

TTDM-128 Modbus Register Map

Version 3.1 Series

Current to Document Date

This document defines the Modbus Register Map for TTDM-128 as of the date of publication.

Each TTDM must have a unique network ID set through the front panel menu. This device address is used by the host computer to identify an individual TTDM unit from among other TTDM units on the same network or other Modbus devices.

TTDM uses 2 wire RS-485 Modbus RTU as the primary communications mode. It will also automatically recognize Modbus ASCII and respond in kind. Default Baud Rate is 19200 but other baud rates are selectable from the front panel menu under Menu | TTDM Network.

Network connection are made through terminal block J13 Terminals 5 and 6 located in the lower left portion of the TTDM Mother Board.

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Modbus Type Coils: Read/Write Digital: Function 01 to Read, Function 05 to Write,

Modbus Address	Name/Description
User Interface Functions/Settings	
01	Initialize Network (write 1 to do function)
02	Update Network (write 1 to do function)
03	Clear Events History (write 1 to do function)
04	Restore Defaults (write 1 to do function)
05	Reserved
06	Auto Reset (1=Yes 0=No)
07	Audible Alarm (1=Yes 0=No)
08	Alarm Re-flash (1=Yes 0=No)

Modbus Type Digital Inputs: Read Only: Function 02 to Read

Modbus Address	Name/Description
User Interface /Internal SI Status Flags	
10001	!Monitor LED
10002	!Service/LED
10003	!Leak/LED
10004	!Trouble/LED

	User Interface Status
30001	Product ID = 0-255
30002	Major Version Number /Minor Version Number: MV =0-99/ mV = 0-99
30003	Version letter cc= ASCII char
30004	Rom Checksum
30005	Spare
30006	Number of NRM Nodes
30007	Number of SIM Nodes
30008	Number of Active Leak Alarms
30009	Number of Active Service Required Alarms
30010	Number of Active Cable Breaks
30011	Number of Active Loop Imbalances
30012	Number of Active YB Breaks
30013	Number of Active RG Breaks
30014	Number of Active SI Comm Errors
30015	Number of Active SI H/W Errors
30016	Current DAC Value

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Events Data (Mapped Version - see Register 40001)	
30017	Current/Total Events Number (1-32767)
30018	TTDM maximum capacity of event list (2048)
30019	Event Index – This is a read-back of the value written to 40001. See discussion at Register 40001 for calculation. This pointer is zero based and used for events list access and verification(0-2047)
30020	Spare
30021	Event Type (See Table 1)
30022	SIM Address this event refers to
30023	Spare
30024	Event Time Stamp (high byte-hours, low byte-minutes)
30025	Event Date Stamp (high byte-month, low byte-day)
30026	Event Date Stamp (low byte-year)
30027	Event Data (i.e. loc)
30028 - 30032	Spare

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SIM Analog Status (Mapped Version - see Register 400002)	
30033	Low Level SIM Status code – (See Table 2)
30034	Location Resistance (Ω) {Loc Res}
30035	Detection Resistance ($k\Omega$) {Sense Res}
30036	Detection Current (μA) {Sense Cur}
30037	Cable Resistance RG (Ω) {R-G Res}
30038	Cable Resistance YB (Ω) {Y-B Res}
30039	Spare
30040	Spare
30041	SIM Node Status : SIM Unused Node = 0xFFFF SIM Active Normal = 0x0000 SIM Active Trouble = 0x0001 SIM Active Service = 0x0004 SIM Active Leak = 0x0002
30042	AI -9 Sensor Version
30043	AI -10 Product ID
30044	SIM Cable Test Length (selected units)
30045	SIM Leak Location (selected units)
30046	SIM New Leak Threshold Resistance (Ω)
30047	SIM Comm Rate 100% = no packet loss
30048	Last SIM Event Code (see Table 1)
30049 – 30091	TTDM LCD Text 4 rows*(20 chars + CR)
30092	Relays states – that way you can get all front panel info with one read
30093 - 30096	spare

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	<p>SIM Analog Inputs/Status - SIM Analog Inputs Address = 101 + (SIM # * 16) Where SIM # is 0 – 127</p> <p>Use these registers for “flat table” access to all SIM parameters without having to map a desired SIM to the standard output registers listed above. See 40002 for the alternate mapping strategy</p>
30101 - 30116	SIM0 - status see Analog Inputs 30033-30048 for format
30117 - 30132	SIM1 - status see Analog Inputs 30033-30048 for format
30133 - 30148	SIM2 - status see Analog Inputs 30033-30048 for format
...	...
32101 - 32116	SIM125 - status see Analog Inputs 30033-30048 for format
32117 - 32132	SIM126 - status see Analog Inputs 30033-30048 for format
32133 - 32148	SIM127 - status see Analog Inputs 30033-30048 for format

	<p>Events List -latest 2048 events with 7 items per each event.</p> <p>These registers provide “flat table” access to the most recent 2048 events. Calculate most recent Event # = (30017 modulo 2048) +1</p> <p>Event Starting Modbus Address = 302149+((Event Entry #-1)*7). Sequence of registers is the same as 30021 - 30027</p>
302149 - 302155	Event Entry 1 - see Event Data 30021 – 30027 for sequence
302156 – 302162	Event Entry 2 – see Event Data 30021 – 30027 for sequence
316471- 316477	Event Entry – 2047 see Event Data 30021 – 30027 for sequence
316478- 316484	Event Entry 2048 - see Event Data 30021 – 30027 for sequence

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	Name/Description of 16 bit value (4 hex characters) TTDM-128
	SIM and Events Overlay Pointers
40001	Host writes desired event number here to map the 7 parameters associated with desired event into registers 30021 to 30027. This is the alternative strategy to “flat table” access. In some host systems selecting a desired event and writing its event number here and then always reading from 300021 to 30027 is more efficient than having to calculate a “flat table” register address starting at 302149
40002	Host writes SIM address here for mapping selected SIM data into Registers 30033 through 30048. This is the alternative strategy to “flat table” access. In some host systems selecting a SIM by writing its address here and then always reading from 300033 to 30048 is more efficient than having to calculate a “flat table” register address starting at 30101
40003	Spare

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General Setup Parameters	
40004	Time (high byte-hours, low byte-minutes) resets TTDM clock to written value when executed
40005	Date (high byte-month, low byte-day) resets TTDM clock to written value when executed
40006	Date (low byte-year) resets TTDM clock to written value when executed
40007	Spare
40008	Language English =0 French =1 German =2 Spanish =3 Italian =4 Japanese =5
40009	Level 1 Password
40010	Level 2 Password
40011	SIM Analog Outputs Password
40012	SIM 4-20 Address –SIM address used to control 4 20
40013	Max 4-20 Value
40014	Re-Alarm Interval
40015	Spare

Seldom Used General Set-up Registers:

40016	TTDM Port Log State used only by diagnostic ASCII modes
40017	Key Input (0-10) used only by TraceTek Supervisor application *
40018	Modem Dial String ASCII Characters 1 and 2 seldom used
40019	Modem Dial String ASCII Characters 3 and 4 seldom used
40020	Modem Dial String ASCII Characters 5 and 6 seldom used
40021	Modem Dial String ASCII Characters 7 and 8 seldom used
40022	Modem Dial String ASCII Characters 9 and 10 seldom used
40023	Modem Dial String ASCII Characters 11 and 12 seldom used
40024	Modem Dial String ASCII Characters 13 and 14 seldom used

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	The following 32 Registers can be mapped to any SIM by setting Holding Register 40002 to SIM#(1-127). SIM setup changes can be made through these registers after writing the desired SIM address in register 40002
	Mapped SIM Operational Setup Parameters
40025	SIM ID String ASCII Character 1 and 2
40026	SIM ID String ASCII Character 3 and 4
40027	SIM ID String ASCII Character 5 and 6
40028	SIM ID String ASCII Character 7 and 8
40029	SIM ID String ASCII Character 9 and 10
40030	SIM ID String ASCII Character 11 and 12
40031	SIM ID String ASCII Character 13 and 14
40032	SIM ID String ASCII Character 15 and 16
40033	SIM ID String ASCII Character 17 and 18
40034	SIM ID String ASCII Character 19 and 20
40035	SIM Units
40036	SIM Sensitivity
40037	SIM Service
40038	AO -1 Resistance Threshold
40039	AO -2 Current Threshold
40040	AO -12 Misc. Parameters
40041	SIM Zone Resistance
40042	SIM Re-Alarm Distance
40043	SIM Barrier Resistance
40044	Spare
	Other Mapped SIM Analog Outputs - NOTE: The following registers are factory calibration and diagnostic setting. Field modification of these values can have dramatic and adverse impact on system performance. (factory password protected)
40045	AO -0 Mode
40046	AO -3 Delta Threshold
40047	AO -4 R ref
40048	AO -5 K Amp
40049	AO -6 V ref
40050	AO -7 Settle
40051	AO -8 Cycle Time
40052	AO -9 Polarity Change Cycles
40053	AO -10 Unit Address

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40054 - 40056	Spare
Reserved Region (40057-40100)	

	“Flat Table Access to SIM Set-up Parameter” SIM starting address = 40101 + (SIM # * 32) Register sequence follows the pattern of 40025 -40056
40101 - 40132	SIM0 – Note: only used for config jumper address setup
40133 - 40164	SIM1 - see Analog Outputs 40025-40056 for format
40165 - 40196	SIM2 - see Analog Outputs 40025-40056 for format
...	...
44101 - 44132	SIM125 - see Analog Outputs 40025-40056 for format
44133 - 44164	SIM126 - see Analog Outputs 40033-40056 for format
44165- 44196	SIM127 - see Analog Outputs 40033-40056 for format

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	<p>Region labels are used on TTDM front panel display to assist in rapid leak location. They are defined by a lower distance limit, an upper distance limit, an optional output relay on an TT- NRM (if installed) and up to 20 ASCII characters. Each SIM can support 10 regions. The total number of registers associated with region definition is therefore $13*10*127 = 16,510$</p> <p>The start of any block of 13 registers can be calculated as follows:</p> <p>SIM Regions Start Address = $420001 + (\text{SIM \#} * 130) + (\text{Region \#} - 1) * 13$</p> <p>The 13 registers follow this sequence:</p>
1	Region Low Limit (currently defined units)
2	Region High Limit (currently defined units)
3	Region Relay (high byte = device address, low byte = relay #)
4	Region ID String ASCII Character 1 and 2
5	Region ID String ASCII Character 3 and 4
6	Region ID String ASCII Character 5 and 6
7	Region ID String ASCII Character 7 and 8
8	Region ID String ASCII Character 9 and 10
9	Region ID String ASCII Character 11 and 12
10	Region ID String ASCII Character 13 and 14
11	Region ID String ASCII Character 15 and 16
12	Region ID String ASCII Character 17 and 18
13	Region ID String ASCII Character 19 and 20
420131-420143	SIM 1, Region 1
420144 - 420156	SIM 1, Region 2
420157 - 420169	SIM 1, Region 3
420170 - 420182	SIM 1, Region 4
420183 - 420195	SIM 1, Region 5
420196 - 420208	SIM 1, Region 6

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420209 - 420221	SIM 1, Region 7
420222 - 420234	SIM 1, Region 8
420235 - 420247	SIM 1, Region 9
420248 - 420260	SIM 1, Region 10
...	...
436511 - 436523	SIM 127, Region 1
436524 - 436536	SIM 127, Region 2
436537 - 436549	SIM 127, Region 3
436550 - 436562	SIM 127, Region 4
436563 - 436575	SIM 127, Region 5
436576 - 436588	SIM 127, Region 6
436589 - 436601	SIM 127, Region 7
436602 - 436614	SIM 127, Region 8
436615 - 436627	SIM 127, Region 9
436628 - 436640	SIM 127, Region 10

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Table 1. Status Codes reported by TTDM for individual SIM channels

<i>ss</i>	<i>Status</i>	<i>ss or uuu</i>	<i>Status or Units</i>
1	Leak	19	SI H/W Recovered
2	New Leak	20	SI Comm Recovered
3	Re-Alarm	21	NRM Comm Recovered
4	Service Req'd	22	SIM Normal
5	Cable Break	23	System Normal
6	YB Loop Break	24	Memory Cleared
7	RG Loop Break	25	RTC/RAM Error
8	Loop Imbalance	26	Re-Alarm X Hours
9	SI H/W Error	27	Alarm Silenced
10	SI Comm Error	35	Feet
11	NRM Comm Error	36	Meters
12	System Restart	37	Zones
13	System Power Down	38	Ft
14	Leak Relay Reset	205	M
15	Setting Changed	204	Z
16	Leak Cleared	203	UA
17	Service Cleared	206	K Ω
18	Cable Restored	220	Ω

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Table 2. Low Level SIM Status Bits

Bit	Description
00	1: detection resistance is below high resistance 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 *(internal SI only)
09	1: low current used 0: high current used *(internal SI only)
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)

- **Key code values for register 400017** These commands will generate remote key commands, just as if a local user had pressed the associated key.

0 = MENU_KEY 1 = LEFT_ARROW_KEY 2 = UP_ARROW_KEY
 3 = RIGHT_ARROW_KEY 4 = DOWN_ARROW_KEY 5 = ESC_KEY
 6 = ENTER_KEY 7 = TEST_KEY 8 = SILENCE_KEY
 9 = RESET_KEY *

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Revision History:

Rev B: 13 November 2006 Corrected register numbers for SIM 2 set-up parameters on Page 9

Rev C: 22 January 2007 Changed status codes for Register 30041 SIM Node Status Page 4

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