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TCS-NET MODBUS **Specifications Manual**

TCS-NET Modbus Protocol Conversion Interface

Model name: _____

TCB-IFMB640TLE

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1 System Overview

This manual describes Modbus* protocol implementation specifications of TCB-IFMB640TLE. TCB-IFMB640TLE is equipped with the Modbus Slave function. Specifications that are not detailed in this manual conform to the following MODBUS specifications.

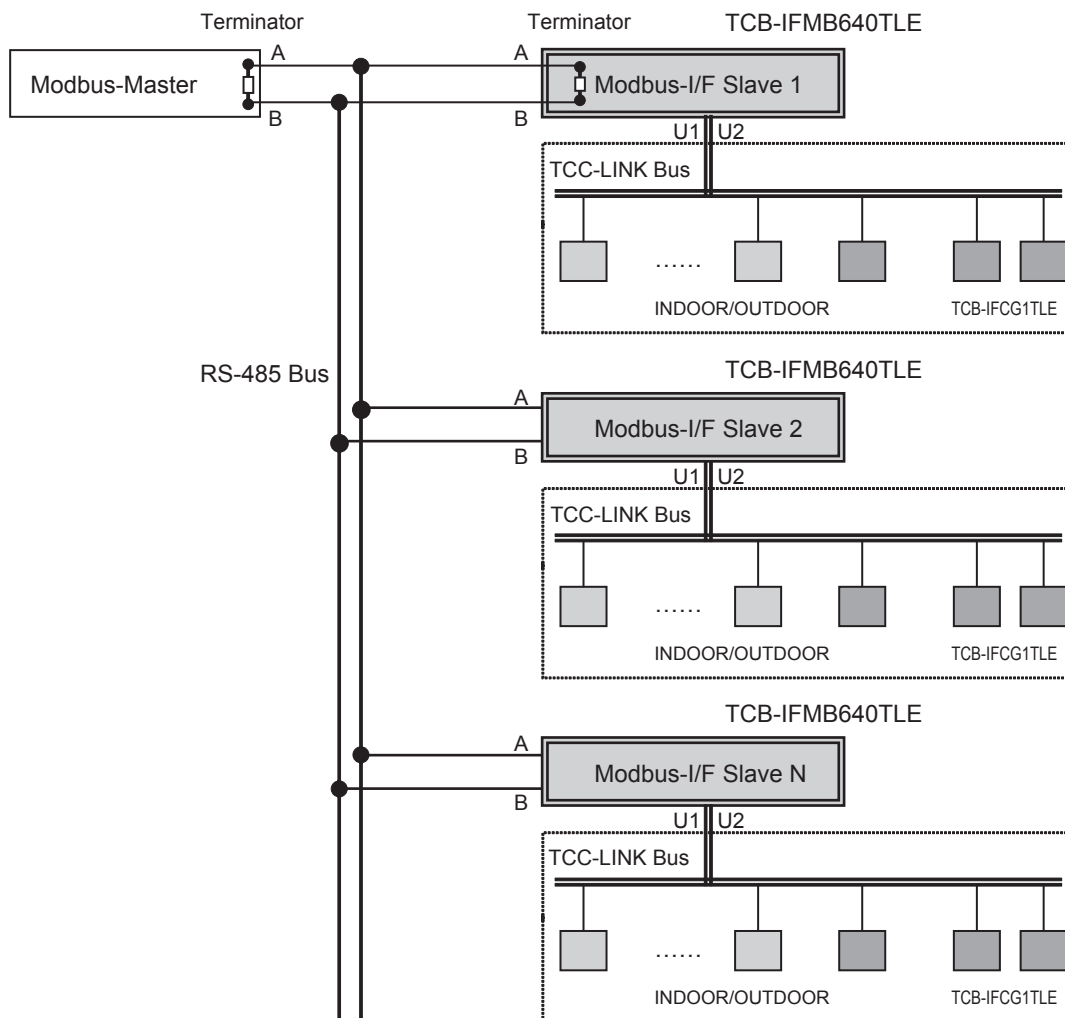
- MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b
- MODBUS over Serial Line Specification and Implementation Guide V1.01
<http://www.modbus-ida.org/>

This implementation specification specifies the operation of Modbus that works on the RS485 serial line, where a slave device sends a response to a request from the master device. Multiple slave devices are connected to the RS485 bus. Modbus uses the Modbus RTU mode with the frame format shown below.

START	SLAVE ADDRESS	FUNCTION	DATA	CRC	END
>=3.5 characters	8 bits	8 bits	N*8 bits (N = 252 max.)	16 bits	>= 3.5 characters

Each slave device is connected to the TCC-LINK main bus. The internal data and operation of indoor units and TCB-IFCG1TLE units (general purpose interface) to which central addresses 1 to 64 are assigned are controlled by the master device. Up to 15 slave devices may be connected to the master device.

A broadcast message will be sent when the slave address 0x00 is specified in a request, and all slave devices will receive the request but send no response including exception response. The figure below shows an example of the connection of the master device, slave devices, and air conditioners.



N = Max. 15

* "Modbus" is a registered trademark of Schneider Electric SA.

2 RS 485 Communication Parameters

RS 485 communication parameters are shown below.

- Character length = 11 bits, Data = 8 bits, Parity Check = even, Start bit = 1 bit low, Stop bit = 1 bit high
- Communication: 9600/19200/38400 bps (default: 19200 bps) Selected manually.
- Bit transmission order: LSB first (b0, b1....). Bit data is transmitted sequentially from the LSB.
- Byte transmission order: Big Endian. 0x1234 -> 0x12 then 0x34. Byte data is transmitted in the big endian order.
- Half duplex, 2 wires. 120 Ω termination. A: Non-inverted input, B: Inverted input
- After receiving a packet, a response is permitted after at least 3.5 characters.
- Connector: 2 terminals

3 Applied Function Codes

The following function codes are implemented.

Function code	Sub function code	Function name
0x01	None	Read coils
0x02	None	Read Discrete input
0x03	None	Read holding register
0x04	None	Read Input register
0x05	None	Write single coil
0x06	None	Write single holding register
0x08	0x00, 01, 02, 04, 0A, 0B, 0C, 0D, 0E, 0F, 11, 12, 14	Diagnostics
0x0B	None	Get Comm Event Counter
0x0C	None	Get Comm Event Log
0x0F	None	Write multiple coils
0x10	None	Write multiple holding registers
		Exception

The relationship between the start address specified in a request from the master device and the value shown by "Modbus-address for registers" in the address assignment table is as follows:

- For Coil
Start address = (Value of Modbus-address for registers) - 1
- For Discrete input
Start address = (Value of Modbus-address for registers) - 10001
- For Input register
Start address = (Value of Modbus-address for registers) - 30001
- For Holding register
Start address = (Value of Modbus-address for registers) - 40001

4 Exception Response

Except for Broadcast, the master device issues a request expecting a normal response from a slave device. Slave units return a normal response when no error is detected, but return no response when an error occurs during the parity check or CRC check. Slave units must return an exception response when they receive a request which has been sent correctly but contains an error that applies to any of the following exception codes.

Exception code	Name
0x01	Illegal function A request of illegal function that is not supported by this specification is received
0x02	Illegal data address An illegal address that does not exist in section 7 of this manual. Address Assignment table or a data request size larger than 249 octets is specified.
0x03	Illegal data value Illegal data in any of the following cases: 1) When data other than that defined in section 7 of this manual Address Assignment table is specified. 2) When Broadcast (slave address = 0) is specified with a function code other than 0x05, 0x06, 0x0F, 0x10 3) When an address is specified for two or more devices
0x04	Slave device failure Slave device internal processing is not correct (When any error occurs during booting or reading the RAM).
0x05	ACK A slave device returns response ACK when it received a request while it is acquiring response data during the slave device initial data acquisition process.
0x06	Slave device busy When a slave device is busy and cannot return response data, this code is returned.
0x07	When a master's request is about an indoor unit which does not respond to the request. (However, the master's request is sent to the indoor unit.)

5 Counters and Registers

TCB-IFMB640TLE is equipped with the following counters and registers that are cleared by a power-on reset, restart process, or a counter reset command.

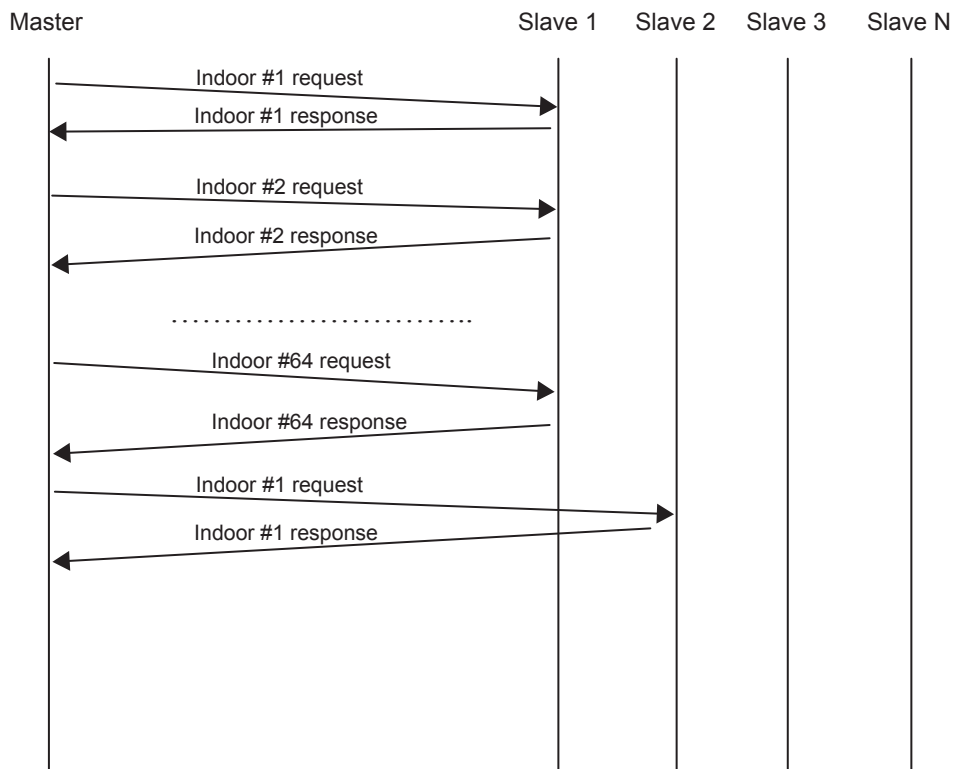
Register/Counter	Description
Coils (R/W)	For air-conditioner database
Discrete input (R)	For air-conditioner database
Input register (R)	For air-conditioner database
Holding register (R/W)	For air-conditioner database
Event counter	Counted when a slave device has processed a received message correctly. This counter is not incremented when the exception command or 0B command is received.
Message counter	Retains the number of messages sent by the slave device.
Diagnostics register	A 16-bit register that retains the content of diagnosis. 0x0000: Normal 0x0001: CRC error 0x0002: EEPROM checksum error Other: Reserved
Bus Communication Error Count	Total number of CRC errors detected by slave devices
Exception Error Count	Total number of exception errors detected by slave devices
Slave Message Count	Total number of messages received by the corresponding slave device
No Response Count	Total number of messages received by the corresponding slave device, which are not accompanied by response
Busy Count	Total of Busy Count (exception error) detected by the corresponding slave device
Bus Character Overrun Count	Number of character overrun errors (failure in receiving part of the data) detected in messages to the corresponding slave device

6 Sequence

The master device sends a request sequentially to each slave device, and gets response data from each slave device. A slave device returns a response to a request from the master device within one second (see the diagram below). When a slave device receives a data read request, the slave device returns the data stored in the register. It is recommended that the master device collects specific information such as air conditioner models, addresses, unique numbers, and operation setting range when the master device accesses the air conditioning system for the first time.

When writing to air conditioners, the master device must read the operation range for, operation mode, fan speed and setting temperature from each air conditioner and write values within the operation range. Pay attention to the sequence of simultaneous setting for writing to air conditioners because it requires time for processing on the slave device side. Furthermore, because no response or exception response with respect to the writing for broadcast message is sent from slave devices, it is recommended that data written to slave devices be checked on the master device side as required. It is recommended to confirm whether a master's request is reflected by reading the read register after appropriate time once a communication is completed, because indoor units may not be able to receive a normal request from the mater due to TCC-LINK communication condition.

In addition, it is also recommended that data be requested at appropriate intervals so that the alarm data that is output from air conditioners is properly reflected in the discrete input register.



7 Address Assignment Table

Total 42368 octets (9728*2/8 + 9984*2*2). The data of the address assignment table is cleared during initialization.

Modbus-description	Indoor-number	Modbus-address for registers	Data name	Length	Octet Order	Explanation
Coils (R/W)	1	1-8	On/Off setting	1 octet	1	1= On,0 =Off (address=1)
			Filter sign reset setting			1= reset,others=no action (address=2)
			Reserved			
		9-16	Operation mode setting	1 octet	2	0x00=unfix,0x 01= heat,0x 02= cool,0x 03= dry 0x 04= fan,0x05 auto (address=9LSB ,address=16MSB)
		17-24	Fan speed setting	1 octet	3	0x00=Invalid,0x01=Fan Stop,0x02=Auto,0x03=High,0x04=Medium,0x05=Low,0x06=Ultra Low,0x07=unfix (address=17 LSB,address=24MSB)
		25-32	Louver setting	1 octet	4	0x00= invalid ,0x 1 =swing, 0x 2= f1,0x 3 =f2,0x 4= f3, 0x 5= f4 ,0x 6 =f5,0x7=stop (address=25 LSB,address=32MSB)
		33-40	Remote controller on/off prohibit setting	1 octet	5	Remote controller on/off prohibit setting (address=33) Remote controller mode prohibit setting (address=34) Remote controller setpoint prohibit setting (address=35) Remote controller louver prohibit setting (address=36) Remote controller fan speed prohibit setting (address=37) 1=prohibit 0=permit
	41-48	Relay 1ch output for TCB-IFCG1TLE	1 octet	6	TCB-IFCG1TLE bit output see manual of TCB-IFCG1TLE	
		Relay 2ch output for TCB-IFCG1TLE				
		Relay 3ch output for TCB-IFCG1TLE				
		Relay 4ch output for TCB-IFCG1TLE				
	49-152	Reserved	104bit	7-19		
	2	153-160	On/Off setting	1 octet	20	1= On,0 =Off (address=153)
			Filter sign reset setting			1= reset,others=no action (address=154)
Reserved						
161-168		Operation mode setting	1 octet	21	0x00= unfix,0x 01= heat,0x 02= cool,0x 03= dry 0x 04= fan ,0x05 auto (address=161 LSB ,address=168MSB)	
169-176		Fan speed setting	1 octet	22	0x00=Invalid,0x01=Fan Sop,0x02=Auto,0x03=High,0x04=Medium,0x05=Low,0x06=Ultra Low,0x07=unfix (address=169 LSB,address=176MSB)	
177-184		Louver setting	1 octet	23	0x00= invalid ,0x 1 =swing, 0x 2= f1,0x 3 =f2,0x 4= f3, 0x 5= f4 ,0x 6 =f5,0x7=stop (address=177 lsb,address=184MSB)	
185-192		Remote controller on/off prohibit setting	1 octet	24	Remote controller on/off prohibit setting (address=185)	
193-200		Relay output for TCB-IFCG1TLE	1 octet	25	TCB-IFCG1TLE bit output (See manual of TCB-IFCG1TLE)	
201-304	Reserved	104bit	26-38			

Modbus-description	Indoor-number	Modbus-address for registers	Data name	Length	Octet Order	Explanation
	n	(152*n -151)- (152*n -144)	On/Off setting	1 octet	19*n -18	
			Filter sign reset setting			
			Reserved			
		(152*n -143)- (152*n -136)	Operation mode setting	1 octet	19*n -17	
		(152*n -135)- (152*n -128)	Fan speed setting	1 octet	19*n -16	
		(152*n -127)- (152*n -120)	Louver setting	1 octet	19*n -15	
		(152*n -119)- (152*n -112)	Remote controller on/off prohibit setting	1 octet	19*n -14	
		(152*n -111)- (152*n -104)	Relay output for TCB-IFCG1TLE	1 octet	19*n -13	TCB-IFCG1TLE bit output See manual of TCB-IFCG1TLE
(152*n -103)- 152*n	Reserved	104 bits	19*n -12—19*n			
64	9577-9584	On/Off setting	1 octet	1198	1= On,0 =Off1 (address=9577)	
		Filter sign reset setting			1= reset,others=no action (address=9578)	
		Reserved				
	9585-9592	Operation mode setting	1 octet	1199	0x00=unfix,0x 01= heat,0x 02= cool,0x 03= dry 0x 04= fan,0x05 auto (address=9585 LSB,address=9592MSB)	
	9593-9600	Fan speed setting	1 octet	1200	0x00=Invalid,0x01=Fan Sop,0x02=Auto,0x03=High,0x04=Medium,0x05=Low,0x06=Ultra Low,0x07=unfix (address=9593 LSB,address=9600MSB)	
	9601-9608	Louver setting	1 octet	1201	0x00= invalid ,0x 1 =swing, 0x 2= f1,0x 3 =f2,0x 4= f3, 0x 5= f4 ,0x 6 =f5,0x7=stop (address=9601 LSB,address=9608MSB)	
	9609-9616	Remote controller on/off prohibit setting	1 octet	1202	Remote controller on/off prohibit setting (address=9609) Remote controller mode prohibit setting (address=9610) Remote controller setpoint prohibit setting (address=9611) Remote controller louver prohibit setting (address=9612) Remote controller fan speed prohibit setting (address=9613) 1=prohibit 0=permit	
	9617-9624	Relay output for TCB-IFCG1TLE	1 octet	1203	TCB-IFCG1TLE bit output (See manual of TCB-IFCG1TLE)	
9625-9728	Reserved	104 bits	1204-1216			

Modbus-description	Indoor-number	Modbus-address for registers	Data name	Length	Octet Order	Explanation			
Discrete input (R)	1	10001-10004	On/Off setting status	1 octet	1	1= On,0 =Off (address=10001)			
			Filter sign status			1= abnormal, 0 =normal) (address =10002)			
			Alarm Status			1= abnormal, 0 =normal) (address =10003)			
			Reserved						
		10005-10008	Reserved						
		10009-10016	Operation mode status	1 octet	2	0x00= invalid,0x 01= heat,0x 02= cool,0x 03= dry 0x 04= fan,0x05 auto heat ,0x06=auto cool,0x07=unfix (address=9 LSB,address= 16=MSB)			
		10017-10024	Fan speed set status	1 octet	3	0x00=Invalid,0x01=Fan Sop,0x02=Auto,0x03=High,0x04=Medium,0x05=Low,0x06=Ultra Low,0x07=unfix (address=10017 LSB,address=10024MSB)			
		10025-10032	Louver setting status	1 octet	4	0x00= invalid ,0x 1 =swing, 0x 2= f1,0x 3 =f2,0x 4= f3, 0x 5= f4 ,0x 6 =f5,0x7=stop (address=10025 LSB,address=10032MSB)			
		10033-10040	Remote controller on/off prohibit setting status	1 octet	5	Remote controller on/off prohibit setting (address=10033) Remote controller mode prohibit setting (address=10034) Remote controller setpoint prohibit setting (address=10035) Remote controller louver prohibit setting (address=10036) Remote controller fan speed prohibit setting (address=10037) 1=prohibit 0=permit			
		10041-10048	Reserved	1 octet	6				
		10049-10056	Reserved	1 octet	7				
		10057-10064	On/Off input for TCB-IFCG1TLE	Alarm input for TCB-IFCG1TLE	1 octet	8	TCB-IFCG1TLE bit input See manual of TCB-IFCG1TLE		
								Din2 input for TCB-IFCG1TLE	
									Din3 input for TCB-IFCG1TLE
Din1 input for TCB-IFCG1TLE									
	Reserved								
		10065-10152	Reserved	88 bits	9-19				

Modbus-description	Indoor-number	Modbus-address for registers	Data name	Length	Octet Order	Explanation	
	2	10153-10156	On/Off setting status	1 octet	20	1= On,0 =Off (address=10153)	
			Filter sign status			1= abnormal, 0 =normal) (address =10154)	
			Alarm Status			1= abnormal, 0 =normal) (address =10155)	
			Reserved				
		10157-10160	Reserved				
		10161-10168	Operation mode status	1 octet	21	0x00= invalid,0x 01= heat,0x 02= cool,0x 03= dry 0x 04= fan,0x05 auto heat ,0x06=auto cool,0x07=unfix (address=10161 LSB ,address=10168MSB)	
		10169-10176	Fan speed set status	1 octet	22	0x00=Invalid,0x01=Fan Sop,0x02=Auto,0x03=High,0x04=Medium,0x05=Low,0x06=Ultra Low,0x07=unfix (address=10169 LSB,address=10176MSB)	
		10177-10184	Louver setting status	1 octet	23	0x00= invalid,0x 1 =swing, 0x 2= f1,0x 3 =f2,0x 4= f3, 0x 5= f4 ,0x 6 =f5,0x7=stop (address=10177LSB,address=10184MSB)	
		10185-10192	Remote controller on/off prohibit setting status	1 octet	24	Remote controller on/off prohibit setting (address=10185) Remote controller mode prohibit setting (address=10186) Remote controller setpoint prohibit setting (address=10187) Remote controller louver prohibit setting (address=10188) Remote controller fan speed prohibit setting (address=10189) 1=prohibit 0=permit	
		10193-10200	Reserved	1 octet	25		
		10201-10208	Reserved	1 octet	26		
		10209-10216	On/Off input for TCB-IFCG1TLE	1 octet	27	TCB-IFCG1TLE bit input See manual of TCB-IFCG1TLE	
		10217-10304	Reserved	88 bits	28-38		
		n	n	152*n+9849 -152*n+9856	On/Off setting status/ etc	1 octet	19*n -18
152*n+9857 -152*n+9864	Operation mode status			1 octet	19*n -17		
152*n+9865 -152*n+9872	Fan speed set status			1 octet	19*n -16		
152*n+9873 -152*n+9880	Louver setting status			1 octet	19*n -15		
152*n+9881 -152*n+9888	Remote controller on/off prohibit setting status			1 octet	19*n -14		
152*n+9889 -152*n+9896	Reserved			1 octet	19*n -13		
152*n+9897 -152*n+9904	Reserved			1 octet	19*n -12		
152*n+9905 -152*n+9912	On/Off input for TCB-IFCG1TLE/ETC			1 octet	19*n -11	TCB-IFCG1TLE bit input See manual of TCB-IFCG1TLE	
152*n+9913 -152*n+10000	Reserved			88 bits	19*n -10-19*n		

Modbus-description	Indoor-number	Modbus-address for registers	Data name	Length	Octet Order	Explanation	
	64	19577-19580	On/Off setting status	1 octet	1198	1= On,0 =Off (address=19577)	
			Filter sign status			1= abnormal, 0 =normal) (address =19578)	
			Alarm Status			1= abnormal, 0 =normal) (address =19579)	
			Reserved				
		19581-19584	Reserved				
		19585-19592	Operation mode status	1 octet	1199	0x00= invalid,0x 01= heat,0x 02= cool,0x 03= dry 0x 04= fan,0x05 auto heat ,0x06=auto cool,0x07=unfix (address=19585 LSB ,address=19592MSB)	
		19593-19600	Fan speed set status	1 octet	1200	0x00=Invalid,0x01=Fan Sop,0x02=Auto,0x03=High,0x04=Medium,0x05=Low,0x06=Ultra Low,0x07=unfix (address=19593 LSB,address=19600MSB)	
		19601-19608	Louver setting status	1 octet	1201	0x00= invalid ,0x 1 =swing, 0x 2= f1,0x 3 =f2,0x 4= f3, 0x 5= f4 ,0x 6 =f5,0x7=stop (address=19601LSB,address=19608MSB)	
		19609-19616	Remote controller on/off prohibit setting status	1 octet	1202	Remote controller on/off prohibit setting (address=19609)	
						Remote controller mode prohibit setting (address=19610)	
						Remote controller setpoint prohibit setting (address=19611)	
						Remote controller louver prohibit setting (address=19612)	
						Remote controller fan speed prohibit setting (address=19613)	
			1=prohibit 0=permit				
19617-19624	Reserved	1 octet	1203				
19625-19632	S-code Status	1 octet	1204				
19633-19640	On/Off input for TCB-IFCG1TLE/ETC	1 octet	1205	TCB-IFCG1TLE bit input (See manual of TCB-IFCG1TLE)			
19641-19728	Reserved	88 bits	1206-1216				

Modbus-description	Indoor-number	Modbus-address for registers	Data name	Length	Explanation
	64	39829	Room temperature	2 octets	See Modbus address 30001-30024
		39830	Setting temperature status	2 octets	See Modbus address 30001-30024
		39831-39834	Alarm code	8 octets	See Modbus address 30001-30024
		39835-39842	Model name	16 octets	See Modbus address 30001-30024
		39843-39850	Peculiar number	16 octets	See Modbus address 30001-30024
		39851	Ability	2 octets	See Modbus address 30001-30024
		39852	Indoor Type	2 octets	See Modbus address 30001-30024
		39853-39858	Analog input for TCB-IFCG1TLE	2 octets*6CH	6-channel analog input for TCB-IFCG1TLE See manual of TCB-IFCG1TLE
		39859	OperationMode/ Fan	2 octets	RS FM Operation mode and air volume can be set
		39860	Cool temp range	2 octets	CT CB Temperature setting upper and lower limits in cool mode
		39861	Heat temp range	2 octets	HT HB Temperature setting upper and lower limits in heat mode
		39862	Dry temp range	2 octets	DT DB Temperature setting upper and lower limits in dry mode
		39863	Auto temp range	2 octets	FT FB Temperature setting upper and lower limits in auto mode
		39864-39984	Reserved	126*2 octets	
	39985-39992	Software version	16 octets	TCB-IFCG1TLE is expressed in ASCII codes followed by the version number.	
Holding register (R/W)	1	40001	Temperature setting value	2 octets	Same as Room temperature Valid range: 0 to 92, unit: 1, fractions rounded off
		40002	Accumulated operation time	2 octets	Octet expression unit: hour ex) 255hours=0xFF Unit: hour. Monitor on/off of the discrete input register to check the on/off state of all air conditioners every 15 minutes. When the register state is on, add 15 minutes. The register data is retained even during power-off.
		40003-40006	Analog output for TCB-IFCG1TLE	2 octets*4CH	4-channel analog output for TCB-IFCG1TLE (See manual of TCB-IFCG1TLE) see Note 2
		40007-40156	Reserved	150*2 octets	See Modbus address 40001-40156
	2	40157	Temperature setting value	2 octets	See Modbus address 40001-40156
		40158	Accumulated operation time	2 octets	See Modbus address 40001-40156
		40159-40162	Analog output for TCB-IFCG1TLE	2 octets*4CH	See Modbus address 40001-40156
		40163-40312	Reserved	150*2 octets	See Modbus address 40001-40156
	n	39845+156*n	Temperature setting value	2 octets	See Modbus address 40001-40156
		39846+156*n	Accumulated operation time	2 octets	See Modbus address 40001-40156
		39847+156*n-39850+156*n	Analog output for TCB-IFCG1TLE	2 octets*4CH	See Modbus address 40001-40156
		39851+156*n-40000+156*n	Reserved	150*2 octets	See Modbus address 40001-40156
	64	49829	Temperature setting value	2 octets	See Modbus address 40001-40156
		49830	Accumulated operation time	2 octets	See Modbus address 40001-40156
		49831-49834	Analog output for TCB-IFCG1TLE	2 octets*4CH	See Modbus address 40001-40156
		49835-49984	Reserved	150*2 octets	See Modbus address 40001-40156

Note 1

- Analog In (2 channels, thermistor) reading
Received TCC-LINK value is retained in this register with two bytes.
The received 2-byte data is a two's complement and is converted to as an absolute measurement temperature by dividing it by 100.
- Example) Received value 0xFE90 -> x0169 (converted to two's complement) -> 361 -> converted to 3.61 (K) (divided by 100) The Celsius temperature is obtained by subtracting 273.15 from 3.61.
- Analog In (4CH 0-10VDC)
Received TCC-LINK value is retained in this register with two bytes. The true value is a two's complement, and the value obtained by dividing the true value by 1000 becomes the board input value.
Example) Received value 0xD8F1 -> converted to 0x270F (two's complement) -> 9999 -> converted to 9.999V (divided by 1000)

Note 2

- TCB-IFCG1TLE Analog Out 4-channel writing
The master device writes a 2-byte two's complement that is 1000 times of the transmit value.
The TCB-IFCG1TLE board value is obtained by dividing a two's complement of 2-byte received value by 3000.
A level in accordance with the value is output from the MPU treating 3.333 as 256 levels. The MPU output value is multiplied by 3 in the external circuit, and the TCB-IFCG1TLE board output value equals the transmit value.
Example 1) A value 9.999V calculated by the master device is sent -> -> 9999 (1000 times) -> 0x270F----> 0x D8F1 (two's complement) This value is written.
Calculation at the receiver (TCB-IFCG1TLE board) 0xD8F1- -> 0x270F (two's complement) -> 9999 -> 3.333V (divided by 3000)- -> 256 levels = 0xFF (3.333V) is DA output. A value 3.333*3 = 9.999V is output from "Analog Out" on the TCB-IFCG1TLE board.
- Example 2) A value 3.000V calculated by the master device is sent -> 3000 (1000 times) -> 0x0BB8-- -> 0xF448 (two's complement) This value is written to the register.
Calculation at the receiver (TCB-IFCG1TLE board) 0xF448 -> 0x0BB8 (two's complement) -> 3000 -> 1V (divided by 3000) - -> 77 levels = 0x4D (1.00V) is DA output. A value 1.00*3 = 3.00V is output from "Analog Out" on the TCB-IFCG1TLE board.

Note 3

- Unused bits can be read and written. No data can be written to reserved areas. If a reserved area is read, 00 is always returned.

Note 4

- The meaning of RS/FM (operation mode, fan speed), CT/CB (temperature setting upper and lower limits in cool mode), HT/HB (temperature setting upper and lower limits in heat mode), DT/DB (temperature setting upper and lower limits in dry mode), and FT/FB (temperature setting upper and lower limits in auto mode) in the Input register (R) is shown below. The master device must read the following values from each air conditioner in advance, and must set values within this range when specifying operation data.

Bits of RS	Meaning
b7, b6	00 All operation modes enabled 01 Cooling/drying disabled 10 Heating disabled 11 Fan only enabled
b5	1: Auto mode enabled, 0: Auto mode disabled
b4	1: Ventilation enabled, 0: Ventilation disabled
b3	1: Heating mode enabled, 0: Heating mode disabled
b2	1: Drying mode enabled, 0: Drying mode disabled
b1	1: Cooling mode enabled, 0: Cooling mode disabled
LSB	1: Fan mode enabled, 0: Fan mode disabled

Bits of FM	Meaning (fan speed)
b3	1: High fan speed enabled, 0: Rapid fan speed disabled
b2	1: Medium fan speed enabled, 0: High fan speed disabled
b1	1: Low fan speed enabled, 0: Low fan speed disabled
b0	1: Ultra-low fan speed enabled, 0: Weak fan speed disabled

Upper-limit / lower-limit temperature	Meaning
CT CB	Temperature setting upper-limit value in cool mode Temperature setting lower-limit value in cool mode
HT HB	Temperature setting upper-limit value in heat mode Temperature setting lower-limit value in heat mode
DT DB	Temperature setting upper-limit value in dry mode Temperature setting lower-limit value in dry mode
FT FB	Temperature setting upper-limit value in auto mode Temperature setting lower-limit value in auto mode

The upper-limit and lower-limit values in the table above are converted to Celsius temperatures using the following formula.

Celsius temperature (°C) = $-35 + (\text{decimal read value} / 2)$

8 Appendix

Alarm Codes

Code	Description	Note
0x25, 0x26	TCC-LINK central control device transmit error	
0x41	Indoor-remote controller communication error	Detected by remote controller
0x42	Remote controller transmit error	
0x43	Indoor-remote controller communication error	Detected by indoor unit
0x44	Indoor-outdoor communication error	Detected by indoor unit
0x46	Decrease in the number of indoor units	
0x47	Indoor-outdoor communication circuit error	Detected by outdoor unit
0x48	Indoor address duplication	
0x49	Master remote controller duplication	
0x4a	Communication error in indoor PCB	
0x4c	Automatic address start error	
0x4f	No indoor unit during automatic addressing	
0x50	Too many indoor units connected or over capacity	
0x52	Header-follower indoor units communication error	
0x53	Error in the number of header outdoor units	
0x54	Connection to other system refrigerant line during automatic addressing	
0x57	Outdoor-outdoor communication error	
0x59	Follower outdoor setup address duplication	
0x5a	Decrease in the number of outdoor units	
0x5c	Follower outdoor error	
0x5f	IPDU communication error	
0x61	Indoor coil TC1 sensor error	
0x62	Indoor coil TC2 sensor error	
0x63	Indoor coil TC1 sensor error	
0x64	TD1 sensor error	
0x65	TD2 sensor error	
0x66	TE1 sensor error	
0x67	TL sensor error	
0x68	TO sensor error	
0x6a	Indoor suction temperature TA sensor error	
0x6c	TS1 sensor error	
0x6d	TH sensor error	
0x6F	Outdoor temperature sensor incorrect wiring (TE, TL)	
0x70	Outdoor pressure sensor incorrect wiring (Pd, Ps)	
0x77	Ps sensor error	
0x78	Pd sensor error	
0x7d	Other indoor errors	
0x7f	Outdoor EEPROM error	
0x81	Compressor breakdown	
0x82	Compressor error (lock)	
0x83	Current detector circuit error	
0x84	Compressor 1 case thermostat operation	
0x86	Low-pressure protective operation	
0x87	Low oil level detection protection	
0x88	Oil level detection temperature sensor error	
0x8e	Compressor 2 case thermostat operation	

Code	Description	Note
0x90	Oil level detection circuit error	
0xc3	Indoor header address duplication	
0xc4	Outdoor line address duplication	
0xc5	Priority indoor unit duplication (displayed on unit with priority)	
0xc6	Priority indoor unit duplication (displayed on unit with priority)	
0xc7	Group wire on individual indoor	
0xc8	No address setting of indoor group	
0xc9	No setting of indoor capacity	
0xca	No setting of outdoor capacity	
0xd4	Central control address duplication	
0xdc	Too many outdoor units connected	
0xdd	IPDU error	
0xde	External interlock error in indoor unit	
0xdf	IC error	
0xe1	Indoor fan moter error	
0xe3	Discharge temperature TD1 error	
0xe4	High-pressure switch operation error	
0xe5	Missing phase detected, phase sequence error	
0xe7	Heatsink TH overhead error	
0xea	Indoor water overflow error	
0xec	Indoor DC fan motor error	
0xed	Outdoor liquid back detection error	
0xef	Gas leak detected	
0xf1	Discharge temperature TD2 error	
0xf3	4-way valve error	
0xf4	High-pressure protective operation	
0xf6	Outdoor fan IPDU error	
0xfa	G-TR short-circuit protection error	
0xfd	Compressor position detector circuit error	
0xff	Other indoor unit errors	
0x100	Intelligent Server communication error	
0x103	Group follower indoor unit error	
0x104	BMS-IFWH communication error	
0x105	BMS-IOKIT communication error	
0x106	BMS-IFWH communication error	
0x107	BMS-IFDD communication error	
0x108	Communication error	
0x109	Communication error	

Converted Capacity Values

Hexadecimal converted capacity values corresponding to TCC-LINK return values are used as response data.

Example) A value acquired as 0x03 (decimal 3) is converted to 28 as capacity.

Return value (decimal)	Converted capacity value (decimal)	Return value (decimal)	Converted capacity value (decimal)
0	Invalid	21	224
1	22	22	250
2	25	23	280
3	28	24	340
4	32	25	355
5	36	26	450
6	40	27	500
7	45	28	560
8	50	29	600
9	56	30	630
10	63	31	670
11	71	32	710
12	80	33	800
13	90	34	840
14	100		
15	112		
16	125		
17	140		
18	160		
19	180		
20	200		

