English

Modbus Register Table
(User Version)

S461

S461 Modbus Register Table and Documentation

1 Modbus Interface

The default settings of the Modbus communication interface are shown as below.

Mode	: RTU
Baud rate	: 19200
Device address	: 1
Framing / parity / stop bit	: 8, N, 1
Response timeout	: 1 second
Response delay	: 0 ms
Inter-frame spacing	: 7 char

Response message that the device returns to the master:

- Function code: 03

The information of the byte order is shown in the table below:

Byte Order	Sequence				Data Type
	1st	2nd	3rd	4th	
1-0-3-2	Byte 1 (MMMMMMMM*)	Byte 0 (MMMMMMMM *)	Byte 3 (SEEEEEEE)	Byte 2 (EMMMMMMM *)	FLOAT
1-0-3-2	Byte 1	Byte 0 LSB	Byte 3 MSB	Byte 2	UINT32 INT32
1-0	Byte 1 MSB	Byte 0 LSB	---	---	UINT16 INT16
1-0	Byte 1 XXX *	Byte 0 DATA	---	---	UINT8 INT8

* S: Sign, E: Exponent, M: Mantissa, XXX: no value

Remarks: Modbus communication settings as well as other settings can be changed by the service App **S4C-FS** or through the windows based **Service Software**.

2 Modbus Register Table

Addr.	Data type	Data Length	Description	Contents/ Example	R
System information					
2000	INT16U	2-Byte	Group ID		R
2001	INT16U	2-Byte	Device ID		R
2002	INT32U	4-Byte	Serial number		R
2004	INT16U	2-Byte	High byte FW ver, Low byte HW ver		R
2005	DOUBLE	8-Byte	Calibration date		R
2009	INT16U	2-Byte	Valid days from calibration date		R
2010	INT16U	2-Byte	Number of measuring channels	15	R
2011	String	16-Byte	Device name	”S461”	R
Unit+Resolution+Type information					
2200	INT16U	2-Byte	Flow		R
2201	INT16U	2-Byte	Velocity		R
2202	INT16U	2-Byte	Consumption (Forward)		R
2203	INT16U	2-Byte	Consumption (Reverse)		R
2205	INT16U	2-Byte	Energy Flow (instant. energy)	Energy meter only	R
2206	INT16U	2-Byte	Heat accumulated	Energy meter only	R
2207	INT16U	2-Byte	Cold accumulated	Energy meter only	R
2208	INT16U	2-Byte	Delta T	Energy meter only	R
2209	INT16U	2-Byte	Temperature inlet	Energy meter only	R
2210	INT16U	2-Byte	Temperature outlet	Energy meter only	R
2211	INT16U	2-Byte	Signal strength Upstream		R
2212	INT16U	2-Byte	Signal strength Downstream		R
2213	INT16U	2-Byte	Signal quality		R
2214	INT16U	2-Byte	Measurement status (E, G, N)		R
2215	INT16U	2-Byte	Sound velocity ratio		R
Status and Channel value					
2300	INT16U	2-Byte	Status	Status	R
2301	Float	4-Byte	Flow	Value	R
2303	Float	4-Byte	Velocity		R
2305	Float	4-Byte	Consumption (Forward)		R
2307	Float	4-Byte	Consumption (Reverse)		R
2311	Float	4-Byte	Energy Flow (instant. energy)	Energy meter only	R
2313	Float	4-Byte	Heat accumulated	Energy meter only	R
2315	Float	4-Byte	Cold accumulated	Energy meter only	R

Addr.	Data type	Data Length	Description	Contents/ Example	R
2317	Float	4-Byte	Delta T	Energy meter only	R
2319	Float	4-Byte	Temperature inlet	Energy meter only	R
2321	Float	4-Byte	Temperature outlet	Energy meter only	R
2323	Float	4-Byte	Signal strength Upstream		R
2325	Float	4-Byte	Signal strength Downstream		R
2327	INT32	4-Byte	Signal quality		R
2329	String	2-Byte	Measurement status (E, G, N)		R
2331	INT16U	2-Byte	Status	Status	R
2332	Float	4-Byte	Sound velocity ratio	Value	R

Explanation:

- Unit+Resolution+type

First byte is unit.

Channel	Unit	Coded unit (decimal)
Flow	m^3/h	14
	m^3/min	15
	l/min	16
	cfm	18
	cfs	83
	USG/min	143
	IG/min	144
	bbl/min	145
Velocity	m/s	10
	ft/min	11
Consumption	m^3	24
	l	25
	cf	26
	IG	148
	UG	146
	bbl	147
Energy Flow	GJ/h	133
	kcal/h	134
	MBtu/h	135
	KJ/h	136
	Btu/h	137
	kW	102

	MW	121
Energy	GJ	138
	kcal	139
	MBtu	140
	KJ	141
	Btu	142
	kWh	105
	MWh	122
Temperature	°C	1
	°F	2

Second byte is data type and resolution:

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Data type: 0 float, 1 4-byte unsigned integer 2 double				Resolution: 0 0 1 0.0 2 0.00 3 0.000 4 0.0000			

Resolution and units

Parameter	Unit	Resolution	Range	Conversion to default unit
Flow	m^3/h (Default)	0.1	0.1 ... 9999.9	a (indicates the value measured in the default unit.)
		1	10000 ... 99999	
	m^3/min	0.1	0.1 ... 9999.9	a / 60
		1	10000 ... 99999	
	l/min	0.1	0.1 ... 9999.9	(a / 60) * 1000
		1	10000 ... 99999	
	cfm	0.01	0.01 ... 999.99	(a / 60) * 35.3146667
	cfs	0.1	0.1 ... 9999.9	(a / 3600) * 35.3146667
		1	10000 ... 99999	
	USG/min	0.1	0.1 ... 9999.9	(a / 60) * 264.1720524
		1	10000 ... 99999	
	IG/min	0.1	0.1 ... 9999.9	(a / 60) * 219.9692483
		1	10000 ... 99999	
	bbl/min	0.1	0.1 ... 9999.9	(a / 60) * 6.2898108
		1	10000 ... 99999	
Velocity	m/s (Default)	0.01	0.01 ... 10.00	a
	ft/min	1	1 ... 2000	a * 3.2808399 * 60

Consumption	M^3 (Default)	0.1	0.1 ... 99999.9	a
		1	100000 ... 9999999	
	l	1	1 ... 9999999	a * 1000
	cf	0.1	0.1 ... 99999.9	a * 35.3146667
		1	100000 ... 9999999	
	IG	0.1	0.1 ... 99999.9	a * 219.9692483
		1	100000 ... 9999999	
	UG	0.1	0.1 ... 99999.9	a * 264.1720524
		1	100000 ... 9999999	
	bbl	0.1	0.1 ... 99999.9	a * 264.1720524 / 42
		1	100000 ... 9999999	
Energy Flow	GJ/h (Default)	0.01	0.01 ... 999.99	a
	kcal/h	1	1 ... 99999	a * 238845.897
	MBtu/h	0.01	0.01 ... 999.99	a * 947.817
	KJ/h	1	1 ... 99999	a * 1000000
	Btu/h	1	1 ... 99999	a * 947817
	kW	0.1	0.1 ... 9999.9	a * 277.8
	MW	0.001	0.001 ... 99.999	a * 0.2778
Energy	GJ (Default)	0.1	0.1 ... 99999.9	a
		1	100000 ... 9999999	
	kcal	0.1	0.1 ... 99999.9	a * 238845.897
		1	100000 ... 9999999	
	MBtu	0.1	0.1 ... 99999.9	a * 947.817
		1	100000 ... 9999999	
	KJ	0.1	0.1 ... 99999.9	a * 1000000
		1	100000 - 9999999	
	Btu	0.1	0.1 … 99999.9	a * 947817
		1	100000 ... 9999999	
	kWh	0.1	99999.9	a * 277.8
		1	100000 ... 9999999	

	MWh	0.1	0.1 ... 99999.9	a * 0.2778
		1	100000 ... 9999999	
Temperature	°C (Default)	0.1	-50.0 ... 200.0	a
	°F	0.1	-50.0 ... 400.0	a * 1.8 +32
Signal strength Upstream	_	0.1	0.1 ... 99.9	
Signal strength Downstream	_	0.1	0.1 ... 99.9	
Signal quality	_	1	1 ... 99	
Measurement status	_	_	E, G, N	'E', 'G', 'N' : ASCII code. E: Error G: Gain adjustment N: Normal
Sound velocity ratio	_	0.1	0.1 ... 99	

- Status

The highest bit indicates if sensor settings were changed by user.

The remaining bits indicate if measuring channels are OK or not. So each of the 15 measuring channels has its own status.

Bit15	Bit15: 0, sensor settings were never changed since last reading from master. Bit15: 1, sensor settings were changed since last reading from master.
Bit0 ... Bit14	Bit0: 0, the first measuring channel is OK; 1, the first measuring channel is NG. Bit1: 0, the second measuring channel is OK; 1, the second measuring channel is NG.

- Channel value

Channel value is arranged from channel1 to channel50 (Max), the length and data type is defined in section of Unit+Resolution+type. Maximum 50 channel is supported.

Channels of S461		
Sensor	**Group ID**	**Channels**
S461 Flow	2	Flow Velocity Consumption (Forward) Consumption (Reverse) Signal strength Upstream Signal strength Downstream Signal quality Measurement status (E, G, N) Sound velocity ratio
S461 Energy	2	Flow Velocity Energy Flow (instantaneous energy)

		Heat accumulated Cold accumulated Delta T Consumption (Forward) Consumption (Reverse) Temperature inlet Temperature outlet Signal strength Upstream Signal strength Downstream Signal quality Measurement status (E, G, N) Sound velocity ratio

Group IDs

Group ID	Description	Remarks
1	Gas Flow Sensor	S401/421, S450/452, S415/418, S430/431
2	Water Flow sensor	S461
3	Dew Point Sensor	S217-M, S215/211/220, S230/231
4	Oil Vapor Sensor	S120, S120-ambient
5	Particle Counter	S130, 132
6	Gas Purity Sensor	S150
7	Air quality sensor	S600, S601, S602
8	Power Meter	S110-V2
9	Temperature Sensor	
10	Pressure Sensor	
15	Others	

Multi-Byte data order

2-byte	4-byte	8-byte
Byte1 Byte0	Byte1 Byte0 Byte3 Byte2	Byte1 Byte0 Byte3 Byte2 Byte5 Byte4 Byte7 Byte6