

Modbus RTU RS485 Manual



AUTOMATED
FUEL MAINTENANCE
SYSTEMS



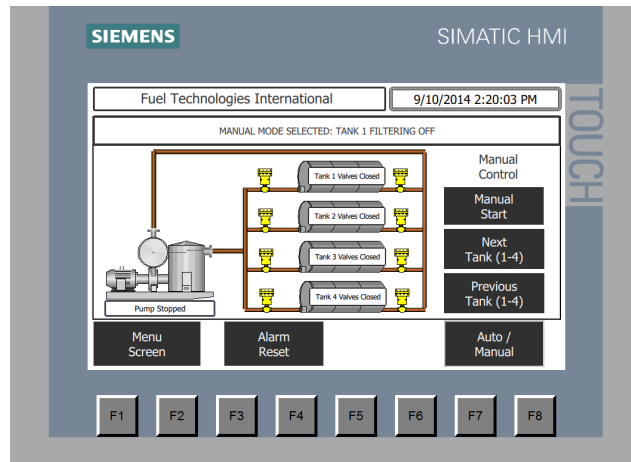
APPROVED

FTI-5A, FTI-10A, FTI-20A

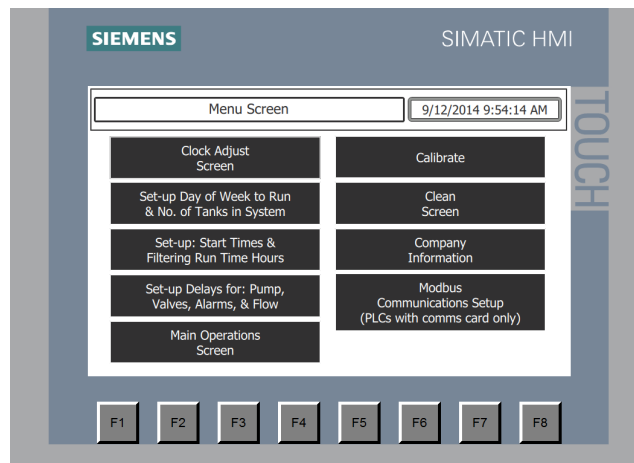
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The Modbus Communications Setup Button is Located On the FTI Control Panel Touch Screen

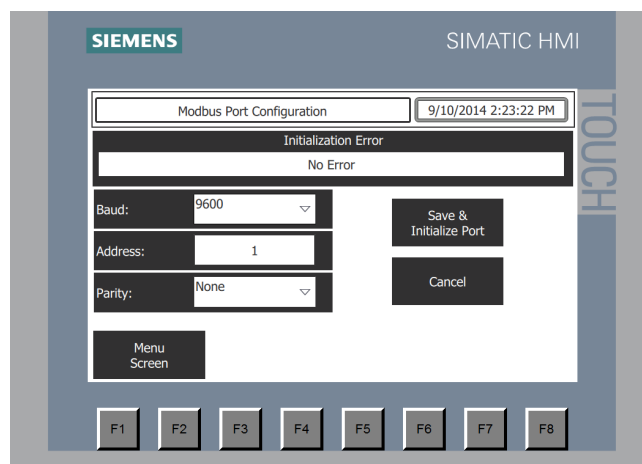
To Access: Push the Menu Screen Button Located on the Main Screen



Then the Modbus Communications Setup Button



Then enter your settings here



MODBUS SETUP:

The PLC system utilizes a Siemens S7-1214C PLC with a CB1241 RS485 Module.

MODBUS communications are a remote MODBUS master system and utilizes MODBUS RTU RS485 communications.

The default set up communications protocol is as follows:

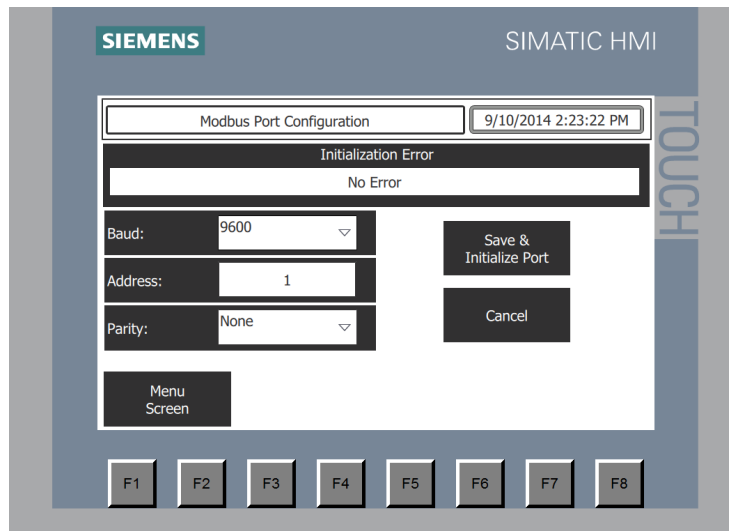
PLC MODBUS ADDRESS: 1

BAUD RATE: 9600

WORD LENGTH: 8

Parity: NONE

STOP BITS: 1



To make a change to any of the Modbus Protocol settings, press the required value on the screen. Where appropriate, a selection will appear. Select the desired value and when ready press the SAVE & INITIALIZE PORT button. This will send the revised values to the PLC.

Depending upon the function of individual variables within the PLC each may have a Modbus READ address, a Modbus WRITE address or both. In simple terms, the Modbus mapping was designed to provide the user with a means to reflect the functionality of the touch screen display.

Below are the READ and WRITE tables for each of the available variables within the PLC:

TAG DESCRIPTIONS	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range / Description
Auto mode Tank 1 Running	MBR_T1_Auto_On	40001.8			
Auto mode Tank 2 Running	MBR_T2_Auto_On	40001.9			
Auto mode Tank 3 Running	MBR_T3_Auto_On	40001.10			
Auto mode Tank 4 Running	MBR_T4_Auto_On	40001.11			
Auto Pressure Relief is running	MBR_P_Relief_On	40001.12			
Sets system in auto mode / Idle & Run	MBR_Auto_On	40001.13	MBW_Auto_On	40028.8	
Turns system on & off manually	MBR_Manual_On_Off	40001.14	MBW_Manual_On_Off	40028.10	
Read-Fault Active / Write-Reset Alarm	MBR_Fault_Active	40001.15	MBW_Reset	40028.9	
Increase tank # to run (1-4)			MBW_Inc_Man	40028.11	
Decrease tank # to run (1-4)			MBW_Dec_Man	40028.12	
Low Flow-Loss of Prime Alarm	MBR_Low_Flow	40001.0			
High Vacuum / Strainer Alarm	MBR_Mesh_100_Flt	40001.1			
1 Micron Filter / Separator Alarm	MBR_Filter_1_Flt	40001.2			
10 Micron Filter Alarm	MBR_Filter_10_Flt	40001.3			
3 Micron Filter Alarm	MBR_Filter_3_Flt	40001.4			
System High Pressure Alarm	MBR_HP_Fault	40001.5			
High Water in Separator Alarm	MBR_Hi_Wat_Lev_Flt	40001.6			
Leak Alarm	MBR_Leak_Flt	40001.7			
Motor Overload Alarm	MBR_OL_Flt	40002.8			
Tank # to run on Sunday	MBR_Sun_Tank	40003	MBW_Sun_Tank	40029	1-4
Tank # to run on Monday	MBR_Mon_Tank	40004	MBW_Mon_Tank	40030	1-4
Tank # to run on Tuesday	MBR_Tue_Tank	40005	MBW_Tue_Tank	40031	1-4
Tank # to run on Wednesday	MBR_Wed_Tank	40006	MBW_Wed_Tank	40032	1-4
Tank # to run on Thursday	MBR_Thur_Tank	40007	MBW_Thur_Tank	40033	1-4
Tank # to run on Friday	MBR_Fri_Tank	40008	MBW_Fri_Tank	40034	1-4
Tank # to run on Saturday	MBR_Sat_Tank	40009	MBW_Sat_Tank	40035	1-4
Sets number of tanks in system	MBR_Tanks	40010	MBW_Tanks	40036	1-4
Sets Low Flow minutes (1-5 minutes)	MBR_Lo_Flow_Lmt	40011	MBW_Lo_Flow_Lmt	40037	1-5
Hours (1-23)	MBR_Hour	40012	MBW_HOUR	40039	1-23
Minutes (1-59)	MBR_Min	40013	MBW_MINUTE	40038	1-59
Day (1-31)	MBR_DAY	40014	MBW_DAY	40040	1-31
Month (1-12)	MBR_MONTH	40015	MBW_MONTH	40041	1-12
Year (xxxx)	MBR_YEAR	40016	MBW_YEAR	40042	
Delays the Alarms from Going Off	MBR_FltDelay	40017	MBW_FltDelay	40043	1-90 Sec
Delays the Pump from Starting	MBR_PumpDly	40018	MBW_PumpDly	40044	1-90 Sec
Pressure Relief duration	MBR_P_Relief_Dur	40019	MBW_P_Relief_Dur	40045	5-90 Sec
Tank 1 Run Time Hours	MBR_T1_Hours	40020	MBW_T1_Hours	40046	1-23
Tank 2 Run Time Hours	MBR_T2_Hours	40021	MBW_T2_Hours	40047	1-23
Tank 3 Run Time Hours	MBR_T3_Hours	40022	MBW_T3_Hours	40048	1-23
Tank 4 Run Time Hours	MBR_T4_Hours	40023	MBW_T4_Hours	40049	1-23
Sunday Start Time Hours	MBR_SunStart_Hr	40024	MBW_SunStart_Hr	40050	1-23
Monday-Friday Start Time Hours	MBR_MonStart_Hr	40025	MBW_MonStart_Hr	40051	1-23
Saturday Start Time Hours	MBR_SatStart_Hr	40026	MBW_SatStart_Hr	40052	1-23

SET FILTERING START TIMES					
TAG DESCRIPTIONS	MODBUS READ		MODBUS WRITE		
Sunday Start Time	MBR_SunStart_Hr	40024	MBW_SunStart_Hr	40050	
Monday-Friday Start Time	MBR_MonStart_Hr	40025	MBW_MonStart_Hr	40051	
Saturday start time	MBR_SatStart_Hr	40026	MBW_SatStart_Hr	40052	

SET RUN TIME HOURS (FILTERING DURATION)					
TAG DESCRIPTIONS	MODBUS READ		MODBUS WRITE		
Tank 1 Run Time Hours	MBR_T1_Hours	40020	MBW_T1_Hours	40046	
Tank 2 Run Time Hours	MBR_T2_Hours	40021	MBW_T2_Hours	40047	
Tank 3 Run Time Hours	MBR_T3_Hours	40022	MBW_T3_Hours	40048	
Tank 4 Run Time Hours	MBR_T4_Hours	40023	MBW_T4_Hours	40049	

AUTO START FLAG					
Tag Descriptions	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
Sets system in auto run mode	MBR_Auto_On	40001.13	MBW_Auto_On	40028.8	

The system is put into AUTO mode by writing to address 40028.8
Confirmation of the AUTO status can be read from 40001.13

ACTIVE FAULT AND ALARM RESET FLAG					
Tag Descriptions	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
(Read) Fault active (Write) Fault Reset	MBR_Fault_Active	40001.15	MBW_Reset	40028.9	0-1

When a fault / alarm occurs in the PLC this be can remotely reset by writing to Modbus address 40028.9
All faults will be reported by the Fault / Alarm Active Flag (Modbus address 40001.15).

MANUAL ON/OFF FLAG					
Tag Descriptions	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
Turn on Manually	MBR_Manual_On_Off	40001.14	MBW_Manual_On_Off	40028.10	

To start and stop the pump in MANUAL mode (usually used for testing), write to the MANUAL ON/OFF flag (Modbus address 40028.10) and this will turn on the Pump. To stop the manual operation repeat the write to Modbus address (40028.10) this will toggle the functionality of the output.

INDIVIDUAL ALARMS ACTIVE FLAG					
Tag descriptions	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
Low Flow-Loss of Prime Alarm	MBR_Lo_Flow	40001.0			
High Vacuum / Strainer Alarm	MBR_Mesh_100_Flt	40001.1			
1 Micron/Separator Filter Alarm	MBR_Filter_1_Flt	40001.2			
10 Micron Filter Alarm	MBR_Filter_10_Flt	40001.3			
3 Micron Filter Alarm	MBR_Filter_3_Flt	40001.4			
System High Pressure Alarm	MBR_HP_Flt	40001.5			
High Water in Separator Alarm	MBR_Hi_Wat_Lev_Flt	40001.6			
Leak Alarm	MBR_Leak_Flt	40001.7			
Motor Overload Alarm	MBR_OL_Flt	40001.8			

Individual Fault / Alarms conditions can be monitored by reading Modbus addresses 40001.0 through 40001.8

DELAY SETTINGS					
Tag Descriptions	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
Fault Delay: (delays the alarms from going off)	MBR_FltDly	40017	MBW_FltDly	40043	1-90 Seconds
Pump Delay: Delays the pump from starting	MBR_PumpDly	40018	MBW_PumpDly	40044	1.90 Seconds
Pressure Relief Duration: Pressure Relief Duration Setting	MBR_P_Relief_DUR	40019	MBW_P_Relief_DUR	40045	5-90 Seconds

The above table indicates the READ and WRITE addresses for the alarm delay settings for the system.
Note: A time value for seconds of 10 represents an actual time of 10.0 seconds.

PLC CLOCK ADJUSTMENT VALUES					
Tag Descriptions	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
Reads / Writes Hours	MBR_Hour	40012	MBR_Hour	40039	1-23
Reads / Writes Minutes	MBR_Min	40013	MBR_Min	40038	1-59
Reads / Writes the Day	MBR_Day	40014	MBR_Day	40040	1-31
Reads / Writes Month	MBR_Month	40015	MBR_Month	40041	1-12
Reads / Writes Year	MBR_Year	40016	MBR_Year	40042	XXXX

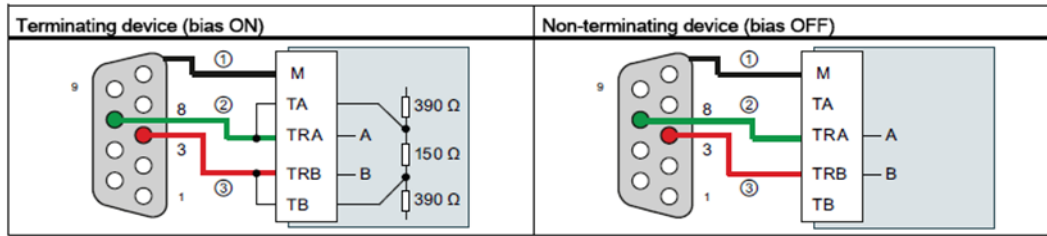
You can write values to the HOURS, MINUTES, DAY, MONTH and YEAR tags in the PLC directly by writing to Modbus addresses 40038 - 40042.

Note Valid write values for are as follows:

HOURS: 1-23
 MINUTES: 1-59
 Day: 1-31
 Month: 1-12
 Year: xxxx

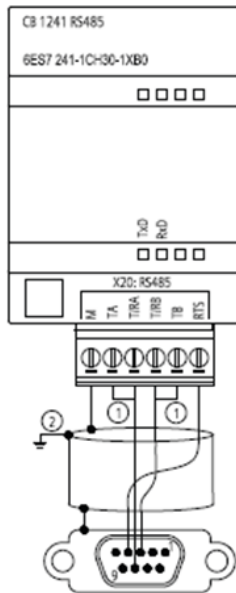
You can also READ the current clock values from the PLC by reading Modbus addresses 40012 through 40016 (for MINUTE, HOUR, WEEK DAY, MONTH AND YEAR respectively).

Table 12- 2 Termination and bias for the CB 1241



- ① Connect M to the cable shield
- ② A = TxD/RxD - (Green wire / Pin 8)
- ③ B = TxD/RxD + (Red wire / Pin 3)

CB 1241 RS485 (6ES7 241-1CH30-1XB0)



- ① Connect "TA" and TB" as shown to terminate the network. (Terminate only the end devices on the RS485 network.)
- ② Use shielded twisted pair cable and connect the cable shield to ground.

You terminate only the two ends of the RS485 network. The devices in between the two end devices are not terminated or biased. See the S7-1200 System Manual section on "Biasing and terminating an RS485 network connector"

Table A- 220 Connector pin locations for CB 1241 RS485 (6ES7 241-1CH30-1XB0)

Pin	9-Pin connector	X20
1	RS485 / Logic GND	--
2	RS485 / Not Used	--
3	RS485 / TxD+	3 - T/RB
4	RS485 / RTS	1 - RTS
5	RS485 / Logic GND	--
6	RS485 / 5V Power	--
7	RS485 / Not used	--
8	RS485 / TxD-	4 - T/RA