MDU Mobile Data Unit

OPERATION MANUAL

Operation Manual
User Guide

Mobile Data Unit "MDU" User Guide

Table of Contents

Package content

1. MDU Unit.

2. ZAGIL modem Unit.

3. Power supply Unit

4. Counter interface "Optional".

5. Gate interface "Optional".

6. Serial cable.

7. 30 cm Flat cable with FC socket.

8. User manual.

What is MDU?

It's an assembly unit; it collects the data from the field and sends it to control room some where

Features

Compact design.

Low power consumption, it can operate on solar cell.

Status LED Health/Fault/Output.

Dual GSM modems to guaranty immediate connection to control room.

Parameters can be change remotely.

GSM Data logger

Fully control over GSM

Specifications

5 Analog inputs "4...20mA".

4 input up/down counter.

14 digital input "Extension module" for Pump monitoring.

8 digital output "Gate interface" it can control 4 gate motors.

Power supply: DC 12V;

Size: 290mm×150mm×55mm.

Interfaces

2 FC socket 10 pin for LED GSM modem
1 RJ-45 socket to extension module.
1 FC socket from power supply board
1 Serial port
5* 3 analog input connectors
4*4 counters up/down connector
 Status LED, Green LED indicate health status, Blue LED indicates
 4 press switch for Counter Reset
1 press switch for Send SMS test
1 press switch for System reset

FIGURE 1 MDU UNIT, GSM MODEMS, PUMP INTERFACE, POWER SUPPLY SOLAR CONTROLLER

This site has 7 digital inputs "in this case it was pump interface" and 2 GSM modem to guaranty permanent and immediate connection to Control room

MDU Unit

MDU unit contains 2 main parts IC1 & IC2

IC1 the main Microcontroller its do the main tasks for the unit besides reading analog sensors, sending data, connecting go modems …

LED status

Power LED: Continues light indicates good battery, flashing light indicates low battery

Sensors LED: Continues light for reading analog sensors 4...20mA

Send1 LED: Continues light in case of sending data which is collected from sensors and the status of MDU and it flashes when it finishes sending data from port 1 for short time

Send2 LED: Continues light in case of sending data which is collected from sensors and the status of MDU and it flashes when it finishes sending data from port 2 for short time

Counter-Fault: Continues light in case of wrong reading from the level meter.

Expansion-Fault: Continues light if the expansion unit "input or output unit" disconnected from MDU unit.

Alarm/Remote: if MDU connected with input interface, continues light indicates Alarm is activated and the siren is triggered, and if MDU connected with output interface, continues light to remote opening gates "remote control output"

IC3 it's the sub-microcontroller and its do the all counter up/down functions

There are 4 LED and it indicates to the operation of the counter

Green light means starting operation and the reading value is zero

When it start counting up the LED turns off and then turns on Red light when it reaches the maximum value of the counter and its +7777

And if it start counting down the LED turns off and then turns on Yellow light when it reaches the minimum value of the counter and its -7777

Status for Operation mode

Normal: the unit sends data via SMS regularly "Hourly" it can be adjusted from the field or control room.

Fault: the unit sends "Fault" if the cable of expansion unit disconnected

Warning: the unit sends "Warning" if there is no any active input "pumps stopped"

Response: the unit sends if the control room requested to fetch data from the unit or if the SMS button pressed

Message content
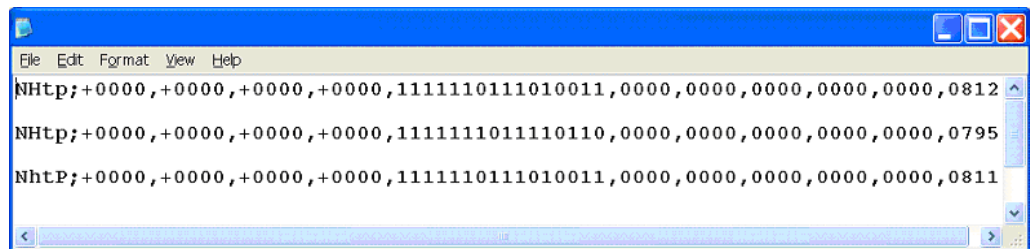
First character it's for unit status "normal, fault, warning, response"

Then the value of the counter 4 values separated by quotation then the status of the 14 inputs or "pump units" then the values of analog 5 inputs the last value it's for battery level.
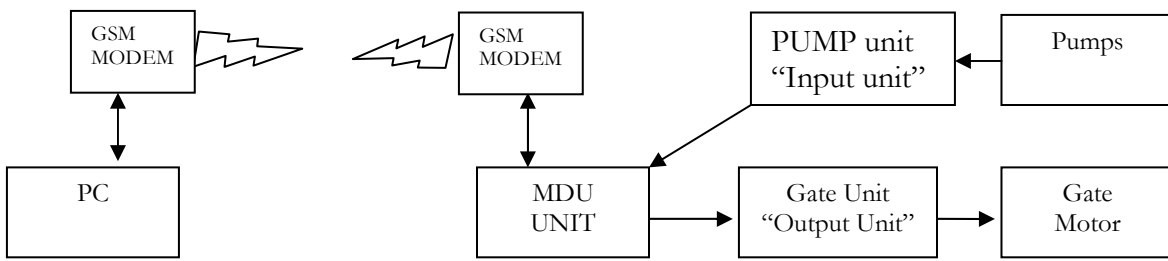
Preparing Unit

In the first time the variable resistor "Vref" must be set, the Volt on Vref must be 1 Volt between the GND and center of Vref

Tasting Unit

Connect the Unit to PC through serial port and Open Hyper-Terminal for testing the received messages.

Make sure you are receiving messages from the tow modems if you are using 2 GSM network or 2 modems.

Logging Data and control over GSM network

```
┌──────────┐            ┌──────────┐     ┌──────────────┐     ┌──────────┐
│   GSM    │  ⟿    ⟿   │   GSM    │     │  PUMP unit   │◄────│  Pumps   │
│  MODEM   │            │  MODEM   │     │ "Input unit" │     │          │
└──────────┘            └──────────┘     └──────────────┘     └──────────┘
     ▲                       ▲                  ╲
     │                       │                   ╲
     ▼                       ▼                    ▼
┌──────────┐            ┌──────────┐     ┌──────────────┐     ┌──────────┐
│          │            │   MDU    │────►│  Gate Unit   │────►│   Gate   │
│    PC    │            │   UNIT   │     │"Output Unit" │     │  Motor   │
└──────────┘            └──────────┘     └──────────────┘     └──────────┘
```

Structure Diagram

PUMP Unit "input unit"

It's a digital input module connected to MDU unit through RJ-45 cable, and accept signal input up to 110 VAC, and there is an output in the unit for Alarm purpose, if the Unit is installed in the place of the pumps it will be useful to warning the technicians, MDU unit control this alarm with specific parameter you can watch it in the logging message.

Tasting Alarm output

Connect pump unit to MDU, Connect MDU to PC with serial port and open new hyper-terminal connection, when you receive the first message on the screen. Type O you will watch Alarm LED turned on and Siren connector closed.

Pump interfaces

7 digital input 110 VAC – 24 VDC

1 common for Neutral

1 MDU expansion port

1 Expansion port to the second Unit

1 connector for Siren "dry contact"

Expansion port "Units"

In case of more than 7 digital inputs you can connect other unit it's the same unit but connected to the main pump unit through the expansion port (units)

LED status

Blue LED indicates the connected Pumps

Red LED indicates working Pumps

Big Alarm LED is On when MDU triggers Alarm

Gate Interface "output unit"

12 digital output module unit connected to MDU unit through RJ-45 cable, every 3 output share 1 common, the unit have 4 groups of outputs every group can control one "Water Gate" there is 4 dry separate contact to indicate that remote Mode starts, the unit can be connected to another gate unit through EXPN PORT(Units) to add another 4 groups of dry contact so the total of output in this case is 24 outputs "8 groups every 3 contacts share 1 common as shown in the diagram.

Tasting Gate interface

You can test gate interface by a light PC program through GSM or serial port instruction attached with the testing software.

Gate interface "Interfaces"

12 digital output dry contact 2 A

4 dry contact to indicates Remote Mode "to draw attention the technician who is responsible for this field"

1 expansion port (MDU)

1 expansion port (Units)

LED status

Green LED is on when the Water Gate is closing.

Yellow LED in on when the Water Gate is opening.

Red LED is on when the controller give stop signal to the Water Gate

Remote LED indicates Remote status

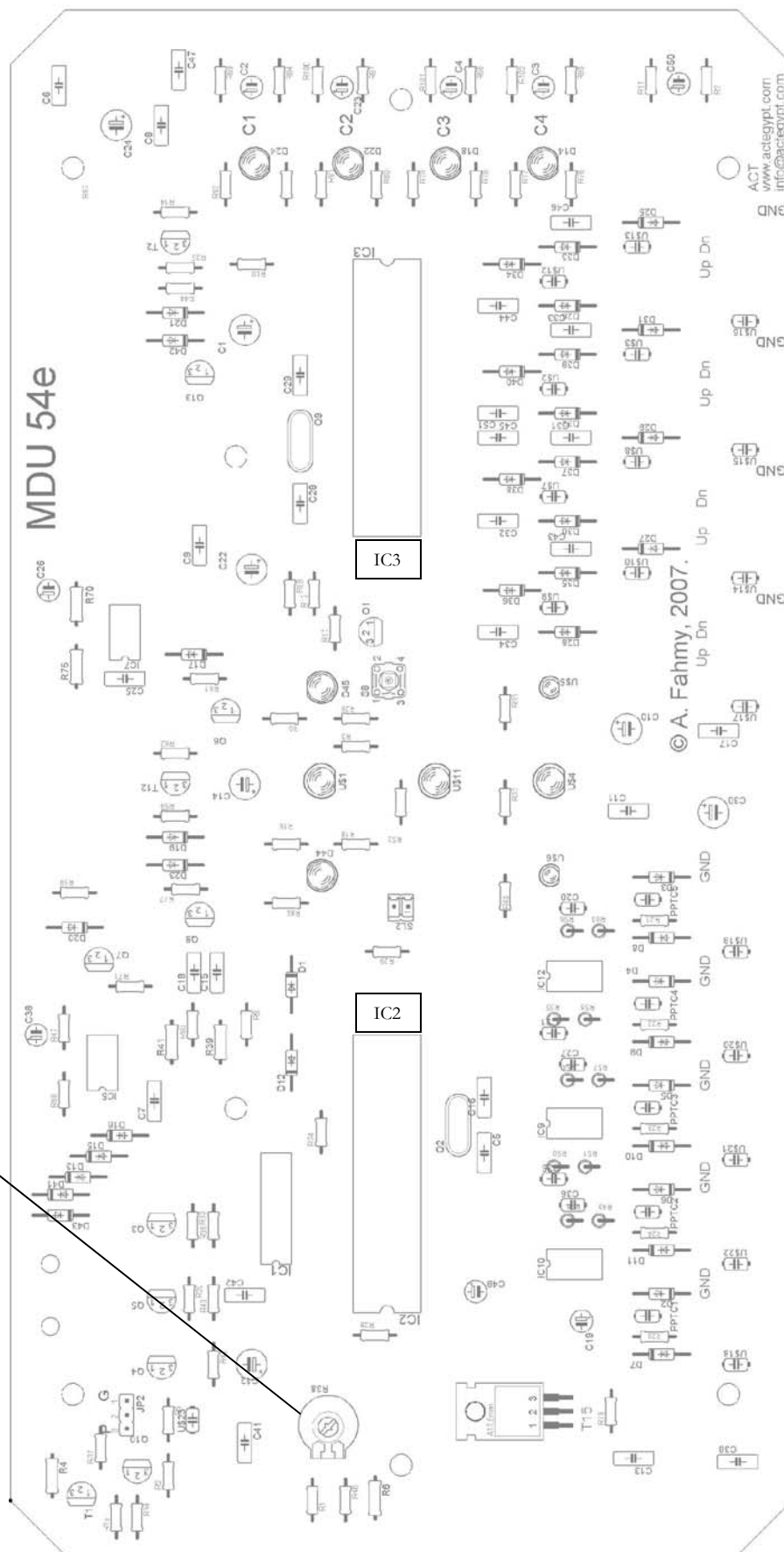LED supply indicates that Gate interface unit is ON

NOTES

- **Only Gate interface unit OR Pump Unit Can be connected to MDU**

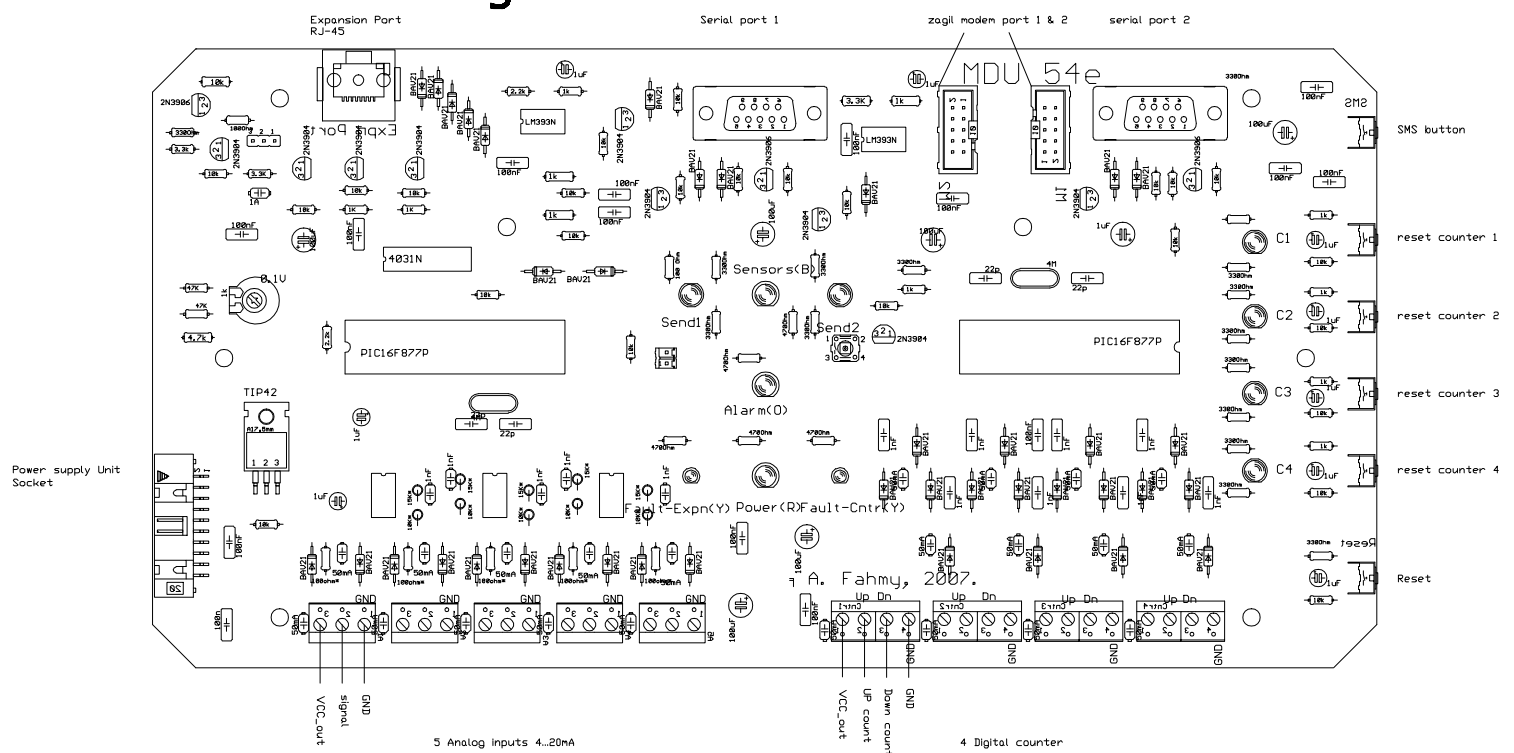**So you CAN'T connect the two units with the same MDU unit at least for this version**

- **This System are perfect for Water Level Management and water applications**

Layout of MDU

MDU 54e Diagram

Expansion Port
RJ-45

Serial port 1

zagil modem port 1 & 2

serial port 2

MDU 54e

SMS button

reset counter 1

reset counter 2

reset counter 3

reset counter 4

Reset

Power supply Unit
Socket

2N3906

Expre Port

LM393N

3.3K

LM393N

4031N

PIC16F877P

PIC16F877P

TIP42

Sensors(B)

Send1

Send2

Alarm(O)

Fault-Expn(Y) Power(R)Fault-Cntr(Y)

A. Fahmy, 2007.

C1

C2

C3

C4

GND   GND   GND   GND   GND

VCC_out

signal

GND

5 Analog inputs 4...20mA

Cntr1   Cntr2   Cntr3   Cntr4
Up Dn Up Dn Up Dn Up Dn

VCC_out

Up count

Down count

GND

GND   GND   GND   GND

4 Digital counter

Pump Interface
A. Fahmy, 2007.

Gate Interface Diagram

Gate Interface Diagram — circuit board layout by A. Fahmy, 2007. Includes labels for Gate 1, Gate 2, Gate 3, Gate 4, Output 1/2/3, Common, Remote 1–4, Expn Port (Units), Expn Port (MDU), and component designators (ICs, relays, resistors, capacitors, diodes).
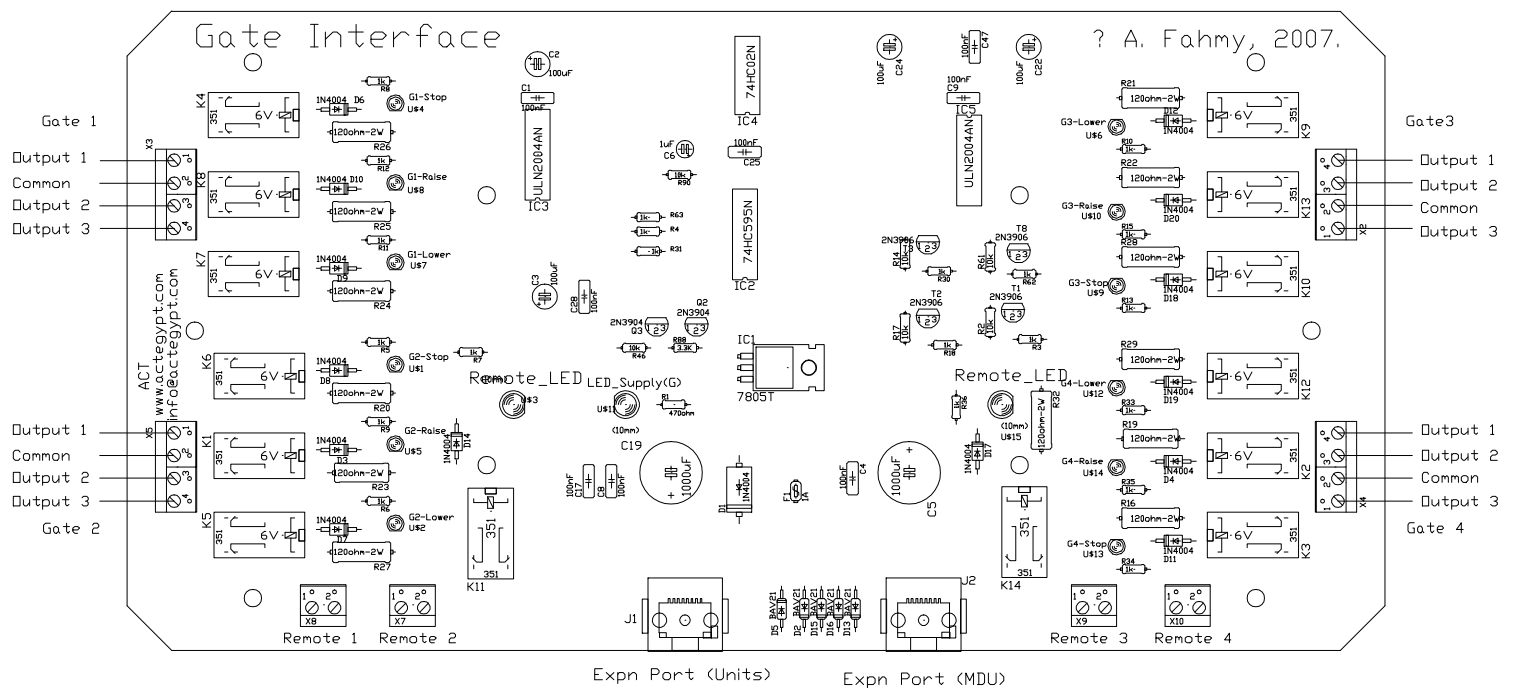
MDU 54e Power Board Diagram

Solar INPUT

Solar
VCC
GND
GND

TIP41C
A17.5mm
3 2 1

G1820
2N3906
2N3904
35l
1N4004
1K

100nF
1000uF
TIP41C
A17.5mm
1 2 3
100nF
1000uF
2PN3906
1K
1K
1K
1K
33K

M2 Fuse (R)
M1 Fuse (R)
+5V Fuse (R)

MDU Power

Power Board

Power Supply
INPUT
12VDC
+12V
GND
GND

G1820
1000uF
100nF

IN
OUT
GND

IN
OUT
GND

IN
OUT
GND

35l
1N4004
100nF
1000uF

12V OK (R)

OS

MDU Powr Socket
Flat cable with FC socket