12-38-7000

VHF and UHF
Transceiver with
Input / Output Module

PRODUCT MANUAL

Version 1.00

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Salcom Product Documentation

This document is designed to familiarise you with Salcom products and guide you through the hardware, configuration, installation and overall system management.

Salcom is an environmentally conscious company and in an effort to conserve paper no longer prints manuals with shipped products. All relevant documentation can be downloaded in PDF form from our website www.salcom.com

Warranty and Disclaimer

Salcom products are warranted for a period of 12 months from the date of purchase against faulty materials and workmanship. Should any fault occur the unit should be returned to the vendor, freight pre-paid. Please include a description of the fault to assist with prompt return. Any unauthorised alterations or repairs will invalidate the warranty.

All information provided in this document is carefully prepared and offered in good faith as a guide in the installation, use and servicing of Salcom products. Installers must ensure that the final installation operates satisfactorily within the relevant regulatory requirements. Salcom accept no responsibility for incorrect installation. We reserve the right to change products, specifications and installation data at any time without notice

Product Overview

The 12-38-7000 transceiver is capable of accurate control and telemetry over long distances. Designed to be used in hostile environments it can withstand temperature extremes as well as being resilient to electrical noise often found in industrial plants.

The transceiver, along with its integrated input/output interface is designed for the control and telemetry of industrial machines with high accuracy and speed.

The on-board SD card is used to store the configuration of unit for easy swap-out and can be also store log and audio wave files. The unit could be made to respond to an event by seizing a radio channel and broadcasting the wave file audio. Anyone carrying a radio transceiver could receive the message.

The 12-38-7000 could also be configured as a store and forward radio repeater to extend the radio range of any installation. This will allow monitoring and control of sites in difficult locations without clear radio access.

The 12-38-7000 is a 5-watt analogue transceiver with POCSAG capability for both transmitting and receiving and comes in two variants, a VHF (136-174 MHz) or UHF (440 – 470 MHz). All parameters are programmable such as frequency, power output, deviation, POCSAG data transmission.

The USB port, or the RS232 serial port can be used to initiate paging transmissions using the SALCOM propriety protocol, Paging Entry Protocol (PET) or Telocator Alphanumeric Protocol (TAP) PG1 protocol

Installation and Connections

The power supply is connected via PI, green power connector to +13.8 Volts DC and Ground. The 12-38 is protected against reversed supply connections. The power source must be reasonably noise free.

Radiation Hazard: Important! To comply with FCC Controlled/Occupational Exposure Limits the aerial must be positioned or mounted to operate at least 0.26 metres away from Operational Staff and 0.57 metres away from the general public.

It is recommended to site the aerial a few metres away from the 12-38 to avoid the possibility of RF feedback causing problems with the transmitter operation. An outside aerial is preferable and will provide better radio coverage. The aerial connection is via the BNC connector and should present a nominal load of 50Ω, with a VSWR of better that 1.8:1.

External indicators consist of a power indicator GREEN LED, normally flashing ON once a second to indicate healthy microcontroller operation.
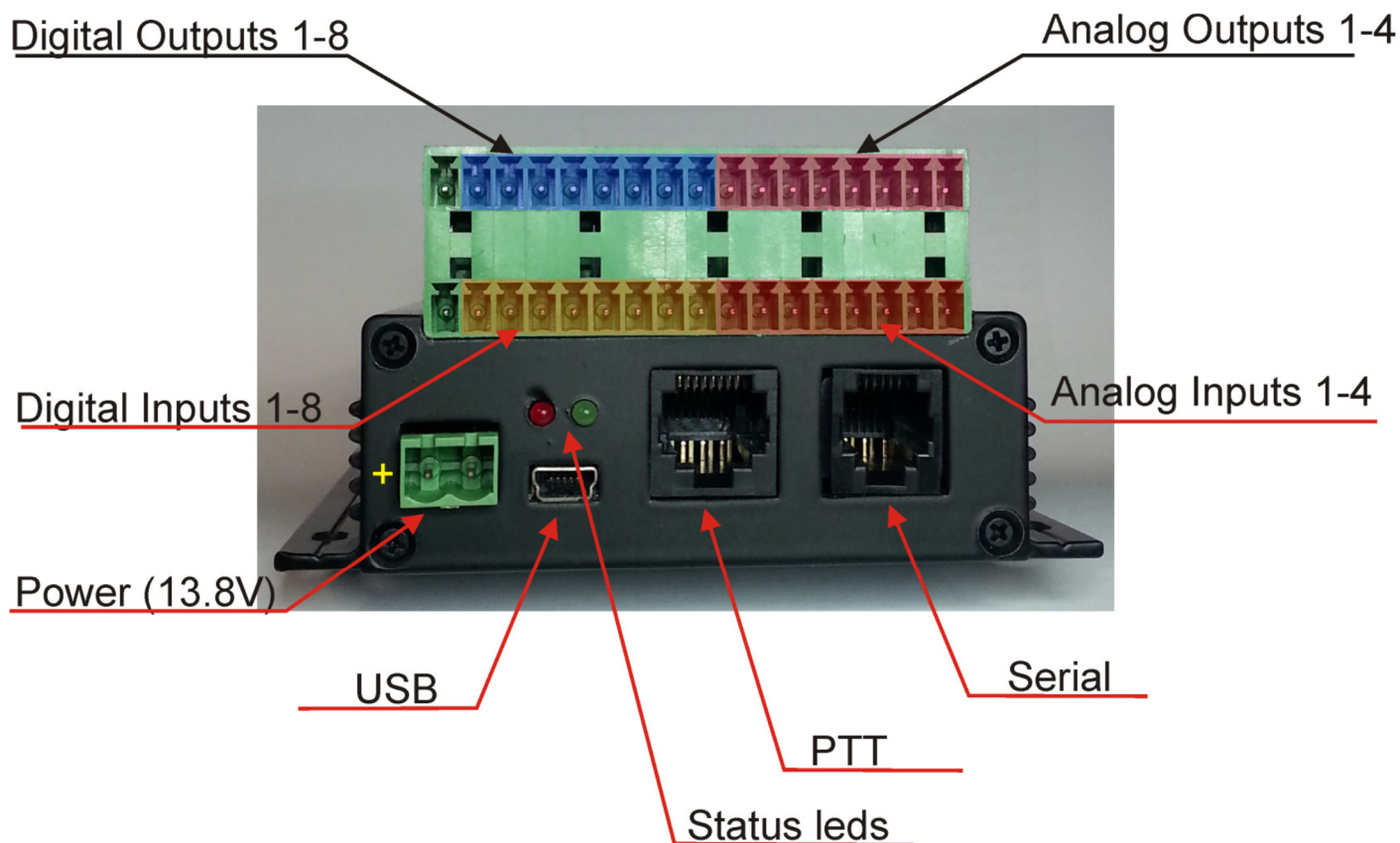
S2 RJ12	
Pin	**Description**
1	Ground
2	Output 1
3	Input 2
4	Input 1
5	RS232 Tx
6	RS232 Rx

S10 RJ45	
Pin	**Description**
1	Ground
2	PTT Input
3	Analogue Input 100mV
4	FSK Input
5	Relay Out 0-12V
6	Switch 100R to GND
7	Speaker
8	+5V
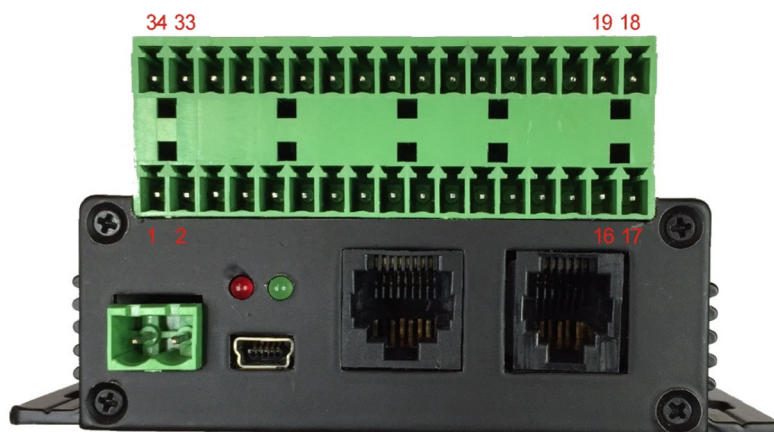
34 Way Connector Pin Layout

Pin	Description
1	Ground
2	Digital inputs 0
3	Digital inputs 2
4	Digital inputs 2
5	Digital inputs 3
6	Digital inputs 4
7	Digital inputs 5
8	Digital inputs 6
9	Digital inputs 7
10	Analog Input - Current loop 0 A
11	Analog Input - Current loop 0 B
12	Analog Input - Current loop 1 A
13	Analog Input - Current loop 1 B
14	Analog Input - Current loop 2 A
15	Analog Input - Current loop 2 B
16	Analog Input - Current loop 3 A
17	Analog Input - Current loop 3 B
18	Ground
19	Analog Output - Current loop 3
20	Ground
21	Analog Output - Current loop 2
22	Ground
23	Analog Output - Current loop 1
24	Ground
25	Analog Output - Current loop 0
26	26 Digital Output 7
27	27 Digital Output 6
28	28 Digital Output 5
29	29 Digital Output 4
30	30 Digital Output 3
31	31 Digital Output 2
32	32 Digital Output 1
33	33 Digital Output 0
34	Ground

Programming

Preparations for Connecting the Programming Software

To change the field programmable options the unit must be connected to a PC either by the preferred USB port S8 (using the supplied USB mini cable), or the standard serial RS232 port S2. When connected via the USB the unit will appear as a virtual storage device.

Note: To make up a serial cable, the S2 connections are shown on page 3. Alternatively purchase an optional Salcom 12-45 serial programming cable.

The 12-38-7000 must be powered during programming, +13.8V to power terminals.

Configuration

All serial commands are sent and received using a standard terminal application connected at 9600:N:8:1 using a 12-45 programming adaptor. Ensure that the correct COM port is selected.

Sending MAP<CR> to the 12-38 will display current configuration information. To change a parameter refer to the terminal programme instructions. An example is given below:

+03=456675000<CR>   to change the RX frequency

Using the USB

If the connection is via the USB then the 12-38 will appear as a drive on the computer. The configuration information is held in the config.ini file which can be opened and edited using a standard text editor. Once the required parameter has been changed save the file back to the original location.

Whilst the USB is connected the Green LED will flash faster.

Parameter Format

Each parameter follows the same format. An example is given below:

;Tx Frequency set the Transit Frequency in Hz   the command description

;+20=456675000   an example for the correct format

+20=456675000   the actual parameter set

Analogue Transmissions Via External Modulation Source

Connect the External Modulation Source to Pin 3 of connector S10. This input is configured for a fixed amplitude input source of 100mV rms , or 280mV p-p. Monitor the RF output on a FM modulation on a meter and adjust the deviation to ±4kHz. Adjust the deviation by fine adjustment of the input signal, or via the PSD by changing the DAC setting within the '***Audio in Atten***' box. Do not click '**Enable Calibration**' tick box for this adjustment. It is important to '**Read**' first, then alter the settings, a higher number gives more deviation and lower number less deviation.

It is also important to keep the deviation to ±4kHz to avoid getting into the compression range. Then press '**Program**' in the '**Configuration**' section to save the settings.

Salcom Protocol

Salcom protocol takes the basic form: ***PPXXXXXXXsLsMMMMMM<CR>***, where:

P   is either **CA** (512 baud alpha), **CN** (512 baud numeric), **ca** (1200 baud alpha), or **cn** (1200 baud numeric).

X   is a 7 digit RIC code.

S   is a space.

L   is a digit (1 to 4 beep level)

M   is the message payload (up to 240 characters).

<CR>   is a carriage return (enter key)

CA _____

Usage: CA<pager#>[<space>]<level>[<space>]<message><CR>

Description: Call alphanumeric pager

Example: CA1119358 1 Please return to reception<CR>

Response: CA11193581<CR><SPACE>Page Sent<CR><LF>

CN _____

Usage: CN<pager#>[<space>]<level>[<space>]<message><CR>

Description: Call numeric pager

Example: CN1119358 1 777<CR>

Response: CN11193581<CR><SPACE>Page Sent<CR><LF>

RES _____

Usage: RES<CR>

Description: Reset 12-38 microcontroller

Example: RES<CR>

Response: SALCOM 12-38-0000 VX.XX<CR><LF>

SN? _____

Usage: SN?<CR>

Description: Retrieve unit serial number and firmware revision

Example: SN?<CR>

Response: SALCOM 12-38-0000 VX.XX 5122345<CR><LF>

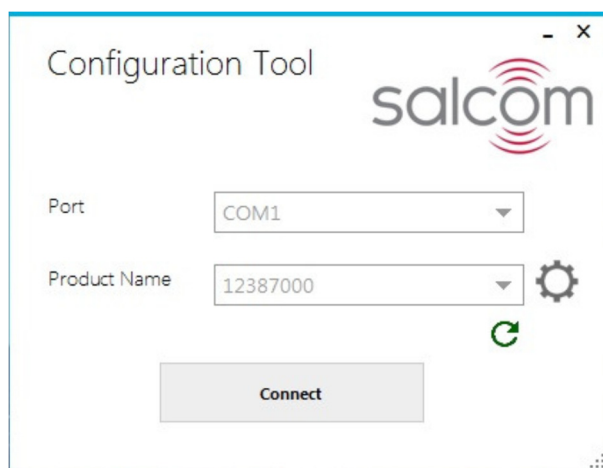## Configuration Using Salcom Configuration Tool

The programmable parameters of the 12-38-7000 can be configured using the SALCOM Configuration Tool software which can be downloaded from the Salcom site www.salcom.com for the unit. The system requirements for the configuration tool is Windows 7 or higher with an available serial (COM) port and installed Microsoft .NET Framework 4.5.

Use S2 (serial connection) to connect the unit to the host computer.

After installing the Configuration Tool, connect the serial cable from the host computer to the serial port of 12-38-7000 and power up the unit (Green led blinking) from start menu run \Salcom Technologies\ConfigTool. The setup window as shown below will appear.

Select the serial Port

Select the relevant product e.g. 12-38-7000

Press the connect button, the Configuration window below will appear.
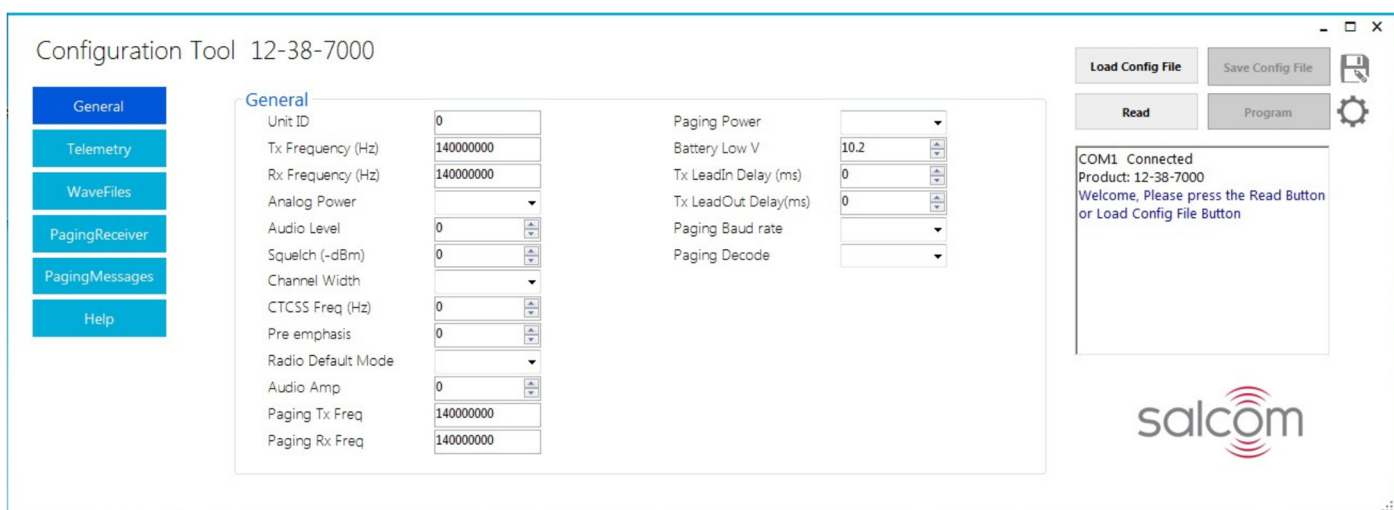
By pressing the read button on the Configuration window, the configuration settings of the unit will be read and the relevant fields will be updated.

Note if the serial connection and cable are configured correctly, the progress of reading can be seen in the progress window at the right.

After reading the unit, "**Program**" and "**Save Config Ffile**" buttons will be activated. By hovering over the mouse pointer on any filed a brief description of the field will be shown.

For this product configuration settings, have been categorised in to 5 categories with help that can be selected by pressing the buttons on the left of the configuration window.

All fields can be adjusted to the requirement of application of the unit.

Paging Messages fields should comply with the Salcom protocol.

Trouble Shooting

The following table may help in problem solving where necessary.

Fault	Check
No illumination of Green LED	Bad power supply connection
Input activated but no transmission	Software configuration incorrect
Unit transmits but nothing received	Poor aerial Wrong frequency Incorrect RIC Incorrect baud-rate Power too low Unit too hot (the unit will also send out an alter via the serial port) Too much vibration
No RS232 serial communication	Incorrect COM port connection selected Software configuration incorrect Cable faulty
Unit starts, but does not complete transmission	Poor supply voltage RF interference (the unit will also report an error on the terminal port)

Compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Any unauthorised changes or modifications to the product may void the user's authority to operate the equipment within a regulatory environment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Technical Specification

Power Supply	13.8V DC
RF Frequency	VHF: 136 - 174 MHz UHF: 440 - 470 MHz
Output Power	Variable up to 5W ± 1dB 50Ω (with quarter wave whip antenna with a gain of 2.14dBi)
Channel Spacing	6.25kHz, 12.5kHz or 25kHz
Modulation	FSK & True FM for Audio
Audio Modes	Analogue FM transmission and reception
Receiver Sensitivity	Better than -119dBm @ 1kHz, 12kHz SINAD
Audio Conditioning	300Hz ---- 3kHz passband software defined pre-emphasis DTMF and CTCSS (<300Hz)
Muting	Software defined muting level
Spurious Emissions	-36dBm max
Serial Input / Output	9600 baud no parity, 8 data bits, 1 stop bit
Discrete Inputs	10 digital and 4 analogue (4 ---- 20 mA) (Expandable to any number required)
Discrete Outputs	10 digital and 4 analogue (4 ---- 20 mA) (Expandable to any number required)
Baud Rate	512 or 1200 baud
Message Format	POCSAG
Transmit Duty Cycle	Up to 100%
Aerial Connection	BNC
Operating Temperature	-10 to +50degC
Enclosure	Dimensions: 77mm x 101mm x 30mm. Material: Extruded aluminium case
Environmental Protection	Requires protection from weather
Type Approvals	USA - FCC Pt 90.203

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