ER55SMPLUS Devices

Table MODBUS

Date: 05-2014

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Introduction

This document explains how to install and connect the ER55 devices on Modbus.
Devices are communications-enabled refrigeration controllers designed for food conservation applications *(i.e. display case, cold room).* They can be used in various commercial buildings and supermarkets.

Product Code: ER55SMPLUS-1C

Application details

When integrating the devices, keep the following considerations in mind:

- Modbus addresses – changeable via operating key on device panel
- Refer to the ER55SMPLUS devices user manual for detailed instructions

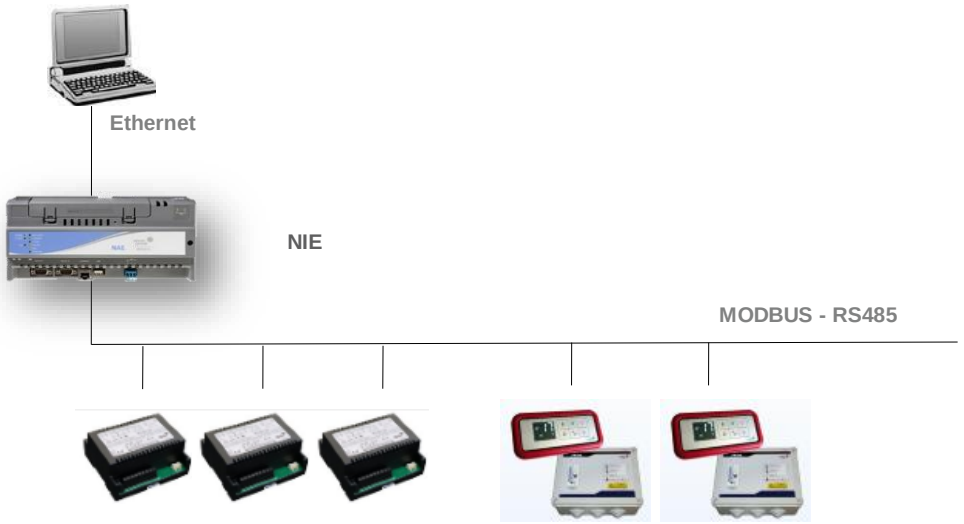


Figure 1: Exemple ER55SMPLUS – JBOX

Component requirements

To integrate device, you need:

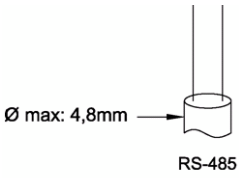
- MSEA with NIE Controller.

Cable Connections

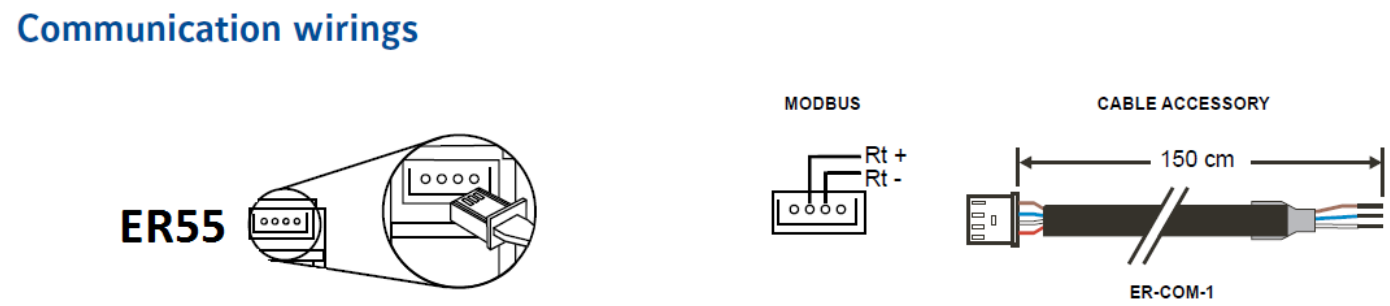
Cable Pin outs for RS485 Bus

Use the following cable pin outs for the connection between bus and device:

Connection	
Terminals	**RS485 Bus**
Rt+	TX/RX+
Rt-	TX/RX-



Communication Wirings



Note: Cables are not provided with ER55 controllers. They have to be ordered separately. It is also possible to make its own wiring: ER55 use AMP 4 poles plug connector

Point Mapping Table

Communication settings

Baud: **9600**
Parity: **None**
Data Bit: **8**
Stop Bit: **1**

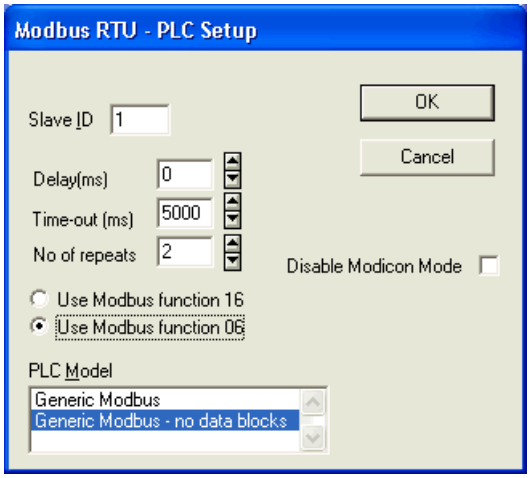
Protocol implementation

ER devices implement partially the modbus protocol due to internal memory limitations.
Only public **FUNCTION 03/04** (read registers) and **06** (write single register) are implemented. No user defined or reserved function code is implemented.

Limitations

- **READ** functions: devices can manage in the same Modbus message not more than 4 registers
- **WRITE** function: devices can write only a single register. It doesn't support the FUNCTION 16 (write multiple registers)

Here is an example of PLC setup in order to manage correctly the messages with ER devices.
Function 06 and "no data block" options are selected



Point Mapping Table

The following tables show the data points for the devices.

Analog Values

Reg	Note	Format	Unit	Short name	Description	Scale
0	R	word	°C	T1	Air temperature	**x0.1**
1	R	word	°C	T2	Evaporator temperature	**x0.1**
2	R	word	°C	T3	Auxiliary temperature	**x0.1**

R: Read Only

Temperature values read on the network are always expressed in °C with decimal.
Example:
A positive temperature of 23.0ºC is read as 230 on the network.
A negative temperature of -23.0ºC is read as -230 on the network.

Binary Status

Reg	Note	Format	Unit	Short name	Description	Scale
120	R	bit	0 = Normal 1 = Alarm	AL	Alarm status	x1.0
121	R	bit	0 = Off 1 = On	DEFACT	Defrost activity	x1.0
122	R	bit	0 = Close 1 = Open	DOOR	Door open status	x1.0
123	R	bit	0 = On 1 = Stby	STBY	Standby status	x1.0
124	R	bit	0 = Normal 1 = Alarm	SF1	Probe T1 failure	x1.0
125	R	bit	0 = Normal 1 = Alarm	SF2	Probe T2 failure	x1.0
126	R	bit	0 = Normal 1 = Alarm	SF3	Probe T3 failure	x1.0
127	R	bit	0 = Normal 1 = Alarm	LOALR	Low temperature alarm	x1.0
128	R	bit	0 = Normal 1 = Alarm	HIALR	High temperature alarm	x1.0
129	R	bit	0 = Normal 1 = Alarm	ALR	Generic alarm	x1.0
130	R	bit	0 = Normal 1 = Alarm	DOORALR	Door open alarm	x1.0
131	R	bit	0 = Normal 1 = Alarm	TIMEALR	Alarm wrong real time clock value	x1.0
132	R	bit	0 = Off 1 = On	COMP	Compressor output	x1.0
133	R	bit	0 = Off 1 = On	FAN	Fan output	x1.0
134	R	bit	0 = Off 1 = On	DEF	Defrost output	x1.0
135	R	bit	0 = Off 1 = On	AUX1	AUX 1 output	x1.0
136	R	bit	0 = Off 1 = On	AUX2	AUX 2 output	x1.0
137	R	bit	0 = Close 1 = Open	DI1	Digital input 1	x1.0
138	R	bit	0 = Close 1 = Open	DI2	Digital input 2	x1.0
139	R	bit	0 = Close 1 = Open	DI3	Digital input 3	x1.0

R: Read Only

Binary Commands

Reg	Note	Format	Unit	Short name	Description	Scale
700	R/W	bit	0 = Disable 1 = Enable	SBE	Standby key enable	x1.0
701	R/W	bit	0 = On 1 = Stby	STDBTSW	Standby switch	x1.0
702	R/W	bit	0 = Unlock 1 = Lock	LOCK	Keyboard lock	x1.0
703	R/W	bit	0 = ref 1 = hea	C-H	Refrigerating or heating control mode	x1.0
704	R/W	bit	0 = Disable 1 = Enable	AAR	Alarm automatic reset enable	x1.0
705	R/W	bit	0 = Disable 1 = Enable	ABE	Alarm buzzer enable	x1.0
706	R/W	bit	0 = Disable 1 = Enable	DFB	Defrost timer backup	x1.0
707	R/W	bit	0 = Disable 1 = Enable	DFA	Fans active during defrost	x1.0
708	R/W	bit	0 = on open 1 = on close	D1A	Digital input 1 activation	x1.0
709	R/W	bit	0 = on open 1 = on close	D2A	Digital input 2 activation	x1.0
710	R/W	bit	0 = on open 1 = on close	D3A	Digital input 3 activation	x1.0
711	R/W	bit	0 = Disable 1 = Enable	FDS	Fan stops at door opening	x1.0
712	R/W	bit	0 = Disable 1 = Enable	SE2	Probe T2 enabling (evaporator)	x1.0
713	R/W	bit	0 = ntc 1 = A99	ST	Sensor types	x1.0
714	R/W	bit	0 = 01 1 = 02	MOD	Application selector	x1.0
715	R/W	bit	0 = Off 1 = On	LGTSW	Light switch	x1.0
716	W	bit	0 = Off 1 = On	DEFSW	Defrost switch	x1.0

R/W: Read/Write

Note: Keyboard lock prevents the local user to have access to parameters setup and keys action (standby, defrost) from the ER keypad. If activated through network connection, this parameter gives action priority to supervisory/commissioning systems

Parameters

Reg	Note	Unit	Short name	Description	Scale
200	R/W		**UN**	Readout scale: 0 = °C decimal 1 = °C 2 = °F	x1.0
201	R/W	°C	**LL**	Minimum limit for setpoint setting	**x0.1**
202	R/W	°C	**HL**	Maximum limit for setpoint setting	**x0.1**
203	R/W	°C	**CSP**	Setpoint (value to be mantained in the room)	**x0.1**
204	R/W	°C	**HY**	Thermostat differential	**x0.1**
205	R/W	Minute	**CC**	Compressor rest time.	x1.0
206	R/W	Minute	**SC**	Compressor/heater stop delay after the door has been opened	x1.0
207	R/W	°C	**ATS**	Alarm threshold management: 0 = not used 1 = absolute 2 = relative	**x0.1**
208	R/W	°C	**ALA**	Absolute alarm low limit.	**x0.1**
209	R/W	°C	**AHA**	Absolute alarm high limit.	**x0.1**
210	R/W	°C	**ALR**	Relative alarm low limit.	**x0.1**
211	R/W	°C	**AHR**	Relative alarm high limit.	**x0.1**
212	R/W		**SA**	Probe used for temperature alarm detection: 0 = T1 1 = T2 2 = T3	x1.0
213	R/W	Minute	**AT**	Delay before alarm temperature warning	x1.0
214	R/W	Minute	**AC**	Alarm delay at power up or defrost end	x1.0
215	R/W		**DS**	Defrost selector: 0 = not used 1 = periodical 2 = periodical optimized 3 = scheduler	x1.0
216	R/W	Hours	**DI**	Time interval among defrosts	x1.0
217	R/W	Minute/10	**D1T**	Defros scheduler event 1 hour	Special
218	R/W	Minute/10	**D2T**	Defros scheduler event 2 hour	Special
219	R/W	Minute/10	**D3T**	Defros scheduler event 3 hour	Special
220	R/W	Minute/10	**D4T**	Defros scheduler event 4 hour	Special
221	R/W	Minute/10	**D5T**	Defros scheduler event 5 hour	Special
222	R/W	Minute/10	**D6T**	Defros scheduler event 6 hour	Special
223	R/W		**D1D**	Defros scheduler event 1 period: 0 = never 1 = all day 2 = Monday to Friday 3 = Monday to Saturday 4 = Week end 5 = Saturday only	x1.0

Parameters

224	R/W		**D2D**	Defros scheduler event 1 period: 0 = never 1 = all day 2 = Monday to Friday 3 = Monday to Saturday 4 = Week end 5 = Saturday only	x1.0
225	R/W		**D3D**	Defros scheduler event 1 period: 0 = never 1 = all day 2 = Monday to Friday 3 = Monday to Saturday 4 = Week end 5 = Saturday only	x1.0
226	R/W		**D4D**	Defros scheduler event 1 period: 0 = never 1 = all day 2 = Monday to Friday 3 = Monday to Saturday 4 = Week end 5 = Saturday only	x1.0
227	R/W		**D5D**	Defros scheduler event 1 period: 0 = never 1 = all day 2 = Monday to Friday 3 = Monday to Saturday 4 = Week end 5 = Saturday only	x1.0
228	R/W		**D6D**	Defros scheduler event 1 period: 0 = never 1 = all day 2 = Monday to Friday 3 = Monday to Saturday 4 = Week end 5 = Saturday only	x1.0
229	R/W		**DF**	Defrost operation: 0 = off cycle 1 = electrical 2 = hot gas	x1.0
230	R/W	°C	**DT**	Defrost end temperature	**x0.1**
231	R/W	Minute	**DD**	Maximum defrost duration	x1.0
232	R/W	Minute	**DC**	Evaporator drain down time	x1.0
233	R/W	Minute	**DU**	First defrost delay after power up	x1.0
234	R/W	Seconds	**DPD**	Defrost pump down	x1.0

Parameters

235	R/W		**DP**	Display defrost mode: 0 = actual temperature 1 = last temperature 2 = setpoint 3 = defrost flag	x1.0
236	R/W	Minute	**DR**	Display delay	x1.0
237	R/W		**IF1**	Digital input 1 selector: 0 = not used 1 = door 2 = when the input is on, an alarm is generated 3 = when the input is on, a defrost is started 4 = Standby	x1.0
238	R/W	Minute	**ID1**	Digital input 1 delay (alarms, door)	x1.0
239	R/W		**IF2**	Digital input 2 selector: 0 = not used 1 = door 2 = when the input is on, an alarm is generated 3 = when the input is on, a defrost is started 4 = Standby	x1.0
240	R/W	Minute	**ID2**	Digital input 2 delay (alarms, door)	x1.0
241	R/W		**IF3**	Digital input 3 selector: 0 = not used 1 = door 2 = when the input is on, an alarm is generated 3 = when the input is on, a defrost is started 4 = Standby 5 = defrost syncronization	x1.0
242	R/W	Minute	**ID3**	Digital input 3 delay (alarms, door)	x1.0
243	R/W		**LGS**	Light control mode: 0 = not used 1 = manual 2 = door 1 opened 3 = door 2 opened 4 = door 3 opened	x1.0
244	R/W		**FF**	Fan operation selector: 0 = Parallel to compressor 1 = Always On 2 = according to evaporator temperature	x1.0
245	R/W	Minute	**FF**	Maximum evaporator fan stop after defrost	x1.0
246	R/W	°C	**FR**	Evaporator fan re-start temp. after defrost	**x0.1**
247	R/W	°C	**FS**	Evaporator-Air temperature difference for the fans to turn OFF	**x0.1**
248	R/W	°C	**FH**	Fan hysteresis	**x0.1**
249	R/W	Minute	**SF1**	Compressor/heater On time at sensor failure	x1.0
250	R/W	Minute	**SF2**	Compressor/heater Stop time at sensor failure	x1.0

Parameters

251	R/W	°C	**SO1**	Sensor 1 offset	**x0.1**
252	R/W	°C	**SO2**	Sensor 2 offset	**x0.1**
253	R/W	°C	**SO3**	Sensor 3 offset	**x0.1**
254	R/W		**SE3**	Sensor T3 selector: 0 = not used 1 = temperature T3 to be displayed 2 = 2nd evaporator	x1.0
255	R/W		**SD**	Displayed sensor: 1 = T1 2 = AVG-weighted average between T1 and T2 3 = T3	x1.0
256	R/W		**AVG**	The relative weight of T2 on T1	x1.0
257	R/W		**AA1**	AUX 1 output selector: 0 = not used 1 = light 2 = on/standby 3 = 2nd evaporator defrost 4 = contacts opens when an alarm condition occurs 5 = contacts makes when an alarm condition occurs 6 = pump down	x1.0
258	R/W		**AA2**	AUX 2 output selector: 0 = not used 1 = light 2 = on/standby 3 = 2nd evaporator defrost 4 = contacts opens when an alarm condition occurs 5 = contacts makes when an alarm condition occurs 6 = pump down	x1.0
259	R/W		**ADD**	Address for PC communication	x1.0
260	R/W	°C	**BIO**	Differential between first and second setpoint	**x0.1**
261	R/W	Minute/10	**BIS**	Second setpoint scheduler, start event	x1.0
262	R/W	Minute/10	**BIE**	Second setpoint scheduler, stop event	x1.0

R: Read Only
R/W: Read/Write

Bias and defrost schedulers data format

Schedule events can be set from network (BIS, BIE and D1T to D6T parameters). A special format is used.
The hour of the day is expressed as the elapsed number of minutes from the beginning of the day.

Example:
06.30 is expressed as 6x60+30=390 minutes
Value read on the network will be **39** and so a scale of **x0.1** has to be applied when reading/writing this parameter

Clock data format

Clock can be set from network MM parameter. A special format is used for this parameter.

Parameters

The hour of the day is expressed as the elapsed number of minutes from the beginning of the day.

Special: D1T … D6T times are expressed as minutes from midnight.
Example: 06.30 is expressed as 6x60+30=390 minutes

CLOCK

Reg	Note	Unit	Short name	Description	Scale
1000	R	Seconds	SS	Clock - seconds	x1.0
1001	R	Minutes	MIN_FROM_MIDNIGHT	Clock - minutes from midnight	x1.0
1002	R/W	Minutes	MM	Clock - minutes	x1.0
1003	R/W	Hours	HOURS	Clock - hours	x1.0
1004	R/W		DAYS	Clock- day: 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday 7 = Sunday	x1.0
303	R/W		SEND_CLOCK	Set RTC clock	x1.0

Set temporary clock writing minutes, hours and day into the 1002, 1003, 1004 registers. Than write 1 into the 303 register to set the RTC clock. Note: if you don't write 1 into the 303 register the clock/day will not be updated.

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