
**Irrigation Terminal Unit
Pulse Flow Meter
Guide**

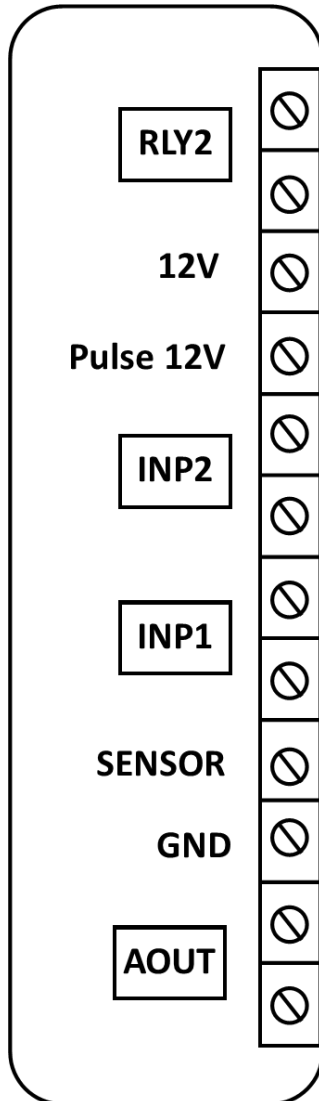


WATER-INSIGHT

Irrigation Terminal Unit Overview

The Irrigation Terminal Unit (ITU) module incorporates high speed digital radios which have a range of up to two kilometres. The modules use the integrated low power 900MHz digital radios to communicate their input state to the INC.

Detailed wiring overview:



RLY2: Application specific
12V: +12-volt output
Pulse 12V: A switch +12-volt supply for external sensor.
INP2: Application specific
INP1: Input (close to assert) digital pulse input for pulse flow meter
SENSOR: analogue input for external sensor. Voltage range 0 – 10 volts (not used for pulse input)
GND: Ground(-) for external sensor
AOUT: Application specific

The Analogue I/O has 12 bit resolution, a stated accuracy of +/-1%FSD, and is sampled at a rate of once per second.

Please note the polarity of the analogue I/O connections.

Device Configuration

Various categories of configuration data can be read and written to/from the device using an EP2 and terminal application (eg PuTTY). The serial port settings to use for this connection are 115200, n, 8, 1.

The general command format is detailed in the table below.

Category	Format/Range	Meaning
version	<major>.<minor>.<build>	Device Firmware version.
address	MAC: xx:xx:xx:xx:xx:xx	The MAC address of the Flow-Logger.

Command	Meaning
get all	Print a list of all configuration values to the terminal.
get <category>	Print a specific configuration or constant value to the terminal.
set <category> <value>	Write a specific configuration value to EEPROM.

The categories that are read only are listed in the table below:

Below are the categories that are used for a pulse flow meter and need configuring using the “set” commands listed above:

Category	Format/Range	Description	Note
channel	Number: 0, 25	Radio channel to use.	
power	Number: 0, 7	Radio Transmitter Power.	Typically 7 (approx. 17 dBm?)
scaling	0,0,0,0	ITU input and output scaling: Input min, input max, output min, output max	Typically input is scaled 0,4095 (max adc count) Output typically scaled 0-FSD
vol_pp	Number	Volume per pulse	typically 10 litres per pulse or 100 litres per pulse
win_len	Number	Accumulated Pulse count for measurement calculations	Number of pulses over which to calculate the average volume
max_freq	255 Hz	Safety Threshold	Pulses collected at greater than this frequency will be discarded as suspected glitches or noise

INC and EP3 Configuration

The ITU is configured into the INC pod-list via the pod configuration file, similar to a regular IPC. Naturally the schedule field does not need to be included for this device. The INC knows that the device is an ITU by the presence a "type = x" line. The INC treats ITUs differently from regular IPCs and repeaters, in that there is a separate task that sends data requests to ITUs, and the communications messages are different. The device type defaults to "IPC" if it is not explicitly specified in the file. This means that configuration file entries for existing IPCs won't need to be changed.

The type value needs to be "Flow".

Below is an example pod configuration file entry for an ITU (Pusle flow meter).

```
[pod1]
address = 00:04:a3:a6:22:8c
channel = 1
name = F1
serial = 1234
mode = local
type = Flow
```

INC Communications Commands for Flow Loggers

The INC has a set of commands to make it communicate with a Flow meter. The Flow meter reuses the already existing "manual" channel (packet type). Most comms with the flow logger can be sent via Local or Mesh comms methods, but for brevity, only the Local (-l) switch option is shown below.

Command	Meaning
telem -l <name> status	Retrieves device specific status information.
telem -l <name> poll	Retrieve a flow reading
telem -l <name> config	Reads all the device configuration settings
telem -l <name> config reload	Force the device reload/ use the configuration values
telem -l/m <Devicename> config < Category> <value>	Writes a Device configuration parameter (per the categories in the table above) with a value which must be valid for that parameter for it to be accepted.

Below is an example INC command shell usage.

telem -l f1 status

```
Sending logging command type 2 to F1 (local)
Sending packet
Packet delivered
[status] n = 40, t = 8:52:17 31/08/2015
```

telem -l f1 config

```
Sending logging command type 4 to F1 (local)
Sending packet
Packet delivered
[config] v = 1
  comms: local
  dest: 00:1e:c0:8d:f7:e1
  power: 5 (0-7)
  channel: 0 (0-25)
  retries: 10
  ttl: 16
  deadband: 4095 (1-4095)
  interval: 30 secs
```

Firmware Upgrade Process

In application firmware version 1.5 the ITU was modified to include a bootloader to allow support for OTA firmware upgrade. As part of the factory run-up process, the bootloader is flashed into the ITU board via the ISP port. The Application firmware can then be flashed into the board using an EP3 in the same way as for an IPC. The ITU does not have a reed switch, so must be IPC list for this to work as the only way that the ITU can be triggered into bootloader active mode is via an OTA command. Consequentially, if the Application firmware upgrade fails the ITU will remain in bootloader active state (where it will blink an error code explaining why it is not able to boot the application).

Installation with Rubicon meter system (Amuri Irrigation)

The Amuri Scheme use the Siemens Sitrans FM M800 meter. TO connect the meter you must:

1. Install the ITU (fit on a panel in a dry area)
2. Install a 4 core cable if required
3. Connect up at the meter end
4. Connect up at the ITU end
5. Configure the meter to output the correct pulses from the meter.

Connecting at the Meter end

Amuri have a 4 core cable for their modbus connection but only two wires are used. The others are stowed on the RS485 ground connector terminal. These can be moved to Output A on the meter and Output A is used for the pulse output

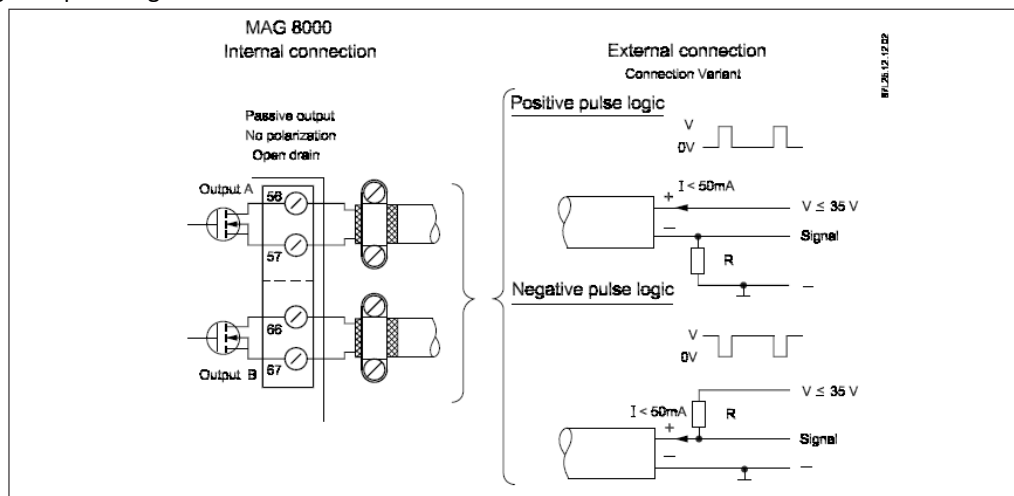
1. Disconnect yellow and white from RS485 ground terminal (not required)



2. Connect to pulse output terminals



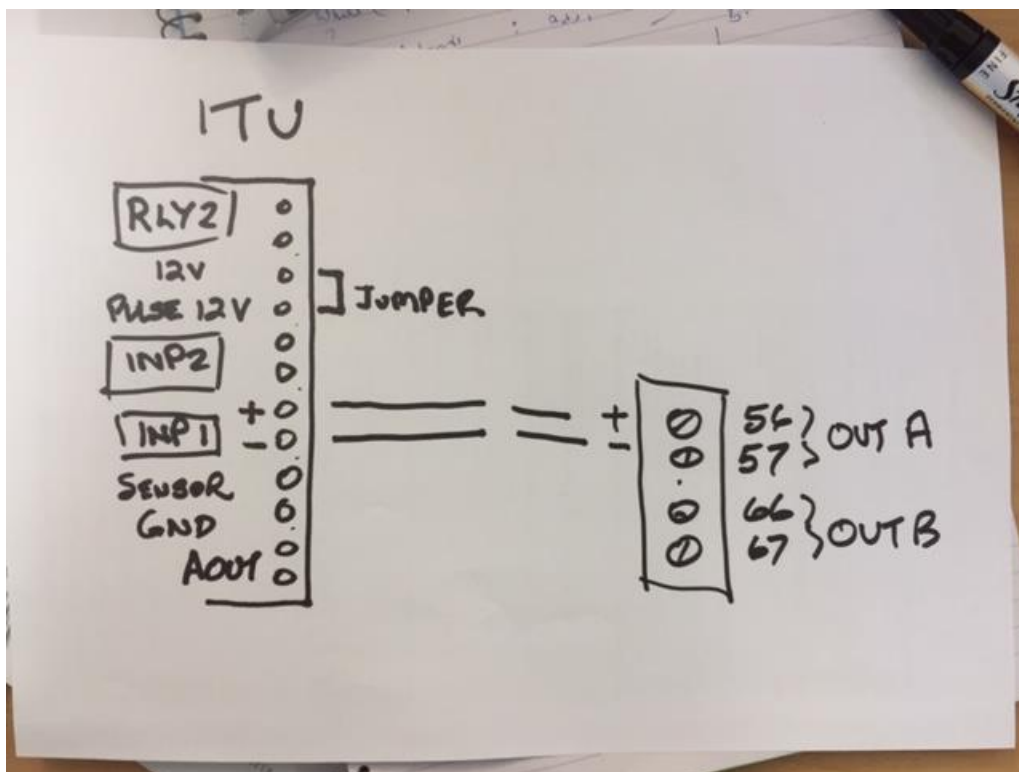
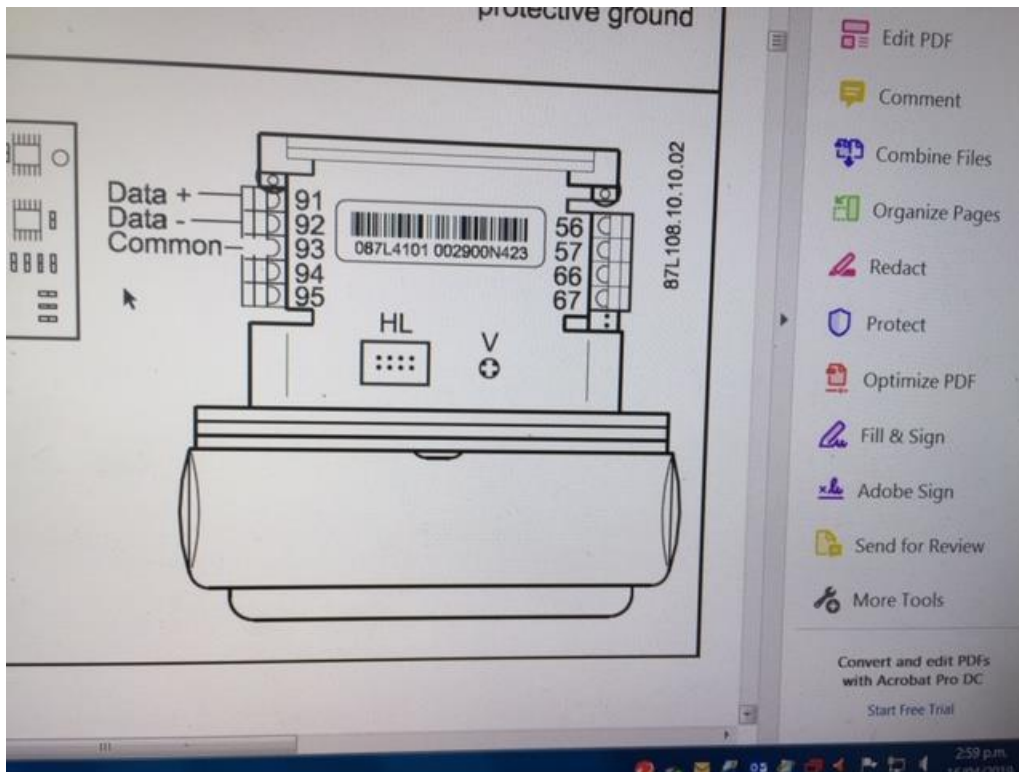
The yellow wires goes to pin 58 of Output A. The White wire to pin 57. With the pullup at the ITU end negative pulse logic will be used.



The pulse output can be configured as volume, alarm or call-up, see section 4 "Commissioning". Pulse output is not polarized and can be connected for positive or negative logic.

R = pull up/down resistor is selected in relation to the V power supply and with at max. current I of 50 mA.

Pulse output must be connected to equipment complying with Low Voltage Directive in order to be considered safe. The isolation within MAG 8000 pulse output is only a functional isolation.



3. Add 2 din rail terminals to Rubicon JBox

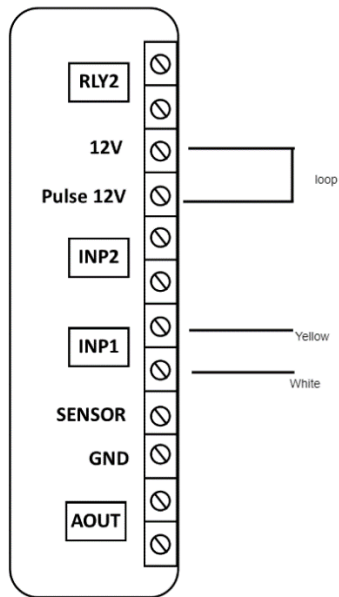


4. Please ensure that the green and brown wires are not disturbed (they are our MODBUS comms)
5. Please ensure that the wire going to your equipment is glanded and sealed where it enters the Rubicon JBox
6. If you want 4 to 20mA you will require a pulse to mA converter.
7. You will need to configure the pulse output on the meter for your volume required.

Connecting at the ITU end

For pulse mode connection the Digital inputs must have a permanent supply voltage. To do this loop the output (12V to the signal 12V pulse) with a wire.

Input 1 is used for the pulse input signal. The yellow wire goes to the signal with the internal pull up and the white goes to the common ground



Configure the meter

This should be done by a qualified technician from Rubicon or Siemens. Output A can be configured for 1000 litres per pulse by default.

There is a test mode for outputting pulse without water flowing. This can be used to generate pulses.

In the absence of an output from the meter shorting the input 1 at the ITU screw terminal pins briefly with a piece of wire will generate pulses which can be read by the INC using the command via the putty debug interfaces. (assuming the system is connected to a NUC)

e.g. short the pin once per second about 10 times then issue the command: `telem -l flow1 poll` (if the device is called flow1) this will return a non zero number for the i/o status.