

MG Master HV

Communication guide

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1 Inhoudsopgave

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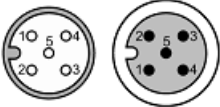
2 Communication with the MG Master HV

Communication with the MG Master HV can be established via CAN-Bus. The protocol implemented is MG Master HV specific based on J1939.

2.1 CAN interface

2.1.1 Pin definition

Type: 5-pin A-coded

Pin	Description	CANOpen, NMEA2000 connector
1	Shield	M12 plug/socket, 5-pin, A-coded 
2	V+	
3	GND	
4	CAN-H	
5	CAN-L	
		<div style="display: flex; justify-content: space-around;"> Male Female </div>

2.2 Master HV transmit data

2.2.1 Interface definition

Speed : 250 kbps
 ID : 29-bit CAN 2.0B

2.2.2 Message definition

J1939 Identifier definition.

<3-bits priority><1-bit reserved><1-bit datapage>< 16-bits PGN >< 8-bit source address >

As described in the list below a PGN consists of datapage + PGN. For example 0x1F214 means:

Datapage = 1

PGN = 0XF214

2.2.3 PGN list

Data	PGN Name	PGN hex	Field	Remarks
Charge voltage limit	Charge Discharge Limits	0x1FF40	0	uint16 [0.1V]
Charge current limit	Charge Discharge Limits	0x1FF40	2	uint16 [0.1A]
Discharge voltage limit	Charge Discharge Limits	0x1FF40	4	uint16 [0.1V]
Discharge current limit	Charge Discharge Limits	0x1FF40	6	uint16 [0.1A]
Status information	System status	0x1FF41	0	Uint32 [1 bits]
Warning information	System warning	0x1FF42	0	Uint64 [1 bits]
Failure information	System failure	0x1FF43	0	Uint64 [1 bits]
Voltage	System measurements	0x1FF44	0	uint16 [0.1V]
Current	System measurements	0x1FF44	2	int16 [0.1A]
State-Of-Charge (SOC)	System measurements	0x1FF44	4	uint8 [1%]
Highest cell voltage	Battery measurements scale	0x1FF45	0	uint16 [0.01V]
Lowest cell voltage	Battery measurements scale	0x1FF45	2	uint16 [0.01V]
Highest cell temperature	Battery measurements scale	0x1FF45	4	uint16 [0.01K]
Lowest cell temperature	Battery measurements scale	0x1FF45	6	uint16 [0.01K]
Highest cell voltage	Battery measurements	0x1FF46	0	uint16 [0.001V]
Lowest cell voltage	Battery measurements	0x1FF46	2	uint16 [0.001V]
Highest cell temperature	Battery measurements	0x1FF46	4	uint16 [1K]
Lowest cell temperature	Battery measurements	0x1FF46	6	uint16 [1K]
Software version	Device Information	0x1FF4F	0	uint16 [0x0102->V1.2]
Hardware Type	Device Information	0x1FF4F	2	uint16 [0x3E82->16002]
Hardware Configuration	Device Information	0x1FF4F	4	uint16 [-]
Hardware Version	Device Information	0x1FF4F	6	uint16 [0x0102->V1.2]

Notes:

- The default source address of the MG Master HV is 0x50.

2.2.3.1 PGN: Charge Discharge Limits, 0x1FF40

0x1FF40 -Charge Discharge Limits			
Periodicity:		250milliseconds	
Priority Default:		0	
Format:		Little Endian/Intel convention	
1	Byte 0	Maximum allowed charge voltage.	
	Byte 1	Data Length:	16 bit, uint16
		Unit:	Voltage, DC
		Resolution:	0.1 V/bit
		Range:	0 to 6553.4 V (invalid: 0xFFFF)
2	Byte 2	Maximum allowed charge current.	
	Byte 3	Data Length:	16 bit, uint16
		Unit:	Current, Electric
		Resolution:	0.1 A/bit
		Range:	0 to 6553.4 A (invalid: 0xFFFF)
3	Byte 4	Maximum allowed discharge voltage.	
	Byte 5	Data Length:	16 bit, uint16
		Unit:	Voltage, DC
		Resolution:	0.1 V/bit
		Range:	0 to 6553.4 V (invalid: 0xFFFF)
4	Byte 6	Maximum allowed discharge current.	
	Byte 7	Data Length:	16 bit, uint16
		Unit:	Current, Electric
		Resolution:	0.1 A/bit
		Range:	0 to 6553.4 A (invalid: 0xFFFF)

2.2.3.2 PGN: System status, 0x1FF41

0x1FF41 - Status flags, discharge current and charge current			
Periodicity:		250milliseconds	
Priority Default:		3	
Format:		Little Endian/Intel convention	
1	Byte 0	Status flags	
	Byte 1	Data Length:	32 bit
	Byte 2	Unit:	-
	Byte 3	Resolution:	1 bit
		Range:	Variable
Bit 0 = Initializing, Bit 1 = Running (ready to active high voltage output), Bit 2 = High Voltage output active, Bit 3 = Warning, Bit 4 = Failure, Bit 5 = Updating batteries, Bit 6 = Requested for system reset, ... Bit 16 = Pre-charging high voltage output active, Bit 17 = Charged, Bit 18 = Discharged, Bit 19 = Balancing active, Bit 20 = Almost charged, Bit 21 = Almost discharged, Bit 22 = Allow to charge, Bit 23 = Allow to discharge			

2.2.3.3 PGN: Warning, 0x1FF42

0x1FF42 -Warning flags.			
Periodicity:		250 milliseconds	
Priority Default:		3	
Format:		Little Endian/Intel convention	
1	Byte 0	Status flags	
	Byte 1	Data Length:	64 bit
	Byte 2	Unit:	-
	Byte 3	Resolution:	1 bit
	Byte 4	Range:	Variable
Byte 5	Bit 0 = Battery cell voltage to high,		
Byte 6	Bit 1 = Second stage protection battery voltage to high,		
Byte 7	Bit 2 = Battery cell voltage to low,		
	Bit 3 = Second stage protection battery voltage to low,		
	Bit 4 = Battery cell temperature to high for charging,		
	Bit 5 = Battery cell temperature to high for discharging,		
	Bit 6 = Second stage protection battery temperature to high,		
	Bit 7 = Battery cell temperature to low for charging,		
	Bit 8 = Battery cell temperature to low for discharging,		
	Bit 9 = Second stage protection battery temperature to low,		
	Bit 10 = Private CAN-bus communication timeout,		
	Bit 11 = Public CAN-bus communication timeout,		
	Bit 12 = Internal power supply weak,		
	Bit 13 = 24V power supply weak,		
	Bit 14 = Hardware failure,		
	Bit 15 = Service request,		
	Bit 16 = Battery terminal temperature to high,		
	Bit 17 = Second stage protection minus terminal temperature to high,		
	Bit 18 = Second stage protection plus terminal temperature to high,		
	...		
	Bit 32 = Battery cell voltages unbalanced,		
	Bit 33 = Battery cell temperatures unbalanced,		
	Bit 34 = External heat source detected,		
	Bit 35 = Charge Power to high,		
	Bit 36 = Discharge power to high		

2.2.3.4 PGN: Failure, 0x1FF43

0x1FF43 -Failure flags.			
Periodicity:		250 milliseconds	
Priority Default:		3	
Format:		Little Endian/Intel convention	
1	Byte 0	Status flags	
	Byte 1	Data Length:	64 bit
	Byte 2	Unit:	-
	Byte 3	Resolution:	1 bit
	Byte 4	Range:	Variable
	Byte 5	Bit 0 = Battery cell voltage to high,	
	Byte 6	Bit 1 = Second stage protection battery voltage to high,	
	Byte 7	Bit 2 = Battery cell voltage to low,	
	Bit 3 = Second stage protection battery voltage to low,		
	Bit 4 = Battery cell temperature to high for charging,		
	Bit 5 = Battery cell temperature to high for discharging,		
	Bit 6 = Second stage protection battery temperature to high,		
	Bit 7 = Battery cell temperature to low for charging,		
	Bit 8 = Battery cell temperature to low for discharging,		
	Bit 9 = Second stage protection battery temperature to low,		
	Bit 10 = Private CAN-bus communication timeout,		
	Bit 11 = Public CAN-bus communication timeout,		
	Bit 12 = Internal power supply weak,		
	Bit 13 = 24V power supply weak,		
	Bit 14 = Hardware failure,		
	Bit 15 = Service request,		
	Bit 16 = Battery terminal temperature to high,		
	Bit 17 = Second stage protection minus terminal temperature to high,		
	Bit 18 = Second stage protection plus terminal temperature to high,		
	Bit 19 = Battery redundancy unit interrupted the interlock,		
	...		
	Bit 32 = Pre-charge short circuits,		
	Bit 33 = Pre-charge circuits overload,		
	Bit 34 = Contactor minus welding,		
	Bit 35 = Contactor plus welding,		
	Bit 36 = Contactor minus,		
	Bit 37 = Contactor plus,		
	Bit 38 = High voltage interlock circuits,		
	Bit 39 = External Emergency shutdown,		
	Bit 40 = Battery initializing,		
	Bit 41 = Battery updating.		

2.2.3.5 PGN: System measurements, 0x1FF44

0x1FF44 -System measurements			
Periodicity:		250 milliseconds	
Priority Default:		3	
Format:		Little Endian/Intel convention	
1	Byte 0	Voltage.	
	Byte 1	Data Length:	16 bit, uint16
		Unit:	Voltage, DC
		Resolution:	0.1 V/bit
		Range:	0 to 6553.4 V (invalid: 0xFFFF)
2	Byte 2	Current.	
	Byte 3	Data Length:	16 bit, int16
		Unit:	Current, Electric
		Resolution:	0.1 A/bit
		Range:	-3276.8 A (discharging) to 3276.6 A (charging) (invalid: 0x7FFF)
3	Byte 4	State-Of-Charge (SOC).	
		Data Length:	8 bit, uint8
		Unit:	Generic Absolute Percentage 0-100%
		Resolution:	1 %
		Range:	0 to100 % (invalid: 0xFF)

2.2.3.6 PGN: Battery measurements on scale, 0x1FF45

0x1FF45 -Battery measurements on scale			
Periodicity:		250 milliseconds	
Priority Default:		3	
Format:		Little Endian/Intel convention	
1	Byte 0	Highest cell voltage.	
	Byte 1	Data Length:	16 bit, uint16
		Unit:	Voltage, DC
		Resolution:	0.01 V/bit
		Range:	0 to 655.34 V (invalid: 0xFFFF)
2	Byte 2	Lowest cell voltage.	
	Byte 3	Data Length:	16 bit, uint16
		Unit:	Voltage, DC
		Resolution:	0.01 V/bit
		Range:	0 to 655.34 V (invalid: 0xFFFF)
3	Byte 4	Highest cell temperature.	
	Byte 5	Data Length:	16 bit, uint16
		Unit:	Generic Temperature, Kelvin
		Resolution:	0.01 K/bit
		Range:	0 to 655.32 deg K
4	Byte 6	Lowest cell temperature.	
	Byte 7	Data Length:	16 bit, uint16
		Unit:	Generic Temperature, Kelvin
		Resolution:	0.01 K/bit
		Range:	0 to 655.32 deg K

2.2.3.7 PGN: Battery measurements, 0x1FF46

0x1FF46 -Battery measurements			
Periodicity:		250 milliseconds	
Priority Default:		3	
Format:		Little Endian/Intel convention	
1	Byte 0	Highest cell voltage.	
	Byte 1	Data Length:	16 bit, uint16
		Unit:	Voltage, DC
		Resolution:	0.001 V/bit
Range:	0 to 65.534 V (invalid: 0xFFFF)		
2	Byte 2	Lowest cell voltage.	
	Byte 3	Data Length:	16 bit, uint16
		Unit:	Voltage, DC
		Resolution:	0.001 V/bit
Range:	0 to 65.534 V (invalid: 0xFFFF)		
3	Byte 4	Highest cell temperature.	
	Byte 5	Data Length:	16 bit, uint16
		Unit:	Generic Temperature, Kelvin
		Resolution:	1 K/bit
Range:	0 to 65534 deg K (invalid: 0xFFFF)		
4	Byte 6	Lowest cell temperature.	
	Byte 7	Data Length:	16 bit, uint16
		Unit:	Generic Temperature, Kelvin
		Resolution:	1 K/bit
Range:	0 to 65534 deg K (invalid: 0xFFFF)		

2.2.3.8 PGN: Battery SOC Synchronization broadcast, 0x1FF4E

0x1FF4E -Battery SOC synchronization broadcast. (source address 0xFF)			
Periodicity:		On SOC synchronization	
Priority Default:		3	
Format:		Little Endian/Intel convention	
1	Byte 0	Group number	
		Data Length:	8 bit, uint8
2	Byte 1	Source address	
		Data Length:	8 bit, uint8

2.2.3.9 PGN: Device Information, 0x1FF4F

0x1FF4F -Device Information			
Periodicity:		250 milliseconds	
Priority Default:		7	
Format:		Little Endian/Intel convention	
1	Byte 0	Software version.	
	Byte 1	Data Length:	16 bit, uint16
		Unit:	0x0102->V1.2
2	Byte 2	Hardware Type.	
	Byte 3	Data Length:	16 bit, uint16
		Unit:	0x3E82->16002
3	Byte 4	Hardware Configuration.	
	Byte 5	Data Length:	16 bit, uint16
		Unit:	-
4	Byte 6	Hardware Version.	
	Byte 7	Data Length:	16 bit, uint16
		Unit:	0x0102->V1.2

3 Master HV receive data

3.1 PGN: Commands and Main DC Voltage, 0x0FFB1

The received command messages needs to have a length of 8 bytes.

0x0FFB1 -commands and Main DC voltage			
Periodicity:		250 milliseconds	
Priority Default:		-	
Format:		Little Endian/Intel convention	
1	Byte 0	Status flags	
		Data Length:	8 bit, uint8
		Unit:	-
		Resolution:	1 bit
		Range: Variable	
0x00 = None (Master active), 0x01 = Run (High voltage output will be activated), 0x02 = Reset (Used to reset failure mode),			
2	Byte 1	Main DC voltage.	
	Byte 2	Data Length:	16 bit, uint16
		Unit:	Voltage, DC
		Resolution:	0.05V/bit
		Range: 0 to 3212.75 V	
3	Byte 3	Destination network address device	
		Data Length:	8 bit, uint8
		Unit:	Network address device
		Range: 0 to 0xFB (default: 0x50)	
4	Byte 4	dummy.	
	Byte 5 Byte 6 Byte 7	Data Length:	32 bit

3.2 PGN: Change network address device, 0x0FEAD

The received command messages needs to have a length of 8 bytes. Once a new network address is received, it will be stored automatically. The new network address is used instantaneously, no re/boot is required.

0x0FEAD -Change network address device			
Periodicity:		-	
Priority Default:		-	
Format:		Little Endian/Intel convention	
1	Byte 0	Destination master HV network address	
		Data Length:	8 bit, uint8
		Unit: Range:	Network address device 0 to 0xFB (default: 0x50)
2	Byte1	New device network address	
		Data Length:	8 bit, uint8
		Unit: Range:	Network address device 0 to 0xFB
3	Byte 2	dummy.	
	Byte 3	Data Length:	48 bit
	Byte 4		
	Byte 5		
	Byte 6 Byte 7		