MOTOR PROTECTION & CONTROL TECHNOLOGY

MB-Relay CANbus BBRTU

User Manual

MB-CAN-BBRTU
Version 01.02
(NE_MB-CAN-BBRTU_MAN_01_10_FN02)

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1. ABSTRACT

The MB-CAN-BBRTU (MB-Relay CANbus BBRTU) acts as a translator between the CANbus SCADA and the MB-Relay. It is advisable to read the MB-Relay user manual, as some of the topics will require knowledge on the MB-Relay. It is also advisable to have knowledge on CANbus.

The communication protocol between the MB-Relay and SCADA is CANbus. Communication protocol between the MB-CAN-BBRTU and the MB-Relay is a NewElec proprietary protocol. Enabling the PLC to communicate with the MB-Relay via CANBus.

2. SPECIFICATIONS

2.1 Technical Specifications of MB-CAN-BBRTU

General Data	Mounting Positions	● Bottom of MB-Relay.
	Allowed Ambient Temperature	● Operation : 0 ºC to +60 ºC
	Humidity	● < 87%
MB-CAN-BBRTU	Power Supply	● +5Vdc
	Consumption	● 180 mA
	Communication Mediums	● CAnBUS ● I2C
CANbus	Protocol	● CANbus
	Baud Rate	● 125kbps. ● 250kbps. ● 500kbps.
	Cable Length @ Baud Rate	● 1200 m @ 9600 bit/s to 45450 bit/s ● 1000 m @93.75Kbit/s to 187.5Kbit/s ● 400 m @ 500 Kbit/s ● 200 m @ 1.5 Mbit/s ● 100 m @ 3 Mbit/s to 12 Mbit/s
	Termination Resistor (Termination resistors must be connected at the beginning and end of bus)	● 120 Ohm.
Indication Lights	Type	● Light Emitting Diode (LED)
	LED Indications	● SCADA Communication ◦ Red = Tx data. ◦ Green = Rx data. ◦ Orange = Both. ● Address Of Module ◦ Flash Green = Address 1. ◦ Flash Red = Address 10. ◦ Flash Orange = Address 100. ◦ Solid Orange = Starting up. ◦ Colour Flash = MB-Re lay comms OK.

2.2 Structure Of The Settings Telegram When MA-CAN messages Selected

The MB-Relay CAN module can setup the MB-Relay so that the MB-Relay and the MB-CAN-BBRTU can act as a MA-Relay and MA-CAN-BBRTU. The setting structure will look as follow:

Identifier	D0	D1	D2~D7
Setting Base Address	Unit Address	Block address.	Data that must be written to the relay.

2.3 Structure Of The Settings Telegram When MB-CAN messages Selected

Due to the amount of settings that the MB-Relay has the messages had to be broken up into the following messages. All the telegrams will fall under the same identifier of the Setting data base address. MB-Relay setting telegram will look as follow:

Identifier	D0	D1	D2~D7
Setting Base Address	Unit Address	Block address.	Data that must be written to the relay.

Setting parameter block 00			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	MLC0	Maximum load 0 in %.	10~100
D3	TC0	Thermal class curve 0.	5~25
D4	MLC1	Maximum load 1 in %.	10~100
D5	TC1	Thermal class curve 1.	5~25
D6	Voltage Selection	Select line voltage value • 0 = 110 Vac • 1 = 380 Vac • 2 = 400 Vac • 3 = 525 Vac • 4 = 550 Vac • 5 = 680 Vac • 6 = 950 Vac • 7 = 1K1 Vac • 8 = 3K3 Vac • 9 = 6K6 Vac • 10 = 11K Vac	0~10
D7	Volt Sym Trip Level	Voltage symmetric trip level in %.	60~100

Setting parameter block 01			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Volt Hi Trip Limit	Voltage higher trip limit in %.	0~15
D3	Volt Low Trip Limit	Voltage lower trip limit in %.	0~15
D4	Unbalance Trip Level	Unbalance trip level in %.	0~50
D5	Unbalance Trip Delay	Unbalance trip delay in seconds.	1~10
D6	ML Run Trip Delay	Minimum load run time trip delay in seconds.	1~10
D7	ML Startup Trip Delay	Minimum load startup trip delay in seconds.	0~200

Setting parameter block 02			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	ML Reset Time	Minimum load reset time value. • 01 = Manual. • 02 = 10 Seconds. • 03 = 5 Minutes. • 04 = 10 Minutes. • 05 = 20 Minutes. • 06 = 30 Minutes. • 07 = 45 Minutes. • 08 = 1 Hour. • 09 = 3 Hours. • 10 = 6 Hours.	0~10
D3	ML Trip Level	Minimum load trip level in %.	10~100
D4	ML Power Trip Level	Power trip level in %.	10~100
D5	EL Lo Byte Trip Level	Earth leakage trip level in mA.	0~999
D6	EL Hi Byte Trip Level		
D7	EL Trip Type	Earth leakage trip type. • 0 = Instantaneous. • 1 = IDMT curve.	0~1

Setting parameter block 03			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	EL Lo Byte Trip Time	Earth leakage instantaneous trip time in milliseconds with 50ms incremental.	100~1000
D3	EL Hi Byte Trip Time		
D4	Run Stall Lo Byte Level	Running stall trip level in %.	110~300
D5	Run Stall Hi Byte Level		
D6	Run Stall Hold Time	Running stall hold off trip delay in seconds.	0~200
D7	Run Stall Lo Byte TD	Running stall trip delay in milliseconds with 50ms incremental..	100~2000

Setting parameter block 04			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Run Stall Hi Byte TD	Running stall trip delay in milliseconds with 50ms incremental..	100~2000
D3	TC Reset Level	Thermal capacity reset level in %.	20~80
D4	Starts Per Hour	Amount of starts that can be done in a hour.	1~60
D5	Consecutive Starts	Consecutive starts that can be done after a start.	1~3
D6	Control Byte A	Relay control settings. • Bit 0 = Minimum load trip enabled. • Bit 1 = Under voltage trip enabled. • Bit 2 = Over voltage trip enabled. • Bit 3 = Volt Sym trip enabled. • Bit 4 = Failsafe enabled. • Bit 5 = Unbalance trip enabled. • Bit 6 = Phase rotation trip enabled. • Bit 7 = Short circuit trip enabled.	0~255
D7	Control Byte B	Relay control settings. • Bit 0 = Single phase trip enabled. • Bit 1 = Running stall trip enabled. • Bit 2 = ML or PF selected for ML trip. • Bit 3 = Earth leakage trip enabled. • Bit 4 = Low pass filter enabled. • Bit 5 = Insulation lockout trip enabled. • Bit 6 = Frequency trip enabled. • Bit 7 = TC reset auto calculate.	0~255

Setting parameter block 05			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Control Byte C	Relay control settings. • Bit 0 = Starts per hour enabled. • Bit 1 = Phase rotation reversed. • Bit 2 = Vectorial stall trip enabled. • Bit 3 = Auto reset enabled. • Bit 4 = Relay 1 assigned as I/O. • Bit 5 = Expanded I/O connected. • Bit 6 = FLED connected.	0~255
D3	Control Byte D	Relay Control settings. • Bit 0 = Temperature 1 trip enabled. • Bit 1 = Temperature 2 trip enabled. • Bit 2 = Temperature 3 trip enabled. • Bit 3 = Temperature 4 trip enabled • Bit 4 = ClassF_Sel	0~15
D4	Field Input 1 Delay LoB	Field input 1 switch delay in milliseconds with 50 ms incremental.	0~2000
D5	Field Input 1 Delay HiB		
D6	Field Input 2 Delay LoB	Field input 2 switch delay in milliseconds with 50 ms incremental.	0~2000
D7	Field Input 2 Delay HiB		

Setting parameter block 06			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Field Input 3 Delay LoB	Field input 3 switch delay in milliseconds with 50 ms incremental.	0~2000
D3	Field Input 3 Delay HiB		
D4	Field Input 4 Delay LoB	Field input 4 switch delay in milliseconds with 50 ms incremental.	0~2000
D5	Field Input 4 Delay HiB		
D6	Field Input 5 Delay LoB	Field input 1 switch delay in milliseconds with 50 ms incremental.	0~2000
D7	Field Input 5 Delay HiB		

Setting parameter block 07			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Field Input 6 Delay HiB	Field input 6 switch delay in milliseconds with 50 ms incremental.	0~2000
D3	Field Input 6 Delay LoB		
D4	Field Input 7 Delay HiB	Field input 7 switch delay in milliseconds with 50 ms incremental.	0~2000
D5	Field Input 7 Delay LoB		
D6	Starter Type	Select one of the following starter values. • 00 = Protection relay. • 01 = Direct on line starter. • 02 = Reversal direct on line starter. • 03 = Star-Delta. • 04 = Reversal Star-Delta. • 05 = Dahlander • 06 = Reversal Dahlander. • 07 = Pole changing. • 08 = Reversal pole changing. • 09 = Soft starter. • 10 = Reversal soft starter. • 11 = Oil circuit breaker – DOL.	0~11
D7	Temperature Type	Temperature type selection • Bit 0 ~ 1 Temperature 1 ◦ 00 = PT100 ◦ 01 = PT1000 ◦ 10 = PTC ◦ 11 = NTC • Bit 2 ~ 3 Temperature 2 ◦ 00 = PT100 ◦ 01 = PT1000 ◦ 10 = PTC ◦ 11 = NTC • Bit 4 ~ 5 Temperature 3 ◦ 00 = PT100 ◦ 01 = PT1000 ◦ 10 = PTC ◦ 11 = NTC • Bit 6 ~ 7 Temperature 4 ◦ 00 = PT100 ◦ 01 = PT1000 ◦ 10 = PTC ◦ 11 = NTC	

Setting parameter block 08			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Temperature 1 High Trip Level	Temperature 1 higher trip level. x – 30 = degree	0~255
D3	Temperature 1 Lo Trip Level	Temperature 1 lower trip level. x – 30 = degree	0~255
D4	Temperature 2 High Trip Level	Temperature 2 higher trip level. x – 30 = degree	0~255
D5	Temperature 2 Lo Trip Level	Temperature 2 lower trip level. x – 30 = degree	0~255
D6	Temperature 3 High Trip Level	Temperature 3 higher trip level. x – 30 = degree	0~255
D7	Temperature 3 Lo Trip Level	Temperature 3 lower trip level. x – 30 = degree	0~255

Setting parameter block 09			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Temperature 4 High Trip Level	Temperature 4 higher trip level. x – 30 = degree	0~255
D3	Temperature 4 Lo Trip Level	Temperature 4 lower trip level. x – 30 = degree	0~255
D4	CT Primary Lo Byte	CT primary	1 ~ 65535
D5	CT Primary Hi Byte		
D6	CT Secondary	CT secondary	1 ~ 255
D7	Reserved		

Setting parameter block 10			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Logic Function 1 Mask	Mask register for logic function 1.	0~255
D3	LF1 Input Pointer A	Points to a input pointer table. (chapter 2.2.1)	0~255
D4	LF1 Input Pointer B	Points to a input pointer table. (chapter 2.2.1)	0~255
D5	LF1 Input Pointer C	Points to a input pointer table. (chapter 2.2.1)	0~255
D6	Logic Function 2 Mask	Mask register for logic function 2.	0~255
D7	LF2 Input Pointer A	Points to a input pointer table. (chapter 2.2.1)	0~255

Setting parameter block 11			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	LF2 Input Pointer A	Points to a input pointer table. (chapter 2.2.1)	0~255
D3	LF2 Input Pointer B	Points to a input pointer table. (chapter 2.2.1)	0~255
D4	Logic Function 3 Mask	Mask register for logic function 3.	0~255
D5	LF3 Input Pointer A	Points to a input pointer table. (chapter 2.2.1)	0~255
D6	LF3 Input Pointer B	Points to a input pointer table. (chapter 2.2.1)	0~255
D7	LF3 Input Pointer C	Points to a input pointer table. (chapter 2.2.1)	0~255

Setting parameter block 12			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Logic Function 4 Mask	Mask register for logic function 4.	0~255
D3	LF4 Input Pointer A	Points to a input pointer table. (chapter 2.2.1)	0~255
D4	LF4 Input Pointer B	Points to a input pointer table. (chapter 2.2.1)	0~255
D5	LF4 Input Pointer C	Points to a input pointer table. (chapter 2.2.1)	0~255
D6	Logic Function 5 Mask	Mask register for logic function 5.	0~255
D7	LF5 Input Pointer A	Points to a input pointer table. (chapter 2.2.1)	0~255

Setting parameter block 13			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	LF5 Input Pointer B	Points to a input pointer table. (chapter 2.2.1)	0~255
D3	LF5 Input Pointer C	Points to a input pointer table. (chapter 2.2.1)	0~255
D4	Logic Function 6 Mask	Mask register for logic function 6.	0~255
D5	LF6 Input Pointer A	Points to a input pointer table. (chapter 2.2.1)	0~255
D6	LF6 Input Pointer B	Points to a input pointer table. (chapter 2.2.1)	0~255
D7	LF6 Input Pointer C	Points to a input pointer table. (chapter 2.2.1)	0~255

Setting parameter block 14			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Timer A Time Lo Byte	Time it will take for timer A to time out in seconds.	0~3000
D3	Timer A Time Hi Byte		
D4	Timer A Start Pointer	Points to a input pointer table. (chapter 2.2.1)	0~255
D5	Timer A Reset Pointer	Points to a input pointer table. (chapter 2.2.1)	0~255
D6	Timer B Time Lo Byte	Time it will take for timer B to time out in seconds.	0~3000
D7	Timer B Time Hi Byte		

Setting parameter block 15			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Timer B Start Pointer	Points to a input pointer table. (chapter x.x.x)	0~255
D3	Timer B Reset Pointer	Points to a input pointer table. (chapter x.x.x)	0~255
D4	Counter A Limit	Count limit to be reached.	0~255
D5	Counter A Count Up Ptr	Points to a input pointer table. (chapter 2.2.1)	0~255
D6	Cntr A Count Down Ptr	Points to a input pointer table. (chapter 2.2.1)	0~255
D7	Cntr A Count Reset Ptr	Points to a input pointer table. (chapter 2.2.1)	0~255

Setting parameter block 16			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Counter B Limit	Count limit to be reached.	0~255
D3	Counter B Count Up Ptr	Points to a input pointer table. (chapter 2.2.1)	0~255
D4	Cntr B Count Down Ptr	Points to a input pointer table. (chapter 2.2.1)	0~255
D5	Cntr B Count Reset Ptr	Points to a input pointer table. (chapter 2.2.1)	0~255
D6	Status Rep Input Pointer	Points to a input pointer table. (chapter 2.2.3)	0~255
D7	Latch Set Input Pointer	Points to a input pointer table. (chapter 2.2.1)	0~255

Setting parameter block 17			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Latch Reset Input Ptr	Points to a input pointer table. (chapter 2.2.1)	0~255
D3	RTC Start Hour	Hour of the real time clock start.	0~23
D4	RTC Start Min	Minutes of the real time clock start.	0~59
D5	RTC Stop Hour	Hour of the real time clock stop.	0~255
D6	RTC Start Min	Minutes of the real time clock stop.	0~255
D7	Relay 1 Input Pointer	Points to a input pointer table. (chapter 2.2.1)	0~255

Setting parameter block 18			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Relay 2 Input Pointer	Points to a input pointer table. (chapter 2.2.1)	0~255
D3	Relay 3 Input Pointer	Points to a input pointer table. (chapter 2.2.1)	0~255
D4	Relay 4 Input Pointer	Points to a input pointer table. (chapter 2.2.1)	0~255
D5	Relay 5 Input Pointer	Points to a input pointer table. (chapter 2.2.1)	0~255
D6	Relay 6 Input Pointer	Points to a input pointer table. (chapter 2.2.1)	0~255
D7	Relay 7 Input Pointer	Points to a input pointer table. (chapter 2.2.1)	0~255

Setting parameter block 19			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Relay 8 Input Pointer	Points to a input pointer table. (chapter 2.2.1)	0~255
D3	Relay 9 Input Pointer	Points to a input pointer table. (chapter 2.2.1)	0~255
D4	Reset Input Pointer	Points to a input pointer table. (chapter 2.2.3)	0~255
D5	TC Warning Level.	TC Level > TC warning level in %.	0~100
D6	Temperature 1 Trip Level	Temperature trip level in degree C.	0~200
D7	Temperature 2 Trip Level	Temperature trip level in degree C.	0~200

Setting parameter block 20			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Temperature 3 Trip Level	Temperature trip level in degree C.	0~200
D3	Reserved		
D4	Reserved		
D5	Reserved		
D6	Reserved		
D7	Reserved		

Setting parameter block 21 ~ 29 reserved

Setting parameter block 30			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Local Remote lsb Ptr	Points to a input pointer table. (chapter 2.2.2)	0~255
D3	Local Remote msb Ptr	Points to a input pointer table. (chapter 2.2.2)	0~255
D4	Local Start FF Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D5	Local Start FS Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D6	Local Start RF Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D7	Local Start RS Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255

Setting parameter block 31			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Local Interlock Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D3	Local Stop Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D4	Remote Start FF Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D5	Remote Start FS Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D6	Remote Start RF Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D7	Remote Start RS Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255

Setting parameter block 32			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Remote Interlock Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D3	Remote Stop Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D4	Auto Start FF Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D5	Auto Start FS Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D6	Auto Start RF Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D7	Auto Start RS Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255

Setting parameter block 33			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Auto Interlock Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D3	Auto Stop Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D4	Feedback signal input Ptr	Points to a input pointer table. (chapter 2.2.3)	0~255
D5	Prewarning Tmr Lo Byte	Pre start warning alarm in seconds.	
D6	Prewarning Tmr Hi Byte		
D7	Execution Timer	Time it should take to execute a start in sec.	0~10

Setting parameter block 34			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Feedback Timer Lo Byte	Time for the feedback signal to be active in milliseconds with 50ms incremental.	0~2000
D3	Feedback Timer Hi Byte		
D4	Backspin Timer Lo Byte	Timer for the motor to back spin before starting the motor again in milliseconds.	
D5	Backspin Timer Hi Byte		
D6	DC Break Time Lo Byte	Time to break the motor when a stop is executed.	
D7	DC Break Time Hi Byte		

Setting parameter block 35			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	Restart Timer Lo Byte	Time to restart the motor after a power down happened.	0~2000
D3	Restart Timer Hi Byte		
D4	Star Max Timer Lo Byte	Maximum time delay between star and delta change over..	
D5	Star Max Timer Hi Byte		
D6	Transition Time Lo Byte	Time to go from high to low speed..	
D7	Transition Time Hi Byte		

Setting parameter block 36			
Data Byte	**Parameter Name**	**Description**	**Range**
D2	FC Timer Lo Byte	Frozen contact timer.	0~2000
D3	FC Timer Hi Byte		
D4	Reserved		
D5	Reserved		
D6	Reserved		
D7	Reserved		

2.2.1 Input Pointers 1 Table

Values that can be routed to the logic function tables, counters, timers, RTC, latch and flasher.

Address	Name
0	Constant Zero.
1	Constant One.
2	In Service.
3	Voltage Present Flag.
4	Over Current Alarm Flag.
5	Short Circuit Alarm Flag.
6	Running Stall Alarm Flag.
7	Unbalance Alarm Flag.
8	Single Phase Alarm Flag.
9	Earth Fault Alarm Flag.
10	Earth Leakage Alarm Flag.
11	Minimum Load Alarm Flag.
12	Over Voltage Alarm Flag.
13	Under Voltage Alarm Flag.
14	Voltage Symmetric Alarm Flag.
15	High Frequency Alarm Flag.
16	Lower Frequency Alarm Flag.
17	Insulation Alarm Flag.
18	Frozen Contact Alarm Flag.
19	Temperature 1 Alarm Flag
20	Temperature 2 Alarm Flag
21	Temperature 3 Alarm Flag
22	Temperature 4 Alarm Flag
23	Over Current Trip Flag.
24	Short Circuit Trip Flag.
25	Running Stall Trip Flag.
26	Unbalance Trip Flag.
27	Single Phase Trip Flag.
28	Earth Fault Trip Flag.
29	Earth Leakage Trip Flag.

30	Minimum Load Trip Flag.
31	Over Voltage Trip Flag.
32	Under Voltage Trip Flag.
33	Voltage Symmetric Trip Flag.
34	High Frequency Trip Flag.
35	Lower Frequency Trip Flag.
36	Insulation Lock Out Trip Flag.
37	Phase Rotation Trip Flag.
38	Starts Per Hour Trip Flag.
39	Frozen Contact Trip Flag.
40	Temperature 1 Trip Flag
41	Temperature 2 Trip Flag
42	Temperature 3 Trip Flag
43	Temperature 4 Trip Flag
44	System Fault Trip Flag
45	Timer A Output Flag.
46	Timer A Inverted Output Flag.
47	Timer A Pulsed Output Flag.
48	Timer A Inverted Pulsed Output Flag.
49	Timer B Output Flag.
50	Timer B Inverted Output Flag.
51	Timer B Pulsed Output Flag.
52	Timer B Inverted Pulsed Output Flag.
53	Real Time Clock Output Flag.
54	Real Time Clock Inverted Output Flag.
55	Counter A Output Flag.
56	Counter A Inverted Output Flag.
57	Counter B Output Flag.
58	Counter B Inverted Output Flag.
59	Logic Function 1 Output Flag.
60	Logic Function 1 Inverted Output Flag.
61	Logic Function 2 Output Flag.
62	Logic Function 2 Inverted Output Flag.
63	Logic Function 3 Output Flag.

64	Logic Function 3 Inverted Output Flag.
65	Logic Function 4 Output Flag.
66	Logic Function 4 Inverted Output Flag.
67	Logic Function 5 Output Flag.
68	Logic Function 5 Inverted Output Flag.
69	Logic Function 6 Output Flag.
70	Logic Function 6 Inverted Output Flag.
71	Digital Input Flag 1.
72	Digital Input Flag 2.
73	Digital Input Flag 3.
74	Digital Input Flag 4.
75	Digital Input Flag 5.
76	Digital Input Flag 6.
77	Digital Input Flag 7.
78	Digital Input Flag 8.
79	Digital Input Flag 9.
80	Digital Input Flag 10.
81	Digital Input Flag 11.
82	Digital Input Flag 12.
83	Digital Input Flag 13.
84	Digital Input Flag 14.
85	Digital Input Flag 15.
86	CANbus Input Flag 01.
87	CANbus Input Flag 02.
88	CANbus Input Flag 03.
89	CANbus Input Flag 04.
90	CANbus Input Flag 05.
91	CANbus Input Flag 06.
92	CANbus Input Flag 07.
93	CANbus Input Flag 08.
94	CANbus Input Flag 09.
95	CANbus Input Flag 10.
96	CANbus Input Flag 11.
97	CANbus Input Flag 12.

98	CANbus Input Flag 13.
99	CANbus Input Flag 14.
100	CANbus Input Flag 15.
101	CANbus Input Flag 16.
102	Starter Output 1 (See MB-Relay user manual)
103	Starter Output 2 (See MB-Relay user manual)
104	Starter Output 3 (See MB-Relay user manual)
105	Starter Output 4 (See MB-Relay user manual)
106	Starter Output 5 (See MB-Relay user manual)
107	Pre Start Warning Flag.
108	DC Breaking Flag.
109	Transition Flag.
110	Back Spin Flag.
111	Execution Trip Flag.
112	Feedback Trip Flag.
113	Unauthorized Current Alarm Flag.
114	Restart Flag.
115	Trip Flag.
116	Pulse Output Flag.
117	Flash Output Flag.
118	Status Reporter Output Flag.
119	Latch Output Flag.
120	TC Warning High Flag
121	Temperature 1 Warning Hi Flag
122	Temperature 1 Warning Lo Flag
123	Temperature 2 Warning Hi Flag
124	Temperature 2 Warning Lo Flag
125	Temperature 3 Warning Hi Flag
126	Temperature 3 Warning Lo Flag
127	Temperature 4 Warning Hi Flag
128	Temperature 4 Warning Lo Flag

2.2.2 Input Pointers 2

It is signals that can be routed to the inputs of the local and remote selection.

Address	Name
0	Constant Zero
1	Constant One
2	Field Input 1
3	Field Input 2
4	Field Input 3
5	Field Input 4
6	Field Input 5
7	Field Input 6
8	Field Input 7
9	Field Input 8
10	Field Input 9
11	Field Input 10
12	Field Input 11
13	Field Input 12
14	Field Input 13
15	Field Input 14
16	Field Input 15
17	PLC Input Bit 1
18	PLC Input Bit 2
19	PLC Input Bit 3
20	PLC Input Bit 4
21	PLC Input Bit 5
22	PLC Input Bit 6
23	PLC Input Bit 7
24	PLC Input Bit 8
25	PLC Input Bit 9
26	PLC Input Bit 10
27	PLC Input Bit 11
28	PLC Input Bit 12
29	PLC Input Bit 13
30	PLC Input Bit 14
31	PLC Input Bit 15
32	PLC Input Bit 16

2.2.3 Input Pointers 3

It is signals that can be routed to the inputs of the starter logic starts, stops and interlock.

Address	Name
0	Constant Zero
1	Constant One
2	In Service Flag
3	Timer A Output
4	Inverted Timer A Output
5	Timer A Pulsed Output
6	Inverted Timer A Pulsed Output
7	Timer B Output
8	Inverted Timer B Output
9	Timer B Pulsed Output
10	Inverted Timer B Pulsed Output
11	RTC Output
12	Inverted RTC Output
13	Counter A Output
14	Inverted Counter A Output
15	Counter B Output
16	Inverted Counter B Output
17	Logical Function 1 Output
18	Inverted Logical Function 1 Output
19	Logical Function 2 Output
20	Inverted Logical Function 2 Output
21	Logical Function 3 Output
22	Inverted Logical Function 3 Output
23	Logical Function 4 Output
24	Inverted Logical Function 4 Output
25	Logical Function 5 Output
26	Inverted Logical Function 5 Output
27	Logical Function 6 Output
28	Inverted Logical Function 6 Output
29	Field Input 1
30	Field Input 2
31	Field Input 3
32	Field Input 4
33	Field Input 5

34	Field Input 6
35	Field Input 7
36	Field Input 8
37	Field Input 9
38	Field Input 10
39	Field Input 11
40	Field Input 12
41	Field Input 13
42	Field Input 14
43	Field Input 15
44	PLC Input Bit 1
35	PLC Input Bit 2
36	PLC Input Bit 3
37	PLC Input Bit 4
48	PLC Input Bit 5
49	PLC Input Bit 6
50	PLC Input Bit 7
51	PLC Input Bit 8
52	PLC Input Bit 9
53	PLC Input Bit 10
54	PLC Input Bit 11
55	PLC Input Bit 12
56	PLC Input Bit 13
57	PLC Input Bit 14
58	PLC Input Bit 15
59	PLC Input Bit 16

2.3 Structure Of The Command Message When MA-Relay Message Type Selected

MB-CAN-BBRTU kept back wards compatibility with the MA-CAN-BBRTU. The command message length was only three bytes long. The command messages structure looks as follow:

Identifier	D0	D1	D2
Command Base Address	Unit Address	Control Byte A.	Control Byte B.

2.4 Structure Of The Command Message When MB-Relay Message Type Selected

The command message length is only four bytes long. The command messages structure looks as follow:

Identifier	D0	D1	D2	D4
Command Base Address	Unit Address	SCADA Input 0	SCADA Input 1	Control A.

SCADA Input 1 bits are as follow:
Bit 0 = CANbus Input 1.
Bit 1 = CANbus Input 2.
Bit 2 = CANbus Input 3.
Bit 3 = CANbus Input 4.
Bit 4 = CANbus Input 5.
Bit 5 = CANbus Input 6.
Bit 6 = CANbus Input 7.
Bit 7 = CANbus Input 8.

SCADA Input 2 bits are as follow:
Bit 0 = CANbus Input 9.
Bit 1 = CANbus Input 10.
Bit 2 = CANbus Input 11.
Bit 3 = CANbus Input 12.
Bit 4 = CANbus Input 13.
Bit 5 = CANbus Input 14.
Bit 6 = CANbus Input 15.
Bit 7 = CANbus Input 16.

Control A bits are as follow:
Bit 0 = Fail Safe enabled.
Bit 1 = Reserved.
Bit 2 = Reserved.
Bit 3 = Reserved.
Bit 4 = Reserved.
Bit 5 = Reserved.
Bit 6 = Reserved.
Bit 7 = Reserved.

2.5 Structure Of The Actual Message When MA-Relay Message Type Selected

MB-CAN-BBRTU kept back wards compatibility with the MA-CAN-BBRTU. The actual messages structure looks as follow:

Identifier	D0	D1~D7
Actual Base Address + Unit Address	Data block	Data

Actual data block 00		
Data Byte	**Parameter Name**	**Description**
D1	Input flags	Field input flags. • Bit 0 = Field Input 1. • Bit 1 = Field Input 2. • Bit 2 = Field Input 3. • Bit 3 = Field Input 4. • Bit 4 = Field Input 5. • Bit 5 = Reserved. • Bit 6 = Reserved. • Bit 7 = MB-Communication Status.
D2	TC Remaining	TC remaining level in %.
D3	Ir Hi Byte	Red current phase level in %.
D4	Ir Lo Byte	
D5	Iw Hi Byte	White current phase level in %.
D6	Iw Lo Byte	
D7	Ib Hi Byte	Blue current phase level in %.

Actual data block 01		
Data Byte	**Parameter Name**	**Description**
D1	Ib Lo Byte	Blue current phase level in %.
D2	Voltage line level	Multiply line voltage by 5.469 to get the voltage value.
D3	EL Level	Earth leakage level in mA. Multiply by 10 to get value.

D4	Alarm Flags A	Alarm flags. • Bit 0 = In service. • Bit 1 = Over current. • Bit 2 = Running stall. • Bit 3 = Unbalance. • Bit 4 = Single phase. • Bit 5 = Under current. • Bit 6 = Earth leakage. • Bit 7 = Under voltage.
D5	Alarm Flags B	Alarm flags. • Bit 0 = Temperature 1 alarm flag. • Bit 1 = Temperature 2 alarm flag. • Bit 2 = Temperature 3 alarm flag. • Bit 3 = Over voltage alarm flag. • Bit 4 = Frozen contact alarm flag. • Bit 5 = Earth fault alarm flag. • Bit 6 = Short circuit alarm flag.
D6	Trip flags A	Trip flags. • Bit 0 = Over current. • Bit 1 = Running stall. • Bit 2 = Unbalance. • Bit 3 = Single phase. • Bit 4 = Under current. • Bit 5 = Earth leakage. • Bit 6 = Phase rotation. • Bit 7 = Under voltage.
D7	Trip flags B	Trip flags. • Bit 0 = Over voltage. • Bit 1 = Temperature 1. • Bit 2 = Temperature 2. • Bit 3 = Temperature 3. • Bit 4 = Frozen contact. • Bit 5 = Earth fault. • Bit 6 = Short circuit.

Actual data block 02		
Data Byte	**Parameter Name**	**Description**
D1	Unbalance Level	Unbalance level in %.
D2	Temperature 1 Level	Temperature 1 level in degree C.
D3	Temperature 2 Level	Temperature 2 level in degree C.
D4	Temperature 3 Level	Temperature 3 level in degree C.

D5	Reserved	
D6	Reserved	
D7	Reserved	

2.6 Structure Of The Actual Message When MB-Relay Message Type Selected

The MB-Relay actual messages structure looks as follow:

Identifier	D0	D1~D7
Actual Base Address + Unit Address	Data block	Data

Actual data block 00		
Data Byte	**Parameter Name**	**Description**
D1	TC Remaining Level	TC remaining level in %.
D2	Current Level Hi Byte	Current level in %.
D3	Current Level Lo Byte	
D4	Ir Hi Byte	Red current phase in %
D5	Ir Lo Byte	
D6	Iw Hi Byte	White current phase in %.
D7	Iw Lo Byte	

Actual data block 01		
Data Byte	**Parameter Name**	**Description**
D1	Ib Hi Byte	Blue current phase in %.
D2	Ib Lo Byte	
D3	Voltage Line Hi Byte	Line voltage of the three phases.
D4	Voltage Line Lo Byte	
D5	Vr Hi Byte	Red phase voltage level.
D6	Vr Lo Byte	

D7	Vw Hi Byte	White phase voltage level.

Actual data block 02		
Data Byte	**Parameter Name**	**Description**
D1	Vw Lo Byte	White phase voltage level.
D2	Vb Hi Byte	Blue phase voltage level.
D3	Vb Lo Byte	
D4	Unbalance Level	Unbalance level in %.
D5	Volt Sym Level	Voltage symmetric level in %.
D6	EL Level Hi Byte	Earth leakage level in mA.
D7	EL Level Lo Byte	

Actual data block 03		
Data Byte	**Parameter Name**	**Description**
D1	Power Factor Level	Power factor level in %.
D2	Frequency Level	Frequency level in Hz.
D3	Insulation Lvl Hi Byte	Insulation level in ohms.
D4	Insulation Lvl Lo Byte	
D5	Alarm Flags A	Alarm flags. • Bit 0 = In service. • Bit 1 = Earth leakage. • Bit 2 = Over current. • Bit 3 = Running stall. • Bit 4 = Unbalance. • Bit 5 = Single phase. • Bit 6 = Minimum load. • Bit 7 = Short circuit.
D6	Alarm Flags B	Alarm flags. • Bit 0 = Voltage present. • Bit 1 = Over voltage. • Bit 2 = Under voltage. • Bit 3 = Voltage symmetric. • Bit 4 = Insulation lock out.

		• Bit 5 = Low frequency. • Bit 6 = High frequency. • Bit 7 = Earth fault.
D7	Alarm Flags C	Alarm flags. • Bit 0 = Vectorial stall. • Bit 1 = Frozen contact. • Bit 2 = Temperature 1. • Bit 3 = Temperature 2. • Bit 4 = Temperature 3. • Bit 5 = Temperature 4. • Bit 6~7 = Reserved.

Actual data block 04		
Data Byte	**Parameter Name**	**Description**
D1	Reserved	
D2	Trip Flags A	Trip flags. • Bit 0 = Over current. • Bit 1 = Running stall. • Bit 2 = Unbalance. • Bit 3 = Single phase. • Bit 4 = Minimum load. • Bit 5 = Short circuit. • Bit 6 = Phase rotation. • Bit 7 = Earth leakage.
D3	Trip Flags B	Trip flags. • Bit 0 = Over voltage. • Bit 1 = Under voltage. • Bit 2 = Voltage symmetric. • Bit 3 = Insulation lockout. • Bit 4 = Low frequency level. • Bit 5 = High frequency level. • Bit 6 = Earth Fault. • Bit 7 = Starts per hour.
D4	Trip Flags C	Trip flags. • Bit 0 = System failure. • Bit 1 = Vectorial stall. • Bit 2 = Frozen contact. • Bit 3 = Execution fault. • Bit 4 = Feedback fault. • Bit 5 = Unauthorized current. • Bit 6~7 = Reserved.

D5	Trip Flags D	Trip flags. • Bit 0 = Temperature 1. • Bit 1 = Temperature 2. • Bit 2 = Temperature 3. • Bit 3 – Temperature 4. • Bit 4~7 = Reserved.
D6	Flag Status A	Flag status. • Bit 0 = Logic table 1. • Bit 1 = Logic table 2. • Bit 2 = Logic table 3. • Bit 3 = Logic table 4. • Bit 4 = Logic table 5. • Bit 5 = Logic table 6. • Bit 6 = Simulation test. • Bit 7 = Counter B.
D7	Flag Status B	Flag status. • Bit 0 = Timer A. • Bit 1 = Timer B. • Bit 2 = Real time clock start. • Bit 3 = Relay 1. • Bit 4 = Relay 2. • Bit 5 = Relay 3. • Bit 6 = Relay 4. • Bit 7 = Counter A.

Actual data block 05		
Data Byte	**Parameter Name**	**Description**
D1	Flag Status C	Flag status. • Bit 0 = Field input 1. • Bit 1 = Field input 2. • Bit 2 = Field input 3. • Bit 3 = Field input 4. • Bit 4 = Field input 5. • Bit 5 = Field input 6. • Bit 6 = Filed input 7. • Bit 7 = MB-Relay communication.
D2	Flags Status D	Flags status. • Bit 0 = Starter output 1. • Bit 1 = Starter output 2. • Bit 2 = Starter output 3. • Bit 3 = Starter output 4. • Bit 4 = Starter output 5.

		• Bit 5 = Reserved. • Bit 6 = Local select lsb. • Bit 7 = Local select msb.
D3	Flag Status E	Flags status. • Bit 0 = CANbus input 1. • Bit 1 = CANbus input 2. • Bit 2 = CANbus input 3. • Bit 3 = CANbus input 4. • Bit 4 = CANbus input 5. • Bit 5 = CANbus input 6. • Bit 6 = CANbus input 7. • Bit 7 = CANbus input 8.
D4	Flag Status F	Flag status. • Bit 0 = CANbus input 9. • Bit 1 = CANbus input 10. • Bit 2 = CANbus input 11. • Bit 3 = CANbus input 12. • Bit 4 = CANbus input 13. • Bit 5 = CANbus input 14. • Bit 6 = CANbus input 15. • Bit 7 = CANbus input 16.
D5	Flag Status G	Flag status. • Bit 0 = Timer A. • Bit 1 = Timer B. • Bit 2 = Status Reporter. • Bit 3 = Latch. • Bit 4 = Relay 5. • Bit 5 = Relay 6. • Bit 6 = Relay 7. • Bit 7 = Relay 8.
D6	Flag Status H	Flag Status. • Bit 0 = Starter output 6. • Bit 1 = Starter output 7. • Bit 2 = Starter output 8. • Bit 3 = Starter output 9. • Bit 5 = Status reporter. • Bit 6 = Pulse Generator • Bit 7 = TC warning level. • Bit 4 = reserved.
D7	Flag Status I	Flag Status. • Bit 0 = Temperature 1 Warning High. • Bit 1 = Temperature 1 Warning Lo. • Bit 2 = Temperature 2 Warning High. • Bit 3 = Temperature 2 Warning Lo.

		• Bit 4 = Temperature 3 Warning High. • Bit 5 = Temperature 3 Warning Lo. • Bit 6 = Temperature 14Warning High. • Bit 7 = Temperature 14Warning Lo.

Actual data block 06		
Data Byte	**Parameter Name**	**Description**
D1	Flag Status J	Flag status. • Bit 0 = Field input 8. • Bit 1 = Field input 9. • Bit 2 = Field input 10. • Bit 3 = Field input 11. • Bit 4 = Field input 12. • Bit 5 = Field input 13. • Bit 6 = Filed input 14. • Bit 7 = Filed input 15.
D2	Counter A Value	Current counter A value.
D3	Counter B Value	Current counter B value.
D4	Current MLC	Current MLC setting selected in %.
D5	Temperature 1 Level	Temperature 1 level in degree C. x- 30 = degrees
D6	Temperature 2 Level	Temperature 2 level in degree C. x- 30 = degrees
D7	Temperature 3 Level	Temperature 3 level in degree C. x- 30 = degrees

Actual data block 07		
Data Byte	**Parameter Name**	**Description**
D1	Temperature 4 Level	Temperature 4 level in degree C. x- 30 = degrees
D2	Relay Model	0 = 005 1 = 010 2 = 050 3 = 100 4 = 300
D3	CT Primary Hi Byte	
D4	CT Primary Lo Byte	
D5	CT Sencondary	
D6	Reserved	

D7	Reserved	

3. DEFINITIONS AND TERMINOLOGY

CBCT	Core balance current transformer. Used to find the difference between three phase current.
CT	Current transformer. Breaks down the current to lower current value.
EEPROM	Electrical Erasable Programmable Read Only Memory (non volatile)
Flash memory	Similar to EEPROM (only block write - non volatile)
In service	When the current rise above 10% of full load current it is assumed that the motor is running.
Intrinsic safe	It is a protection technique for safe operation of electronic equipment in explosive atmospheres. The concept was developed for safe operation of process control instrumentation in hazardous areas. The theory behind intrinsic safety is to ensure that the available electrical and thermal energy in the system is always low enough that ignition of the hazardous atmosphere cannot occur.
LED	Light emitting diode (It is used as visual indicators)
Motor protection relay	It is an intelligent (computerized) unit monitoring an electric motor's current and voltage supply. In case of overloading, phase lost etc. the power supply of the motor will be interrupted by the protection relay to prevent damage to the motor.
MB-CAN-BBRTU	MB-Relay CANbus board bottom remote translating unit.
PLC	Programmable Logic Controller.

4. FUNCTIONAL DESCRIPTION

The MB-CAN-BBRTU can be broken down into the following function blocks:

- Micro-Controller
- MB-Relay Interface.
- CANbus Interface.
- Light Emitting Diodes (LED)

Micro-Controller – Is the core of the system. The micro-controller ensures that the operation of the MB-CAN-BBRTU gets executed. The micro-controller acts as a bridge between the MB-Relay and the SCADA.

MB-Relay Interface – Is the communication bus between the MB-Relay and MB-CAN-BBRTU. With the MB-Relay interface it is possible for the two micro-controllers MB-Relay and MB-CAN-BBRTU to exchange data.

CANbus Interface – Allows the MB-Relay to communicate with the SCAD. With the CANbus interface it is possible to update the MB-CAN-BBRTU with new values as well as the SCADA.

Light Emitting Diodes – Allows the MB-CAN-BBRTU to indicate conditions to the operator.

5. OPERATING INSTRUCTIONS

5.1 Getting Started

5.1.1 Setting Up The MB-CAN-BBRTU

Following must be done via the MB-Relay front-end:

- Connect the MB-Relay front-end to the relay.
- Select the communication device as CANbus.
- Set the settings of the relay.
- Transmit the data to the relay.

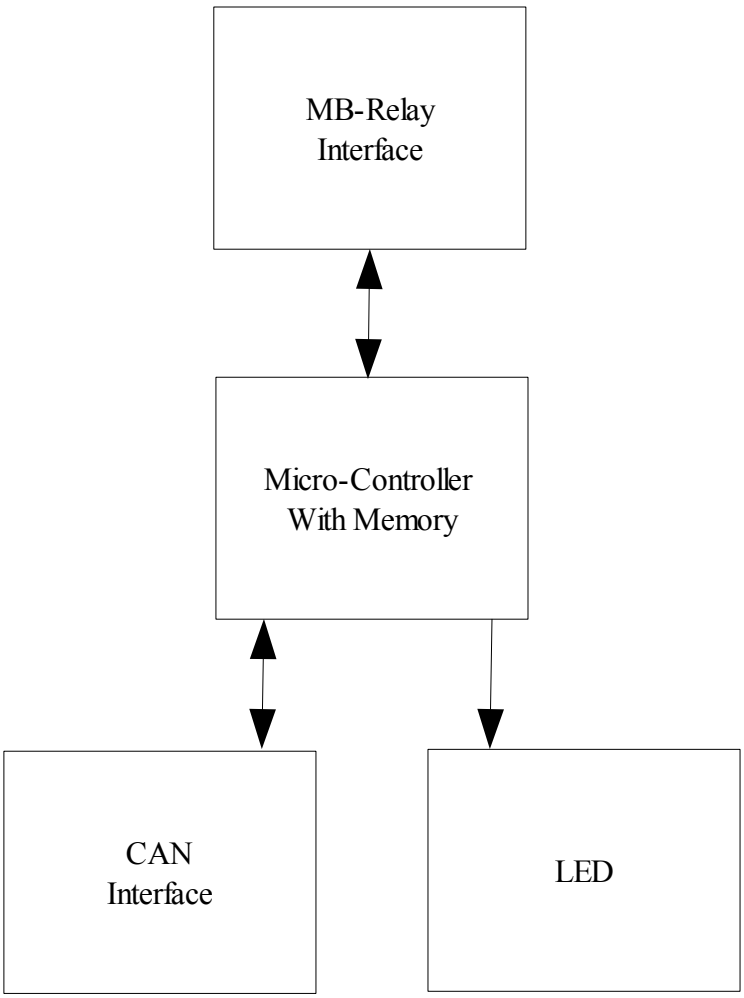
5.2 Monitoring Diagnostic On Front-End

The front-end will shows the following diagnostics under the **"Statistics"** tab:

1. Canbus module present.
2. Software revision.
3. Communication status – Status of the CANbus.
4. Average cyclic message time – Time between cyclic messages.
5. Negative Error – Biggest negative time error between cyclic messages.
6. Positive Error – Biggest positive time error between cyclic messages.

6. DIAGRAMS

6.1 Block Diagram of MB-CAN-BBRTU



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