

Modbus kommunikáció

légkondicionálókhoz





Modbus szervezet:

-> <http://www.modbus.org> (néha Modbus-IDA)

-> Modbus eszköz kereső motor

<http://www.modbus.org/devices.php>



Modbus (RTU)

- soros kommunikációs protokoll
- [Modicon](#) (most Schneider Electric) 1979-ben jegyeztette be
- programozható logikai vezérlők számára (PLC-k).

- Egyszerű és robusztus rendszer, ezért alap kommunikációs protokollá nőtte ki magát az iparban

Terjedésének fő okai:

- Az ipari alkalmazásokat szem előtt tartva fejlesztették ki
- Nyilvánosan elérhető és jogdíj mentes
- Könnyű telepíteni és karbantartani
- Nem korlátozzák a kereskedőket a felhasználásban



Modbus RTU ; Modbus TCP ?

RTU -> Remote Terminal Unit: minden nyolc bites bájt tartalmaz két négy biten kódolt hexadecimális értéket. Sajátossága a másik módhoz képest, hogy gyorsabb, illetve minden üzenet folyamatos folyamként kerül elküldésre.

TCP -> Transmission Control Protocol (egy része az Internet Protocol-nak IP)

FJ-RC-MBS-1 csak a Modbus RTU-t tudja használni közvetlenül!!!



Ha igény van Modbus TCP-re a megoldás:

Átjáró (Gateway - Protocol Converter) beiktatása

Néhány termék példa:

- FieldServer FS-B2010-01
- Advantech ADAM-4572

Csatlakoztatható a Modbus RTU más kommunikációs protokollokhoz?

Konverterek, átjárók (gateways) elérhető :

- BACnet IP
- KNX
- LonWorks
- ...





Modbus RTU jellemzői:

- Master / Slave Protokoll (mester/szolga, kliens/ szerver).
- A kommunikáció lekérdezésen vagy adatlehíváson alapul, a Master olvassa és írja a Slave adatait.
- Csak egy Master lehet.
- A Slave-k figyelik a Master lekérdezéseit.

Különböző jelátviteli médiák:

- RS-232 2 pont kapcsolata, 15 méter maximum.
Maximum 2 eszköz (ModBus RTU)
- RS-485 multi pont kapcsolat, 1200 méter maximum
Maximum 247 eszköz. (Modbus RTU)
1 masterhez kötve.
- TCP/IP Standard Ethernet formátum.
Korlátlan eszköz. (Modbus TCP)

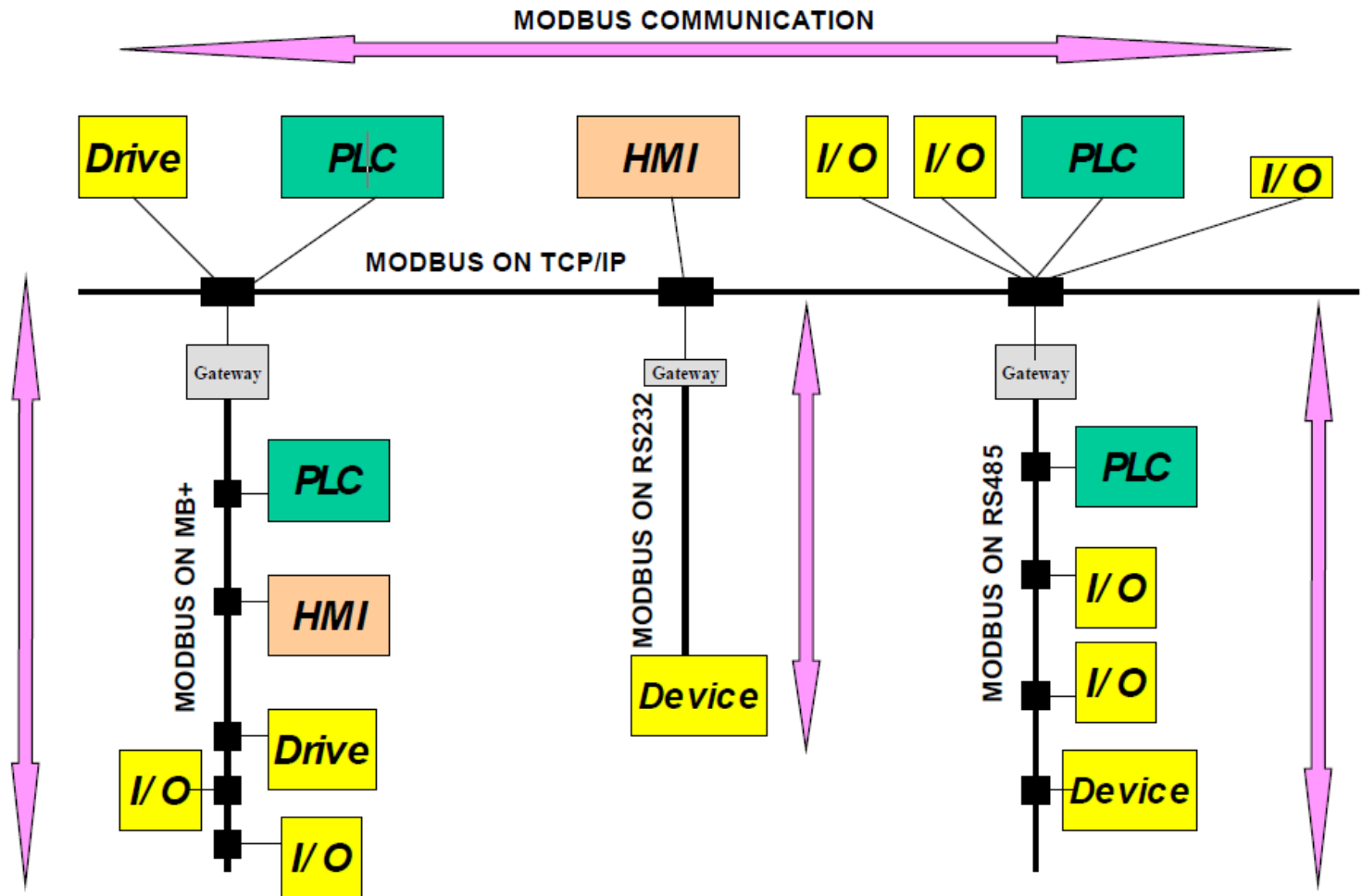
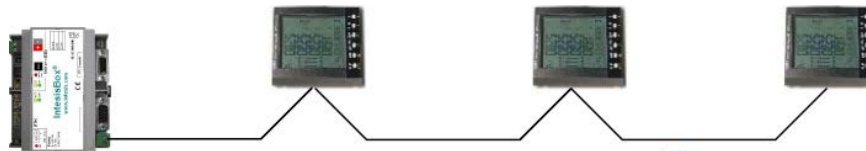


Figure 2: Example of MODBUS Network Architecture

RS-485 BUS topológiája

BUS RS-485 csak soros Bus eszköz kapcsolódási rendszert engedélyez, csillag csatlakozási topológia tilos.

BUS vezeték hossza max. 1,200 méter 9600 baud. A maximum távolság függ a kommunikáció sebességétől. Gyorsabb (több baud) rövidebb vezeték hossz.





ModBus RTU RS-485 vagy RS-232 hálózaton

Baud ráta jel átviteli sebesség. (~~600, 1200~~, 2400, 4800,
9600, 19200, ~~38400, 57600, 115200~~ Bps)

Adat Bit-ek 8.

Egy busz hálózatban levő eszközök paramétereik azonosak kell legyenek.

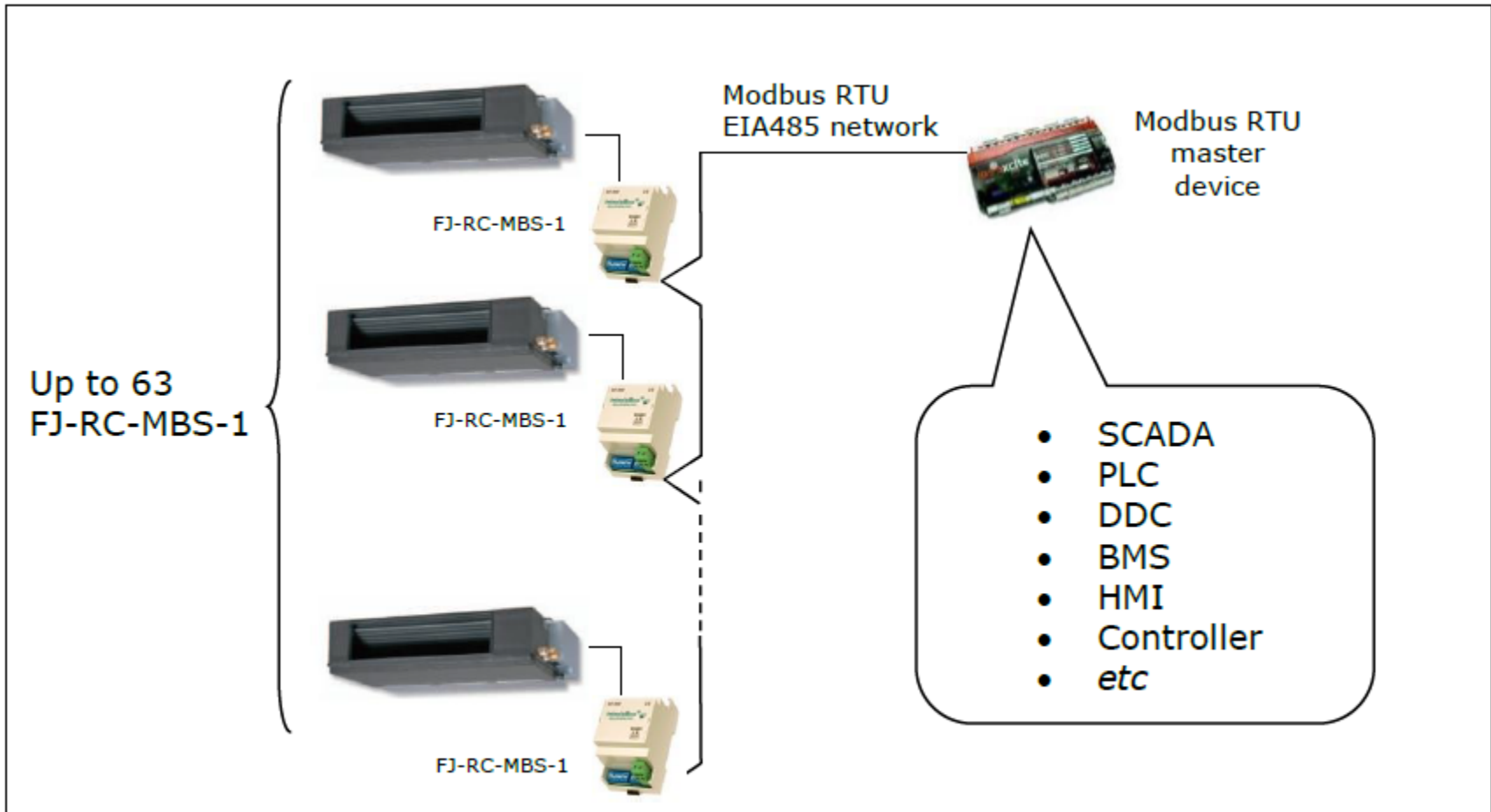


Figure 1.1 FJ-RC-MBS-1 Connection capabilities

2.2 Connection of the interface to Modbus

Use the EIA485 connector in the FJ-RC-MBS-1 to connect to the Modbus network.

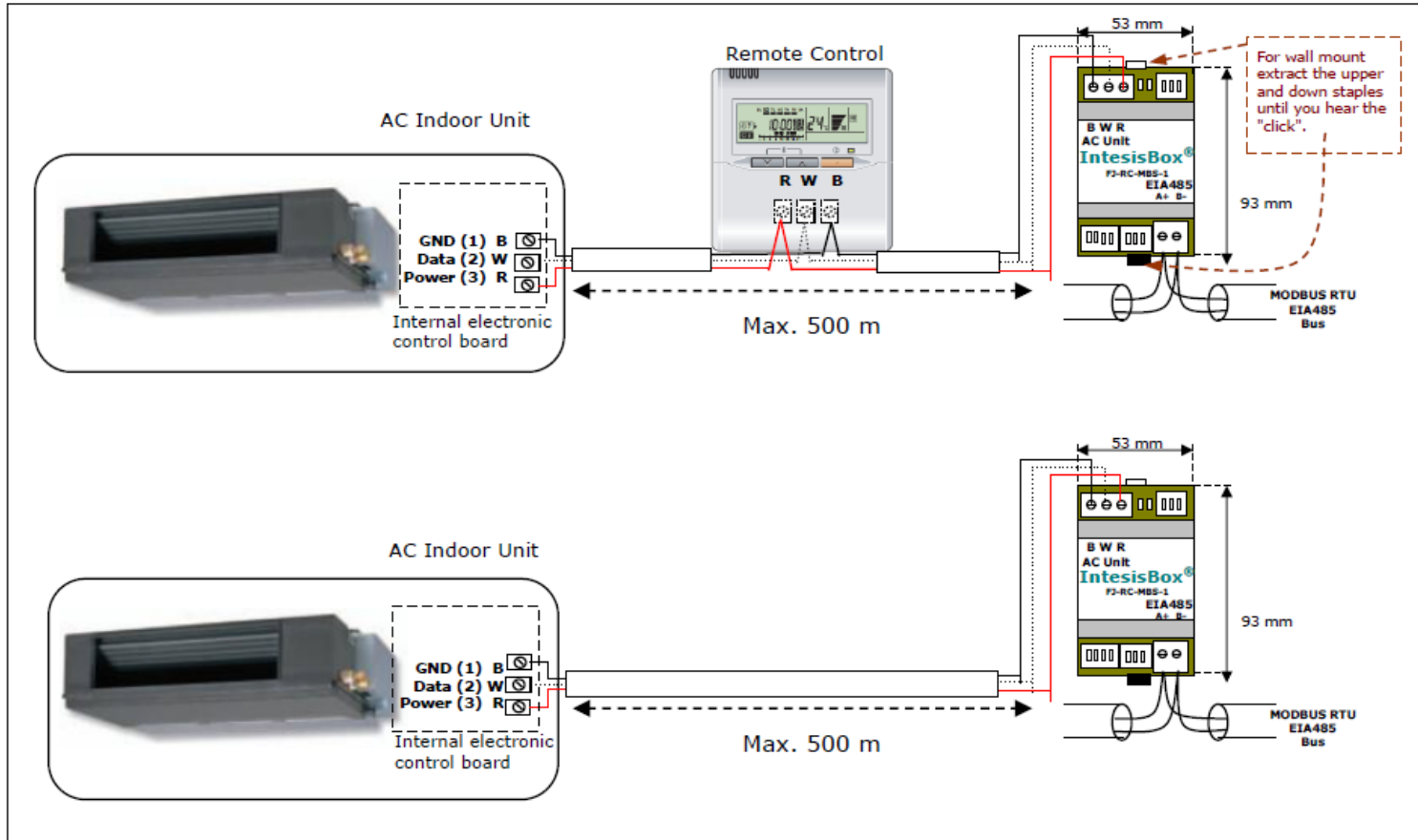


Figure 2.1 FJ-RC-MBS-1 connection diagram



DIP-Switch Settings

- DIP-SW Set S1 Remote Controller Port Configuration

Switch				default setting	setting description	
1	2	3	4			
Off				x	Ibox Slave & WRC Master connected	
On					Ibox Master & no WRC or WRC Slave connected	
	Off			x	no function	Default setting
	On					(do not set it into this position)
		Off		x	AC type (for error code table)	RAC G-Series & VRF-II Series
		On				RAC Non- & Inverter & VRF V/S/J
			Off			Default setting
			On			(do not set it into this position)

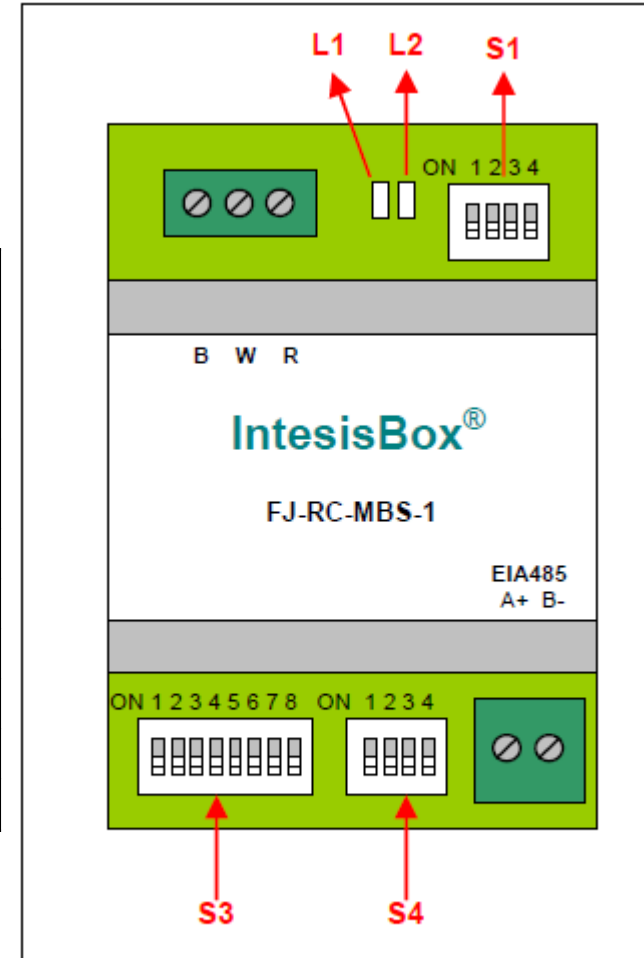
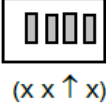
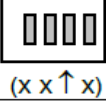
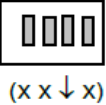


Figure 3.1 FJ-RC-MBS-1

DIP-Switch Settings

- DIP-SW Set S1 – SW3 & 4 – Error Code Setting

AC System Type	Switch configuration (S1)	Error section
RAC non inverter models RAC inverter models	 (x x ↑ x)	6.1
VRF V / S / J	 (x x ↑ x)	6.2
RAC inverter model G* series VRF J-II / V-II / VR-II	 (x x ↓ x)	6.1

* G series stands for units that include a 'G' just before the power number in its reference.
E.g.: ASYG09LTCA

NOTE: Devices with Software Version (register 51 in PLC-addresses) 2.1 and below connected to *RAC inverter model G series* or *VRF J-II / V-II / VR-II series* will need to add 100 to the error code prompted. That is, if error prompted is 17, the corresponding error in the list below might be $17+100 = 117$.

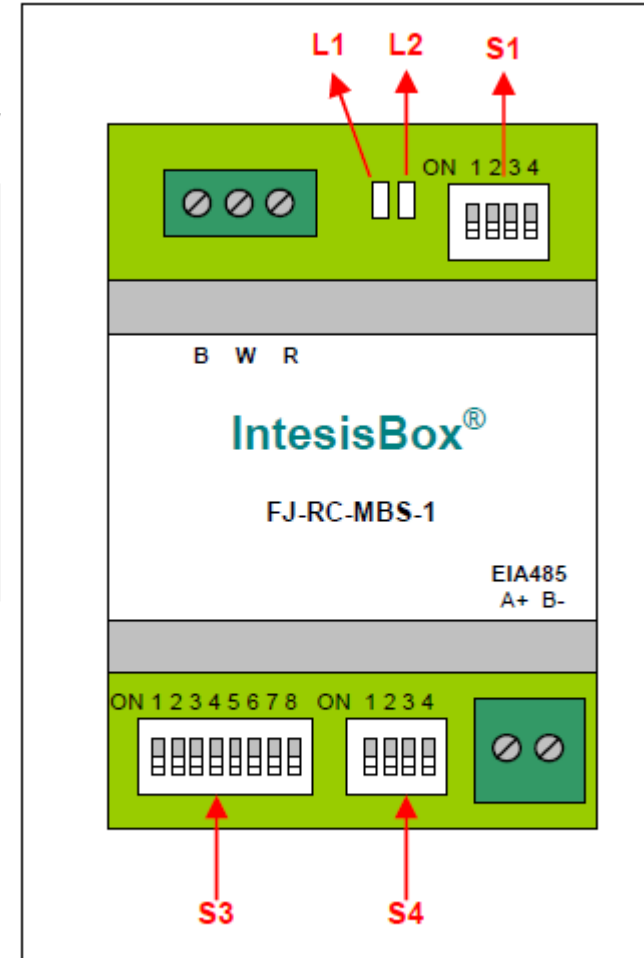


Figure 3.1 FJ-RC-MBS-1



Error Code table

6.1 RAC and VRF J-II / V-II / VR-II series

Error in Modbus	Error in Remote Controller	Error Description	AC System Type
0	00	Wired remote controller error	RAC Inverter and Non Inverter
1	01	Indoor signal error	
2	02	Indoor room temperature sensor error	
3	03	Indoor room temperature sensor error	
4	04	Indoor heat exchanger temperature sensor (middle) error	
5	05	Indoor heat exchanger temperature sensor (middle) error	
6	06	Outdoor heat exchanger temperature sensor (outlet) error	
7	07	Outdoor heat exchanger temperature sensor (outlet) error	
8	08	Power voltage error	
9	09	Float switch operated	
10	0A	Outdoor temperature sensor error	
11	0b	Outdoor temperature sensor error	
12	0C	Outdoor discharge pipe temperature sensor error	
13	0d	Outdoor discharge pipe temperature sensor error	
14	0E	Heat sink thermistor (Inverter) error	
15	0F	Discharge temperature error	
17	11	Indoor unit EEPROM error	
18	12	Indoor fan error	
19	13	Indoor signal error	
20	14	Outdoor EEPROM error	
21	15	Compressor temperature sensor error	
22	16	Pressure switch abnormal, Pressure sensor error	
23	17	IPM protection	
24	18	CT error	
25	19	Active filter error INV voltage protection	
26	1A	Compressor location error	
27	1b	Outdoor fan error	
28	1C	Outdoor unit computer communication error	
29	1d	2-way valve temperature sensor error	
30	1E	3-way valve temperature sensor error	
31	1F	Connected indoor unit error	
32	20	Indoor MANUAL AUTO switch error	
33	21	reverse VDD permanent stop protection	
34	22	VDD permanent stop protection	
36	24	Excessive high pressure protection on cooling	
37	25	P.F.C. circuit error	
38	26	Indoor signal error	
39	27	Indoor signal error	
40	28	Indoor heat exchanger temperature sensor (inlet) error	
41	29	Outdoor heat exchanger temperature sensor (middle) error	
42	2A	Power supply frequency detection error	



Error Code table

6.1 RAC and VRF J-II / V-II / VR-II series

43	2b	Compressor temperature error
44	2C	4-way valve error
45	2d	Heat sink thermistor P.F.C. error
46	2E	Indoor unit damper error Inverter error
47	2F	Low pressure error
48	30	Refrigerant circuit address set-up error
49	31	Master unit, Slave unit set-up error
50	32	Connected the indoor number set-up error
51	33	P.F.C. printed circuit board error
52	34	Indoor fan 2 error
53	35	Control box thermistor error
54	36	Indoor unit CT error
55	37	Indoor fan motor 1 driving circuit error
56	38	Indoor fan motor 2 driving circuit error
117	11	Serial communication error between indoor/outdoor units
118	12	Remote controller communication error
119	13	Communication error between outdoor units
120	14	Network communication error
121	15	Scan error
122	16	Peripheral unit communication error
123	17	Electricity charge apportionment error
133	21	Indoor unit initial setting error
134	22	Indoor unit capacity abnormal
135	23	Incompatible series connection error
136	24	Connection unit number error
137	25	Connection pipe length error
138	26	Indoor unit address setting error
139	27	Master/slave unit setting error
140	28	Other setting error
141	29	Connection unit number error in wired remote controller system
149	31	Indoor unit power supply abnormal
150	32	Indoor unit main PCB error
151	33	Indoor unit display PCB error
152	34	Power relay error
153	35	Indoor unit manual auto switch error
154	36	Heater relay error
155	37	Indoor unit transmission PCB error
156	38	Network convertor PCB error
157	39	Indoor unit power supply circuit error
158	3A	Indoor unit communication circuit (wired remote controller) error
165	41	Indoor unit room temp. thermistor error
166	42	Indoor unit heat ex. temp. thermistor error
167	43	Humidity sensor error
168	44	Light sensor error



Error Code table

6.1 RAC and VRF J-II / V-II / VR-II series

169	45	Gas sensor error
170	46	Float sensor error
171	47	Water temperature sensor error
172	48	Warm water flow rate sensor error
173	49	Heater sensor error
181	51	Indoor unit fan motor 1 error
182	52	Indoor unit coil (expansion valve) error
183	53	Indoor unit water drain abnormal
184	54	Air cleaning function error
185	55	Filter cleaning function error
186	56	Water circulation pump error
187	57	Indoor unit damper error
188	58	Indoor unit intake grille position error
189	59	Indoor unit fan motor 2 error
195	5U	Indoor unit miscellaneous error
197	61	Outdoor unit power supply abnormal
198	62	Outdoor unit main PCB error
199	63	Outdoor unit inverter PCB error
200	64	Outdoor unit active filter/PFC circuit error
201	65	Outdoor unit IPM error
202	66	Convertor distinction error
203	67	Outdoor unit power short interruption error (protective operation)
204	68	Outdoor unit magnetic relay error
205	69	Outdoor unit transmission PCB error
206	6A	Outdoor unit display PCB error
213	71	Outdoor unit discharge temp. thermistor error
214	72	Outdoor unit compressor temp. thermistor error
215	73	Outdoor unit heat ex. temp. thermistor error
216	74	Outside air temp. thermistor error
217	75	Outdoor unit suction gas temp. thermistor error
218	76	Outdoor unit operating valve thermistor error
219	77	Outdoor unit heat sink temp. thermistor error
220	78	Expansion valve temperature sensor error
229	81	Receiver liquid level detection sensor error
230	82	Outdoor unit sub-cool heat ex. gas temp. thermistor error
231	83	Outdoor unit liquid pipe temp. thermistor error
232	84	Outdoor unit current sensor error
233	85	Fan motor current sensor error

RAC
Inverter models G
series

VRF
J-II / V-II / VR-II
Series



Error Code table

6.1 RAC and VRF J-II / V-II / VR-II series

234	86	Outdoor unit pressure sensor error
235	87	Oil sensor error
245	91	Outdoor unit compressor 1 error
246	92	Outdoor unit compressor 2 error
247	93	Outdoor unit compressor start up error
248	94	Outdoor unit trip detection
249	95	Outdoor unit compressor motor control error
250	96	Open loop error(Field-weakening relevant)
251	97	Outdoor unit fan motor 1 error
252	98	Outdoor unit fan motor 2 error
253	99	Outdoor unit 4-way valve error
254	9A	Outdoor unit coil (expansion valve) error
259	9U	Outdoor unit miscellaneous error
261	A1	Outdoor unit discharge temperature 1 error
262	A2	Outdoor unit discharge temperature 2 error
263	A3	Outdoor unit compressor temperature error
264	A4	Outdoor unit pressure error 1
265	A5	Outdoor unit pressure error 2
266	A6	Outdoor unit heat exchanger temperature error
267	A7	Suction temperature abnormal
268	A8	Poor refrigerant circulation
269	A9	Current overload error
270	AA	Outdoor unit special operation error
271	AC	Ambient temperature error
272	AF	Out of the possible operation range
273	AJ	Freeze protection operated
277	C1	Peripheral unit main PCB error
278	C2	Peripheral unit transmission PCB error
279	C3	Peripheral unit PCB 1 error
280	C4	PCB 2 error
281	C5	PCB 3 error
282	C6	PCB 4 error
283	C7	PCB 5 error
284	C8	Peripheral unit input device error
285	C9	Display device error
286	CA	EEPROM error
287	CC	Peripheral unit sensor error
288	CF	Peripheral unit external connector error (USB memory)
289	CJ	Other parts error
293	F1	System tool software error
294	F2	System tool adaptor error
295	F3	System tool interface error
296	F4	System tool environment error
309	J1	RB unit error
310	J2	Branch boxes error
311	J3	Total heat exchanging, ventilation unit error
312	J4	Domestic hot water unit error
313	J5	Zone control interface error

RAC
Inverter models G
series

VRF
J-II / V-II / VR-II
Series



Error Code table 6.2 VRF V / S / J series

Error in Modbus	Error in Remote Controller	Error Description	
0	00	No Error	VRF V / S / J series
2	02	Model information Error	
4	04	Power frequency Error	
6	06	EEPROM access Error	
7	07	EEPROM deletion Error	
9	09	Room sensor Error	
10	0A	Heat Ex. Middle Sensor Error	
11	0b	Heat Ex. Inlet sensor Error	
12	0C	Heat Ex. Outlet sensor Error	
13	0d	Blower temperature thermistor Error	
17	11	Drain Error	
18	12	Room temperature Error	
19	13	Indoor fan motor Error	
20	18	Standard wired remote Error	
		Standard wired token Error	
31	1F	Network communication Error	
32	20	Node setting error	
33	21	Communication Error between Main PCB & Transmission PCB	
34	32	Outdoor unit Error	

DIP-kapcsoló beállítások

- DIP-SW Set S3: Slave címek

Add	Switches								Add	Switches							
	1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8
0	↓	↓	↓	↓	↓	↓	x	x	16	↓	↓	↓	↓	↑	↓	x	x
1*	↑	↓	↓	↓	↓	↓	x	x	17	↑	↓	↓	↓	↑	↓	x	x
2	↓	↑	↓	↓	↓	↓	x	x	18	↓	↑	↓	↓	↑	↓	x	x
3	↑	↑	↓	↓	↓	↓	x	x	19	↑	↑	↓	↓	↑	↓	x	x
4	↓	↓	↑	↓	↓	↓	x	x	20	↓	↓	↑	↓	↑	↓	x	x
5	↑	↓	↑	↓	↓	↓	x	x	21	↑	↓	↑	↓	↑	↓	x	x
6	↓	↑	↑	↓	↓	↓	x	x	22	↓	↑	↑	↓	↑	↓	x	x
7	↑	↑	↑	↓	↓	↓	x	x	23	↑	↑	↑	↓	↑	↓	x	x
8	↓	↓	↓	↑	↓	↓	x	x	24	↓	↓	↓	↑	↑	↓	x	x
9	↑	↓	↓	↑	↓	↓	x	x	25	↑	↓	↓	↑	↑	↓	x	x
10	↓	↑	↓	↑	↓	↓	x	x	26	↓	↑	↓	↑	↑	↓	x	x
11	↑	↑	↓	↑	↓	↓	x	x	27	↑	↑	↓	↑	↑	↓	x	x
12	↓	↓	↑	↑	↓	↓	x	x	28	↓	↓	↑	↑	↑	↓	x	x
13	↑	↓	↑	↑	↓	↓	x	x	29	↑	↓	↑	↑	↑	↓	x	x
14	↓	↑	↑	↑	↓	↓	x	x	30	↓	↑	↑	↑	↑	↓	x	x
15	↑	↑	↑	↑	↓	↓	x	x	31	↑	↑	↑	↑	↑	↓	x	x

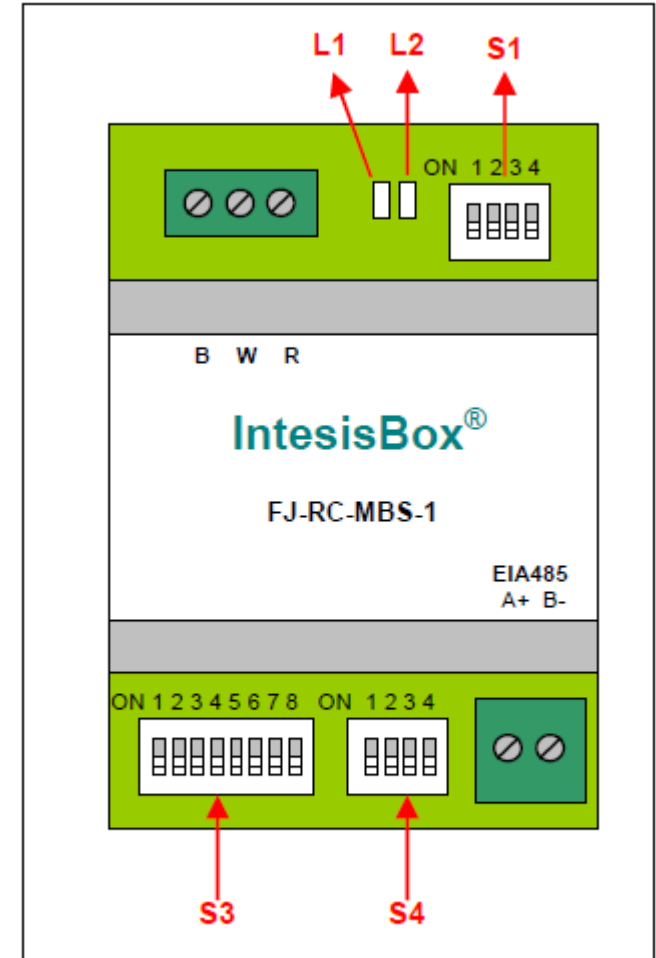


Figure 3.1 FJ-RC-MBS-1

DIP-kapcsoló beállítások

- DIP-SW Set S3: Baud ráta beállítása

Switches								Description
1	2	3	4	5	6	7	8	
x	x	x	x	x	x	↓	↓	2400bps
x	x	x	x	x	x	↑	↓	4800bps
x	x	x	x	x	x	↓	↑	9600bps (- default value)
x	x	x	x	x	x	↑	↑	19200bps

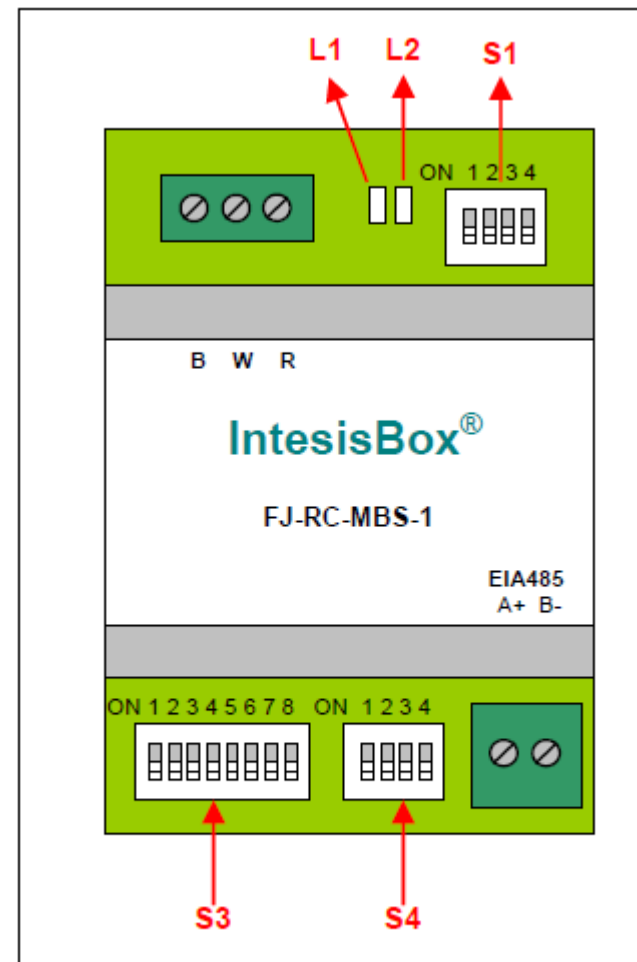


Figure 3.1 FJ-RC-MBS-1

DIP-kapcsoló beállításai

- DIP-SW S4: hőmérséklet & ventilátor

Switch				default setting	setting description
1	2	3	4		
Off				x	temperature values in ° (x1)
On					temperature values in ° (x10)
	Off			x	temperature values in °C (Celsius)
	On				temperature values in °F (Fahrenheit)
		Off		x	4 Fan speeds
		On			3 Fan speeds
			Off	x	EIA485 bus without terminal resistor
			On		internal terminal resistor of 120Ω**

The termination resistor must only be activated in the interfaces connected at both ends of the bus, not in the rest. The EIA485 bus can be biased through internal jumpers JP2 and JP3.

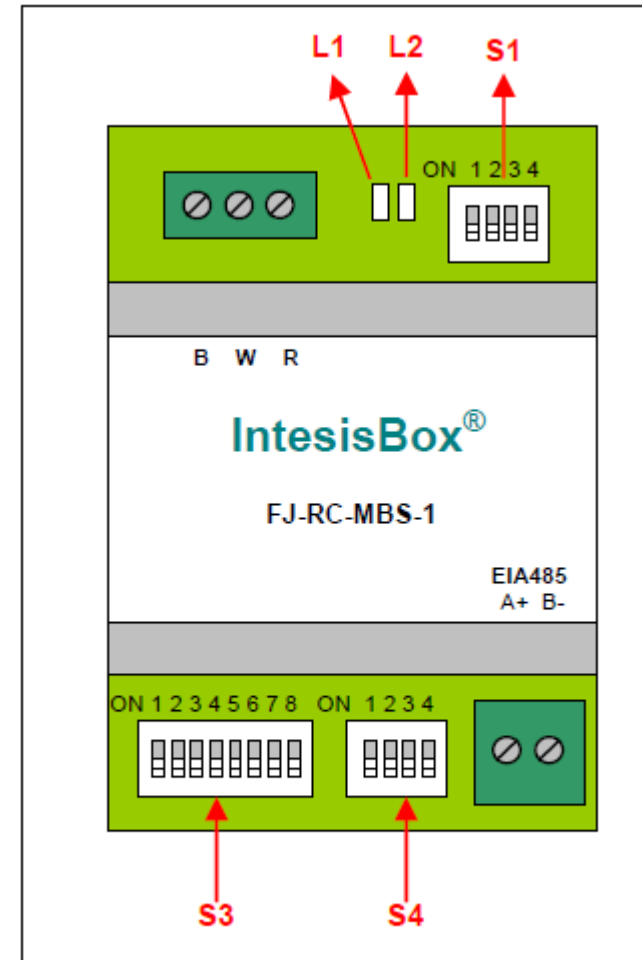
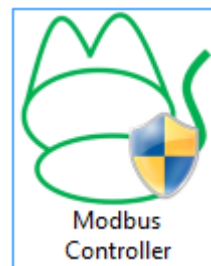


Figure 3.1 FJ-RC-MBS-1



Modbus RTU “élő” kommunikáció

- FGL “Modbus Controller” szoftver



-USB-s csatlakozás RS485 konverterrel & Telnet Client szoftverrel:



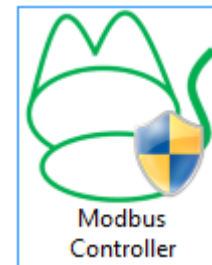
Adam/Apax .NET Utility 2.0

Home › Business › Other

[http://support.advantech.com.tw/support/DownloadSRD
etail.aspx?SR_ID=1-2AKUDB](http://support.advantech.com.tw/support/DownloadSRDetail.aspx?SR_ID=1-2AKUDB)



FGL “Modbus Controller” szoftver



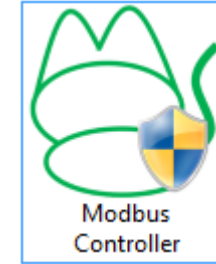
Modbus Controller

File Setting Help

Adaptor Name	Address	OP	MODE	Set Temp.	Fan Speed	Louver Vertical	Louver Horizon	Filter Statu	Error S	Error Code	Last Update
Adaptor1	COM5_1	On	Heat	25	-	Pos-0	(-)	OK	False	--	01.10.2013 13:07:5



FGL “Modbus Controller” szoftver



Modbus Controller

File Setting Help

Adaptor	Address	OP	MODE	Set Temp.	Fan Speed	Louver Vertical	Louver Horizontal
Adaptor1	COM5_2	-	(-)	(-)	(-)	(-)	(-)

Operation Setting

On/Off:

Operation Mode:

Set Temp. (°C):

Fan Speed:

Filter Reset:

Vertical Air Flow Direction:

Horizontal Air Flow Direction:



Telnet Client szoftver



Adam/Apax .NET Utility 2.0

Home > Business > Other



Adam Commander

Port: COM5
Baudrate: Baud_9600
Parity: None
Databits: Eight
Timeout: 1000 ms
Stopbits: Two
Scan interval: 1000 ms

Advantech ASCII MODBUS

Device ID: 1
MODBUS type: 04: Input register
Address: 1
Length: 8
Number of polls: 0
Valid response: 0
Stopped

Address	Value
30001	0
30002	0
30003	0
30004	0
30005	0
30006	0
30007	0
30008	0

Start



Telnet Client szoftver



Adam/Apax .NET Utility 2.0

Home > Business > Other



Adam Commander

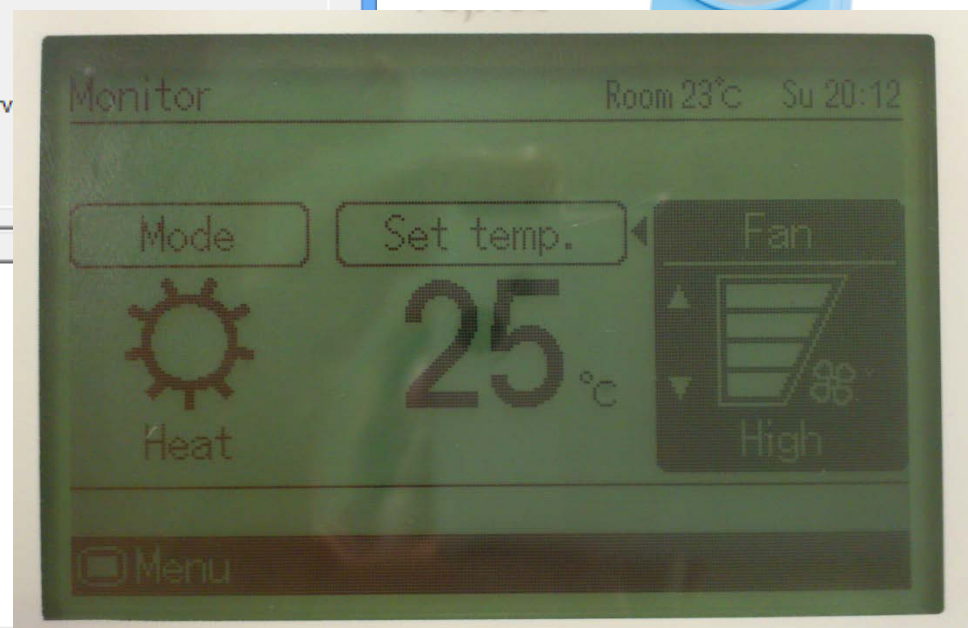
Port: COM5
Baudrate: Baud_9600 Databits: Eight Timeout:
Parity: None Stopbits: Two Scan interv

Advantech ASCII MODBUS

Device ID: 1
MODBUS type: 04: Input register
Address: 1
Length: 1
Number of polls: 10
Valid response: 10
No_Error

Address	Value
30001	1

Stop





Telnet Client szoftver



Adam/Apax .NET Utility 2.0

Home › Business › Other



Adam Commander

Port: COM5
Baudrate: Baud_9600 Databits: Eight Timeout:
Parity: None Stopbits: Two Scan interv

Advantech ASCII MODBUS

Device ID: 1 Address Value
MODBUS type: 30001 0
04: Input register
Address: 1
Length: 1
Number of polls: 127
Valid response: 127
No_Error

Stop

