

Modbus RTU RS485 Manual



AUTOMATED
FUEL MAINTENANCE
SYSTEMS



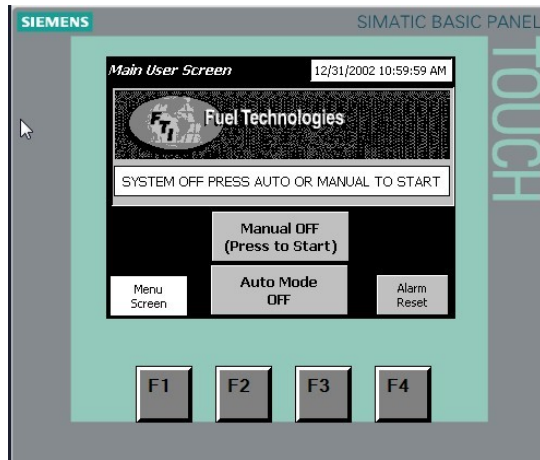
APPROVED

FTI-5A, FTI-10A & FTI-20A
SINGLE TANK

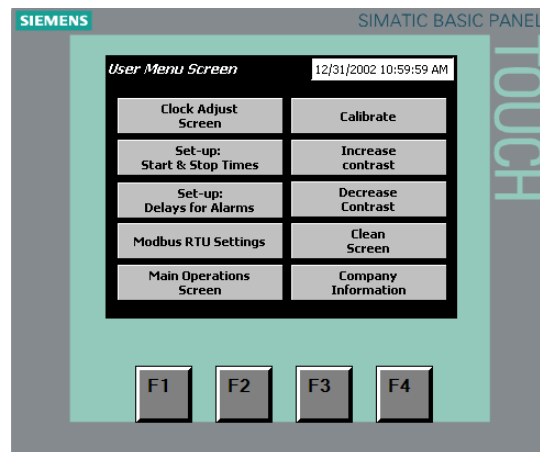
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The Modbus Communications Setup Button is Located On the FTI Control Panel Touch Screen

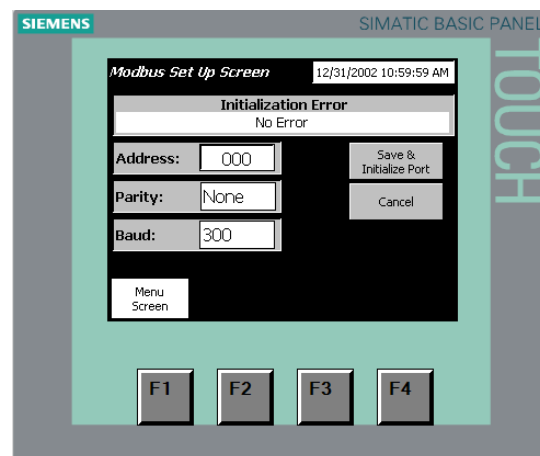
To Access: Push the Menu Screen Button Located on the Main Screen



Then the Modbus RTU Settings 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:

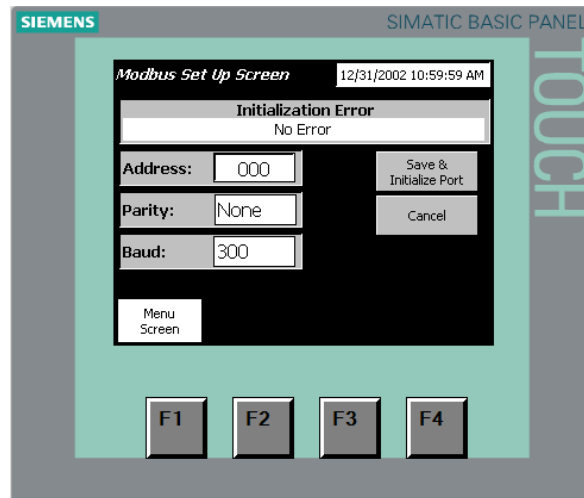
PLC MODBUS ADDRESS: 1

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
Sets system in auto run mode	MBR_Auto_On	40001.8	MBW_Auto_On	40043.8	
Turn system on & off manually	MBR_Manual_On_Off	40001.9	MBW_Manual_On_Off	40043.9	
Auto Mode / System on	MBR_Auto_Running	40001.10			
Manual Mode / System on	MBR_Manual_Running	40001.11			
Audible on / Mutes Audible Alarm	MBR_Audible_On	40001.12	MBW_Mute	40043.11	
Alarm Reset			MBW_Reset	40043.10	
1 Micron/Separator Filter Alarm	MBR_1_Mic_Flt	40001.13	Spare0_4_2		
10 Micron Filter Alarm	MBR_10_Mic_Flt	40001.14	Spare0_5_2		
System High Pressure Alarm	MBR_Press_Flt	40001.15	Spare0_6_2		
Fault / Alarm status –Active	MBR_Fault_Active	40001.0	Spare0_7_2		
High Water in Separator Alarm	MBR_Water_Flt	40001.1			
High Vacuum / Strainer Alarm	MBR_Vacuum_Flt	40001.2			
Leak Alarm	MBR_Leak_Flt	40001.3			
Motor Overload Alarm	MBR_OL_Fault	40001.4			
Low Flow-Loss of Prime Alarm	MBR_Lo_Flo_Flt	40001.5			
	Spare	40001.6			
3 Micron Filter Alarm	MBR_3_Mic_Flt	40001.7			
Generator ON - Filtration OFF	MBR_Genny_On	40002.8			
Optional Pause / Stop	MBR_Paused	40002.9			
	Spare2_2	40002.10			
	Spare2_3	40002.11			
	Spare2_4	40002.12			
	Spare2_5	40002.13			
	Spare2_6	40002.14			
	Spare2_7	40002.15			
High Water in Separator Alarm Dly	MBR_Water_Flt_Dly	40003	MBW_Water_Dly	40045	Seconds
High Vacuum / Strainer Alarm Dly	MBR_Vac_Flt_Dly	40004	MBW_Vac_Dly	40046	Seconds
Leak Alarm Delay	MBR_Leak_Flt_Dly	40005	MBW_Leak_Dly	40047	Seconds
1, 3 & 10 Micron Filter Alarm Delay	MBR_Flt_Dly	40006	MBW_Filt_Dly	40048	Seconds
System High Pressure Alarm Delay	MBR_Press_Dly	40007	MBW_Press_Dly	40049	Seconds
Low Flow-Loss of Prime Alarm Dly	MBR_Flo_Dly	40008	MBW_Flo_Dly	40050	1-5 Minutes
	Spare	40009		40051	
(Read / Write) Clock Minutes	MBR_MINUTE	40010	MBW_MINUTE	40080	1-59
(Read / Write) Clock Hours	MBR_HOUR	40011	MBW_HOUR	40081	1-23
(Read / Write) Day (1-31)	MBR_DAY	40012	MBW_DAY	40082	1-31
(Read / Write) Month	MBR_MONTH	40013	MBW_MONTH	40083	1-12
(Read / Write) Year	MBR_YEAR	40014	MBW_YEAR	40084	
Increase Year			MBW_IncYear	40043.0	
Increase Month			MBW_IncMon	40043.1	
Increase Week Day (Sun-Mon)			MBW_IncWeekday	40043.2	
Increase Clock Hours			MBW_IncHr	40043.3	
Increase Clock Minutes			MBW_IncMin	40043.4	
Decrease Year			MBW_DecYear	40043.5	
Decrease Month			MBW_DecMon	40043.6	
Decrease Week Day (Sun-Mon)			MBW_DecWeekday	40043.7	
Decrease Clock Hours			MBW_DecHr	40044.8	
Decrease Clock Minutes			MBW_DecMin	40044.9	

TAG DESCRIPTIONS	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
Adjust Sun Start Hours	MBR_SUN_START_HR	40022	MBW_SunStartHr	40059	
Adjust Mon Start Hours	MBR_MON_START_HR	40023	MBW_MonStartHr	40060	
Adjust Tue Start Hours	MBR_TUE_START_HR	40024	MBW_TueStartHr	40061	
Adjust Wed Start Hours	MBR_WED_START_HR	40025	MBW_WedStartHr	40062	
Adjust Thu Start Hours	MBR_THU_START_HR	40026	MBW_ThuStartHr	40063	
Adjust Fri Start Hours	MBR_FRI_START_HR	40027	MBW_FriStartHr	40064	
Adjust Sat Start Hours	MBR_SAT_START_HR	40028	MBW_SatStartHr	40065	
Adjust Sun Stop Hours	MBR_SUN_STOP_HR	40036	MBW_SunStopHr	40073	
Adjust Mon Stop Hours	MBR_MON_STOP_HR	40037	MBW_MonStopHr	40074	
Adjust Tue Stop Hours	MBR_TUE_STOP_HR	40038	MBW_TueStopHr	40075	
Adjust Wed Stop Hours	MBR_WED_STOP_HR	40039	MBW_WedStopHr	40076	
Adjust Thu Stop Hours	MBR_THU_STOP_HR	40040	MBW_ThuStopHr	40077	
Adjust Fri Stop Hours	MBR_FRI_STOP_HR	40041	MBW_FriStopHr	40078	
Adjust Sat Stop Hours	MBR_SAT_STOP_HR	40042	MBW_SatStopHr	40079	

Tag Descriptions	AUTO START FLAG				
	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
Sets system in auto run mode	MBR_Auto_On	40001.8	MBW_Auto_On	40043.8	

The system is put into AUTO mode by writing to address 40043.8
Confirmation of the AUTO status can be read from 40001.8

Tag Descriptions	FAULT / ALARM RESET FLAG				
	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
Reset alarms			MBW_Reset	40043.10	

When a fault / alarm occurs in the PLC this be can remotely reset by writing to Modbus address 40043.10
Note: Address 40043.11 (Mute) will Silence the alarm.

Tag Descriptions	MANUAL ON/OFF FLAG				
	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
Turn on Manually	MBR_Manual_On_Off	40001.9	MBW_Manual_On_Off	40043.9	

To start and stop the pump in MANUAL mode (usually used for testing), write to the MANUAL ON/OFF flag (Modbus address 40043.9) and this will turn on the Pump. To stop the manual operation repeat the write to Modbus address 40043.9) this will toggle the functionality of the output.

FAULT / ALARM ACTIVE FLAG					
Tag Descriptions	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
General Fault / Alarm on	MBR_Fault_Active	40001.0			

Any fault will be reported by the Fault / Alarm Active Flag (Modbus address 40001.0).

INDIVIDUAL ALARMS ACTIVE FLAG					
Tag descriptions	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
High Water in Separator Alarm	MBR_Water_Flt	40001.1			
High Vacuum / Strainer Alarm	MBR_Vacuum_Flt	40001.2			
Leak Alarm	MBR_Leak_Flt	40001.3			
Motor Overload Alarm	MBR_OL_Flt	40001.4			
1 Micron/Separator Filter Alarm	MBR_1_Mic_Flt	40001.13			
10 Micron Filter Alarm	MBR_10_Mic_Flt	40001.14			
System High Pressure Alarm	MBR_Press_Flt	40001.15			
Low Flow-Loss of Prime Alarm	MBR_Lo_Flo_Flt	40001.5			
3 Micron Filter Alarm	MBR_3_Mic_Flt	40001.7			

Individual Fault / Alarms conditions can be monitored by reading Modbus addresses 40001.1 through 40001.6 and addresses 40001.13 through 40001.15

ALARM DELAY SETTINGS					
Tag Descriptions	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
High Water in Separator Alarm Delay	MBR_Water_Flt_Dly	40003	MBW_Water_Dly	40045	Seconds
High Vacuum / Strainer Alarm Delay	MBR_Vac_Flt_Dly	40004	MBW_Vac_Dly	40046	Seconds
Leak Alarm Delay	MBR_Leak_Flt_Dly	40005	MBW_Leak_Dly	40047	Seconds
1, 3 & 10 Micron Filter Alarm Delay	MBR_Filt_Dly	40006	MBW_Flt_Dly	40048	Seconds
System High Pressure Alarm Delay	MBR_Press_Dly	40007	MBW_Press_Dly	40049	Seconds
Low Flow-Loss of Prime Alarm Delay	MBR_Flo_Dly	40008	MBW_Flo_Dly	40050	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					
Tag Descriptions	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
Increase Minutes		40010	MBW_Inc_Min	40043.4	
Decrease Minutes		40010	MBW_Dec_Min	40044.9	
Increase Hours		40011	MBW_Inc_Hr	40043.3	
Decrease Hours		40011	MBW_Dec_Hr	40044.8	
Increase day		40012	MBW_Inc_Weekday	40043.2	
Decrease day		40012	MBW_Dec_Weekday	40043.7	
Increase Month		40013	MBW_IncMon	40043.1	
Decrease Month		40013	MBW_DecMon	40043.6	
Increase Year		40014	MBW_IncYear	40043.0	
Decrease Year		40014	MBW_DecYear	40043.5	

Modbus addresses 40043.0 through 40044.9 above allow the user to increment or decrement the time clock inside the PLC. You can adjust the Minutes, Hours, Day of Week, Year, and the Month.

PLC CLOCK VALUES					
Tag Descriptions	MODBUS READ		MODBUS WRITE		
	Tag	Modbus Address	Tag	Modbus Address	Value Range
Minutes	MBR_Minute	40010	MBW_IncMin	40043.4	1-59
			MBW_DecMin	40044.9	
Hours	MBR_Hour	40011	MBW_IncHr	40043.3	1-23
			MBW_DecHr	40044.8	
Day (1-31)	MBR_WeekDay	40012	MBW_IncWeekDay	40043.2	Sun-Mon
			MBW_DecWeekDay	40043.7	
Month	MBR_Month	40013	MBW_IncMon	40043.1	1-12
			MBW_DecMon	40043.6	
Year	MBR_Year	40014	MBW_IncYear	40043.0	
			MBW_DecYear	40043.5	

As an alternative to utilizing the INC/DEC function for the PLC clock adjustments, the user can write values to the MINUTES, HOUR, DAY, MONTH and YEAR tags in the PLC directly by writing to Modbus addresses 40080 - 40084.

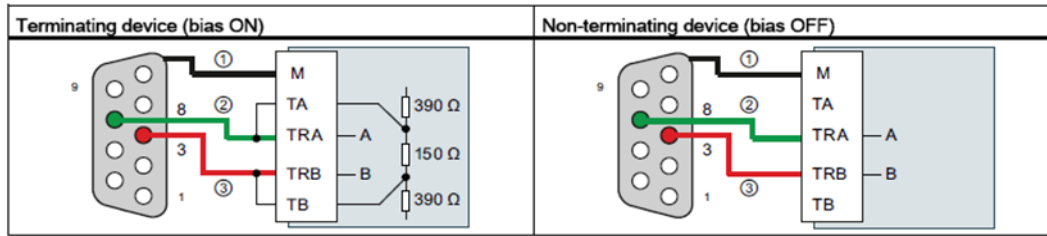
Note Valid write values for are as follows:

MINUTES: 1-59

HOURS: 1-23

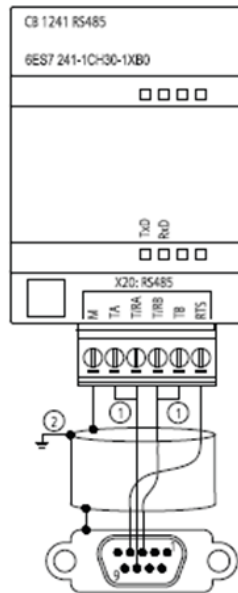
Day: 1-31

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