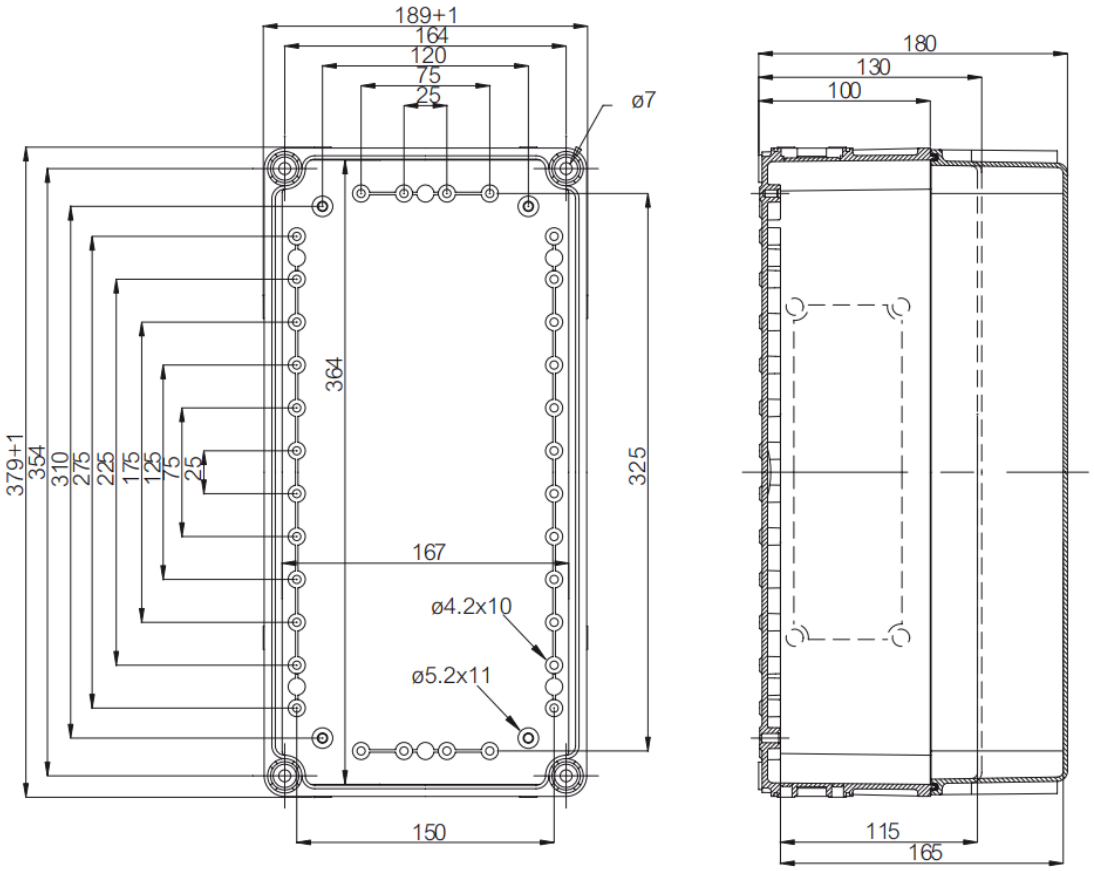
Important! The V2 signal negative terminal is common (ground) with the charging supply C1 0V terminal. However, because V1 can be used as a charging supply its negative terminal is NOT to the common ground. If V1 and V2 signals are both to be used, then a suitable signal isolator must be used.

[1] For applications requiring higher C1 Charging Voltages, please specify when ordering.

[2] The V1 and V2 circuits are NOT internally isolated, so the field signals MUST be properly isolated to avoid damage to the Micro. Lee-Dickens Ltd are able to provide advice and supply a suitable Isolator as required.

2 INSTALLATION

2.1 Micro-SX Enclosure Drilling and Dimensions



All dimensions in mm.

2.2 Signal Wiring

Signal cables should be brought into the enclosure via suitable glands installed in the underside of the enclosure.

The signals should be wired to the DIN Rail terminals. The following terminals are provided:

- Earth
- C1
- 0V
- V1+ (4 to 20mA)
- V1-
- V2+ (0 to 2.3V)
- V2 (GND)
- D1 (contact)
- D2 (contact)
- D3 (contact)
- Common (GND)

3 SETTING TO WORK

3.1 Checks

- ✓ It is advisable to give the Micro's integral batteries a good charge. Measure the battery volts (C03.9 is positive, C03.10 is negative). When fully charged the batteries should measure above 4.10V.

In order to charge the batteries there are several options:

a. Wire in an external power source (5 to 16.56Vdc) to C01 (between C+ and 0V)

b. Connect a USB serial lead (plugged into a computer) into C02 (available from Lee-Dickens)

c. Replace the Batteries (3x AAA 1000mAh NiMH)

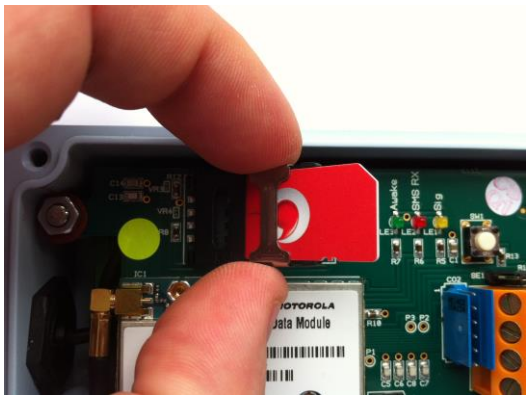
- ✓ Check that the SIM card[3] to be used is active and has a suitable contract or credit available.
- ✓ Place the SIM in a suitable mobile phone handset. At the proposed installation location confirm that a valid GSM signal is available.
  - Check the phone's signal strength indication
  - Send a test SMS message
  - Make a test phone call

3.2 Procedure

1. Remove the lid of the Micro by unscrewing the four screws.

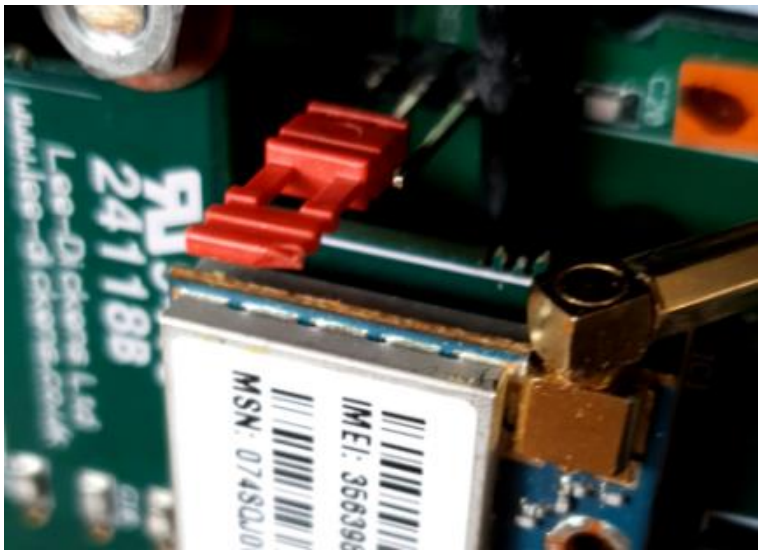
[3] Most SIM cards can be used with your Micro. To order a SIM from GiffGaff you may wish to use the link below: http://giffgaff.com/orders/affiliate/sitewatch **NOTE:** The Micro uses a Standard SIM (NOT a 'Micro SIM'!).

2. Insert a suitable SIM card into the SIM card holder (C05).



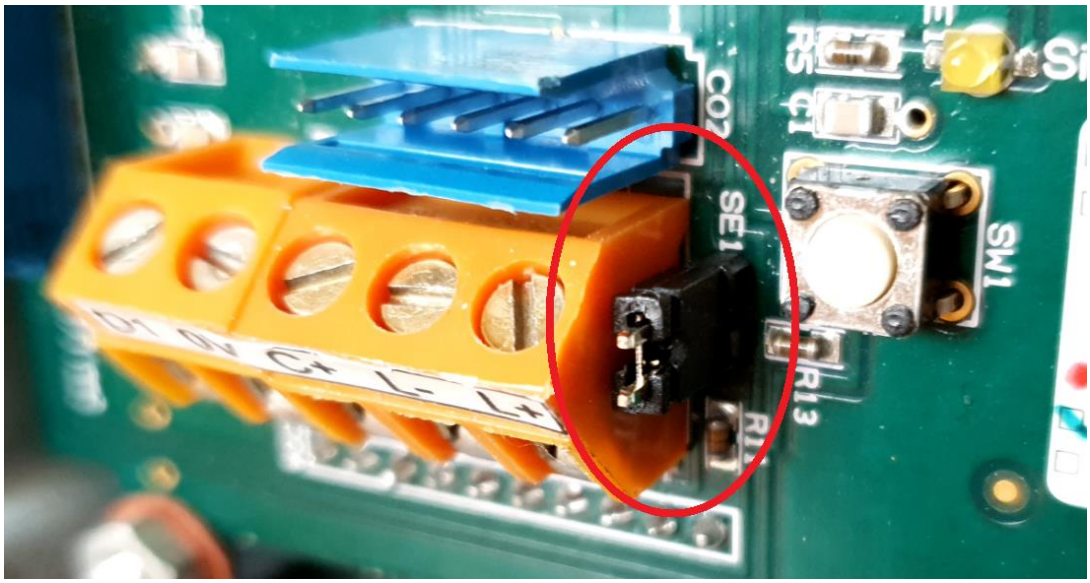
3. **Battery Circuit:** Insert the Bottom board link into pins 2&3 (as shown in **Error! Reference source not found.**) which will connect the RTU's battery. *Note that this link has 3 pins - pins 1&2 are for disconnecting the* RTU's *battery for long-term storage.*

IMPORTANT: the links must be applied in the correct order to avoid possible damage to the unit. The battery link must be in circuit BEFORE the GSM module link is applied.



4. **GSM Module Power:** Insert the Top board Battery link – this applies power to the GSM module [4].

[4] IMPORTANT! SE1 on the Lower PCB introduces the batteries onto the charging circuit. While these are NOT in the circuit any charging voltage may be high, and is sufficient to destroy the G24 module! So it is most important that the GSM Module Power link is only ever in place once the battery link is in position 1-2.



5. Turn on the external power supply by inserting the breaker blade located on the DIN rail (labelled as 'C1').[5]
6. Press the Wake-up button (SW1) for 3 seconds[6].
7. After 30 seconds the Green LED should illuminate – the Micro installation is now complete[7].

3.3 Installation Checking

In order to test that the Micro is working, use a Mobile phone to send a 'Get Status' SMS (text message) to the Micro.

If the Micro is awake, its green LED will be illuminated. If not, the Micro will typically wake up within 15 minutes, but can also be woken by pressing the 'Wake Up' button (SW1). When the Micro is next awake it will reply by sending a Status SMS message. It will then stay awake for at least 15 minutes allowing further SMS messages to be more quickly exchanged.

This would be a good time to configure the Micro as described in the Micro Handbook.

[5] It is important that the external power is only applied if both of the links are in place, otherwise it is possible to damage the unit.

[6] Check that all cables are clear of the wake-up button (SW1). Typically cables should be dressed to the left of the unit.

[7] If the LEDs do not illuminate as expected, please refer to the Fault Finding section in the Micro Handbook.