FischerPanda

Fischer Panda GmbH

SAE J1939 Interface Description

fpCAN

Customer description - AGT DC Generators
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1 Revision history

Revision	Date	Changes
1.35	2026-06-18	- Document created for AGT DC Generators based on customer documentation
1.36	2026-07-23	- PGN 64892 "DPF C1 – Diesel Particulate Filter Control 1" added - PGN 64800 "A1DOC1 - Aftertreatment 1 Diesel Oxidation Catalyst 1" added
1.37	2026-10-15	- PGN 65133 "HTR – Heater Information" added

Contents

1 Revision history **1**

2 Preamble **4**
2.1 CAN communication description . . . 4

3 ISO functions **5**
3.1 ISO Acknowledgement . . . 5
3.2 ISO Request . . . 7
3.3 ISO Transport Protocol – Data Transfer . . . 8
3.4 ISO Transport Protocol – Connection Management . . . 9
3.5 ISO Transport Protocol – Connection Management, RTS group function . . . 10
3.6 ISO Transport Protocol – Connection Management, CTS group function . . . 11
3.7 ISO Transport Protocol – Connection Management, EOM group function . . . 12
3.8 ISO Transport Protocol – Connection Management, BAM group function . . . 13
3.9 ISO Transport Protocol – Connection Management, Abort group function . . . 14
3.10 ISO Address Claim . . . 15
3.11 ISO Commanded Address . . . 17

4 SAE-J1939 functions **19**
4.1 J1939 EEC1 – Electronic Engine Controller #1 . . . 19
4.2 DD2 – Dash Display 2 . . . 20
4.3 J1939 A1DOC1 - Aftertreatment 1 Diesel Oxidation Catalyst 1 . . . 21
4.4 J1939 DPF C1 – Diesel Particulate Filter Control 1 . . . 22
4.5 J1939 GTACPP – Generator Total AC Percent Power . . . 24
4.6 HTR – Heater Information . . . 25
4.7 J1939 HOURS – Engine Hours . . . 26
4.8 J1939 ET1 – Engine Temperatures 1 . . . 27
4.9 DD1 – Dash Display 1 . . . 28

5 Special functions - Proprietary PGNs **29**
5.1 PROPA00 – Remote Procedure Request . . . 29
5.1.1 The fields within the 29-bit Identifier . . . 30
5.2 PROPB00 – Response for PROPA00 RPC-request . . . 32
5.3 PROPB01 – Generator System Information . . . 33
5.4 PROPB03 – Generator System RPM . . . 35
5.5 PROPB05 – Generator System Temperatures . . . 36
5.6 PROPB08 – System Information . . . 37
5.7 PROPB0F – Service Hour Counter . . . 38
5.8 PROPB14 – AGT 1 (Generator DC Output) . . . 39
5.9 PROPB16 – AGT 3 (temperatures) . . . 40
5.10 PROPB17 – AGT 4 (Proprietary AC Generator Values) . . . 42
5.11 PROPB18 – AGT 5 (Battery charge) . . . 43
5.12 PROPB19 – AGT 6 (Battery charger control target value and limiter) . . . 44
5.13 PROPB1A – AGT 7 (Charger output mode and value) . . . 46
5.14 PROPB1B – AGT 8 (Power Control) . . . 48
5.15 PROPB25 – fpCAN Device Info . . . 49

6 Remote Procedure Requests **50**
6.1 Introduction to the topic . . . 50
6.2 Functionality . . . 50
6.3 Request types . . . 50
6.4 Endianness of the RPC-PGNs . . . 50
6.5 Notice for sending RPC requests . . . 50

6.6 RPC-ID 0x000d – Clear errors/warnings . . . 51
6.7 RPC-ID 0x0012 – Automatic start mode . . . 53
6.8 RPC-ID 0x008b – Service done . . . 55
6.9 RPC-ID 0x008e – Set CPU in Power-Save-Mode (Sleep controller) . . . 56
6.10 RPC-ID 0x0093 – Read software release . . . 57
6.11 RPC-ID 0x0094 – Read serial number . . . 58
6.12 RPC-ID 0x009c – Remote start of Generator . . . 60
6.13 RPC-ID 0x009e – Power on via RPC . . . 62
6.14 RPC-ID 0x009f – Switching utility relay output . . . 63
6.15 RPC-ID 0x0214 – Setting AGT charger mode . . . 64

Index **1**

2 Preamble

2.1 CAN communication description

The protocol consists of the general ISO 11992 part which is responsible for addressing and arbitration as well as the data flow, the SAE-J1939 portion of usable frames from the automotive and commercial vehicle segment and the special fpCAN containing the part not yet shown in the standards precisely in order to realize until now non-existent features and enhancements.

The fpCAN is ISO / SAE-J1939 / NMEA2000® conform and also uses a bitrate of 250 kbits per second and a 29-bit extended Identifier and can be mixed with NMEA2000®. The orientation of the data is always LSB first unless explicitly defined otherwise.

3 ISO functions

The ISOBUS-Standard describes the main functions process control, data exchange and arbitration that are used in *SAE-J1939*, *NMEA2000®* and *fpCAN*. The structure of data is the same in all these standards.

3.1 ISO Acknowledgement

PGN 59392 (0xE800)
Specification: This message is provided by ISO 11783 for a handshake mechanism between transmitting and receiving devices. This message is the possible response to acknowledge the reception of a “normal broadcast” message or the response to a specific command to indicate compliance or failure. The application layer is responsible for determining when this message is desired, outside of network management requirements specified by this standard (e.g. response to ISO Request message). The destination address of this PGN shall always contain a destination specific address.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	6	0	0	232	0	X
hex	6	0	0	E8	00	X
PGN	leer	59392 (E800)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7

Content:

Byte	Data Type	Data Field
0	DD177	0x00 = Positive Acknowledgment;
	DF52	0x01 = Negative Acknowledgment;
		0x02 = PGN supported but access denied;
		0x03 to 0xFF = Reserved
1	DD177	Group Function of PGN being acknowledged.
	DF52	This field identifies for a device the specific group
		function of a PGN being acknowledged or declined. This
		field is not used if the PGN being acknowledged or
		declined is not a group function PGN.
2	DD001	reserved bits, all set to logic 1
	DF52	
3		reserved bits, all set to logic 1
4		reserved bits, all set to logic 1
5	DD009	Parameter Group Number (PGN) expressed in binary,
		LSB first
	DF52	
6		PGN
7		PGN
	Single Frame	

3.2 ISO Request

PGN 59904 (0xEA00)
Specification: ISO 11783 defines this message to provide a method for *requesting the transmission of a PGN* from a network device or devices. As defined by ISO, this message has a *data length of 3 bytes* with no padding added to complete the single frame. The appropriate response to this message is based on the PGN being requested, and whether the receiver supports the requested PGN. See section 3.4.2 of 11783-3 for the rules governing the response to this PGN.
Note that the destination address must be entered.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	6	0	0	234	0	X
hex	6	0	0	EA	00	X
PGN		59904 (EA00)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	-	-	-	-	-

Content:

Byte	**Data Type**	**Data Field**
DB0	DD009	Parameter Group Number (PGN) expressed
	DF52	in binary, LSB first
DB1		PGN
DB2	DD001	PGN
	Single Frame	

3.3 ISO Transport Protocol – Data Transfer

PGN 60160 (0xEB00)
Specification: ISO 11783 defines this PGN as part of the transport protocol method used for transmitting messages that have 9 or more data bytes. This PGN represents a single packet of a multipack message and is used in conjunction with PGN 60416. Once a connection has been established or a broadcast announcement has been made, this message is transmitted using the timing and handshake requirements in section 3.10 of 11783-3 until all the message's packets are transmitted or the transmission is aborted. Although this PGN is addressable, when used with the Broadcast Announce Message (BAM) method, the destination shall be 255.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	6	0	0	235	0	X
hex	6	0	0	EB	00	X
PGN		60160 (EB00)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7

Content:

Byte	**Data Type**	**Data Field**
0	DD180	0x00 = Positive Acknowledgment;
	DF52	0x01 = Negative Acknowledgment;
		0x02 = PGN supported but access denied;
		0x03 to 0xFF = Reserved
1	DD181	Multipack data:
	DF52	56 bits organized as seven 8-bit bytes, each of the bytes
		is transmitted in the same order as it would in a standard
		(i.e., single frame) message. Unused bytes shall be filled
		with 0xFF.
2		
3		
4		
5		
6		
7		
	Single Frame	

3.4 ISO Transport Protocol – Connection Management

PGN 60416 (0xEC00)
Specification: ISO 11783 defines this group function PGN as part of the transport protocol method used for transmitting messages that have 9 or more data bytes. This PGN's role in the transport process is determined by the group function value found in the first data byte of the PGN.

RTS - When the group function is **R**equest **T**o **S**end (RTS), the PGN is asking a specific node on the network for permission to transmit a larger than 8 byte message to the node. This process is referred to as opening a connection.

CTS - If the group function is **C**lear **T**o **S**end (CTS), the PGN is notifying the transmitter of a multipack message how many packets the node is ready to receive and which packets have been received successfully. This group function is the proper response to an RTS group function to start the transmission of the multipack data and allows the receiver to control the flow of data throughout the multipack transmission.

EOM - When the group function is **E**nd **O**f **M**essage (EOM), the PGN is notifying the transmitter of a multipack message that all packets were received successfully. This group function signals the successful conclusion of a transmission started with the RTS group function thus closing the connection.

ABORT - When the group function is Abort, the PGN is notifying the transmitter or receiver of the multipack message that the other partner is terminating the connection without completing the transfer of the message. This group function can also be used to refuse the connection when the RTS group function is initially received.

BAM - When the group function is **B**roadcast **A**nnounce **M**essage (BAM), the PGN is notifying all network nodes that a multipack message is about to be transmitted on the network. Because the BAM group function is broadcast, no further handshake is required.

For a complete description of this PGN's usage and timing requirements see section 3.10 of 11783-3.

3.5 ISO Transport Protocol – Connection Management, RTS group function

PGN 60416 (0xEC00)

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	6	0	0	236	0	X
hex	6	0	0	EC	00	X
PGN		60416 (EC00)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7

Content:

Byte	**Data Type**	**Data Field**	**Values**	**Default**
0	DD179	0x10 = Request to Send;	0x01	RTS (0x10)
	DF52	0x11 = Clear to Send;	-	
		0x13 = End of Message;	0xFF	
		0x20 = Broadcast Announce Message;		
		0xFF = Abort;		
		0x00 to 0xF, 0x12, 0x14 to 0x1F,		
		0x21 to 0xFE = Reserved		
1	DD007	Number of routes, waypoint, event,	9	
	DF54	mark, etc.	-	
			1785	
2				
3	DD180	Multi-packet frame counter	0x01	
	DF52		-	
			0xFF	
4	DD001	reserved bits, all set to logic 1		
	DF52			
5	DD009	Parameter Group Number (PGN) expressed		
	DF52	in binary, LSB first		
6		PGN		
7		PGN		
	Single Frame			

3.6 ISO Transport Protocol – Connection Management, CTS group function

PGN 60416 (0xEC00)

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	6	0	0	236	0	X
hex	6	0	0	EC	00	X
PGN		60416 (EC00)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7

Content:

Byte	**Data Type**	**Data Field**	**Values**	**Default**
0	DD179	0x10 = Request to Send;	0x01	CTS (0x11)
	DF52	0x11 = Clear to Send;	-	
		0x13 = End of Message;	0xFF	
		0x20 = Broadcast Announce Message;		
		0xFF = Abort;		
		0x00 to 0xF, 0x12, 0x14 to 0x1F,		
		0x21 to 0xFE = Reserved		
1	DD180	Number of frames that can be sent	0x01	
	DF52	Multi-packet frame counter, valid	-	
		range 0x01 to 0xFF	0xFF	
2	DD180	Number of next frames to be transmitted	0x01	
	DF52	Multi-packet frame counter, valid	-	
		range 0x01 to 0xFF	0xFF	
3	DD001	reserved bits, all set to logic 1		
	DF52			
4		reserved bits, all set to logic 1		
5	DD009	Parameter Group Number (PGN) expressed		
	DF52	in binary, LSB first		
6		PGN		
7		PGN		
	Single Frame			

3.7 ISO Transport Protocol – Connection Management, EOM group function

PGN 60416 (0xEC00)

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	6	0	0	236	0	X
hex	6	0	0	EC	00	X
PGN		60416 (EC00)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7

Content:

Byte	**Data Type**	**Data Field**	**Values**	**Default**
0	DD179	0x10 = Request to Send;	0x01	EOM (0x13)
	DF52	0x11 = Clear to Send;	-	
		0x13 = End of Message;	0xFF	
		0x20 = Broadcast Announce Message;		
		0xFF = Abort;		
		0x00 to 0xF, 0x12, 0x14 to 0x1F,		
		0x21 to 0xFE = Reserved		
1	DD007	Total message size, bytes	9	
	DF54		-	
			1785	
2				
3	DD180	Total number of frames received	0x01	
	DF52		-	
			0xFF	
4	DD001	reserved bits, all set to logic 1		
	DF52			
5	DD009	Parameter Group Number (PGN) expressed		
	DF52	in binary, LSB first		
6		PGN		
7		PGN		
	Single Frame			

3.8 ISO Transport Protocol – Connection Management, BAM group function

PGN 60416 (0xEC00)

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	6	0	0	236	0	X
hex	6	0	0	EC	00	X
PGN		60416 (EC00)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7

Content:

Byte	**Data Type**	**Data Field**	**Values**	**Default**
0	DD179	0x10 = Request to Send;	0x01	BAM (0x20)
	DF52	0x11 = Clear to Send;	-	
		0x13 = End of Message;	0xFF	
		0x20 = Broadcast Announce Message;		
		0xFF = Abort;		
		0x00 to 0xF, 0x12, 0x14 to 0x1F,		
		0x21 to 0xFE = Reserved		
1	DD007	Total message size, bytes	9	
	DF54		-	
			1785	
2				
3	DD180	Total number of frames to be transmitted	0x01	
	DF52		-	
			0xFF	
4	DD001	reserved bits, all set to logic 1		
	DF52			
5	DD009	Parameter Group Number (PGN) expressed		
	DF52	in binary, LSB first		
6		PGN		
7		PGN		
	Single Frame			

3.9 ISO Transport Protocol – Connection Management, Abort group function

PGN 60416 (0xEC00)

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	6	0	0	236	0	X
hex	6	0	0	EC	00	X
PGN		60416 (EC00)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7

Content:

Byte	**Data Type**	**Data Field**	**Values**	**Default**
0	DD179	0x10 = Request to Send;	0x01	Abort (0xFF)
	DF52	0x11 = Clear to Send;	-	
		0x13 = End of Message;	0xFF	
		0x20 = Broadcast Announce Message;		
		0xFF = Abort;		
		0x00 to 0xF, 0x12, 0x14 to 0x1F,		
		0x21 to 0xFE = Reserved		
1	DD001	reserved bits, all set to logic 1		
	DF52			
2				
3				
4				
5	DD009	Parameter Group Number (PGN) expressed		
	DF52	in binary, LSB first		
6		PGN		
7		PGN		
	Single Frame			

3.10 ISO Address Claim

PGN 60928 (0xEE00)
Specification: This network management message is used to claim network address, reply to devices requesting the claimed address, and to respond with device information (NAME) requested by the ISO Request (PGN 059904) or Complex Request Group Function (PGN 126208).
If a Complex Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:
If no request able fields have been included with the Complex Request, then the response is to return this PGN, just like responding to the ISO Request (PGN 059904) described above.
If the Complex Request (PGN 126208) includes one or more request able fields, then the response shall be filtered by the one or more fields and field values contained within the request.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	6	0	0	238	0	X
hex	6	0	0	EE	00	X
PGN		60928 (EE00)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7

Content:

Bits	Data Type	Data Field	Length	Values	Default
0-20	DD173	NMEA2000® Unique Number assigned	21		0
	DF52	by manufacturer to ensurethat the			
		NAME field for each manufactured			
		device is unique.			
21-31	DD172	NMEA2000® Manufacturer Code	11		0
	DF52				
32-34	DD201	Device Instance Lower	3		
	DF52	(ISO ECU Instance)			
35-39	DD174	Device Instance Upper	5		
	DF52	(ISO Function Instance)			
40-47	DD171	NMEA2000® Function Code	8		
	DF52				
48	DD175	Dominant Bits	1		
	DF52				
49-55	DD170	NMEA2000® Device Class	7		
	DF52				
56-59	DD169	System Instance (ISO Device	4	0	
	DF52	Class Instance)		-	
				15	
60-62	DD168	Industry Group	3		4
	DF52				Marine
63	DD001	reserved bit, all set to logic 1	1		
	DF52				
	Single Frame				

3.11 ISO Commanded Address

PGN 65240 (0xFED8)
Specification: ISO 11783 defined this message to provide a mechanism for assigning a network address to a node. The NAME information in the data portion of the message must match the name information of the node whose network address is to be set. ISO 11783-5 requires this message to be sent using the BAM Transport Protocol method. The appropriate response to this message is defined in section 5.2.3 of 11783-5.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	254	216	X
hex	X	0	0	FE	D8	X
PGN		65240 (FED8)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7

Content:

Bits	Data Type	Data Field	Length	Values	Default
0-20	DD173	NMEA2000® Unique Number assigned	21		0
	DF52	by manufacturer to ensurethat the			
		NAME field for each manufactured			
		device is unique.			
21-31	DD172	NMEA2000® Manufacturer Code	11		0
	DF52				
32-34	DD201	Device Instance Lower	3		
	DF52	(ISO ECU Instance)			
35-39	DD174	Device Instance Upper	5		
	DF52	(ISO Function Instance)			
40-47	DD171	NMEA2000® Function Code	8		
	DF52				
48	DD175	Dominant Bits	1		
	DF52				
49-55	DD170	NMEA2000® Device Class	7		
	DF52				
56-59	DD169	System Instance (ISO Device	4	0	
	DF52	Class Instance)		-	
				15	
60-62	DD168	Industry Group	3		4
	DF52				Marine
63	DD001	reserved bit, all set to logic 1	1		
	DF52				
64-71	DD176	New Source Address:	8		
	DF52	0x00 to 0xFB (0 to 251)=Claimable			
		NMEA 2000 network address space			
		0xFC (252) = Reserved			
		0xFD (253) = Reserved			
		0xFE (254) = Null address			
		0xFF (255) = Global address			
	BAM				

4 SAE-J1939 functions

4.1 J1939 EEC1 – Electronic Engine Controller #1

PGN 61444 (0xF004)
Type: Broadcast all 100ms
Description: Contains the engine load and the engine speed from the engine control unit (e.g. Hatz)

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	240	4	X
hex	X	0	0	F0	04	X
PGN		61444 (F004)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
Bits			SPN513	SPN190				

Content:

Byte	**SPN**	**Data Length (bits)**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0		8	uint8	not used	X	X
1		8	uint8	not used	X	X
2	513	8	uint8	Engine Load (from ECU)	1 % / -125	-125 … 125
3	190	16	uint16	Engine Speed (from ECU)	1/8 rpm	0 … 8031.8
4						
5		8	uint8	not used	X	X
6		8	uint8	not used	X	X
7		8	uint8	not used	X	X

4.2 DD2 – Dash Display 2

64671 (0xFC9F)
Type: Broadcast cyclic single frame (1000ms).
Description: Fuel level – ratio of volume of fuel to the total volume of fuel storage container.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	252	159	X
hex	X	0	0	FC	9F	X
PGN		64671 (FC9F)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN			6642					

Content:

Byte	**SPN**	**Data Length**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0		8 bits	uint8	0xFF		
1		8 bits	uint8	0xFF		%
2	6642	8 bits	uint8	Engine Fuel 2 Tank 1 Level	0,4 % / bit gain 0 offset	0 … 100 %
3		8 bits	uint8	0xFF		
4		8 bits	uint8	0xFF		
5		8 bits	uint8	0xFF		
6		8 bits	uint8	0xFF		
7		8 bits	uint8	0xFF		

4.3 J1939 A1DOC1 - Aftertreatment 1 Diesel Oxidation Catalyst 1

PGN 64800 (0xFD20)
Type: Broadcast all 500 ms
Description: Handles diagnostic and operational data from the diesel oxidation catalyst.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	6	0	0	253	32	X
hex	6	0	0	FD	20	X
PGN		64800 (FD20)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
Bits	SPN 4765							

Content:

Byte	**SPN**	**Data Length (bits)**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	4765	16	uint16	Intake Temperature	0,03125 °C/bit	-273 … 1734,96875 °C
1					-273 offset	
2						
3						
4						
5						
6						
7						

4.4 J1939 DPF C1 – Diesel Particulate Filter Control 1

PGN 64892 (0xFD7C)
Type: Broadcast cyclic single frame (1000ms)
Description: The engine Electronic Control Unit (ECU) uses DPF C1 to broadcast regeneration statuses, filter conditions, and active DPF lamp commands.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	253	124	X
hex	X	0	0	FD	7C	X
PGN		64892 (FD7C)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN		3700, 3701	3703	3708	3710		3698	

Content:

Byte	SPN	Data Length	Data Type	Parameter	Resolution / Offset	Data Range
1	3700	Bit 2-3		Active Regeneration Status	0 … 3	0 … 3
				0 = Not Active		
				1 = Active		
				2 = Regeneration Needed		
				3 = Not Available		
1	3701	Bit 4-6		DPF Status	0 … 7	0 … 7
				0 = Regeneration not needed		
				1 = Regen. needed, lowest level		
				2 = Regen. needed, moderate level		
				3 = Regen. needed, highest level		
				4-6 = reserved for SAE assignm.		
				7 = not available		
2	3703	Bit 2-3		DPF Regeneration Inhibited	0 … 3	0 … 3
				due to Inhibit Switch		
				0 = Not Inhibited		
				1 = Inhibited		
				2 = Reserved for SAE assignment		
				3 = Not Available		
3	3708	Bit 4-5		DPF Regeneration Inhibited	0 … 3	0 … 3
				due to Neutral Gear Switch		
				0 = Not Inhibited		
				1 = Inhibited		
				2 = Reserved for SAE assignment		
				3 = Not Available		
4	3710	Bit 0-1		DPF Regeneration Inhibited	0 … 3	0 … 3
				due to Parking Brake		
				0 = Not Inhibited		
				1 = Inhibited		
				2 = Reserved for SAE assignment		
				3 = Not Available		
6	3698	Bit 2-4		Exhaust Gas High Temperature	0 … 7	0 … 7
				0 = Off		
				1 = On - solid		
				2-6 = reserved for SAE assignm.		
				7 = not available		

4.5 J1939 GTACPP – Generator Total AC Percent Power

PGN 64911 (0xFD8F)
Type: Broadcast all 250 ms
Description: This PGN contains quantities for the instantaneous AC power from the generator, as percentages of rated power.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	6	0	0	253	143	X
hex	6	0	0	FD	8F	X
PGN		64911 (FD8F)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
Bits	SPN 3590		SPN 3591		SPN 3592			

Content:

Byte	**SPN**	**Data Length (bits)**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	3590	16	uint16	Generator total percent	0,0078125 %/bit	-251 … 250,99 %
1				kW (real power)	-251 offset	
2	3591	16	uint16	Generator total percent	0,0078125 %/bit	-251 … 250,99 %
3				kVA (apparent power)	-251 offset	
4	3592	16	uint16	Generator total percent	0,0078125 %/bit	-251 … 250,99 %
5				kvar (reactive power)	-251 offset	
6						
7						

4.6 HTR – Heater Information

65133 (0xFE6D)
Type: Broadcast cyclic single frame (1000ms).
Description: Status and temperature data of vehicle auxiliary or parking heaters.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	254	109	X
hex	X	0	0	FE	6D	X
PGN		65133 (FE6D)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN				1677				

Content:

Byte	**SPN**	**Data Length**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0		8 bits	uint8	0xFF		
1		8 bits	uint8	0xFF		%
2		8 bits	uint8	0xFF		
3	1677	Bit 0-3	uint8	Auxiliary Heater Mode	1 / bit	0 … 15
				0x00 = Heater not active	0 offset	
				0x01 = Off due to ADR		
				0x02 = Economy mode		
				0x03 = Normal mode		
				0x04 = Heater pump up-keep		
				0x0E = Error		
				0x0F = Not available		
4		8 bits	uint8	0xFF		
5		8 bits	uint8	0xFF		
6		8 bits	uint8	0xFF		
7		8 bits	uint8	0xFF		

4.7 J1939 HOURS – Engine Hours

PGN 65253 (0xFEE5)
Type: Broadcast cyclic single frame (100 ms)
Description: Operating hour counter.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	254	229	X
hex	X	0	0	FE	E5	X
PGN		65253 (FEE5)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	247				249			

Content:

Byte	**SPN**	**Data Length (bits)**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	247	32	uint32	Operating Hours	3 min ($\frac{1}{20}$ h)	0 … 214748364,75 h
1				(motor running)	0 offset	
2						
3						
4	249	32	uint32	Not used	-	-
5						
6						
7						

4.8 J1939 ET1 – Engine Temperatures 1

PGN 65262 (0xFEEE)
Type: Broadcast cyclic single frame (1000 ms)
Description: Generator Temperatures.

NOTE
The engine fuel temperature and the engine oil temperature are only available with engines with engine control unit (ECU) and when this ECU is in operation / when the diesel engine is running.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	254	238	X
hex	X	0	0	FE	EE	X
PGN		65262 (FEEE)				

Data Bytes:

Bits	8	8	16		16		8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
Bits	SPN 110	SPN 174	SPN 175		SPN 176		SPN 52	SPN 1134

Content:

Byte	**SPN**	**Data Length (bits)**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	110	8	uint8	Engine coolant temp.	1 °C/bit	-40 … 213 °C
				0xFE = short circuit	offset -40	
				0xFF = not available		
1	174	8	uint8	Engine fuel temp.	1 °C/bit	-40 … 213 °C
				0xFE = short circuit	offset -40	
				0xFF = not available		
2	175	16	uint16	Engine oil temp.	$\frac{1}{32}$ °C/bit	-273 … 1735 °C
3				0xFE = short circuit	offset -273	
				0xFF = not available		
4	176	16	uint16	Not used	-	-
5						
6	52	8	uint8	Not used	-	-
7	1134	8	uint8	Not used	-	-

4.9 DD1 – Dash Display 1

65276 (0xFEFC)
Type: Broadcast cyclic single frame (1000ms).
Description: Fuel level – ratio of volume of fuel to the total volume of fuel storage container.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	254	252	X
hex	X	0	0	FE	FC	X
PGN		65276 (FEFC)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN		96						

Content:

Byte	**SPN**	**Data Length**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0		8 bits	uint8	0xFF		
1	96	8 bits	uint8	Fuel Level 1	0,4 % / bit gain 0 offset	0 … 100 %
2		8 bits	uint8	0XFF		
3		8 bits	uint8	0xFF		
4		8 bits	uint8	0xFF		
5		8 bits	uint8	0xFF		
6		8 bits	uint8	0xFF		
7		8 bits	uint8	0xFF		

5 Special functions - Proprietary PGNs

5.1 PROPA00 – Remote Procedure Request

PGN 61184 (0xEF00)
Type: Single frame, target oriented, partially routed via »fpControl CAN Interface – SAE J1939« (fpControl CI-SAE J1939) [1]
Description: Special function for parameter request and for producing special operation. Using PROPA00 a remote procedure request is sent to a device which acknowledges with a PROPB00 message (PGN 65280) as described in 5.2 as broadcast. The possible requests are displayed in the chapter "RPC-Requests". An RPC-ID and up to 3 parameters (3 x 16 bits) can be transferred. **Unlike most of the standard PGNs the RPC-ID and parameters are big endian encoded.**

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	239	XX	X
hex	X	0	0	EF	XX	X
PGN		61184 (EF00)				

NOTE: »XX« in field PS must be replaced with the destination address. Refer to 5.1.1.

Data Bytes:

Bits	16	16	16	16
Name	RPD-ID	Param 1	Param 2	Param 3
SPN				

Content:

Byte	**Data Length (bits)**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	16	uint16	Request RPC-ID	-	0…65535
1					
2	16	uint16	Request Parameter 1	-	0…65535
3					
4	16	uint16	Request Parameter 2	-	0…65535
5					
6	16	uint16	Request Parameter 3	-	0…65535
7					

[1] »fpControl CAN Interface – SAE J1939«: https://knowledgebase.fischerpanda.de/?p=4052

5.1.1 The fields within the 29-bit Identifier

Field		Meaning	Description	Comment
Prio		Priority	Priority of the message on the CAN bus. Messages of higher importance are sent before those of lower priority.	»0« has the highest priority.
Parameter Group Number	EDP DP	Extended Data Page Data Page	With EDP and DP, four different data pages can be selected for J1939 messages (Parameter Group).	EDP = 0 and DP = 0: SAE J1939 Parameter Groups
	PF	PDU Format	Protocol Data Unit Format – defines whether the message is intended for a specific device in the CAN bus or for the entire network.	**1 … 239:** A specific device in the CAN bus should be addressed by this CAN message. The PS field contains the destination address. **240 … 255:** All devices in the CAN bus should be addressed by this CAN message. The PS field contains a Group Extension.
	PS	PDU Specific	Protocol Data Unit Specific – based on the value of the PF field	If the message is intended for a specific device (PF <= 239), PS is the destination address of this device. **»XX« must be replaced with a destination address != 0.** If the message is intended for all devices (PF > = 240), PS is the group extension field and enables a higher number of possible broadcast messages.
SA		Source Address	Address of the device sending the current message.	»X« must be replaced with the source address.

NOTE:

The destination address in the PS field must always be a value != 0. The destination address »0« isn´t used by any Fischer Panda device.

5.2 PROPB00 – Response for PROPA00 RPC-request

PGN 65280 (0xFF00)
Type: Broadcast single frame, partially routed via »fpControl CAN Interface – SAE J1939« (fpControl CI-SAE J1939) [2]
Description: RPC-Response frame for PROPA00 (refer to 5.1) and for file transfer. In case of an error the RPC-ID and 0xFFFF$_{hex}$ in parameter fields 1-3 will be transferred.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	0	X
hex	X	0	0	FF	00	X
PGN		65280 (FF00)				

Data Bytes:

Bits	16	16	16	16
Name	Function	Param 1	Param 2	Param 3
Bits				

Content:

Byte	**Data Length (bits)**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	16	uint16	Requested RPC-ID	-	0…65535
1					
2	16	uint16	Request Parameter 1	-	0…65535
3					
4	16	uint16	Request Parameter 2	-	0…65535
5					
6	16	uint16	Request Parameter 3	-	0…65535
7					

[2] »fpControl CAN Interface – SAE J1939«: https://knowledgebase.fischerpanda.de/?p=4052

5.3 PROPB01 – Generator System Information

PGN 65281 (0xFF01)
Type: Broadcast cyclic single frame (250 ms)
Source: fpControl
Description: This frame is sent cyclic from generator controller to the panel. Different states and display messages are contained which can also be evaluated from extern.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	1	X
hex	X	0	0	FF	01	X
PGN		65281 (FF01)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	520200		520192	520195	520193	520201	520202	520203

Content:

Byte	**SPN**	**Data Length**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	520200	16 bits	uint16	System battery voltage	$\frac{1}{10}$ V / bit	0…6553,5
1					0 offset	
2	520192	8 bits	uint8	**System state**	0 – 255	0...255
				0 = Standby (Generator is stopped)		
				1 = Self-test		
				2 = Preheat		
				3 = Starting (Starter on)		
				4 = Starting		
				5 = Start-up phase (Starter off)		
				6 = Override phase		
				(Frequency control)		
				7 = Warm-up phase		
				(Switching to voltage		
				control with checking		
				oil pressure)		
				8 = Normal mode		
				(Generator is running)		
				9 = Stopping phase		
				possibly with turbo lag		
				10 = Error occurred		
				11 to 255 are unused		

Byte	SPN	Data Length	Data Type	Parameter	Resolution / Offset	Data Range
3	520195	8 bits	uint8	Error code if in error state	0 – 255	0...255
4	520193	8 bits	uint8	Delay until next state	0 – 255	0...255
5	520201	8 bits	uint8	Cyclic recurring		
				unacknowledged warnings.	0 – 255	0...255
				Warnings are toggled per		
				cycle, that means every		
				500 ms for example 1, 6,		
				3, 4, 1, 6, 3, 4… and so on.		
				If a warning has been		
				acknowledged Show Warning=0		
				until the next warning		
6	520202	8 bits	uint8	Cyclic recurring all active		
				warnings. Warning is active		
				if <> 0. A warning is active		
				if it is acknowledged and no		
				longer displayed but still		
				present. This warning is		
				displayed cyclic.	0 – 255	0...255
7	520203	8 bits	uint8	Special config bits:	0 – 255	0...255
		Bit 0		1 = automatic start active,		
				0 = automatic start inactive		
		Bit 1		1 = automatic start requested,		
				genset will try to start		
		Bit 2		Not used		
		Bit 3		Not used		
		Bit 4		1 = teach start request		
		Bit 5		1 = Actuator max position test		
		Bit 6		1 = Actuator teaching OK		
		Bit 7		1 = Actuator teaching failed	0 – 255	0...255

5.4 PROPB03 – Generator System RPM

PGN 65283 (0xFF03)
Type: Broadcast cyclic single frame (100 ms)
Source: fpControl or Inverter
Description: Generator RPM. In case of iSeries generators the RPM is sent by the inverter. PROPB03 is required for the "Start without inverter" function.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	3	X
hex	X	0	0	FF	03	X
PGN		65283 (FF03)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	520230							

Content:

Byte	**SPN**	**Data Length (bits)**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	520230	16	uint16	Engine Speed	1 rpm / bit	0 … 65535
1				(sent from inverter)	0 offset	
2		8			-	-
3		8			-	-
4		8			-	-
5		8			-	-
6		8			-	-
7		8			-	-

5.5 PROPB05 – Generator System Temperatures

PGN 65285 (0xFF05)
Type: Broadcast cyclic single frame (100 ms)
Source: fpControl
Description: Temperature Information about the system.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	5	X
hex	X	0	0	FF	05	X
PGN		65285 (FF05)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	520204	520205	520206					

Content:

Byte	**SPN**	**Data Length**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	520204	8 bits	uint8	Temperature Winding	1 °C / bit	-40 … 213 °C
				0xFE = short circuit	-40 offset	
				0xFF = not available		
1	520205	8 bits	uint8	Temperature Exhaust	1 °C / bit	-40 … 213 °C
				0xFE = short circuit	-40 offset	
				0xFF = not available		
2	520206	8 bits	uint8	Temperature MCU	1 °C / bit	-40 … 213 °C
				0xFE = short circuit	-40 offset	
				0xFF = not available		
3		8 bits	uint8			
4		8 bits	uint8			
5		8 bits	uint8			
6		8 bits	uint8			
7		8 bits	uint8			

5.6 PROPB08 – System Information

PGN 65288 (0xFF08)
Type: Broadcast cyclic single frame (5 s)
Description: Transmits the system information consisting of Generator Type and Nominal Genset Power.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	8	X
hex	X	0	0	FF	08	X
PGN		65288 (FF08)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	520302		520303					

Content:

Byte	**SPN**	**Data Length (bits)**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	520302	16	uint16	Generator Type	1 / bit	0…65535
1					0 Offset	
2	520303	16	uint16	Nominal Genset Power	1 kW / bit	0…65535 kW
3				[kW]	0 Offset	
4					-	
5						
6					-	
7						

Type codes for Marine VS DC Generators

Generator Type Code	**Generator Type**
3001	20-VS
3002	35-VS
3003	45-VS
3004	75-VS
3005	100-VS

5.7 PROPB0F – Service Hour Counter

PGN 65295 (0xFF0F)
Type: Broadcast cyclic single frame (100 ms)
Description: Service Hour Counter.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	15	X
hex	X	0	0	FF	0F	X
PGN		65295 (FF0F)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	520223							

Content:

Byte	**SPN**	**Data Length**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	520223	32 bits	uint32	Service Hour Counter [LSB]	3 min (1/20 h)	0 … 214748364,75 h
1				[second byte]	0 offset	
2				[third byte]		
3				[MSB]		
4		8 bits	uint8	-	-	-
5		8 bits	uint8	-	-	-
6		8 bits	uint8	-	-	-
7		8 bits	uint8	-	-	-

5.8 PROPB14 – AGT 1 (Generator DC Output)

PGN 65300 (0xFF14)
Type: Broadcast cyclic single frame (100 ms)
Description: AGT DC Voltage, DC Current and DC Power of Generator DC Output.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	20	X
hex	X	0	0	FF	14	X
PGN		65300 (FF14)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	520207		520208		520209			

Content:

Byte	**SPN**	**Data Length**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	520207	16 bits	uint16	AGT Gen-Out DC Voltage	0,1 V / bit	0 … 6553,5 V
1					0 offset	
2	520208	16 bits	uint16	AGT Gen-Out DC Current	0,1 A / bit	-3000,0 A … 3553,5 A
3					-3000,0 A offset	
4	520209	32 bits	uint32	AGT Gen-Out DC Power	1 W / bit	-2E9 … 2E9 W
5					-2E9 W offset	
6						
7						

5.9 PROPB16 – AGT 3 (temperatures)

PGN 65302 (0xFF16)
Type: Broadcast cyclic single frame (100ms)
Description: AGT temperatures of heatsink, rail+, rail- and MCU. / HYBR temperatures of IGBT-1, IGBT-2, IGBT-3 and Cabinet.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	22	X
hex	X	0	0	FF	16	X
PGN		65302 (FF16)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	520226	520227	520228					520229

Content:

Byte	SPN	Data Length	Data Type	Parameter	Resolution / Offset	Data Range
0	520226	8 bits	uint8	AGT Temp. heatsink / HYBR Temp. IGBT-1 0xFE = short circuit 0xFF = not available	1 °C / bit -40 offset	-40 … 213 °C
1	520227	8 bits	uint8	AGT Temp. rail+ / HYBR Temp. IGBT-2 0xFE = short circuit 0xFF = not available	1 °C / bit -40 offset	-40 … 213 °C
2	520228	8 bits	uint8	AGT Temp. rail- / HYBR Temp. IGBT-3 0xFE = short circuit 0xFF = not available	1 °C / bit -40 offset	-40 … 213 °C
3		8 bits				
4		8 bits				
5		8 bits				
6		8 bits				
7	520229	8 bits	uint8	AGT Temp. electr. (MCU) / AGT HYBR Temp. Cabinet 0xFE = short circuit 0xFF = not available	1 °C / bit -40 offset	-40 … 213 °C

5.10 PROPB17 – AGT 4 (Proprietary AC Generator Values)

PGN 65303 (0xFF17)
Type: Broadcast cyclic single frame (100 ms)
Description: Proprietary AC Generator Values for Debug and Visualization (AGT AC Voltage, Current, Frequency and Power).

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	23	X
hex	X	0	0	FF	17	X
PGN		65303 (FF17)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	520277		520278		520231		520280	

Content:

Byte	**SPN**	**Data Length**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	520277	16 bits	uint16	AGT AC Voltage	0,1 V / bit	0 … 6553,5 V
1					0 offset	
2	520278	16 bits	uint16	AGT AC Current	0,1 A / bit	0 … 6553,5 A
3					0 offset	
4	520231	16 bits	uint16	AGT AC Frequency	$\frac{1}{128}$ Hz / bit	0 … 501,9921875 Hz
5					0 offset	
6	520280	16 bits	uint16	AGT AC Power	0,1 kW / bit	0 … 6553,5 kW
7					0 offset	

5.11 PROPB18 – AGT 5 (Battery charge)

PGN 65304 (0xFF18)
Type: Broadcast cyclic single frame (250 ms)
Description: This PGN contains the battery charge in [%]. It is sent cyclically from generator control if an AGT type is configured. The cyclic transmission of the PGN 65304 can be deactivated / activated via the RPC-ID 0x0213. If the PGN 65304 is sent cyclically, the panel shows a battery symbol with a charging bar instead of the load on the generator.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	24	X
hex	X	0	0	FF	18	X
PGN		65304 (FF18)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	520269							

Content:

Byte	**SPN**	**Data Length**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	520269	16 bits	uint16	AGT Battery charge	0,0078125 % / bit	-251 … 250,99%
1					-251 offset	
2		8 bits	uint8	-	-	-
3		8 bits	uint8	-	-	-
4		8 bits	uint8	-	-	-
5		8 bits	uint8	-	-	-
6		8 bits	uint8	-	-	-
7		8 bits	uint8	-	-	-

5.12 PROPB19 – AGT 6 (Battery charger control target value and limiter)

PGN 65305 (0xFF19)
Type: Broadcast cyclic single frame (250ms). If the message is not sent cyclically, the AGT goes to idle for safety reasons (timeout: 250 ms).
Description: The control for voltage or current is selected via the control target value in SPN 520270. This PGN is also used to code whether the other size is to be used as limiter.

When regulating to voltage without limitation the current is ignored. If the limitation is active, the voltage is regulated as long as the battery current is below its limit value. When the battery current reaches its limit, the system switches to current control. The battery management system delivers the input values.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	25	X
hex	X	0	0	FF	19	X
PGN		65305 (FF19)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	520270	520271	520272		520273			

Content:

Byte	SPN	Data Length	Data Type	Parameter	Resolution / Offset	Data Range
0	520270	8 bits	uint8	**control target value** (voltage or current), **type of limiter** and if the **limiter is active or not**	1 / bit 0 offset	0 = U 1 = U with I limit 2 = I 3 = I with U limit 4 = P 5 = P with U limit 6 = P with I limit 7 = P with U and I limit
1	520271	8 bits	uint8	**Battery capacity** (current state of charge of the battery)	1 % / bit 0 offset	0 … 100 %
2	520272	16 bits	uint16	**Battery voltage** (control variable when ctrl. voltage or voltage limiter when controlling current)	0,1 V / bit 0 offset	0 … 6553,5 V
3						
4	520273	16 bits	uint16	**Battery current** (control variable when ctrl. current or current limiter when controlling voltage)	0,1 A / bit 0 offset	0 … 6553,5 A
5						
6						
7						

5.13 PROPB1A – AGT 7 (Charger output mode and value)

PGN 65306 (0xFF1A)
Type: Broadcast cyclic single frame (100ms).
Description: This message is sent from the battery charger and it informs cyclic about the mode, the output value, and the state of the charger.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	26	X
hex	X	0	0	FF	1A	X
PGN		65306 (FF1A)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	520274		520275		520276		520299	

Content:

Byte	SPN	Data Length	Data Type	Parameter	Resolution / Offset	Data Range
0	520274	16 bits	uint16	**Charger output mode**	1 / bit	0 … 4
1					0 offset	0 = none
						1 = voltage
						2 = current
						3 = percent
						4 = power
2	520275	16 bits	uint16	**Charger output value**		
3				**dependent on** the		
				output mode it is the		
				voltage,	0,1 V / bit	0 … 6553,5 V
				current,	0,1 A / bit	0 … 6553,5 A
				percent	0,1 % / bit	0 … 100,0 %
				or **power**.	0,1 kVA / bit	0 … 6553,5 kVA
					0 offset	
4	520276	16 bits	uint16	**Charger state**	1 / bit	0 … 2
5					0 offset	0 = bulk
						1 = absorption
						2 = float
						0xffff = not available
6	520299	16 bits	uint16	HYBR Set Voltage	0,1 V / bit	0 … 6553,5 V
7					0 offset	

5.14 PROPB1B – AGT 8 (Power Control)

PGN 65307 (0xFF1B)
Type: Broadcast cyclic single frame (250ms). If the message is not sent cyclically, the AGT goes to idle for safety reasons (timeout: 250 ms).
Description: PGN to support power control. Power specification of the apparent power in full VA.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	27	X
hex	X	0	0	FF	1B	X
PGN		65307 (FF1B)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	520291							

Content:

Byte	**SPN**	**Data Length**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	520291	32 bits	uint32	Apparent power	1 VA / bit	0 … 327.670 VA
1				in full [VA]	0 offset	
2						
3						
4		8 bits	uint8	-	-	-
5		8 bits	uint8	-	-	-
6		8 bits	uint8	-	-	-
7		8 bits	uint8	-	-	-

5.15 PROPB25 – fpCAN Device Info

PGN 65317 (0xFF25)
Type: Broadcast cyclic single frame (1 s).
Description:

- Sends Bus ID, Module ID, Software Version and Serial Number of each detected fpCAN device.
- Cycles through the detected fpCAN devices on each transmit.

Structure of the 29-bit identifier:

Bits	3	1	1	8	8	8
Name	Prio	EDP	DP	PF	PS	SA
dec	X	0	0	255	37	X
hex	X	0	0	FF	25	X
PGN		65317 (FF25)				

Data Bytes:

Bits	8	8	8	8	8	8	8	8
Name	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
SPN	520243	520244	520245		520246			

Content:

Byte	**SPN**	**Data Length**	**Data Type**	**Parameter**	**Resolution / Offset**	**Data Range**
0	520243	8 bits	uint8	**Bus ID**	1 / bit 0 offset	0 … 255
1	520244	8 bits	uint8	**Module ID**	1 / bit 0 offset	0 … 255
2	520245	16 bits	uint16	**Software Version**	1 / bit 0 offset	0 … 65535
3						
4	520246	32 bits	uint32	**Serial Number**	1 / bit 0 offset	0 … 4.294.967.296
5						
6						
7						

Encoding of »Software Version«

Upper nibble MSB	**Lower nibble MSB**	**LSB**
Release Candidate 0-15	Major Version 0-15	Minor Version 0-255

6 Remote Procedure Requests

6.1 Introduction to the topic

Although basic runtime information will be made available on the J1939/NMEA2000® bus it is not possible to map all functionality to the standard PGNs. Because of the necessity to make those unmapped parameters/functions accessible the FP-Bus supports a simplified RPC-mechanism.

6.2 Functionality

It is possible to request/set specific data and/or request the execution of a function on a FP-Bus device. Therefore, the RPC-mechanism uses the proprietary Fischer Panda Messages PGNs PropA00 (PGN 61184) and PropB00 (PGN 65280). PropA00 is used to send the request and due to its definition as address oriented PGN the request can either be sent to an individual device (unicast) or to all devices (multicast). The device processing the request will check if the requested RPC-ID is known to it. If so, it will acknowledge it with sending the answer on PropB00, if not it will not respond anything. In case of an error while processing a request the parameter fields 1-3 of the corresponding response would be set to $0xFFFF_{hex}$. PropB00 will always be broadcasted, so that every device on the bus is able to process it (if necessary).

6.3 Request types

The RPC-ID is a unique identifier for individual functions on FP-Bus devices. The identifier itself is 15 bits wide and is represented by the lower 15 bits of the first word of an RPC-Request/-Response. The MSB (bit 15) categorizes it into *»read- and write-requests«*. The MSB set to 1 indicates a *»write-request«* (e.g. write something into a register, execute a function that changes parameters, conditions etc.), whereas the MSB set to 0 indicates a read-request (e.g. request of a special parameter, condition etc.).

6.4 Endianness of the RPC-PGNs

Unlike most of the standard PGNs the content of the RPC-PGNs is **big endian** encoded.

6.5 Notice for sending RPC requests

NOTICE
Property damage to the generator control due to cyclic remote procedure requests.
Most remote procedure requests write to the EEPROM.
Frequent writing to the EEPROM can lead to the rapid destruction of this component.
Send remote procedure requests only once, never cyclically.

6.6 RPC-ID 0x000d – Clear errors/warnings

Type: R / W

Description: This RPC clears errors/warnings. If the generator ran into an error - after clearing it resets the generator-status to 0 (standby).
ATTENTION: If the generator-control is in automatic-start mode and there is still an active start request (e.g. by digital input or RPC-ID 0x809c) the generator will try to start again after clearing an error.

Read Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	-	-	-
param #1	-	-	-
param #2	-	-	-
param #3	-	-	-

Read Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	-	-	-
param #1	-	-	-
param #2	-	-	-
param #3	-	-	-

Write Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x800d	-	-
param #1	0xffff: clears all warnings	1 / bit	0 … 65535
	0x0000 – 0x00ff clears	0 offset	
	individual warning		
param #2	0xffff: clears error	1 / bit	0 … 65535
		0 offset	
param #3	-	-	-

Write Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x800d	-	-
param #1	echoed value of request	1 / bit	0 … 65535
		0 offset	
param #2	echoed value of request	1 / bit	0 … 65535
		0 offset	
param #3	-	-	-

6.7 RPC-ID 0x0012 – Automatic start mode

Type: R / W

Description: This RPC informs about the status of the automatic start mode (Read Request) and is used to activate/deactivate the automatic start mode (Write Request).

NOTE

At the **iControl2 system** activating the automatic start is only possible using the control panel.

Read Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x0012	-	-
param #1	-	-	-
param #2	-	-	-
param #3	-	-	-

Read Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x0012	-	-
param #1	0: automatic start-mode off	1 / bit	0 … 1
	1: automatic start-mode on	0 offset	
param #2	minimum value	1 / bit	0 … 1
		0 offset	
param #3	maximum value	1 / bit	0 … 1
		0 offset	

Write Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x8012	-	-
param #1	0: automatic start-mode off	1 / bit	0 … 1
	1: automatic start-mode on	0 offset	
param #2	-	-	-
param #3	-	-	-

Write Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x8012	-	-
param #1	0: automatic start-mode off	1 / bit	0 … 1
	1: automatic start-mode on	0 offset	
param #2	-	-	-
param #3	-	-	-

6.8 RPC-ID 0x008b – Service done

Type: W

Description: Resetting the service interval to the number of operating hours defined for the relevant generator type.

Write Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x808b	-	-
param #1	0x0001 = service done	1 / bit	0 … 1
		0 offset	
param #2	-	-	-
param #3	-	-	-

Write Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x808b	-	-
param #1	0x0001 = service done	1 / bit	0 … 1
		0 offset	
param #2	-	-	-
param #3	-	-	-

6.9 RPC-ID 0x008e – Set CPU in Power-Save-Mode (Sleep controller)

Type: W

Description: Remote Power Off.
The panel sends this RPC frame with the first payload word set to “1” which turns off the control.

Write Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x808e	-	-
param #1	0 = Running	1 / bit	0 … 1
	1 = Turn off the control	0 offset	
param #2	-	-	-
param #3	-	-	-

Write Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x808e	-	-
param #1	echoed value of request	1 / bit	0 … 1
		0 offset	
param #2	-	-	-
param #3	-	-	-

6.10 RPC-ID 0x0093 – Read software release

Type: R

Description: Being requested this RPC delivers the software release of the device.

Read Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x0093	-	-
param #1	[MSB] = server address	1 / bit	0 … 65535
	[LSB] = client address	0 offset	
param #2	-	-	-
param #3	-	-	-

Read Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x0093	-	-
param #1	[MSB] = Bus address	1 / bit	0 … 65535
	[LSB] = Module ID	0 offset	
param #2	Software Release	1 / bit	0 … 65535
	format [xx].[yy]	0 offset	
param #3	-	-	-

6.11 RPC-ID 0x0094 – Read serial number

Type: R

Description: Being requested this RPC delivers the serial number of the addressed device.

Read Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x0094	-	-
param #1	Client address	1 / bit	0 … 65535
		0 offset	
param #2	-	-	-
param #3	-	-	-

Read Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x0094	-	-
param #1	[MSB] = Bus address	1 / bit	0 … 65535
	[LSB] = Modul ID	0 offset	
param #2	Serial number, [MSW]	1 / bit	0 … 65535
		0 offset	
param #3	Serial number, [LSW]	-	-

How does an RPC request for the serial number work in practice? Let's dive into it:
In this example we will request the serial number of two communication interfaces using PROPA00 (PGN 61184) (refer to **??**). A remote procedure request for RPC ID 0x0094 is sent to each device which acknowledges with PROPB00 (PGN 65280) (refer to **??**) as broadcast. Parameter #1 (Payload1) contains the bus address of the subscriber whose serial number is to be requested. In this example it is address »234« (hex. 0xEA). This request must be carried out separately for each bus subscriber whose serial number is required.

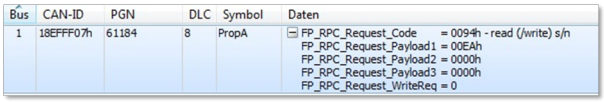


Figure 1: Example for an RPC request for the serial number

In our example, we also request the serial number of the second communication interface with the address »235«. Below you can see the acknowledgements (PROPB00) of both interfaces to our requests.

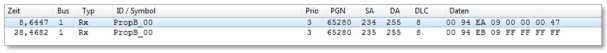


Figure 2: Acknowledgements (PROPB00) of both interfaces to the request for the serial number

The contents of the acknowledgement messages in detail:

Read Response	**Acknowledgement of the first request**	**Acknowledgement of the second request**
RPC-ID	**0x0094**	**0x0094**
param #1	[MSB] = Bus address = **0xEA** = 234 dec, [LSB] = Modul ID = **0x09** (Com. Interface)	[MSB] = Bus address = **0xEB** = 235 dec, [LSB] = Modul ID = **0x09** (Com. Interface)
param #2	Serial number, [MSW] = **0x0000**	Serial number, [MSW] = **0xFFFF** = 65535 dec *)
param #3	Serial number, [LSW] = **0x0047** = 71 dec	Serial number, [LSW] = **0xFFFF** = 65535 dec

*) The second interface requested in this example is a development hardware and does not have a valid serial number, therefore 0xFFFF.

6.12 RPC-ID 0x009c – Remote start of Generator

Type: R / W

Description: The functionality of this RPC is based on the remote-start feature using the dedicated digital input on the generator control unit. A switch closing the circuit between this digital input and GND would request a generator remote start-procedure. Analogously sending a write request with payload 1 will do. Sending 0 would be the equivalent of opening the switch again. Thinking of a virtual switch (e.g. in a remote application's GUI) the answer Frames of either 0x809c or 0x009c will contain the position (0/1) of this switch. **So that the generator can be started receiving this message the automatic-start mode must be activated.**

Read Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x009c	-	-
param #1	-	-	-
param #2	-	-	-
param #3	-	-	-

Read Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x009c	-	-
param #1	position of remote GUI's switch	1 / bit 0 offset	0 … 1
param #2	-	-	-
param #3	-	-	-

Write Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x809c	-	-
param #1	1 = start 0 = stop	1 / bit 0 offset	0 … 1
param #2	-	-	-
param #3	-	-	-

Write Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x809c	-	-
param #1	position of remote GUI's switch	1 / bit	0 … 1
		0 offset	
param #2	-	-	-
param #3	-	-	-

6.13 RPC-ID 0x009e – Power on via RPC

Type: W

Description: With this RPC ID, the controller can be switched on via a bus command (remote power on).

Write Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x809e	-	-
param #1	0x0001 = remote power on	1 / bit	0 … 1
		0 offset	
param #2	don't care	-	-
param #3	don't care	-	-

Write Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x809e	-	-
param #1	echoed value of request	-	-
param #2	-	-	-
param #3	-	-	-

Note: The system can be **switched off** again using **RPC-ID 0x008e**.

Note: If there are several CAN interfaces in the fpCAN bus (several generator systems) you can "wake up" individual systems instead of all together (destination address DA: FF). In this case, the destination address of the corresponding CAN interface must be selected in the PROPA00 message (PGN 61184).

6.14 RPC-ID 0x009f – Switching utility relay output

Type: W

Description: Switching the utility relay output on / off.
Note: Without a release, for example by a sync module, independent switching is not possible.

Read Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x809f	-	-
param #1	0 = requests **switching off**	1 / bit	0 … 1
	the relay contact	0 offset	
	1 = requests **switching on**		
	the relay contact		
param #2	-	-	-
param #3	-	-	-

Read Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x809f	-	-
param #1	echoed value of request	1 / bit	0 … 1
param #2	-	-	-
param #3	-	-	-

6.15 RPC-ID 0x0214 – Setting AGT charger mode

Type: R / W

Description: With this RPC-ID the charger can be set into its different modes: BMS, UIU Charger or Hybrid Charger.

Read Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x0214	-	-
param #1	-	-	-
param #2	-	-	-
param #3	-	-	-

Read Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x0214	-	-
param #1	**Mode**	1 / bit	0 … 1 (AGT)
	0 = BMS	0 offset	10 (Hybrid Charger)
	1 = UIU Charger (this		
	is the default value)		
	10 = Hybrid Charger		
param #2	min. value: 0	1 / bit	0
		0 offset	
param #3	max. value: number of	1 / bit	0 … 2
	available modes - 1	0 offset	

Write Request	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x8214	-	-
param #1	**Mode**	1 / bit	0 … 1 (AGT)
	0 = BMS	0 offset	10 (Hybrid Charger)
	1 = UIU Charger (this		
	is the default value)		
	10 = Hybrid Charger		
param #2	-	-	-
param #3	-	-	-

Write Response	Parameter definition	Resolution / Offset	Data Range
RPC-ID	0x8214	-	-
param #1	echoed value of request:	1 / bit	0 … 1 (AGT)
	Mode	0 offset	10 (Hybrid Charger)
param #2	-	-	-
param #3	-	-	-

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