37382

OptionSC09/SC10
Engine CAN Bus

Functional Description
GCP-30 from Software Version 4.3046

Manual 37382

WARNING

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions. Failure to follow instructions can cause personal injury and/or property damage.

The engine, turbine, or other type of prime mover should be equipped with an overspeed (overtemperature, or overpressure, where applicable) shutdown device(s), that operates totally independently of the prime mover control device(s) to protect against runaway or damage to the engine, turbine, or other type of prime mover with possible personal injury or loss of life should the mechanical-hydraulic governor(s) or electric control(s), the actuator(s), fuel control(s), the driving mechanism(s), the linkage(s), or the controlled device(s) fail.

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

CAUTION

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts.

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

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Important definitions

WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation that, if not avoided, could result in damage to equipment.

NOTE

Provides other helpful information that does not fall under the warning or caution categories.

Revision History

Rev.	Date	Editor	Changes
NEW	07-02-07	TP	Release based on 37313B

Contents

Chapter 1.
General Information

CAUTION

This brief manual can only be used together with the complete manual.

This manual describes the following options:

- **Option SC09:**
  - mtu MDEC or
  - Deutz EMR 2 or
  - Standard ECU viar **SAE J1939**
  - and **Woodward IKD 1** (unit 1; details in manual GR37135)
  - and **Woodward IKD 1** (unit 2; details in manual GR37135)
  - Monitoring of ECU measured values
  - Control of Scania S6 via J1939
  - Control of Volvo EMS2 via J1939
  - Control of mtu ADEC via J1939
  - Control via J1939 standard messages

- **Option SC10** (additionally to **SC09**)
  Woodward ST 3 (details in manual GR37112)

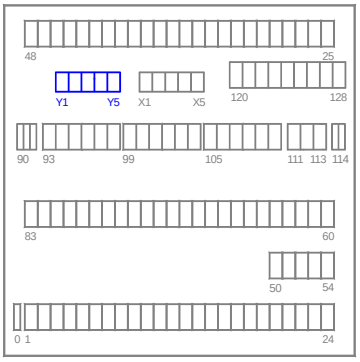
The **Options SC09**, and **SC10** allows to operate the above mentioned devices at the CAN engine bus. It is not possible to operate 2 engine controls at the same time.

The connected devices have to be enabled using the configuration.

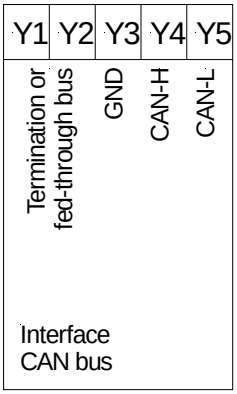
Chapter 2.
Option SC09/SC10

Connection

back view:



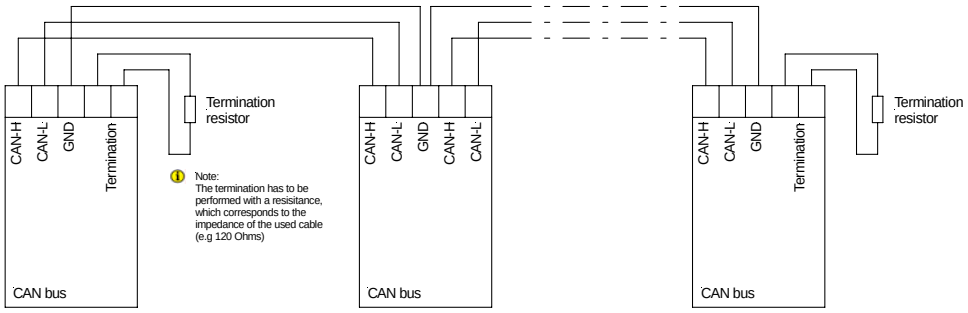
terminal assignment



Y1	Y2	Y3	Y4	Y5	CAN bus (engine bus)
[1] CAN-H	[1] CAN-L	GND	CAN-H	CAN-L	CAN bus
X1	X2	X3	X4	X5	CAN bus (guidance bus)

[1]..may be used for feeding through the CAN bus to other participants or for connecting the termination reisitor.

Please note that the CAN bus line has to be terminated with a termination resistor at both ends! The following figure illustrates the structure of a CAN bus.



Configuration

Configure engin.bus JA

Configuration of the engine bus **YES/NO**

To ensure a fast proceeding in the extensive configuration screens, different parameter groups are grouped in blocks. A setting to "YES" or "NO" has no influence on the fact whether a control, monitoring, etc. is performed or not. The entry has only the following effects:

YES .....The configuration screens of the following blocks are displayed and can either be enabled ("Select" button) or parameter changes can be performed ("Cursor→", "Digit↑" or "Select" buttons). A decision whether the parameters are processed will not be made.

NO .....The parameters of the following block are skipped, i.e. they are not displayed and cannot be changed.

CAN baud rate 000kBd

Baud rate of the engine CAN bus **100/125/250/500 kBaud**

Baud rate of the engine CAN bus. Please note that **all** participants at the engine CAN bus have to be operated with the same baud rate.
The default value is 250 kBaud.
(If an MDEC unit is to be connected, 125 kBaud is to be configured here.)

IKD 1 - Digital Extension Card

NOTE

The discrete inputs of the IKD 1 can only be configured using the PC software LeoPC1.
Please take information about the IKD 1 functions and configuration from the Woodward manual 37135.

Parameter

IKDx on bus
NO
[x = 1/2]

IKD 1.x on bus **YES/NO**

YES..... The IKD 1 functions are activated. Moreover, it is monitored whether the IKD 1.{x} is connected to the engine bus. If this parameter is set to YES, but the IKD 1.{x} is not connected to the CAN bus, an interface error will be triggered in the GCP.
NO..... The functions of the IKD 1 are locked and no communication monitoring to IKD1.{x} is performed.

Note to IKD 1 interface error - The "interface error Y1Y5" with alarm class 1 is triggered, if the GCP does not receive a message from the IKD 1 for about 5 s. Moreover, the relay with the parameter 134 (or 135) de-energizes (or energizes; depending on programming). The relay energizes again as soon as the GCP receives data from the IKD 1 again. The message "interface error Y1Y5" is only cleared with an acknowledgement.

IKD 1 Relay Outputs

The parameters are at the end of the GCP configuration file. Please note that you may have to perform additional settings directly at the IKD 1 via direct configuration if necessary. Please observe the IKD 1 manual about this.

Assignment {x}. relay on IKD{y}
[x = 1..8] / [y = 1/2]

Configuration of the relay outputs on the IKD 1.y

The relay {x} on the IKD 1.{y} energizes if the configured logical condition is fulfilled.

Example: Relay 2 on the IKD 1.2

Assignment 2. relay on IKD2

Configuration of the 2nd relay on the IKD 1.2

The relay 2 on the IKD 1.2 energizes if the configured logical condition is fulfilled.

IKD 1 Discrete Inputs

The parameters are at the end of the GCP configuration file. Please note that you may have to perform additional settings (e.g. normally open/closed, delay, alarm class, etc.) directly at the IKD 1 via direct configuration if necessary. Please observe the IKD 1 manual about this.

Error text DI{x} IKD{y} (term. {z})
[x = 1..8] / [y = 1/2] / [z = 5..12]

Configuration of the IKD 1.y alarm texts

The discrete input {x} (term. {y}) on the IKD 1.{z} displays the text configured here at the GCP display.

Example: Discrete input 5 on the IKD 1.1

Error text DI5 IKD1 (term. 9)

Configuration of the IKD 1.1 alarm texts

The discrete input 5 (term. 9) on the IKD 1.1 displays the text configured here at the GCP display.

Relay Manager

No.	Outputs	Comment
...	...	
98	IKD 1.[1] - discrete input [1]	
99	IKD 1.[1] - discrete input [2]	
100	IKD 1.[1] - discrete input [3]	
101	IKD 1.[1] - discrete input [4]	
102	IKD 1.[1] - discrete input [5]	
103	IKD 1.[1] - discrete input [6]	
104	IKD 1.[1] - discrete input [7]	
105	IKD 1.[1] - discrete input [8]	
106	IKD 1.[2] - discrete input [1]	
107	IKD 1.[2] - discrete input [2]	
108	IKD 1.[2] - discrete input [3]	
109	IKD 1.[2] - discrete input [4]	
110	IKD 1.[2] - discrete input [5]	
111	IKD 1.[2] - discrete input [6]	
112	IKD 1.[2] - discrete input [7]	
113	IKD 1.[2] - discrete input [8]	
...	...	
134	Communication with IKD1.[1] okay	
135	Communication with IKD1.[2] okay	
..	..	

Send Telegram 'Guidance Bus of the GCP-30'

MUX	No.	Content (words)	Unit	Comment	
...	...	...			
4/1	13	IKD 1 alarms		Bit 15 = 1	IKD 1.[1] - discrete input [8]
				Bit 14 = 1	IKD 1.[1] - discrete input [7]
				Bit 13 = 1	IKD 1.[1] - discrete input [6]
				Bit 12 = 1	IKD 1.[1] - discrete input [5]
				Bit 11 = 1	IKD 1.[1] - discrete input [4]
				Bit 10 = 1	IKD 1.[1] - discrete input [3]
				Bit 9 = 1	IKD 1.[1] - discrete input [2]
				Bit 8 = 1	IKD 1.[1] - discrete input [1]
				Bit 7 = 1	
				Bit 6 = 1	
				Bit 5 = 1	
				Bit 4 = 1	
				Bit 3 = 1	
				Bit 2 = 1	
				Bit 1 = 1	
				Bit 0 = 1	
...	...	...			
22/2	68	IKD 1.[2] alarms		Bit 15 = 1	IKD 1.[2] - discrete input [1]
				Bit 14 = 1	IKD 1.[2] - discrete input [2]
				Bit 13 = 1	IKD 1.[2] - discrete input [3]
				Bit 12 = 1	IKD 1.[2] - discrete input [4]
				Bit 11 = 1	IKD 1.[2] - discrete input [5]
				Bit 10 = 1	IKD 1.[2] - discrete input [6]
				Bit 9 = 1	IKD 1.[2] - discrete input [7]
				Bit 8 = 1	IKD 1.[2] - discrete input [8]
				Bit 7 = 1	
				Bit 6 = 1	
				Bit 5 = 1	
				Bit 4 = 1	
				Bit 3 = 1	
				Bit 2 = 1	
				Bit 1 = 1	
				Bit 0 = 1	
...	...	...			

ST 3 - Lambda Controller (not with Option SC09)

NOTE

The ST 3 functions can only be configured using the PC software LeoPC1.
Please take information about the ST 3 functions from the Woodward manual 37112.

Parameter

ST3 on bus NO

ST 3 on engine bus	**YES/NO**

YES .....The ST 3 functions are activated. Moreover, it is monitored whether the ST 3 is connected to the engine bus. If this parameter is set to YES, but the ST 3 is not connected to the CAN bus, an interface error will be triggered in the GCP.
NO .....The ST 3 functions are locked and the communication to the ST 3 is not monitored.

Note: Ensure that the ST 3 controller is configured correctly. Enter 6 as **Node-ID** there.

Note to ST 3 interface error - The "interface error Y1Y5" with alarm class 1 is triggered, if the GCP does not receive a message from the ST 3 for about 5 s. The ST 3 display values are overwritten with "0". Moreover, the relay with the parameter 136 de-energizes (or energizes; depending on programming). If the GCP receives data from the ST 3 again, the relay energizes again, and the ST 3 values are displayed again. The message "interface error Y1Y5" is only cleared with an acknowledgement.
(If an interface error Y1Y5 is triggered, which has been caused by e.g. a faulty IKD communication, the ST 3 values will still be displayed correctly.)

Functional Description GCP-30 with ST 3 Coupling

Displays

Three ST 3 values are transferred to the GCP and displayed in the GCP online display as follows:
Lambda set value and actual values in screen: "L: Se0,00 Ac0,00"
Actuator position in % in screen: "P.actu: 000,00%"

Error message lambda probe

If the ST 3 detects a malfunction of the lambda probe, the error message 'Lambda probe' appears with alarm class 1 in the display.

GCP commands to the ST 3 controller

The GCP sends the following commands to the ST 3 controller depending on the respective operation state:

- Leave stop position
  This command is sent to the ST 3 controller as long as the GCP controls the auxiliary drives (pre-run and post-run auxiliary drives).
  (In operation mode manual, the auxiliary drives are always controlled and therefore, the message "Leave stop position" is always sent.)

- Release lambda control
  This command is sent to the ST 3 controller as long as the reply "GLS closed"
  is present at the GCP.

- Initialization of the stepper motor
  This command is sent to the ST 3 controller for approx. 200ms as soon as the auxiliary drives pre-run is started.

Additionally, the GCP sends the actual value of the generator real power for the control to the ST 3 controller.

Manual adjustment of the actuator position:

The actuator position can be adjusted manually using the higher/lower buttons of the GCP. To do this, the GCP has to be in manual operation mode and the actuator position display has to be visible.

Relay Manager

No.	Outputs	Comment
...	...	
129	Error lambda probe (via CAN bus)	
130	Activate lambda probe	
...	...	
136	Communication with ST 3 okay	
..	..	

Send Telegram 'Guidance Bus of the GCP-30'

MUX	No.	Content (words)	Unit	Comment	
...	**...**	...			
19/3	**60**	Internal alarms 7		Bit 15 = 1	
				Bit 14 = 1	
				Bit 13 = 1	Alarm ST3: lambda probe
				Bit 12 = 1	
				Bit 11 = 1	
				Bit 10 = 1	
				Bit 9 = 1	
				Bit 8 = 1	
				Bit 7 = 1	
				Bit 6 = 1	
				Bit 5 = 1	
				Bit 4 = 1	
				Bit 3 = 1	
				Bit 2 = 1	
				Bit 1 = 1	
				Bit 0 = 1	
...	**...**				
23/1	**70**	Lambda set value	× 100		
23/2	**71**	Lambda actual value	× 100		
23/3	**72**	Actuator position	× 0,01 %		
...	**...**	...			

Coupling Engine Control Units via CAN

The abbreeviation ECU is often used for Engine Control Unit in the following.

Overview Table

NOTE

A simultaneous CAN bus coupling of the MDEC and J1939 components is not possible.

Description	Displays / Messages		Description						mtu
	German	English	SPN /#6	Std. *	Deutz EMR2	Scania S6	Volvo EMS2	mtu ADEC	MDEC
Visualization									
Display: engine speed [1/min]	Mot.Drehz. 0000	Eng.speed 0000	190	✓	✓	✓	✓	✓	✓
Display: oil pressure /#4	Öldruck 00,00b	Oil pres. 00.00b	100	✓	✓	✓	✓	✓	✓
Display: Alarm codes #7	Fehlercodes 0000	Fail.codes 0000		✓ /#5	✓ /#5		✓	✓	✓
Display: ECU operating hours	Betrieb: 00000h	running 00000h	247	✓	✓	✓	✓	✓	✓
Display: coolant temperature /#4	Kühlmit. 000,0C	Coolant 000.0C	110	✓ /#1	✓	✓	✓	✓	✓
Display: oil temperature /#4	Öl 000,0C	Oil 000.0C	175	✓		✓	✓	✓	✓
Display: fuel temperature /#4	Kraftst. 000,0C	Fuel ü000.0C	174	✓ /#1	✓	✓		✓	✓
Display: speed reply	Feedb.Drz. 0000	Feedb.speed 0000							✓
Display: coolant level	Kühlm.Stand 000%	Cool. level 000%	111	✓	✓	✓			
Display: fuel consumption	Verbr. 000 l/h	Rate 0000.0 l/h	183	✓	✓	✓	✓		
Alarm: ECU defective	AL ECU defekt	AL ECU defect							✓
Alarm: coolant temperature	Kühlmitteltemp.	Coolant temp.				✓			✓
Alarm: ST coolant temperature	ST Kühlmitt.temp	ST Coolant temp.			✓				✓
Alarm: oil temperature exceeded	Öltemp. zu hoch	HI Oil temp.							✓
Alarm: SD coolant level	SD Kühlm.stand	SD Coolant level	111	✓	✓	✓			✓
Alarm: SD coolant charging air	SDKühlm.Ladeluft	SD Cool.chrg.air							✓
Alarm: ST oil level	ST Ölstand	ST oil level			✓	✓ /#2			
Alarm: ST engine protection	ST Motorschutz	ST Eng. protect.			✓				
Alarm: ST overspeed	ST Überdrehzahl	ST overspeed							✓
Alarm: ECU red alarm #7	ECU Rot-Alarm	ECU red alarm		✓	✓	✓	✓	✓	✓
Alarm: oil pressure too low	Öldruck niedrig	Low oil pressure				✓			✓
Alarm: ST oil pressure	ST Öldruck	ST oil pressure			✓				✓
Alarm: ECU yellow alarm #7	ECU Gelb-Alarm	ECU yell. alarm		✓	✓	✓	✓	✓	✓
Alarm: coolant level	Kühlmittelstand	Coolant level			✓ /#3				✓ /#3
Alarm: coolant temperature	Kühlmittelvorh.	Preheat Temp low							✓
Alarm: ST coolant charging air	STKühlm.Ladeluft	ST Cool.chrg.air			✓				✓
Alarm: SD set speed	SD Solldrehzahl	SD Speed demand							✓
Alarm: SD engine speed	SD Agg.Drehzahl	SD Engine speed	190	✓	✓	✓	✓	✓	✓
Alarm: SD oil pressure	SD Öldruck	SD Oil pressure	100	✓	✓	✓	✓	✓	✓
Alarm: SD error codes	SD Fehler Codes	SD failure codes							✓
Alarm: SD operating hours	SD Betr.Std.	SD oper. hours	247	✓	✓	✓	✓	✓	✓
Alarm: SD coolant temperature	SD Kühlmitteltmp	SD Coolant temp.	110	✓	✓	✓	✓	✓	✓
Alarm: SD oil temperature	SD Öltemperatur	SD Oil temp.	175	✓	✓	✓	✓	✓	✓
Alarm: SD fuel temperature	SD Kraftst.Tmp.	SD Fuel temp.	174	✓	✓	✓		✓	✓
Alarm: SD fuel consumption	SD Kraftst.verbr.	SD Fuel rate	183	✓	✓	✓	✓		
Remote control							✓		
Speed set point via CAN #8				✓	✓	✓	✓	✓	✓
Start engine via CAN						✓	✓	✓	
Stop engine via CAN				✓	✓	✓	✓	✓	
Switch droop via CAN #9				✓		✓	✓	✓	
Switch rated speed via CAN (1500 /1800 rpm)						✓	✓	✓	
Ramp rated speed via CAN						✓	✓		
Monitoring (If these watchdogs are enabled, the values measured by the ECU are monitored instead of the repsetive analog inputs.)									
Oil pressure				✓	✓	✓	✓	✓	✓
Coolant temperature				✓	✓	✓	✓	✓	✓
Speed				✓	✓	✓	✓	✓	✓

* for example Iveco, Perkins, John Deere, CAT and other ECU manufacturers

SD..Sensor defective, ST..Stop/shutdown, AL..Alarm; **#1** the resolution is 1 °C; **#2** can either mean "oil pressure too high" as well as "oil pressure too low"; **#3** For the EMR2, this display means **shutdown** because of too low coolant level; for MDEC only **Warning** because of too low coolant level; **#4** Switchable: bar ↔ psi, or °C ↔ °F; #**5** displayed are SPN and FMI of the active errors DM1; #6 (=Suspect Parameter Name) indicates the measurement values, to which the error code refers, according to J1939 protocol; #7 Please note that this type of fault display is standard, but is not supported by all ECUs; **#8** A speed set point via CAN is only possible if the GCP is equipped with a BPQ or XPQ package (analog controller); **#9** Droop should be enabled for parallel applications

NOTE

This overview has only an informative character and is not binding because of the many ECU models and their configuration possibilities.

Please note that the functions may require to be enabled for some ECUs when coupling ECUs. It may happen that this is only possible by the manufacturer and should be observed when ordering the ECU!

NOTE

The previous table (J1939 'Standard' = 'Std.') lists the displays, which can be displayed by the GCP in principal. If a value is not sent by the used ECU, this sends a corresponding indicator value according to the SAE J1939 standard. This is detected by the GCP and the respective value will not be displayed. A priority is defined in the CAN ID of an SAE J1939 message according to SAE J1939 standard. This is not taken into account by the GCP. Basically. the GCP receives messages of all priorities.

General Parameters and Functions for J1939 Engine Control Units and MDEC

The parameter "ECU interface monitoring" and "Monitoring ECU values" have the same meaning with all ECUs. Therefore, the are described in this section independent of the ECU.

NOTE

This parameter can only be configured using LeoPC1. Units with an older software revision act as if this parameter is set to YES.

ECU interface monitoring **YES/NO**

YES .....If the connection MDEC-GCP or J1939-GCP or the power supply is interrupted for approx. 5 s, the message "interf.err. Y1Y5" is displayed with alarm class 1. Additionally, the display values will be overwritten with question marks.
Some ECUs show the behavior that the CAN bus is only active if the ignition is energized, i.e: **disabling the ignition results a faulty display**.

No .....If the connection MDEC-GCP or J1939-GCP is interrupted, this message is not displayed.

Note: This setting has no effect on the interface error triggering for IKD and ST3. It has also no influence on the relays with the parameters 134 to 138.

Monitoring ECU Values

```
Monitoring ECU
Values      ON
```

Monitoring ECU values (oil pressure, coolant temp., speed) **ON/OFF**

ON..... The values for oil pressure, coolant temperature, and speed, sent by the ECU via CAN, may be monitored for exceeding configurable limits by the GCP. The watchdogs and the display screens of the analog inputs T6, T7 and the pickup input evaluate the ECU values with this setting. **Therefore, the input signals of the analog inputs T6, T7 and the pickup input are not displayed and not monitored**.

The ECU oil pressure value is displayed for "analog input" T6, coolant temperature for "analog input" 7, and speed instead of the standard speed display. For this, these "inputs" must be **enabled** under analog inputs or engine.
The monitoring will be performed with the monitoring parameters configured for these "inputs".

The analog inputs 6 and 7 should be configured with the respective name and the respective unit (pressure: 00,0bar or 000,0psi.; temp.: 000°C or 000°F).

OFF..... No monitoring of the ECU values will be performed. The analog inputs T6, T7 and the pickup input of the GCP may be used as usual.

NOTE

The monitoring will be suppressed in case of a CAN bus fault. Since a reliable monitoring cannot be guaranteed anymore, it must be ensured that the engine shuts down automatically when reaching critical values!

NOTE

Some ECUs show the behavior that the CAN bus is only active if the ignition is energized, i.e: disabling the ignition results a faulty display (some screens are overwritten with question marks) for these ECUs and it also results an interface error if interface monitoring is enabled.

ECUs with CAN Bus Connection According to 'SAE J1939' Protocol

A lot of ECUs support the 'SAE J1939' protocol for exchanging CAN data. Each data information standardized there has an **SPN** (Suspect Parameter Number), which describes the data information. SPN 110 for example stands for the coolant temperature.
This standard defines several hundred SPNs. However, only a small part is important for most of the applications. Therefore, only a part of the SPNs is supported by the ECU.

Manufacturer-specific data (proprietary messages):
'SAE J1939' also allows for areas of manufacturer-specific data, i.e. for data, which is not defined in the standard. In most cases, these data are used for control purposes (like start/stop, speed set point).
Some manufacturers also issue specific error messages using manufacturer-specific data.

Besides important standardized data, the GCP also support some manufacturer-specific datafor the "Deutz EMR2", "Scania S6", "Volvo EMS2", and "mtu ADEC" ECUs (refer to the overview table).

Selecting the Used J1939 ECU

```
J1939
----------------
```

Note
J1939 coupling cannot be operated simultaneously with MDEC!

J1939 **OFF / Standard / EMR2 / S6 / EMS2 / ADEC**

OFF .....The J1939 coupling is disabled: No J1939 data is processed. A faulty J1939 connection cannot trigger an interface error Y1Y5.

Standard .....The J1939 coupling is enabled: J1939 data is displayed according to the SAE J1939 standard are displayed.
This setting must be configured for all J1939 ECUs, which cannot be selected here (e.g. John Deere, Perkins, Iveco, Sisu, etc.).

EMR2.....The **Deutz EMR2** is enabled: J1939 data according to the SAE J1939 standard **and** some EMR2-specific data are considered.

S6.....The **Scania EMS/S6** is enabled: J1939 data according to the SAE J1939 standard **and** some EMR2-specific data are considered.

EMS2 .....The **Volvo EMS2** is enabled: J1939 data according to the SAE J1939 standard **and** some EMR2-specific data are considered.

ADEC.....The **MTU ADEC** is enabled: J1939 data according to the SAE J1939 standard **and** some EMR2-specific data are considered.

NOTE

If a coupling is enabled, the following is valid:

A faulty J1939 connection can trigger an interface error Y1Y5. (If an interface error is triggered by the J1939 component, the display values are overwritten with question marks).

J1939 Standard ECU

The Standard setting is to be used for all J1939 engine control units, which cannot be selected explicitly in the J1939 parameter (e.g. John Deere, Perkins, Iveco, Sisu, etc.).

The baud rate for the engine bus must be configured the same as on the ECU (mostly 250 kBaud).

Displaying J1939 Data (Visualization)

If data is to be visualized only, no further settings are required (an exception is taking over the operating hours, refer to below).
The GCP is only able to display values, which are listed under Standard in the table, provided that they are also supported by the ECU. Please refer to the documents of the respective ECU for this! The respective functions may be enabled before for some ECUs.

Displaying the Active Alarm Codes with SPN and FMI:

The GCP can display the active alarm codes (DM1), which are sent with the "Conversion Method" version 1 or version 4 (refer to the information from the ECU manufacturer).
The GCP displays the active alarm codes in a screen as follows, if supported by the ECU:

"A SPN00000 FMI00"

This screen displays the **active** (**A**) alarm codes according to **SAE J1939** (DM1):

SPN (= Suspect Parameter Number) indicates e.g. the measurement value, to which the alarm code refers, (e.g. SPN = 100 corresponds to oil pressure).

FMI (= Failure Mode Indicator) specifies the alarm more detailed (e.g. FMI = 3 means: value is valid but over the standard value.)

If more alarms are present, up to 10 alarms can be taken up. The displayed alarm code changes approx. every 3 s then.

"SPN = FMI = 0" means: No alarm is present or alarm codes are not available (see documentation of the used ECU).

The centralized faults yellow or red alert are displayed. These can be assigned to an output relay. The DM1 alarm messages are not deleted when the CAN bus is interrupted. This enables to view the last ECU alarm messages even if the ECU is disabled.

Display of the J1939 Operating Hours

If J1939 is enabled and the operating hours are sent by the J1939 ECU, the operating hours of the ECU (max. 65535 hours) are used for the operating hour display.
The maintenance is also evaluated from this.

NOTE

The operating hour update takes place every minute with detected generator frequency.

The operating hour output on word 76 of the guidance bus takes place independently of the generator frequency.

The **ECU unit number must be configured** to enable the ECU to take over the operating hours.

Note to J1939 interface error - If the GCP does not receive J1939 data for approx. 5 s, the measurement values of the J1939 participants are overwritten with question marks and the J1939 alarm messages are suppressed. Moreover, the relay with the parameter 138 de-energizes (or energizes; depending on programming). If the GCP receives J1939 data again, the relay energizes again, and the measurement values as well as the alarm messages of the J1939 participants are displayed again.
If the parameter ECU interface monitoring is set to YES, the interface error Y1Y5 message is displayed with alarm class 1 additionally.
This message is only cleared with an acknowledgement.

Remote Control According to J1939 Standard

If the remote control function is to be used, the parameters "ECU unit numb." (refer to operating hours above), "Remote con. J1939", "J1939 Droop", "GCP device numb.", and "max speed offset" are to be configured.

```
Remote con.J1939
          YES
```

Remote control **YES/NO**

NO .....Remote control is disabled. The GCP sends **no** control commands to the ECU.
YES .....The GCP supports the following remote control functions: speed set point pre-set and droop

```
J1939      Droop
           OFF
```

J1939 Droop **OFF / Parallel / Permanent**

OFF .....GCP sends always "Alternative droop 1"
Parallel.....Unit sends "Alternative droop 1" only if a circuit breaker is closed.
Permanent ...Unit never sends "Alternative droop 1" to the ECU.

Note: For some ECUs, switching the droop during operation (e.g. in mains parallel setting) may cause brief power rises, because the full droop value has effect on the speed set point pre-set at first for some ECUs.

Details:
The droop is controlled with SPN 2881 (Engine **Alternative** Droop Accelerator 1 Select). This means that 2 droop values are to be configured at the ECU:
1. The "normal" droop value, which is to be used when the GCP wants to operate with droop and
2. the "alternative" droop 1 value, which is to be used when the GCP wants to operate without droop.

Refer to the ECU manual to find out whether the used ECU supports droop on SPN 2881.

```
ECU   unit numb.
           000
```

J1939 unit number **0 to 255**

The GCP sends only data to the ECU, which sends using this CAN device number. (This setting is necessary because the operating hours must be requested from the GCP in contrast to other data.)
Standard value = 0


```
GCP device numb.
             000
```

GCP device number **0 to 255**

Some ECUs accept only remote control commands sent by devices with a specific device number. This number must be configured here.
This parameter is only visible if remote control is enabled.

```
max speed offset
       000 1/min
```

Speed offset **0 to 999 min^{-1}**

This parameter is only visible if the remote control is enabled and adjusts the range of the speed deviation around the rated speed, which is sent to the ECU.
It relates to the engine rated speed. There are two methods of sending the speed set point to the ECU: With a speed offset and a speed set point.

Note: In order to utilize the speed output for the ECU via CAN, the **analog controller for frequencies** has to be enabled with maximum output range. Otherwise the maximum speed offset may not be reached.

The GCP sends a speed set point in rpm that varies around the rated speed in the range of +/- the speed deviation.

How to test this parameter during commissioning:

Isolated operation: Disable the frequency controller and change the parameter for the initial state between 0 and 100%, the engine should change the speed as follows:

0	= rated speed – speed deviation ECU	e.g. 1500 – 120	= 1380rpm
50	= rated speed	e.g.	= 1500rpm
100	= rated speed + speed deviation ECU	e.g. 1500 + 120	= 1620rpm

Note: Keep this value as small as possible, i.e. do not enter a speed deviation of 500, if the engine varies only between 1400 and 1600rpm.

Mains parallel operation: Check with the set point in the display if the engine is able to deliver the full power.

Speed Pre-Set:

The speed pre-set is performed on TSC1, SPN 898. An absolute speed value will be sent to the ECU for this. Refer to the ECU manual to find ouit whether the used ECU supports the SPN 898.

DEUTZ EMR2 J1939

The EMR2 setting is to be configured for the Deutz EMR 2 ECU.

The baud rate for the engine bus must be configured to 250 kBaud.

Displaying J1939 Data (Visualization)

If data is to be visualized only, no further settings are required (an exception is taking over the operating hours, refer to below).
The GCP is able to display values, which are listed under EMR2 in the table.

Displaying the Active Alarm Codes with SPN and FMI:

The GCP can display the active alarm codes (DM1).
The GCP displays the active alarm codes in a screen as follows, if supported by the ECU:

"A SPN00000 FMI00"

This screen displays the **active** (**A**) alarm codes according to **SAE J1939** (DM1):

SPN (= Suspect Parameter Number) indicates e.g. the measurement value, to which the alarm code refers, (e.g. SPN = 100 corresponds to oil pressure).

FMI (= Failure Mode Indicator) specifies the alarm more detailed (e.g. FMI = 3 means: value is valid but over the standard value.)

If more alarms are present, up to 10 alarms can be taken up. The displayed alarm code changes approx. every 3 s then.

"SPN = FMI = 0" means: No alarm is present or alarm codes are not available.

The centralized faults yellow or red alert are displayed. These can be assigned to an output relay. The DM1 alarm messages are not deleted when the CAN bus is interrupted. This enables to view the last ECU alarm messages even if the ECU is disabled.

Display of the J1939 Operating Hours

If J1939 is enabled and the operating hours are sent by the J1939 ECU, the operating hours of the ECU (max. 65535 hours) are used for the operating hour display.
The maintenance is also evaluated from this.

NOTE

The operating hour update takes place every minute with detected generator frequency.

The operating hour output on word 76 of the guidance bus takes place independently of the generator frequency.

The **ECU unit number must be configured** to enable the ECU to take over the operating hours:

Note to J1939 interface error - If the GCP does not receive J1939 data for approx. 5 s, the measurement values of the J1939 participants are overwritten with question marks and the J1939 alarm messages are suppressed. Moreover, the relay with the parameter 138 de-energizes (or energizes; depending on programming). If the GCP receives J1939 data again, the relay energizes again, and the measurement values as well as the alarm messages of the J1939 participants are displayed again.
If the parameter ECU interface monitoring is set to YES, the interface error Y1Y5 message is displayed with alarm class 1 additionally.
This message is only cleared with an acknowledgement.

Remote Control for Deutz EMR 2

If the remote control function is to be used, the parameters "ECU unit numb." (refer to operating hours above), "Remote con. J1939", "GCP device numb.", and "max speed offset" are to be configured.

```
Remote con.J1939
            YES
```

Remote control **YES/NO**

NO..... Remote control is disabled. The GCP sends **no** control commands to the ECU.
YES..... The GCP supports the following remote control functions: speed set point pre-set and droop

```
ECU   unit numb.
            000
```

J1939 unit number **0 to 255**

The GCP sends only data to the ECU, which sends using this CAN device number. (This setting is necessary because the operating hours must be requested from the GCP in contrast to other data.)
Standard value = 0

```
GCP device numb.
            000
```

GCP device number **0 to 255**

Some ECUs accept only remote control commands sent by devices with a specific device number. This number must be configured here. For EMR2, 3 must be configured ususally.
This parameter is only visible if remote control is enabled.
Standard value = 3

```
max speed offset
      000 1/min
```

Speed offset **0 to 999 min^{-1}**

This parameter is only visible if the remote control is enabled and adjusts the range of the speed deviation around the rated speed, which is sent to the ECU.
It relates to the engine rated speed. There are two methods of sending the speed set point to the ECU: With a speed offset and a speed set point.

Note: In order to utilize the speed output for the ECU via CAN, the **analog controller for frequencies** has to be enabled with maximum output range. Otherwise the maximum speed offset may not be reached.

The GCP sends a speed set point in rpm that varies around the rated speed in the range of +/- the speed deviation.

How to test this parameter during commissioning:

Isolated operation: Disable the frequency controller and change the parameter for the initial state between 0 and 100%, the engine should change the speed as follows:

0	= rated speed – speed deviation ECU	e.g. 1500 – 120	= 1380rpm
50	= rated speed	e.g.	= 1500rpm
100	= rated speed + speed deviation ECU	e.g. 1500 + 120	= 1620rpm

Note: Keep this value as small as possible, i.e. do not enter a speed deviation of 500, if the engine varies only between 1400 and 1600rpm.

Mains parallel operation: Check with the set point in the display if the engine is able to deliver the full power.

Speed Pre-Set:

The speed pre-set is performed on TSC1, SPN 898. An absolute speed value will be sent to the ECU for this.

SCANIA S6 J1939

The S6 setting is to be configured for the Scania S6 ECU.

The baud rate for the engine bus must be configured to 250 kBaud for J1939 applications.

Displaying J1939 Data (Visualization)

If data is to be visualized only, no further settings are required (an exception is taking over the operating hours, refer to below).
The GCP is able to display values, which are listed under Scania S6 in the table.

Displaying the Active Alarm Codes with SPN and FMI:

The active alarm codes DM1 with SPN and FMI cannot be displayed, because these alarm codes are not supported by the Scania S6.
However, the collective yellow or red alarms are displayed. These may be assigned to a relay.

Moreover, some manufacturer-specific alarm codes are supported (refer to overview table).

Display of the J1939 Operating Hours

If J1939 is enabled and the operating hours are sent by the J1939 ECU, the operating hours of the ECU (max. 65535 hours) are used for the operating hour display.
The maintenance is also evaluated from this.

NOTE

The operating hour update takes place every minute with detected generator frequency.

The operating hour output on word 76 of the guidance bus takes place independently of the generator frequency.

The **ECU unit number must be configured** to enable the ECU to take over the operating hours:

Note to J1939 interface error - If the GCP does not receive J1939 data for approx. 5 s, the measurement values of the J1939 participants are overwritten with question marks and the J1939 alarm messages are suppressed. Moreover, the relay with the parameter 138 de-energizes (or energizes; depending on programming). If the GCP receives J1939 data again, the relay energizes again, and the measurement values as well as the alarm messages of the J1939 participants are displayed again.
If the parameter ECU interface monitoring is set to YES, the interface error Y1Y5 message is displayed with alarm class 1 additionally.
This message is only cleared with an acknowledgement.

Remote Control for Scania S6

If the remote control function is to be used, the parameters "ECU unit numb." (refer to operating hours above), "Remote con. J1939", "J1939 Droop", "GCP device numb.", and "max speed offset" are to be configured.
If the remote control function is enabled, the "Scania Coordinator" **must not** be used at the same time, because this may result in conflicts on the CAN bus.

CAUTION

It is essential to observe that the engine can also be stopped safely without a CAN connection in an emergency case (for example by disabling the ignition at the ECU)!

```
Remote con.J1939
            YES
```

Remote control **YES/NO**

NO .....Remote control is disabled. The GCP sends **no** control commands to the ECU.
YES .....The GCP supports the following remote control functions: speed set point pre-set and droop

```
J1939      Droop
            OFF
```

J1939 Droop **OFF / Parallel / Permanent**

OFF .....GCP sends no droop bit
Parallel.....Unit sends droop bit to the ECU as soon as both circuit breakers are closed.
Permanent ...Unit sends always a droop bit to the ECU.

Note: For some ECUs, switching the droop during operation (e.g. in mains parallel setting) may cause brief power rises, because the full droop value has effect on the speed set point pre-set at first for some ECUs.

```
ECU   unit numb.
            000
```

J1939 unit number **0 to 255**

The GCP sends only data to the ECU, which sends using this CAN device number.
Standard value = 0

```
GCP device numb.
            000
```

GCP device number **0 to 255**

Some ECUs accept only remote control commands sent by devices with a specific device number. This number must be configured here.
This parameter is only visible if remote control is enabled.
Standard value = 3


```
max speed offset
      000 1/min
```

Speed offset **0 to 999 min^{-1}**

This parameter is only visible if the remote control is enabled and adjusts the range of the speed deviation around the rated speed, which is sent to the ECU.
It relates to the engine rated speed. There are two methods of sending the speed set point to the ECU: With a speed offset and a speed set point.

Note: In order to utilize the speed output for the ECU via CAN, the **analog controller for frequencies** has to be enabled with maximum output range. Otherwise the maximum speed offset may not be reached.

The GCP sends a speed offset with a range of 0 to 100%. 50% = rated speed. There is also an internal speed offset configured in the ECU, this parameter determines what corresponds with 0% or 100%. If there is a positive and a negative speed offset, they should be symmetrical in the ECU. We recommend to have the same speed offset configured in the ECU and in this parameter here. A different setting will result in an additional "controller gain".

How to test this parameter during commissioning:

Isolated operation: Disable the frequency controller and change the parameter for the initial state between 0 and 100%, the engine should change the speed as follows:

0 = rated speed – negative speed offset from ECU
50 = rated speed
100 = rated speed + positive speed offset from ECU

Mains parallel operation: Check with the set point in the display if the engine is able to deliver the full power.

Start Command:

The start command will always be issued if the starter relay is enabled.
The command will be reset as soon as speed is detected.
(ID: Proprietary)

Stop Command:

The start command will always be issued if the engine is not released and speed is detected.
(ID: Proprietary)

Speed Offset

The GCP issues a speed offset relative to the rated speed accoring to the controller output and the configured speed offest.
(ID: Proprietary)

Droop

The GCP will issue a droop bit according to the setting of the parameter "J1939 Droop".
(ID: Proprietary)

Idle Operation:

If idle mode is enabled via terminal 70, the GCP issues a respective command to the ECU.
(ID:Proprietary)

Critical Operation (Override):

If critical mode is selected via terminal 6, the GCP issues an "Override" command to the Scania ECU.
(ID:Proprietary)

Rated Speed:

The GCP selects the rated speed 1 or 2 to be sent to the Scania ECU using the rated speed configured under Engine / Pickup. If the configured rated speed is 1800 rpm, rated speed 2 (standard 1800 rpm) will be sent, for every other value, rated speed 1 (standard 1500 rpm) will be sent.
(ID:Proprietary)

Volvo EMS 2 J1939

The EMS2 setting is to be configured for the Volvo EMS 2 ECU.

The baud rate for the engine bus must be configured to 250 kBaud.

Displaying J1939 Data (Visualization)

If data is to be visualized only, no further settings are required (an exception is taking over the operating hours, refer to below).
The GCP is able to display values, which are listed under Volvo EMS2 in the table.

Displaying the Active Alarm Codes with SPN and FMI:

The GCP can display the active alarm codes (DM1).
The GCP displays the active alarm codes in a screen as follows, if supported by the ECU:

"A SPN00000 FMI00"

This screen displays the **active** (**A**) alarm codes according to **SAE J1939** (DM1):

SPN (= Suspect Parameter Number) indicates e.g. the measurement value, to which the alarm code refers, (e.g. SPN = 100 corresponds to oil pressure).

FMI (= Failure Mode Indicator) specifies the alarm more detailed (e.g. FMI = 3 means: value is valid but over the standard value.)

If more alarms are present, up to 10 alarms can be taken up. The displayed alarm code changes approx. every 3 s then.

"SPN = FMI = 0" means: No alarm is present or alarm codes are not available.

The centralized faults yellow or red alert are displayed. These can be assigned to an output relay. The DM1 alarm messages are not deleted when the CAN bus is interrupted. This enables to view the last ECU alarm messages even if the ECU is disabled.

Display of the J1939 Operating Hours

If J1939 is enabled and the operating hours are sent by the J1939 ECU, the operating hours of the ECU (max. 65535 hours) are used for the operating hour display.
The maintenance is also evaluated from this.

NOTE

The operating hour update takes place every minute with detected generator frequency.

The operating hour output on word 76 of the guidance bus takes place independently of the generator frequency.

The **ECU unit number must be configured** to enable the ECU to take over the operating hours:

Note to J1939 interface error - If the GCP does not receive J1939 data for approx. 5 s, the measurement values of the J1939 participants are overwritten with question marks and the J1939 alarm messages are suppressed. Moreover, the relay with the parameter 138 de-energizes (or energizes; depending on programming). If the GCP receives J1939 data again, the relay energizes again, and the measurement values as well as the alarm messages of the J1939 participants are displayed again.
If the parameter ECU interface monitoring is set to YES, the interface error Y1Y5 message is displayed with alarm class 1 additionally.
This message is only cleared with an acknowledgement.

Remote Control for Volvo EMS 2

If the remote control function is to be used, the parameters "ECU unit numb." (refer to operating hours above), "Remote con. J1939", "J1939 Droop", "GCP device numb.", and "max speed offset" are to be configured.

If the remote control function is enabled, the "Volvo Translator" (CIU) **must not** be used at the same time, because this may result in conflicts on the CAN bus.

CAUTION

It is essential to observe that the engine can also be stopped safely without a CAN connection in an emergency case (for example by disabling the ignition at the ECU)!

```
Remote con.J1939
            YES
```

Remote control **YES/NO**

NO .....Remote control is disabled. The GCP sends **no** control commands to the ECU.
YES .....The GCP supports the following remote control functions: speed set point pre-set and droop

```
J1939      Droop
            OFF
```

J1939 Droop **OFF / Parallel / Permanent**

OFF .....GCP sends no droop bit
Parallel.....Unit sends droop bit to the ECU as soon as both circuit breakers are closed.
Permanent ...Unit sends always a droop bit to the ECU.

Note: For some ECUs, switching the droop during operation (e.g. in mains parallel setting) may cause brief power rises, because the full droop value has effect on the speed set point pre-set at first for some ECUs.

```
ECU   unit numb.
            000
```

J1939 unit number **0 to 255**

The GCP sends only data to the ECU, which sends using this CAN device number. (This setting is necessary because the operating hours must be requested from the GCP in contrast to other data.)
Standard value = 0

```
GCP device numb.
            000
```

GCP device number **0 to 255**

Some ECUs accept only remote control commands sent by devices with a specific device number. This number must be configured here.
This parameter is only visible if remote control is enabled.
Standard value = 3

```
max speed offset
      000 1/min
```

Speed offset **0 to 999 min^{-1}**

This parameter is only visible if the remote control is enabled and adjusts the range of the speed deviation around the rated speed, which is sent to the ECU.
It relates to the engine rated speed. There are two methods of sending the speed set point to the ECU: With a speed offset and a speed set point.

Note: In order to utilize the speed output for the ECU via CAN, the **analog controller for frequencies** has to be enabled with maximum output range. Otherwise the maximum speed offset may not be reached.

The GCP sends a speed offset with a range of 0 to 100%. 50% = rated speed. There is also an internal speed offset configured in the ECU, this parameter determines what corresponds with 0% or 100%. If there is a positive and a negative speed offset, they should be symmetrical in the ECU. We recommend to have the same speed offset configured in the ECU and in this parameter here. A different setting will result in an additional "controller gain".

How to test this parameter during commissioning:

Isolated operation: Disable the frequency controller and change the parameter for the initial state between 0 and 100%, the engine should change the speed as follows:

0 = rated speed – negative speed offset from ECU
50 = rated speed
100 = rated speed + positive speed offset from ECU

Mains parallel operation: Check with the set point in the display if the engine is able to deliver the full power.

Start Command:

The start command will always be issued if the starter relay is enabled.
The command will be reset as soon as speed is detected.
(ID: Proprietary)

Stop Command:

The start command will always be issued if the engine is not released and speed is detected.
(ID: Proprietary)

Speed Offset

The GCP issues a speed offset relative to the rated speed according to the controller output and the configured speed offest.
(ID: Proprietary)

Droop

The GCP will issue a droop bit according to the setting of the parameter "J1939 Droop".
(ID: Proprietary)

Idle Operation:

If idle mode is enabled via terminal 70, the GCP issues a respective command to the ECU.
(ID:Proprietary)

Rated Speed:

The GCP selects the rated speed 1 or 2 to be sent to the ECU using the rated speed configured under Engine / Pickup. If the configured rated speed is 1800 rpm, rated speed 2 (standard 1800 rpm) will be sent, for every other value, rated speed 1 (standard 1500 rpm) will be sent.
(ID:Proprietary)

Note:
The change is only effective if the ECU is able to detect a **change** of the rated speed.
Therefore, the ECU must be enabled and connected to the GCP via CAN during the change of the rated speed.
If an ECU, which is configured to a rated speed of 1500 rpm , is connected to a GCP, which has been configured to 1800 rpm without an ECU connection, the setting 1500 rpm is maintained in the ECU!

Preglow:

The GCP sends a respective command to the ECU during the preglow period (however, this command will not be executed by all ECUs).
(ID:Proprietary)

mtu ADEC J1939

The ADEC setting is to be configured for the mtu ADEC ECU.

The baud rate for the engine bus must be configured to 250 kBaud.

CAUTION

The GCP must not be connected directly to the ADEC bus. A SAM (Service and Application Module) with J1939 card must be connected in between!

Displaying J1939 Data (Visualization)

If data is to be visualized only, no further settings are required (an exception is taking over the operating hours, refer to below).
The GCP is able to display values, which are listed under ADEC in the table.

Displaying the Alarm Codes:

The alarm codes are displayed in the "FailCodes 0000" screen.
If more than one alarm is present, the alarm numbers are displayed one after the other.

Additionally, the collective yellow or red alarms are displayed. These may be assigned to a relay.

Display of the J1939 Operating Hours

If J1939 is enabled and the operating hours are sent by the J1939 ECU, the operating hours of the ECU (max. 65535 hours) are used for the operating hour display.
The maintenance is also evaluated from this.

NOTE

The operating hour update takes place every minute with detected generator frequency.

The operating hour output on word 76 of the guidance bus takes place independently of the generator frequency.

The **ECU unit number must be configured** to enable the ECU to take over the operating hours:

Note to J1939 interface error - If the GCP does not receive J1939 data for approx. 5 s, the measurement values of the J1939 participants are overwritten with question marks and the J1939 alarm messages are suppressed. Moreover, the relay with the parameter 138 de-energizes (or energizes; depending on programming). If the GCP receives J1939 data again, the relay energizes again, and the measurement values as well as the alarm messages of the J1939 participants are displayed again.
If the parameter ECU interface monitoring is set to YES, the interface error Y1Y5 message is displayed with alarm class 1 additionally.
This message is only cleared with an acknowledgement.

Remote Control for mtu ADEC

If the remote control function is to be used, the parameters "ECU unit numb." (refer to operating hours above), "Remote con. J1939", "J1939 Droop", "GCP device numb.", and "max speed offset" are to be configured.

CAUTION

It is essential to observe that the engine can also be stopped safely without a CAN connection in an emergency case (for example by disabling the ignition at the ECU)!

```
Remote con.J1939
          YES
```

Remote control **YES/NO**

NO .....Remote control is disabled. The GCP sends **no** control commands to the ECU.
YES .....The GCP supports the following remote control functions: speed set point pre-set and droop

```
J1939      Droop
           OFF
```

J1939 Droop **OFF / Parallel / Permanent**

OFF .....GCP sends no droop bit
Parallel.....Unit sends droop bit to the ECU as soon as both circuit breakers are closed.
Permanent ...Unit sends always a droop bit to the ECU.

Note: For some ECUs, switching the droop during operation (e.g. in mains parallel setting) may cause brief power rises, because the full droop value has effect on the speed set point pre-set at first for some ECUs.

Details:
Usually, a droop of 4 % is configured by default with the ADEC ECU.
If no droop is to be used, a change to Droop 2 will be performed. This is configured to 0 % by default (Droop2 corresponds with the "Engine Alternative Droop Accelerator 1 Select", SPN 2881, according to J1939).

```
ECU   unit numb.
           000
```

J1939 unit number **0 to 255**

The GCP sends only data to the ECU, which sends using this CAN device number. The value 128 must be configured for mtu ADEC here.
Standard value = 0

```
GCP device numb.
           000
```

GCP device number **0 to 255**

The device number, from which the ADEC accepts remote control messages (refer to the ADEC settings) must be entered here. Then, the GCP sends with this number only. The value **1** must be configured here for the ADEC coupling.
This parameter is only visible if remote control is enabled.
Standard value = 3

```
max speed offset
      000 1/min
```

Speed offset **0 to 999 min^{-1}**

This parameter is only visible if the remote control is enabled and adjusts the range of the speed deviation around the rated speed, which is sent to the ECU.
It relates to the engine rated speed. There are two methods of sending the speed set point to the ECU: With a speed offset and a speed set point.

Note: In order to utilize the speed output for the ECU via CAN, the **analog controller for frequencies** has to be enabled with maximum output range. Otherwise the maximum speed offset may not be reached.

The GCP sends a speed set point in rpm that varies around the rated speed in the range of +/- the speed deviation.

How to test this parameter during commissioning:

Isolated operation: Disable the frequency controller and change the parameter for the initial state between 0 and 100%, the engine should change the speed as follows:

0	= rated speed – speed deviation ECU	e.g. 1500 – 120	= 1380rpm
50	= rated speed	e.g.	= 1500rpm
100	= rated speed + speed deviation ECU	e.g. 1500 + 120	= 1620rpm

Note: Keep this value as small as possible, i.e. do not enter a speed deviation of 500, if the engine varies only between 1400 and 1600rpm.

Mains parallel operation: Check with the set point in the display if the engine is able to deliver the full power.

Start Command:

The start command will always be issued if the starter relay is enabled.
The command will be reset as soon as speed is detected.
(ID: Proprietary)

Stop Command:

The start command will always be issued if the engine is not released and speed is detected.
(ID: Proprietary)

Speed Pre-Set:

The speed pre-set is performed on TSC1, SPN 898. An absolute speed value will be sent to the ECU for this.

Droop

The droop will be controlled using the SPN 2881 (Engine Alternative Droop Accelerator 1 Select). This means that 2 droop values are to be configured at the ECU.

1. The "normal" droop value (for ADEC 4% by default), which is to be used, if the GCP does not enable the droop bit.
2. The 1. alternativ droop value (Droop 2 for ADEC 0% by default), which is to be used, if the GCP enables the droop bit.

Rated Speed:

The GCP selects the rated speed 1 (50 Hz, 1500 rpm) or 2 (60 Hz, 1800 rpm) to be sent to the ECU using the rated speed configured under Engine / Pickup. (If the configured rated speed is neither 1500 rpm nor 1800 rpm, a failure ID will be sent to the ECU.)
(ID:Proprietary)

J1939 Relay Manager Functions

No.	Outputs	Note
138	Communication with J1939 okay	
150	Yellow alarm	
151	Red alarm	

If the red or yellow alarm is intended to trigger an alarm class, the respective relay output may be connected with a discrete input.

Send Telegram Guidance Bus for J1939 ECU Data

NOTE

The following data is transferred in the 'extended blocks' of the GCP. The data volume, which is added by the 'extended blocks', results that a gateway GW 4 can only transfer the data of the first four GCPs anymore. If it is necessary that all data of all GCPs is to be transferred, a second Gateway GW 4 has to be used.

NOTE

The analog values are overwritten with "0" in case of an interface error.

MUX	No.	Content (words)	Unit	Comment	
23/1	**70**	refer to ST3			
23/2	**71**	refer to ST3			
23/3	**72**	refer to ST3			
24/1	**73**	Engine speed	rpm		
24/2	**74**	Oil pressure	bar × 0,01	Switchable: bar ↔ psi	
24/3	**75**	Alarm code SPN (active alarms DM1)	-	together with No. 80 /#**3**	
25/1	**76**	Operating hours	h		
25/2	**77**	Coolant temperature	°C × 0,1 (+/-)	Switchable: °C ↔ °F	
25/3	**78**	Oil temperature	°C × 0,1 (+/-)	Switchable: °C ↔ °F	
26/1	**79**	Fuel temperature	°C × 0,1 (+/-)	Switchable: °C ↔ °F	
26/2	**80**	Alarm code FMI (active alarms DM1)	-	together with No. 75 /#**3**	
26/3	**81**	ECU alarms 1		Bit 15 = 1	ST coolant charging air /#**1**
				Bit 14 = 1	Internal
				Bit 13 = 1	Coolant level /#**1**
				Bit 12 = 1	Yellow alarm
				Bit 11 = 1	ST oil pressure /#**1**
				Bit 10 = 1	Oil pressure low /#**2**
				Bit 9 = 1	Red alarm
				Bit 8 = 1	Internal
				Bit 7 = 1	ST engine protection /#**1**
				Bit 6 = 1	ST oil level /#**1** /#**2**
				Bit 5 = 1	Internal
				Bit 4 = 1	SD coolant level
				Bit 3 = 1	Internal
				Bit 2 = 1	ST coolant temperature /#**1**
				Bit 1 = 1	Coolant temperature /#**2**
				Bit 0 = 1	Internal
27/1	**82**	ECU alarms 2		Bit 15 = 1	SD fuel temperature
				Bit 14 = 1	SD oil temperature
				Bit 13 = 1	SD coolant temperature
				Bit 12 = 1	Internal
				Bit 11 = 1	Internal
				Bit 10 = 1	SD oil pressure
				Bit 9 = 1	SD engine speed
				Bit 8 = 1	Internal
				Bit 7 = 1	Internal
				Bit 6 = 1	Internal
				Bit 5 = 1	Internal
				Bit 4 = 1	Internal
				Bit 3 = 1	Internal
				Bit 2 = 1	Internal
				Bit 1 = 1	Internal
				Bit 0 = 1	Internal
27/2	**83**	Fuel consumption		0000,0 l/h	
27/3	**84**	Reserve			
28/1	**85**	Coolant level	%	FFxx'h = no ECU value present FExx'h = probe error	
28/2	**86**	Reserve			
28/3	**87**	Reserve		Bit 15 = 1	Internal
				...	...
				Bit 9 = 1	Internal
				Bit 8 = 1	Interface error Y1Y5 by J1939
				Bit 7 = 1	Internal
				...	...
				Bit 0 = 1	Internal

#1 only Deutz EMR 2, **#2** only Scania EMS/S6, #**3** the DM1 errors are displayed for Standard, EMR2, and EMS2. If more alarms are present, up to 10 alarms can be taken up at the same time. The forwarded alarm code changes approx. every 3 s then. With ADEC, the alarm code is sent upon word 75. Wors 80 has no importance with ADEC.

Engine Control 'MDEC'

NOTE

Please take information about the MDEC functions from the manufacturer's manual.

The MDEC engine control has proprietary CAN protocols (V302, V303, V304), which are **not** based on J1939.

The engine bus **baud rate** is to be configured to 125 kBaud for MDEC applications.

```
MDEC
----------------
```

Note
MDEC cannot be operated simultaneously with J1939 coupling!

MDEC **OFF / ON**

OFF .....The mtu MDEC coupling is disabled and no MDEC data is processed. A faulty MDEC connection cannot trigger an interface error Y1Y5.

ON .....The mtu MDEC coupling is enabled, MDEC values and the following parameters are displayed, and values are sent to the MDEC.

Note: This parameter should be set to "ON" in MDEC operation, since MDEC expects the speed setting even if the control is performed via analog or three-step controllers.
If MDEC coupling is enabled with this parameter, a faulty MDEC connection may trigger an interface error Y1Y5 depending on the setting of the interface monitoring parameter.

(If an interface error is triggered by the MDEC, the display values are overwritten with question marks.)

```
MDEC protocol
          ---
```

MDEC protocol **V302 / V303 / V304**

Firmware version of the MDEC.
Configure the protocol implemented in the MDEC here.

```
max speed offset
      000 1/min
```

Speed offset **0 to 999 min^{-1}**

This parameter is only visible if the remote control is enabled and adjusts the range of the speed deviation around the rated speed, which is sent to the ECU.
It relates to the engine rated speed. There are two methods of sending the speed set point to the ECU: With a speed offset and a speed set point.

Note: In order to utilize the speed output for the ECU via CAN, the **analog controller for frequencies** has to be enabled with maximum output range. Otherwise the maximum speed offset may not be reached.

The GCP sends a speed set point in rpm that varies around the rated speed in the range of +/- the speed deviation.

How to test this parameter during commissioning:

Isolated operation: Disable the frequency controller and change the parameter for the initial state between 0 and 100%, the engine should change the speed as follows:

0	= rated speed – speed deviation ECU	e.g. 1500 – 120	= 1380rpm
50	= rated speed	e.g.	= 1500rpm
100	= rated speed + speed deviation ECU	e.g. 1500 + 120	= 1620rpm

Note: Keep this value as small as possible, i.e. do not enter a speed deviation of 500, if the engine varies only between 1400 and 1600rpm.

Mains parallel operation: Check with the set point in the display if the engine is able to deliver the full power.

Note to MDEC interface error - If the GCP does not receive an "Alive" message from the MDEC for approx. 6 s, the MDEC measurement values are overwritten with question marks and the MDEC alarm messages are suppressed. Moreover, the relay with the parameter 137 de-energizes (or energizes; depending on programming). If the GCP receives the "Alive" message again, the relay energizes again, and the measurement values as well as the alarm messages of the MDEC are displayed again.
If the parameter ECU interface monitoring is set to YES, the interface error Y1Y5 message is displayed with alarm class 1.
This message is only cleared with an acknowledgement.
(If an interface error Y1Y5 is triggered, which has been caused by e.g. a faulty IKD communication, the MDEC values will still be displayed correctly.)

Display of the MDEC Operating Hours

If MDEC is enabled, the operating hours of the ECU (max. 65535 hours) are used for the operating hour display. The maintenance is also evaluated from this.

NOTE

The operating hour update takes place every minute with detected generator frequency.

(The operating hour output on word 76 of the guidance bus takes place independently of the generator frequency).

The Output Relay Manager

No.	Outputs	Note
...	...	
137	Communication with MDEC okay	
150	Yellow alarm	
151	Red alarm	

If the red or yellow alarm is intended to trigger an alarm class, the respective relay output may be connected with a discrete input.

Send Telegram Guidance Bus for MDEC Data

NOTE

The following data is transferred in the 'extended blocks' of the GCP. The data volume, which is added by the 'extended blocks', results that a gateway GW 4 can only transfer the data of the first four GCPs anymore. If it is necessary that all data of all GCPs is to be transferred, a second Gateway GW 4 has to be used.

MUX	No.	Content (words)	Unit	Comment	
23/1	**70**	refer to ST3			
23/2	**71**	refer to ST3			
23/3	**72**	refer to ST3			
24/1	**73**	Engine speed	rpm		
24/2	**74**	Oil pressure	bar × 0,01	Switchable: bar ↔ psi	
24/3	**75**	Alarm codes			
25/1	**76**	Operating hours of the ECU	h		
25/2	**77**	Coolant temperature	°C × 0,1 (+/-)	Switchable: °C ↔ °F	
25/3	**78**	Oil temperature	°C × 0,1 (+/-)	Switchable: °C ↔ °F	
26/1	**79**	Fuel temperature	°C × 0,1 (+/-)	Switchable: °C ↔ °F	
26/2	**80**	Speed reply	rpm		
26/3	**81**	ECU alarms 1		Bit 15 = 1	ST coolant charging air
				Bit 14 = 1	Coolant preheating
				Bit 13 = 1	Coolant level
				Bit 12 = 1	ECU yellow alarm
				Bit 11 = 1	ST oil pressure
				Bit 10 = 1	Oil pressure low
				Bit 9 = 1	ECU red alarm
				Bit 8 = 1	ST overspeed
				Bit 7 = 1	Internal
				Bit 6 = 1	Internal
				Bit 5 = 1	SD coolant charging air
				Bit 4 = 1	SD coolant level
				Bit 3 = 1	Oil temperature exceeded
				Bit 2 = 1	ST coolant temperature
				Bit 1 = 1	Coolant temperature
				Bit 0 = 1	AL ECU defective
27/1	**82**	ECU alarms 2		Bit 15 = 1	SD fuel temperature
				Bit 14 = 1	SD oil temperature
				Bit 13 = 1	SD coolant temperature
				Bit 12 = 1	SD operating hours
				Bit 11 = 1	SD alarm codes
				Bit 10 = 1	SD oil pressure
				Bit 9 = 1	SD engine speed
				Bit 8 = 1	Reserve (MDEC bit 8)
				Bit 7 = 1	Reserve (MDEC bit 7)
				Bit 6 = 1	Reserve (MDEC bit 6)
				Bit 5 = 1	Reserve (MDEC bit 5)
				Bit 4 = 1	Reserve (MDEC bit 4)
				Bit 3 = 1	Reserve (MDEC bit 3)
				Bit 2 = 1	Reserve (MDEC bit 2)
				Bit 1 = 1	Reserve (MDEC bit 1)
				Bit 0 = 1	SD speed request
27/2	**83**	Reserve (MDEC bit 11)			
27/3	**84**	Reserve (MDEC bit 12)			
28/1	**85**	Reserve (MDEC bit 13)			
28/2	**86**	Reserve (MDEC bit 14)			
28/3	**87**	Reserve (MDEC bit 15)		Bit 15 = 1	Internal
				...	...
				Bit 9 = 1	Internal
				Bit 8 = 1	Interface error Y1Y5 by MDEC
				Bit 7 = 1	Internal
				...	...
				Bit 0 = 1	Internal
29/1	**88**	Reserve (MDEC bit 16)			
29/2	**89**	Reserve (MDEC bit 17)			
29/3	**90**	Reserve (MDEC bit 18)			

NOTE

The analog values are overwritten with "0" in case of an interface error.

MDEC Connection

Coupling for set point value transfer of the GCP unit and the mtu Diesel Engine Control (MDEC) can be realized alternatively using one of the following connection s:

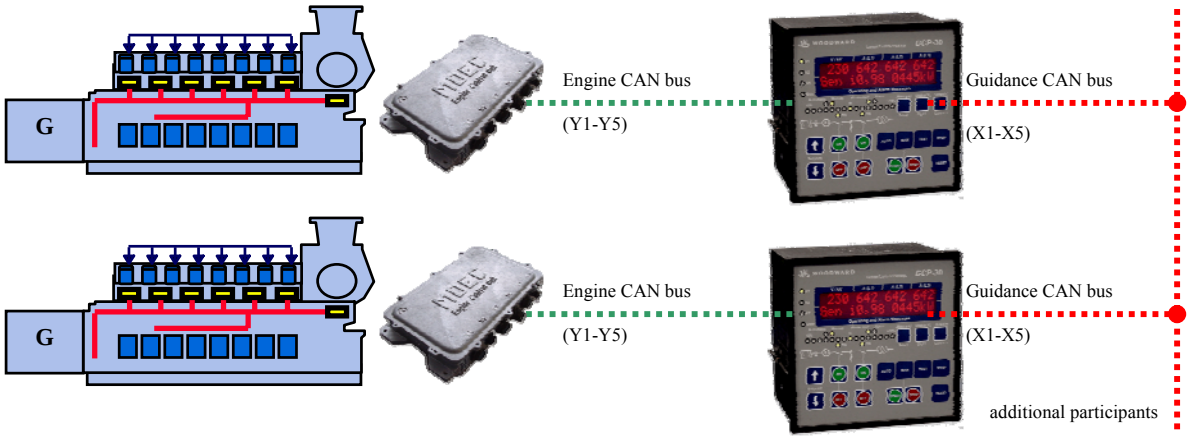
... via **three-position controllers**
(possible in every standard unit with three-position controller),

... via **analog controller outputs**
(possible in every standard unit with analog controller outputs with 20 mA signal), or

... via **engine CAN bus**

NOTE

If you order an MDEC at mtu please note this on your order to mtu. Different versions are available and mtu has to implement another remote set point value module in the MDEC. The MDEC would alternatively be delivered with remote set point value via three-position controller, analog controller or CAN bus connection.



The following functions are additionally available using a CAN bus coupling:

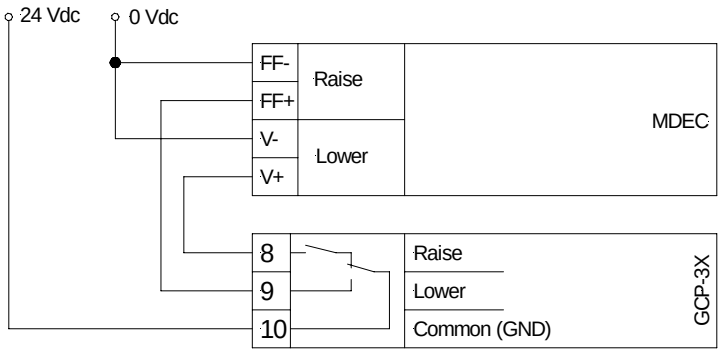
- remote set point value of speed..... GCP → MDEC
- display of selected values ..... GCP ← MDEC
- display of selected sensors..... GCP ← MDEC
- display of selected alarms ..... GCP ← MDEC

Connection to GCP

NOTE

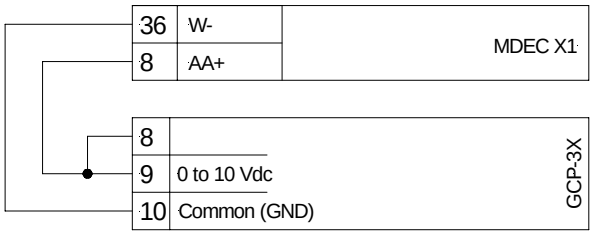
For function and configuration of the MDEC please see the manual of the manufacturer.

Set point Specification Via Three-Step Controller



Set point Specification Via Analog Controller

The controller output at the GCP has to be set to 0 to 10 V for this.



Set point Specification Via CAN

Except of the CAN connection described earlier, no further connection between MDEC and GCP has to be established.

Engine Bus Visualization Via LeoPC1 (MDEC and J1939)

NOTE

This function is only implemented from Software version 4.3010.

The following MDEC or J1939 data can be displayed via LeoPC1 in the sensors/actors level (if supported by the used ECU):

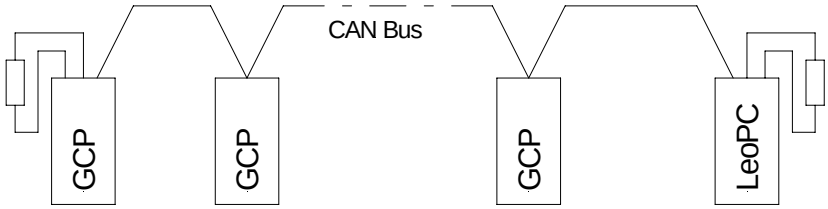
Engine speed	[rpm]
Oil pressure	[bar or psi]
Oil temp.	[°C or °F]
Coolant temp.	[°C or °F]
Fuel temp.	[°C or °F]
Coolant level	[%]
Consumption	[l/h]
Alarm codes	

NOTE

The display "0" appears for an interface error MDEC/J1939. If a measurand does not exist for J1939, "0" is displayed here as well.

The displayed unit depends on the settings in parameter block Measuring. Further information about this can be found in the LeoPC1 manual (37146).

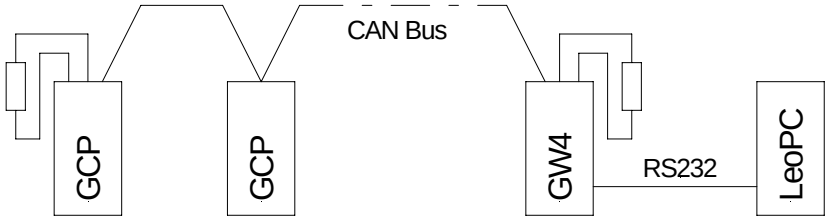
CAN Bus Connection via A CAN Card or an USB to CAN Adapter to LeoPC1



Observe the notes about termination (termination resistor) of the CAN bus under Connection on page 5. Ensure that the CAN card or the CAN to USB adapter at the LeoPC1 computer is terminated properly.

Up to 14 GCPs can be connected as participants.

CAN Bus Connection via A GW 4 and the RS-232 Interface to LeoPC1



Observe the notes about termination (termination resistor) of the CAN bus under Connection on page 5.
Up to 4 GCPs can be connected to a GW 4.

Configuration of the GW 4:

Since the GCP uses the extended block to visualize the engine control data , the GW 4 has to be configured to extended blocks as well. See manual GW 4 (37133).

Configuration of the GCP:

Only odd generator numbers may be configured at the GCPs!

Adaptation of the LeoPC1 file

(only necessary if the engine control data of engines with a generator number different from 1 are to be visualized.)

The modification can be made using a text editor. It is strongly recommended to store a copy of the original file in a different directory or under a different name for security reasons.

In order to only display the odd machine numbers with visualization, the LeoPC1 file xxxx-xxxx_x_pyzz.cfg (xxxx-xxxx_x = part number, y = number of machines, zz = language) has to be modified as described in the following:

Example for 2 machines:

The file for 3 machines has to be used and the 2nd machine (or the machines with even numbers for more machines) has to be commented out with " ;* ".

Original location in the .cfg file:

```
;* Definition: levels, used devices, options - Ansichten, verwendete Geräte,
Optionen
[PLANT]
NAME=Demo
DEF_VIEW=1
ENGINE1="Generator 01"
ENGINE2="Generator 02"
ENGINE3="Generator 03"
```

Modified .cfg file:

```
;* Definition: levels, used devices, options - Ansichten, verwendete Geräte,
Optionen
[PLANT]
NAME=Demo
DEF_VIEW=1
ENGINE1="Generator 01"
;*ENGINE2="Generator 02"
ENGINE3="Generator 03"
```

Appendix A.
List of Parameters

Unit number P/N _____ Rev _____

Version GCP-30 _____

Project _____

Serial number S/N _____ Date _____

Access	Parameter	Setting range	Default value	Customer setting	
ENGINE BUS CONFIGURATION					
	CAN baud rate	100 / 125 / 250 / 500 kBaud	250 kBaud	-	-
IKD 1 CONFIGURATION					
L	IKD1 on bus	YES / NO	NO	☐ Y ☐ N	☐ Y ☐ N
L	Assignment 1. relay on IKD1	*	1		
L	Assignment 2. relay on IKD1	*	2		
L	Assignment 3. relay on IKD1	*	3		
L	Assignment 4. relay on IKD1	*	4		
L	Assignment 5. relay on IKD1	*	5		
L	Assignment 6. relay on IKD1	*	6		
L	Assignment 7. relay on IKD1	*	7		
L	Assignment 8. relay on IKD1	*	8		
L	Error text DI1 IKD1 (term. 5)	16 digit configurable text	IKD1 DI 1		
L	Error text DI2 IKD1 (term. 6)	16 digit configurable text	IKD1 DI 2		
L	Error text DI3 IKD1 (term. 7)	16 digit configurable text	IKD1 DI 3		
L	Error text DI4 IKD1 (term. 8)	16 digit configurable text	IKD1 DI 4		
L	Error text DI5 IKD1 (term. 9)	16 digit configurable text	IKD1 DI 5		
L	Error text DI6 IKD1 (term.10)	16 digit configurable text	IKD1 DI 6		
L	Error text DI7 IKD1 (term.11)	16 digit configurable text	IKD1 DI 7		
L	Error text DI8 IKD1 (term.12)	16 digit configurable text	IKD1 DI 8		
IKD 2 CONFIGURATION					
L	IKD2 on bus	YES / NO	NO	☐ Y ☐ N	☐ Y ☐ N
L	Assignment 1. relay on IKD2	*	1		
L	Assignment 2. relay on IKD2	*	2		
L	Assignment 3. relay on IKD2	*	3		
L	Assignment 4. relay on IKD2	*	4		
L	Assignment 5. relay on IKD2	*	5		
L	Assignment 6. relay on IKD2	*	6		
L	Assignment 7. relay on IKD2	*	7		
L	Assignment 8. relay on IKD2	*	8		
L	Error text DI1 IKD2 (term. 5)	16 digit configurable text	IKD2 DI 1		
L	Error text DI2 IKD2 (term. 6)	16 digit configurable text	IKD2 DI 2		
L	Error text DI3 IKD2 (term. 7)	16 digit configurable text	IKD2 DI 3		
L	Error text DI4 IKD2 (term. 8)	16 digit configurable text	IKD2 DI 4		
L	Error text DI5 IKD2 (term. 9)	16 digit configurable text	IKD2 DI 5		
L	Error text DI6 IKD2 (term.10)	16 digit configurable text	IKD2 DI 6		
L	Error text DI7 IKD2 (term.11)	16 digit configurable text	IKD2 DI 7		
L	Error text DI8 IKD2 (term.12)	16 digit configurable text	IKD2 DI 8		
ST 3 CONFIGURATION					
L	ST3 on bus	YES / NO	NO	☐ Y ☐ N	☐ Y ☐ N

Access	Parameter	Setting range	Default value	Customer setting	
MDEC CONFIGURATION					
	MDEC	OFF / ON	OFF	☐ 0 ☐ 1	☐ 0 ☐ 1
	MDEC protocol	V302 / V303 / V304	V302		
J1939 CONFIGURATION					
	J1939	OFF Standard EMR2 S6 EMS2 ADEC	OFF	☐ OFF ☐ Std ☐ EMR2 ☐ S6 ☐ EMS2 ☐ ADEC	☐ OFF ☐ Std ☐ EMR2 ☐ S6 ☐ EMS2 ☐ ADEC
	Remote con.J1939	YES / NO	NO	☐ Y ☐ N	☐ Y ☐ N
	J1939 Droop	OFF Parallel Permanent	OFF	☐ OFF ☐ Parallel ☐ Perm.	☐ OFF ☐ Parallel ☐ Perm.
	ECU unit numb.	0 to 255	000		
	GCP device numb.	0 to 255	003		
	max speed offset	0 to 999 rpm	100		
INTERFACE MONITORING					
	Monitoring ECU Values	OFF / ON	OFF	☐ 0 ☐ 1	☐ 0 ☐ 1
L	**ECU interface monitoring**	YES / NO	NO	☐ Y ☐ N	☐ Y ☐ N

L This parameter may only be accessed via LeoPC1 depending on the unit

***** refer to the Relay Manager section of the configuration manual for more info

We appreciate your comments about the content of our publications.

Please send comments to: stgt-documentation@woodward.com

Please include the manual number from the front cover of this publication.

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