

**General ( 485 통신사항 )**

항목	사양
통신속도	9600/19200 bps
통신방식	RS485 2 Wire 반이중방식
Data 길이	Half Duplex system Binary(8bit)
Stop bit	1 bit
Error check	Modbus-RTU: CRC16(2byte)
Parity check	없음

**1. Function code General**

Code	Funtion Name	Meaning
03	Read Holding Registers	Reading of various infomation
04	Read Input Registers	Reading of measurement valus or production information
06	Preset Single Registers	Change of varaiious infomation

**1.1 Function code 3 (0x03) = Read holding resistors**

Request (Master -> Slave)

0x01	0x03	0x00	0x00	0x00	0x00	xx	xx
국 번	명 령	시작 번지		데이터 개수		CRC 16	
		상위	하위	상위	하위	상위	하위

Response (Slave -> Master)

0x01	0x00	0x00	0x00	0x00	0x00	xx	xx
국 번	응답명령	데이터 개수		데이터		CRC 16	
				상위	하위	상위	하위

**1.2 Function code 6 (0x06) = write single resistors**

Request (Master -> Slave)

0x01	0x06	0x00	0x01	0x00	0x00	xx	xx
국 번	명 령	번지		데이터		CRC 16	
		상위	하위	상위	하위	상위	하위

Response (Slave -> Master)

0x01	0x06	0x00	0x00	0x00	0x00	xx	xx
국 번	응답명령	번지		데이터		CRC 16	
		상위	하위	상위	하위	상위	하위

**1.3 Function code 4 (0x04) = Read input resistors**

- 30001 - 30005 5 byte 연속 출력 됨
- 30006 - 30010 5 byte 연속 출력 됨

## 2. 순시 유량 명령

### 2.1 General

(1) Request ( Master -> Slave )

0	1	2	3	4	5	6	7
Device address	Function code	Address 1	Address 0	Data1	Date0	CRC16	CRC16
1~99	04	0	0	0	5	XX	XX

(2) Response ( Slave -> Master )

0	1	2	3	4	5	6	7	8	9
Device address	Function code	Length bytes	Flux high byte	Flux low byte	Unit dot	velocity high byte	velocity low byte	Percent age % byte	Percent age % byte
1~99	04	10							
10	11	12	13	14					
MTP high byte	MTP low byte	Alarming state	CRC16	CRC16					
			XX	XX					

### 2.2 순시유량 ( Flux )

(1) Request ( Master -> Slave) 적산 유량 읽기 명령

0	1	2	3	4	5	6	7
Device address	Function code	Address 1	Address 0	Data1	Date0	CRC16	CRC16
1~99	04	0	0	0	5	XX	XX

(2) Response ( Slave -> Master )

0	1	2	3	4	5	6	7
Device address	Function code	bytes	Forward accumulative Total 3	Forward accumulative Total 2	Forward accumulative Total 1	Forward accumulative Total 0	Reverse accumulative Total 3
1~99	04	10	byte3	byte2	byte1	byte0	byte3
8	9	10	11	12	13	14	
Reverse accumulative Total 2	Reverse accumulative Total 1	Reverse accumulative Total 0	Unit of accumulative Total	reserved	CRC	CRC	
byte2	byte1	byte0		0	XX	XX	

### 2.3 순방향 적산 Ver1.5 이상 적용

(1) Request (Master -> Slave)

0	1	2	3	4	5	6	7
Device address	Function code	Address 1	Address 0	Data1	Date0	CRC16	CRC16
1~99	04	0	38	0	2	XX	XX

(2) Response ( Slave -> Master )

F\_Total long( 0 - 29999 99999 ) m3 고정

0	1	2	3	4	5	6	8	9
Device address	Function code	Length bytes	F Total B3	F Total B2	F Total B1	F Total B0	crc16	crc16
1-99	04	4	B3	B2	B1	B0	xx	xx

### 2.4 역방향 적산 Ver1.5 이상 적용

(1) Request (Master -> Slave)

0	1	2	3	4	5	6	7
Device address	Function code	Address 1	Address 0	Data1	Date0	CRC16	CRC16
1~99	04	0	40	0	2	XX	XX

(2) Response ( Slave -> Master )

R\_Total long( 0 - 29999 99999 ) m3 고정

0	1	2	3	4	5	6	8	9
Device address	Function code	Length bytes	R Total B3	R Total B2	R Total B1	R Total B0	crc16	crc16
1-99	04	4	B3	B2	B1	B0	xx	xx

### 2.5 순시유량 Ver1.5 이상 적용

(1) Request (Master -> Slave)

0	1	2	3	4	5	6	7
Device address	Function code	Address 1	Address 0	Data1	Date0	CRC16	CRC16
1~99	04	0	42	0	2	XX	XX

(2) Response ( Slave -> Master )

Flow : Float m3/h 고정

0	1	2	3	4	5	6	8	9
Device address	Function code	Length bytes	Flow B3	Flow B2	Flow B1	Flow B0	crc16	crc16
1-99	04	4					xx	xx

### 3. Read holding registers

번지	명령	형식	실행	Parameter Name	범위	단위	버전
30001	04	unsigned integer	R	Value Flow		None	v1.2
30002		byte(MSB)	R	Unit dot (8bits) B7 B6B5B4 B3B2B1B0	B2 B1 B0 = 0 LTR / s 1 LTR / m 2 LTR / h 3 M3 / s 4 M3 / m 5 M3 / h 6 gal 7 USK  B6 B5 B4 0 = .00000 1 = 0.0000 2 = 00.000 3 = 000.00 4 = 0000.0 5 = 00000.  B7=0 정방향 B7=1 역방향	None	v1.2
30002		byte(LSB)	R	unsigned integer velocity high(8bits)	XX. XXX	m/s	v1.2
30003		byte(MSB)	R	unsigned integer velocity Low(8bits)	XX. XXX	m/s	v1.2
30003		byte(LSB)	R	unsigned integer Percentage high(8bits)	XXX .XX	%	v1.2
30004		byte(MSB)	R	unsigned integer Percentage Low(8bits)	XXX. XX	%	v1.2
30004		byte(LSB)	R	unsigned integer MTP High(8bits)	XXXXX	%	v1.2
30005		byte(MSB)	R	MTP Low(8bits)		%	v1.2
30005		byte(LSB)	R	Alarming state(8bits) XXXX B3B2B1B0	B0=1 High Alarm B1=1 Low Alarm B2=1 Empty Pipe B3=1 SYS Error	None	v1.2
30006 30007	04	unsigned Long	R	Forward Total B3 B2 B1 B0 MSB LSB		None	v1.2
30007 30008		unsigned Long	R	Reverse Total B3 B2 B1 B0		None	v1.2

				MSB	LSB		
30009		byte(MSB)	R	Unit of Total (8bits)	Unit of Total (8bits) [Ltr] 00 = 000000.000 01 = 0000000.00 02 = 00000000.0 03 = 000000000. [M3] 04 = 000000.000 05 = 0000000.00 06 = 00000000.0 07 = 000000000. [gal] 08 = 000000.000 09 = 0000000.00 10 = 00000000.0 11 = 000000000. [USG] 12 = 000000.000 13 = 0000000.00 14 = 00000000.0 15 = 000000000.	None	v1.2
30009		byte(LSB)	R	미사용	0	None	V1.2
30025	04	unsigned integer	R	Ext Pressure 표현 ex) 12.15 --> 1215 100이 곱해진 값으로 출력됨 (주1 )	kg/cm2	None	V1.4
30026	04	unsigned integer	R	유량 30026 명령에서 4byte 요구해야함	0 - 65535	None	V1.4
30027	04	byte(MSB) byte(LSB)	R	30026 번지에서 4byte 요구시 연속출력 됨  Dot (byte)  유량 Unit (byte)	(MSB) XXXX B3 B2 B1 B0 0 = .00000 1 = 0.0000 2 = 00.000 3 = 000.00 4 = 0000.0 5 = 00000. B3=0 정방향 B3=1 역방향 (LSB) XXXXX B2 B1 B0 0 LTR / s 1 LTR / m 2 LTR / h 3 M3 / s 4 M3 / m 5 M3 / h 6 gal 7 USK	None	V1.4

30028	04	unsigned integer	R	Velocity	XX.XXX	m/s	v1.4
30029	04	unsigned integer	R	Flow Percent	XXX.XX	%	v1.4
30030	04	unsigned integer	R	MTP	XXXXX	%	v1.4
30031	04	Byte(MSB) Byte(LSB)	R	XXXX B3B2B1B0 Alarm_states	(MSB) Ararm_states B0=1 High Alarm B1=1 Low Alarm B2=1 Empty Pipe B3=1 SYS Error ----- (LSB) 예약	None	v1.4 예약
30033 30034	04	unsigned long	R	Forward Total B1 B0 B3 B2	0-29999 99999	None	v1.4
30035 30036	04	unsigned long	R	Reverse Total B1 B0 B3 B2	0-29999 99999	None	v1.4
30037	04	byte(MSB) byte(LSB)	R	Totalizer_Unit Flow_Direct	Unit of Total (8bits) [Ltr] 00 = 000000.000 01 = 0000000.00 02 = 00000000.0 03 = 000000000. [M3] 04 = 000000.000 05 = 0000000.00 06 = 00000000.0 07 = 000000000. [gal] 08 = 000000.000 09 = 0000000.00 10 = 00000000.0 11 = 000000000. [USG] 12 = 000000.000 13 = 0000000.00 14 = 00000000.0 15 = 000000000.	None	v1.4
30038 30039	04	unsigned long	R	Forward Total B3 B2 B1 B0	0-29999 99999	m3	v1.5
30040 30041	04	unsigned long	R	Reverse Total B3 B2 B1 B0	0-29999 99999	m3	v1.5
30042 30043	04	float	R	유량 B3 B2 B1 B		m3/h	v1.5
30044 30045	04	float	R	Presure B3 B2 B1 B0	(주2) 미지원		예약
30046 30047	04	float	R	Flow 주3 )		m3/h	예약

30048 30049	4	long	R	Forward Total B3 B2 B1 B0		m3	
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주 1) 30025 번지에서 2byte 요구해야합니다. Pressure

주 2) 미지원

주 3) 30046 번지에서 8byte 요구해야합니다. Flow, Forward Total 연속출력



#### 4. write single resistors

번지	명령	형식	실행	Parameter Name	범위	단위	버전
40001	03,06	Short	N/A	Total Reset	0 Total Reset	m3	v1.5
40002	03,06	Short	R/W	Comm Addres		None	v1.2
40003	03,06	Short	R/W	Baud Rate	0 300 1 600 2 1200 3 2400 4 4800 5 9600 6 19200	bps	v1.2
40004	03,06	Short	R/W	Snsr Size	3,6,10,15, 20,25,32,40, 50,65,80,100, 125,150,200,250, 300,350,400,500, 600,700,800,900,1 6001000,1200,1400 ,1800,2000,2200,2 4002500,2600,2800 ,3000	mm	v1.2
40005	03,06	Short	R/W	Flow Direct	0 Forward 1 Reverse	None	v1.2
40006	03,06	Short	R/W	Flow Range	0 - 99999	None	v1.2
40007	03,06	Short	R/W	Flow Unit	0 LTR / s 1 LTR / m 2 LTR / h 3 M3 / s 4 M3 / m 5 M3 / h 6 UGK 7 USK	None	v1.2
40008	03,06	Short	R/W	Flow Rspns	0 1 1 2 2 3 3 4 4 6 5 8 6 10 7 16 8 24 9 24	s h i f t avg	v1.2
40009	03,06	Short	R/W	Flow Cutoff	0 - 199.99	None	v1.2
40010	03,06	Short	R/W	Cutoff Ena	0 Disable 1 Enable	None	v1.2
40011	03,06	Short	R/W	Total Unit	[Ltr] 00 = 000000.000 01 = 0000000.00 02 = 00000000.0 03 = 000000000.	None	v1.2

					[M3] 04 = 000000.000 05 = 0000000.00 06 = 00000000.0 07 = 000000000. [gal] 08 = 000000.000 09 = 0000000.00 10 = 00000000.0 11 = 000000000. [USG] 12 = 000000.000 13 = 0000000.00 14 = 00000000.0 15 = 000000000.		
40012	03,06	Short	R/W	SegmaN Ena	0 1	None	예약
40013	03,06	Short	R/W	Analog Type	0 1	None	예약
40014	03,06	Short	R/W	Analog Zero	0.0000~1.9999	None	v1.2
40015	03,06	Short	R/W	Analog Range	0.0000~1.9999	None	v1.2
40016	03,06	Short	R/W	Pulse Type	0 : Frequency 1 : Pluse	None	v1.2
40017	03,06	Short	R/W	Pulse Fact	0: 0.001 Ltr 1: 0.01 Ltr 2: 0.1 Ltr 3: 1 Ltr 4: 0.001 m3 5: 0.01 m3 6: 0.1 m3 7: 1 m3 8: 0.001 gal 9: 0.01 gal 10: 0.1 gal 11: 1 gal 12: 0.001 USG 13: 0.01 USG 14: 0.1 USG 15: 1 USG	None	v1.2
40018	03,06	Short	W	Pulse Width	0: 0.2 2: 1 3: 2 4: 4 5: 8 6: 100 7: 150 8: 200 9: 700	ms	예약
40019	03,06	Short	R/W	Frequency_range	0000~5000	Hz	v1.2
40020	03,06	Short	R/W	LCD_Alm_Hi_Ena	0 Disable 1 Enable	None	v1.2
40021	03,06	Short	R/W	Alm_Hi_Val	0 - 100.00	%	v1.2
40022	03,06	Short	R/W	LCD_Alm_Lo_Ena	0 Disable	None	v1.2

					1 Enable		
40023	03,06	Short	R/W	Alm_Lo_Val	0 - 100.00	%	v1.2
40024	03,06	Short	R/W	Empty_Alarm_on_of	0 Disable 1 Enable	None	v1.2
40025	03,06	Short	R/W	Mtsnsr_Trip	19999	None	예약
40026	03,06	Short	R/W	Mtsnsr_Crc	0-3.9999	None	예약
40027	03,06	Short	R/W	Field_Type	0 1 2	None	예약
40028	03,06	Short	R/W	Flow_Zero	양수 999 음수 1000이상 보 수	None	v1.2
40029	03,06	Short	R/W	Sensor_Fac	0-3.9999	None	v1.2
40030	03,06	Short	R/W	MultFactor	0-3.9999	None	v1.2
40031	03,06	Short	R/W	LCD_Retain		None	예약
40032	03,06	Short	R/W	Meter_Fact	0-3.9999	None	v1.2
40033	03,06	Short	R/W	PlsntLmtVl	0 1 2 3 4 5 6 7 8 9	None	예약
40034	03,06	Short	R/W	PlsntDelay	0 1 2 3 4 5 6 7 8 9	None	예약
40035	03,06	Short	R/W	PlsntLmtEn	0 1	None	예약
40035	03,06	Short	R/W	Sensor_Spec		None	예약