TTSIM-1 Modbus Interface Specification

Section 1: General Information

Hardware Interface: TTSIM-1 uses two wire, RS-485, full duplex, no hardware handshaking at a fixed rate of 9600 baud. The TTSIM-1 software is able to distinguish between four different communication protocols and respond automatically in the mode being used by the host system. The four supported protocols are: Modbus-ASCII, Modbus-RTU, Johnson Control Metasys and a proprietary version of Opto22. System integrators choosing to communicate directly with the TTSIM-1 are free to use either Modbus ASCII or Modbus RTU using the registers listed in the following tables.

Node addressing: All TTSIM-1 units are shipped from the factory with address of 199 set in register 40011.   New TTSIM-1 units must be re-addressed to a unique unused network address. Simultaneous connection of several units with the same address will cause a communications failure with all of those units. The TTSIM-1's can be pre-addressed by the TraceTek distributor using a TTDM-PLUS panel or 3rd party PC based software (e.g. Modscan). A TTSIM-1 can be temporarily forced to 00 by installing Configuration Jumper. (See TTSIM Installation and Operation Instructions.) With this jumper in place the TTSIM-1 will respond to node address 00 and a new unique address can then be loaded in register 40011 using any software utility capable of writing to a Modbus register (e.g. Modscan). After the configuration jumper is removed the address loaded in 40011 will take precedence.

Note: In the following tables those registers in **bold type** are the most likely registers to be used by system integrators. All registers are documented but many are used only for factory calibration or internal system monitoring.

Table 1. Analog Input Registers

All data fields are returned as 16 bit integer values				
Modbus Register	Name	Description	Units	Range
30001	Status Word	Bit level status flags, (see Table 3.)	None	0-65535
30002	Location Resistance	Location of leak or contamination when detection is above current thresh.	Ohms	0-65535
30003	Detection resistance	Resistance through the leak or contamination	Kohms	0 -65535
30004	Detection Current	Current flowing through leak or contamination	0.1 micro-amps	0-65535
30005	RG Resistance	Loop resistance red to green	Ohms	0-65535
30006	YB Resistance	Loop resistance yellow to black	Ohms	0-65535
30007	ADC Counts1	Adc count of V1 (internal value)	count	0-65535
30008	ADC Counts2	Adc count of V2 (internal value)	count	0-65535
30009	ADC Counts3	Adc count of V3 (internal value)	count	0-65535
30010	F/W version	Firmware version V x.xx	none	0-65535
30011	Product ID	Product ID number	none	0-65535
30012	EEPROM Checksum	Check sum	none	0-65535
30013	Voltage Step Size	Step size in ohms(internal value)	ohms	0-65535

Table 2. Analog Output Registers

Modbus Register	Name	Description	Units	Range
All data fields are returned as 16 bit integer				
40001	SIM Operating Mode	0: normal, 8 normal w/no off time, 64: detect Earth to RG loop, 72 detect Earth to YB loop	None	0 – 4095 [0 default]
40002	High Current Threshold	Leak resistance below which high current mode is automatically selected	Kohms	0 – 4095 [50 default]
40003	Locating Current Threshold	Current above which a location is measured	0.1 micro-amps	0 - 4095 [100 default]
40004	Sensor Delta Threshold	Maximum difference in percent between RG loop resistance and YB loop resistance	percent	0 – 4095 [10 default]
40005	Rref	Reference resistance minus offset of 6000 (Factory calibration value)	Ohms	0 – 4095 [2250 default]
40006	K	Op Amp Gain correction (Factory calibration value)	none	0 – 4095 [2016 default]
40007	Vref	A/D reference voltage (Factory calibration value_	mVolts	0 – 4095 [2500 default]
40008	Settling Time	Settling time before making A/D measurements	mSec	0 – 255 [50 default]
40009	Cycle Time	Seconds of measurement cycle plus off-time	Sec	0-655 [0 default]
40010	Cycles per Polarity	Number of cycles before alternating polarity	count	0 – 4095 [0 default]
40011	Node Address	RS485 node address	none	0 – 255 [0 default]
40012	High Voltage Threshold	YB loop resistance above which high voltage mode is automatically selected	Ohms x 10	0 –4095 [800 default]
40013 – 40020	Misc. Flags, Gain setting	Calibration and mode controls used during calibration. -RESERVED	none	
40021	EEPROM Check	Checksum for EEPROM	None	varies

Table 3. Status Word Flags (Register 30001)

Bit	Description
Data is returned from register 300001 as four hexadecimal digits	
00	1: detection resistance below high current threshold
01	1: current is above locating current threshold
02	1: open of high resistance in sensor loop(s)
03	1: difference / average of loop resistance > delta threshold
04	1: EEPROM read error
05	1: EEPROM write error
06	1: EEPROM verify error
07	1: EEPROM type X24C01A or equiv. 0: EEPROM type X24C01
08	1: low voltage used 0: high voltage used
09	1: low current used 0: high current used
10	1: measurement cycle in progress 0: off time
11	1: reverse polarity mode 0: normal polarity mode
12	1: ADC calibrate disabled 0: ADC Calibrate enabled
13- 15	Spare (always 0)