DEIF A/S

Installation Instructions and Reference Handbook

Engine Controller EC-1

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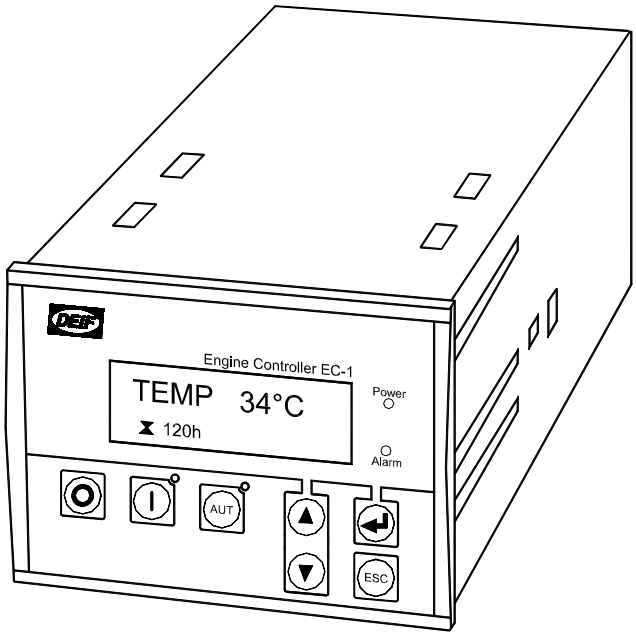
SW 1.4X.X



- *Installation instructions*
- *Functional descriptions*
- *Parameter list*

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1. About this document

This chapter includes general user information about this handbook concerning the general purpose, the intended users and the overall contents and structure.

General purpose

This document is the Installation Instructions and Reference Handbook for DEIF's Engine Controller, the EC-1. The document mainly includes installation instructions, presentation of push-buttons, LEDs and display, functional descriptions and complete standard parameter lists.

The general purpose of the Installation Instructions and Reference Handbook is to provide the information needed to install the unit correctly and to provide information about the functionality of the unit and its applications. The handbook also offers the user the information he needs in order to successfully set up the parameters needed in his specific application.

Please make sure to read this handbook before working with the multi-line 2 controller and the gen-set to be controlled. Failure to do this could result in human injury or damage to the equipment.

Intended users

The handbook is mainly intended for the person responsible for installing the unit and for the person responsible for the unit setup. Naturally, others might also find useful information in the handbook.

Contents/overall structure

The Installation Instructions and Reference Handbook is divided into chapters and in order to make the structure of the document simple and easy to use, each chapter will begin from the top of a new page. The following will outline the contents of each of the chapters.

About this document

This first chapter includes general information about this handbook as a document. It deals with the general purpose and the intended users of the Installation Instructions and Reference Handbook. Furthermore, it outlines the overall contents and structure of the document.

Warnings and legal information

The second chapter includes information about general legal issues and safety precautions relevant in the handling of DEIF products. Furthermore, this chapter will introduce note and warning symbols, which will be used throughout the handbook.

General product information

The third chapter will deal with the unit in general and its place in the DEIF product range.

Installation instructions

This chapter includes the information needed to perform correct installation of the unit, e.g. mounting instructions, terminals, wiring, inputs, etc.

Push-buttons, LEDs and display

This chapter deals with push-button and LED functions. Furthermore, information about the display including icon list is presented.

Functional descriptions

This chapter includes functional descriptions for the unit's standard functions. Screen dumps and flow charts are used in order to simplify the information.

Parameter list

This chapter includes a complete standard parameter list for setup. Therefore, this chapter is to be used for reference, when information about specific parameters is needed.

2. Warnings and legal information

This chapter includes important information about general legal issues relevant in the handling of DEIF products. Furthermore, some overall safety precautions will be introduced and recommended. Finally, the highlighted notes and warnings, which will be used throughout the document, are presented.

Legal information and responsibility

DEIF takes no responsibility for installation or operation of the engine set. If there is any doubt about how to install or operate the engine controlled by the unit, the company responsible for the installation or the operation of the set must be contacted.

The units are not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

Safety issues

Installing the unit implies work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.

Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.

Factory settings

The unit is delivered with certain factory settings. Given the fact that these settings are based on average values, they are not necessarily the correct settings for matching the individual engine. Thus precautions must be taken to check the settings before running the engine.

Definitions

Throughout this document a number of notes and warnings will be presented. To ensure that these are noticed, they will be highlighted in order to separate them from the general text.

Notes

The notes provide general information, which will be helpful for the reader to bear in mind.

Warning

The warnings indicate a potentially dangerous situation, which could result in death, personal injury or damaged equipment, if certain guidelines are not followed.

3. General product information

This chapter includes overall product information about the unit in general and its place in the DEIF product range.

Introduction

The concept of EC-1 is to offer a simple and effective solution to engine builders, who need a flexible yet cost-competitive protection and control unit for small and medium-sized engines. If the engine is combined with a generator to form a power emergency system, a number of options are available to complete the functionality.

Type of product

The Engine Controller EC-1 is a micro-processor based control unit containing all necessary functions for protection and control of a diesel engine. Furthermore, it contains a single-phase AC voltage measuring circuit. The unit is equipped with an LCD display presenting all values and alarms.

Options

The basic EC-1 engine controller unit can be equipped with the flexible options needed to provide the optimum solution. The options cover e.g. various protection and control functions for generator, CAN bus communication for different engine types and input options.

A full options list is included in the data sheet.

4. Installation instructions

This chapter includes the information needed to perform correct installation of the unit, e.g. mounting instructions, terminals, wiring, inputs, etc.

Mounting

The unit is designed for flush mounting by means of 4 fixing clamps, which are included at delivery. The two fixing clamps on each side are mounted on the top and bottom of the EC-1 box.

Chapter 4 includes detailed information on switchboard cutout and unit dimensions.

Terminals

Low power signals

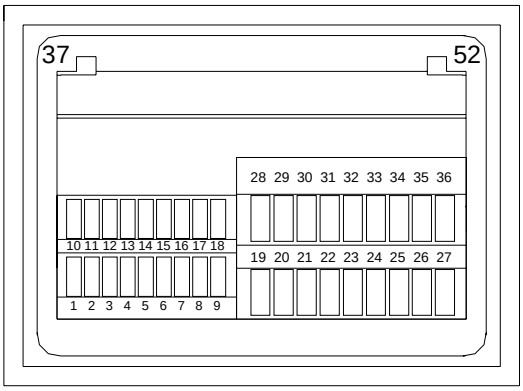
Terminals 1-18	
Terminals 1-3	CAN bus (option H5)
Terminals 4-7	3 x multi-function inputs (option M17)
Terminals 8-9	Speed pick-up input (option M17)
Terminals 10-11	Status relay output (micro-processor watchdog)
Terminals 12-18	Binary inputs

High power signals

Terminals 19-36	
Terminals 19-22	Single-phase AC voltage measurement (max. voltage 480V AC) (option B2)
Terminals 23-25	Relay outputs
Terminals 26-27	DC power supply
Terminals 28-31	Not used
Terminals 32-36	Relay outputs

Unit rear view

A unit rear view of the terminal slots can be seen below.



The RJ11 connector for the PC connection interface box is placed on the side of the unit.

Terminal description

For the relay outputs the following terms will be used:

NO means Normally Open.
NC means Normally Closed.
Com. means common terminal for the individual relay.

Term.	Technical data	Description
10…11	Status out. Contact ratings 1 A 30V DC/V AC	General status output for marine approvals
12	Common	Common for term. 13…18
13	Digital input	Start enable/configurable
14	Digital input	Remote start/configurable
15	Digital input	Charge alternator D+ (running)/configurable
16	Digital input	Overspeed/configurable
17	Digital input	Coolant temperature/configurable
18	Digital input	Oil pressure/configurable
23	Common	Common for term. 24, 25 and 32 and emergency stop*
24	Relay output 1. Contact ratings 2 A 30V DC/V AC	Horn. Function NO
25	Relay output 2. Contact ratings 2 A 30V DC/V AC	Alarm/configurable. Function NO
26	Power supply –	GND
27	Power supply +	5…36V DC
28…31	Not used	Note 23 and 31 is internally connected
32	Relay output 3. Contact ratings 2 A 30V DC/V AC	Start prepare/configurable. Function NO
33-34	Relay output 4. Contact ratings 8 A 30V DC/V AC	Run coil/stop coil/configurable. Function NO
35-36	Relay output 5. Contact ratings 8 A 30V DC/V AC	Starter (crank)/configurable. Function NO
Optional configurable inputs		
4	Common	Common for term. 5…7
5	VDO1/4..20mA/binary input	Fuel level/configurable
6	VDO2/4..20mA/binary input	Oil pressure/configurable
7	VDO3/4..20mA/binary input	Water temp./configurable
Optional CAN bus #1 engine interface		
1 2 3	CAN-GND CAN-L CAN-H	CAN J1939 engine communication
Optional tacho RPM input		
8 9	Tacho-GND Tacho input	Magnetic pick-up. PNP or NPN/tacho generator/ charge alternator W terminal
Optional single-phase generator voltage input		
19	L2 or N	Generator voltage and frequency
20	Not used	
21	L1	
22	Not used	

* If terminal 23 is used for emergency stop, please see the wiring diagram on page 9.

Terminal 23 emergency stop must be connected to +12/24V DC, because the other reference for the detection is internally wired to terminal 26 (negative). Besides deactivating the run coil output and activating the stop coil output, this terminal also disconnects the supply to relays 1-3. Sufficient care must be taken not to prevent a stop with the cut of supply, meaning that a stop coil output cannot be set to any of the relays 1-3. This function is turned OFF by default.

**The status relay is the uP watchdog output. This relay is normally energised, and the switch is closed after power up. If the uP fails or the power is lost, the relay will deenergise and the switch will open. If the unit fails to start up at power up, then the relay switch will remain open.

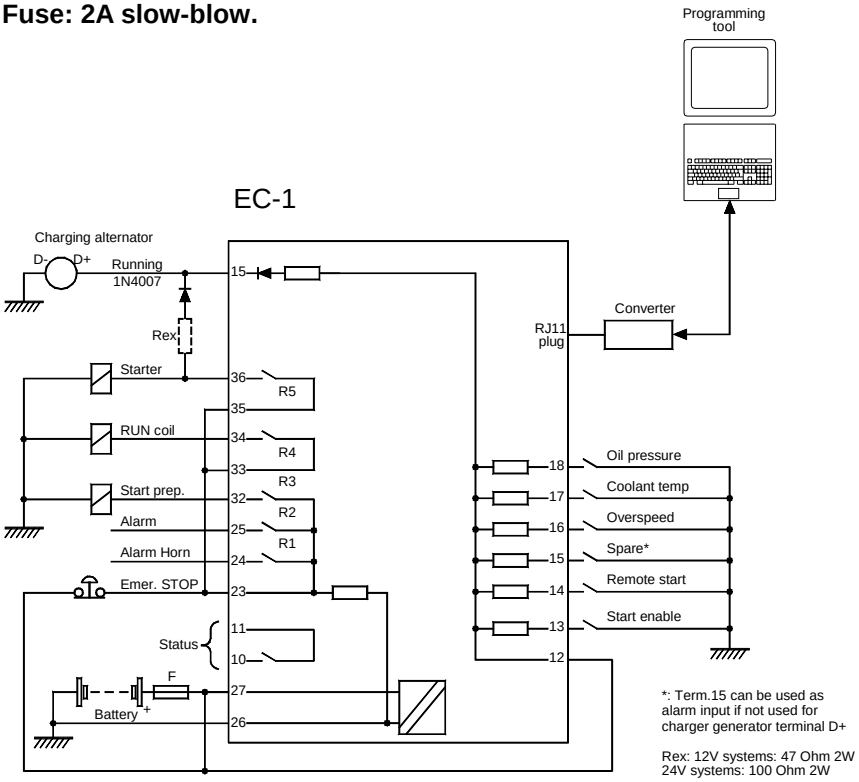
The binary input functions are configurable via the PC utility software and can be configured to cover the following functions.

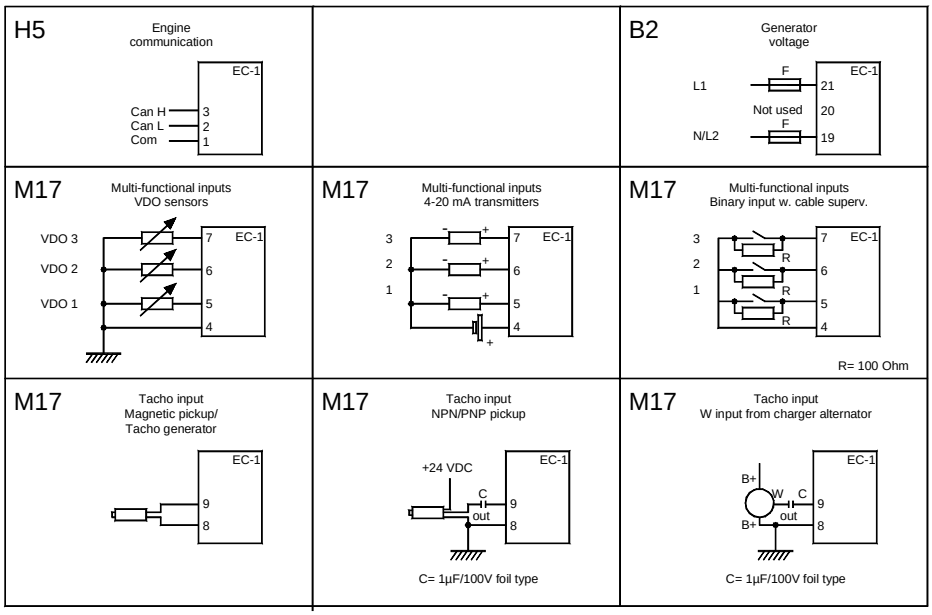
- Alarm/limit
- Engine running
- Horn
- Idle speed
- Not used
- Start prepare
- Run coil
- Starter
- Stop coil
- External heater (option M17)
- Stop coil (not acc. in start seq.)

It is possible to choose run coil on one relay and stop coil on another, thus supporting engines with double systems.

Wiring

F: Fuse: 2A slow-blow.



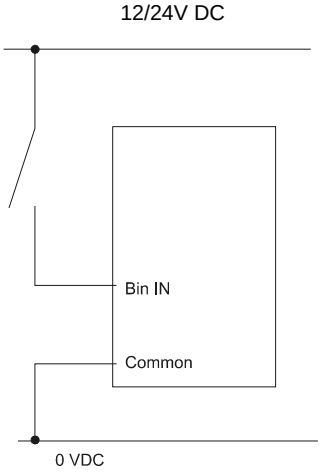


The illustrated configuration is the default factory setting. The use of the relays can be chosen freely.

It is important to protect the unit against damage caused by high voltages. Therefore, the fuse must not be more than 2A.

Binary inputs

All binary inputs are 12/24V DC bi-directional optocoupler type. The typical wiring is illustrated below:



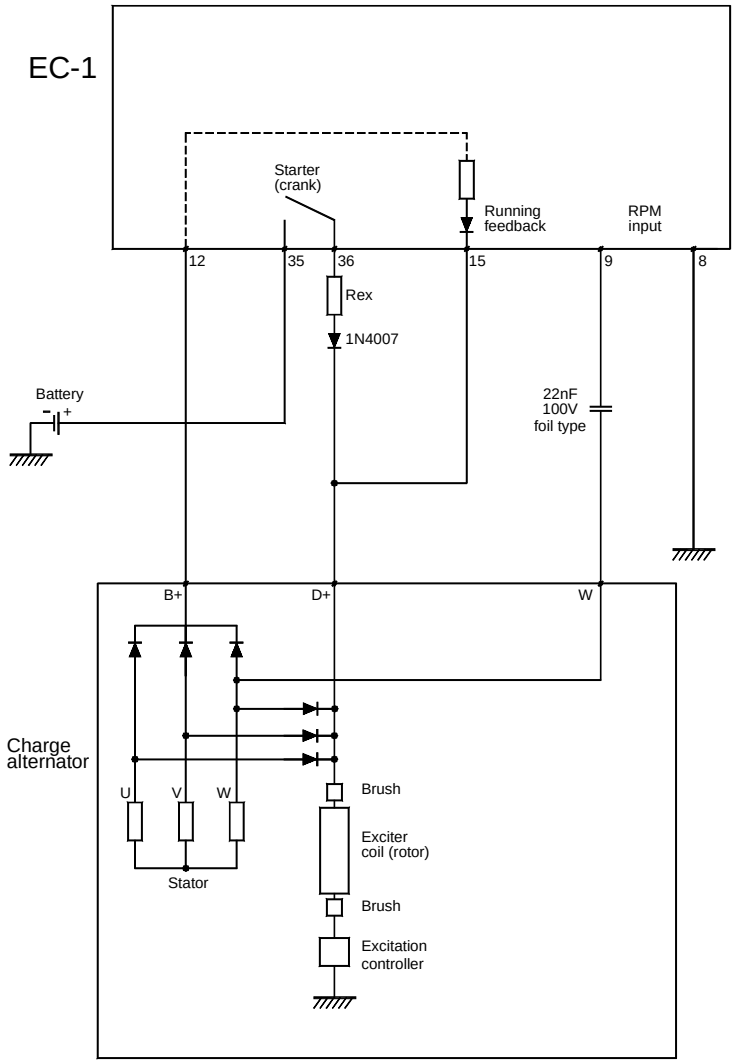
The binary inputs use fixed signals. Only the mode shift input and the test input (if the timer is used) use pulse signal.

Charger alternator connections

The charger alternator can be connected in 2 different ways:

1) Using the D+ terminal connected to terminal 15
2) Using the W terminal connected to the RPM input (option M17)

Usually only one of these possibilities is used.



Rex: Excitation resistor	12V systems: 47Ω 2 W

Running feedback	24V systems: 100Ω 2 W

At standstill the battery + is connected to terminal 12 (common), and a current flows to terminal 15 and via the D+ input on the alternator to ground (battery -). When the starter is engaged (cranking), the battery will supply the D+ through the REX resistor, helping the alternator to excite. When the alternator starts to produce voltage (excitation OK), the speed of the alternator will be above running speed, and the voltage on term. 15 will rise to a value higher than the battery voltage and then interrupt the current flow through REX and activate the running feedback input. Engine is running.

Technical information

Technical specifications

Accuracy:	Class 2.0 to EN 60688/IEC 688
Operating temp.:	-25…70°C
Storage temp.:	-40…70°C
Measuring input voltage:	50…480V AC phase to phase
Load:	1.5MΩ
Frequency:	30…70Hz
Pick-up input voltage:	2.0…70V peak
Pick-up input frequency:	10-10000Hz
Aux. supply:	4-36V DC continuously Max. 8W consumption
Passive binary in voltage:	Bi-directional optocoupler 8…36V DC
Impedance:	4.7kΩ
VDO inputs:	Resistor inputs, internal 4V supply
Analogue input:	From active transducer
Current inputs:	4…20mA
Impedance:	50Ω
Active binary in internal voltage:	Dry contact inputs 4V DC supply, with cable supervision
Impedance:	240Ω ~ 16mA
Relay outputs:	3 relays: 30V DC/AC 2A 2 relays: 30V DC/AC 8A 1 status relay: 24V DC 1A
Mounting:	Panel mounted
Size:	78 x 106 mm
Climate:	Class HSE, to DIN 40040
Display:	122 x 32 pixel back-light STN
Safety:	To EN 61010-1, installation category (overvoltage category) III, 600V, pollution degree 2
Protection:	Front: IP 52 (IP 54 with gasket, option L) Terminals: IP20 To IEC 529 and EN 60529

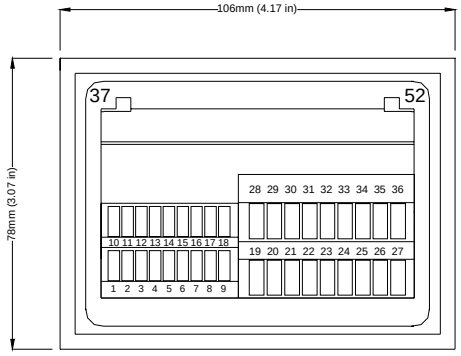
EMC/CE:	To EN 61000-6-1/2 SS4631503 (PL4) and IEC 255-3
Material:	All plastic materials are self-extinguishing according to UL94 (V1)
Plug connections:	AC voltage inputs: 3.5 mm^2 multi stranded Other: 1.5 mm^2 multi stranded
PC connection:	RS232 converter box (option J5)
Approval:	CE & C-UL (listing pending)
Weight:	Approx. 0.7 kg (1.5 lbs)

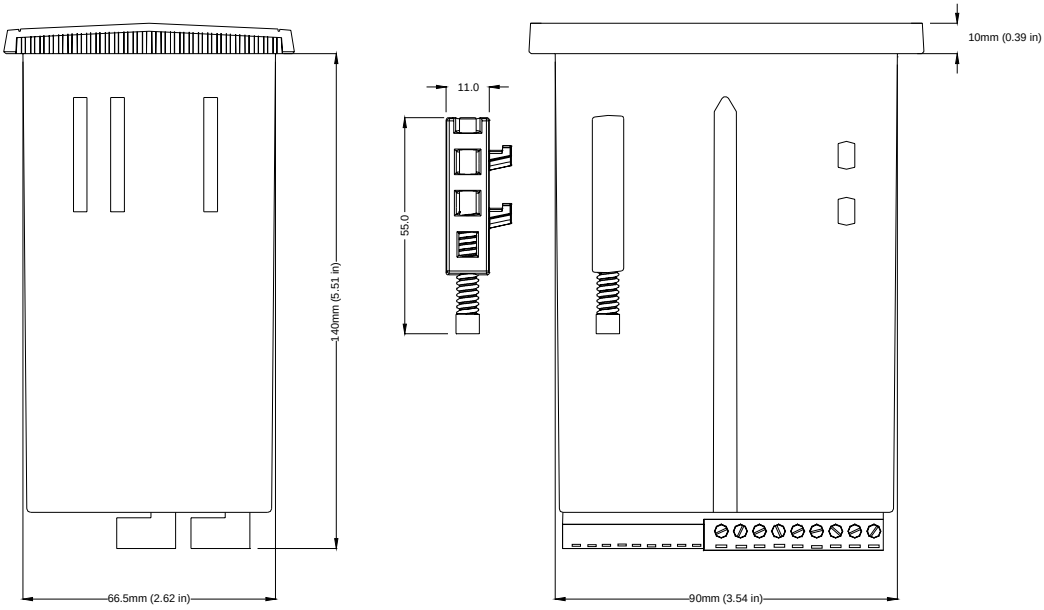
Unit dimensions and panel cutout

Panel cutout

H x W = 68 x 92 +0.3 mm

H x W = 2.68” x 3.62” +0.01”





5. Push-buttons, LEDs and display

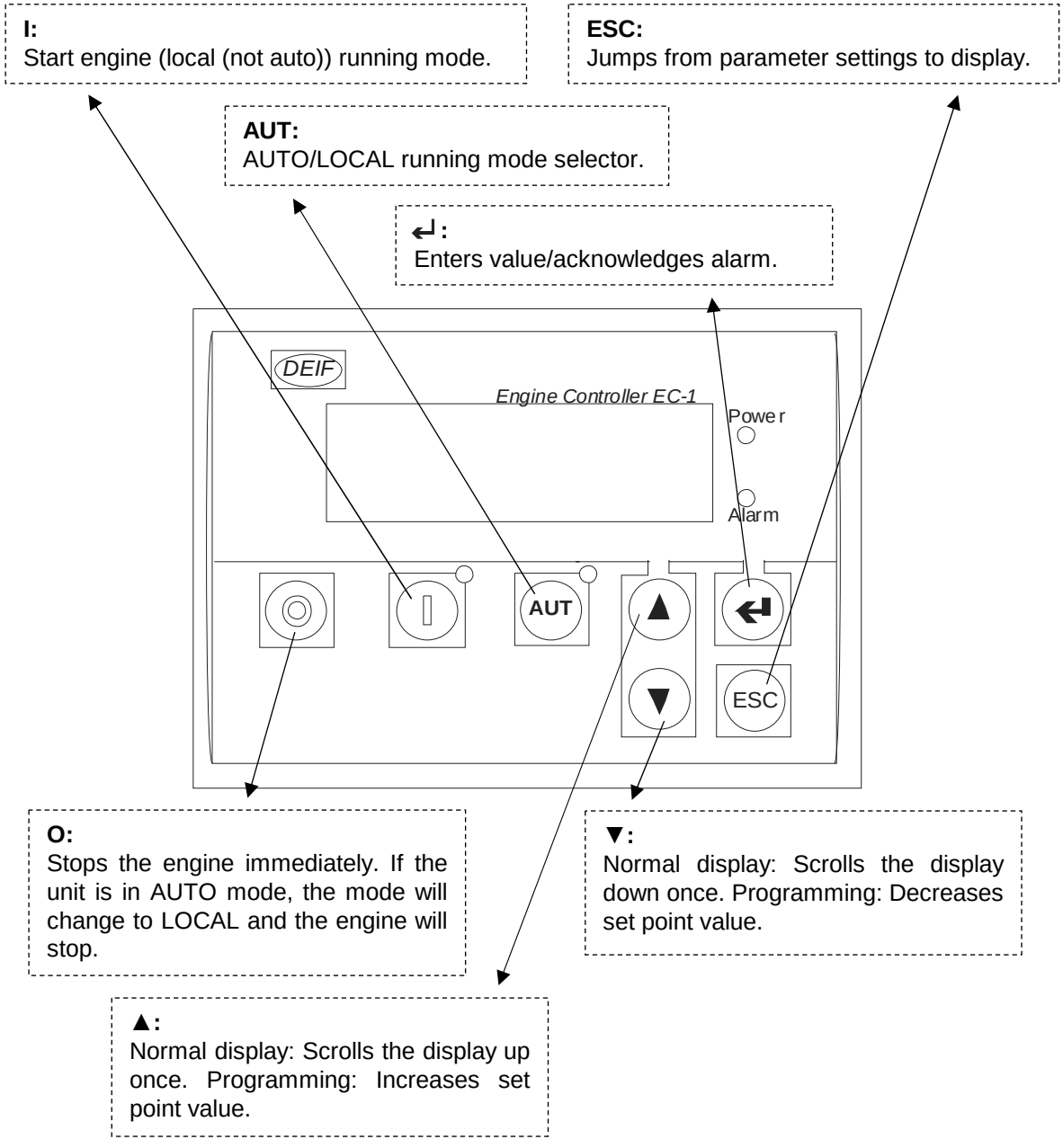
This chapter deals with the display including the push-button and LED functions.

Unit

Front dimensions H x W	78 x 106 mm (3.07” x 4.17”)
Unit depth	150 mm (5.91”)

Push-button functions

There are 7 push-buttons on the unit with the following functions:



I: Start engine (local (not auto)) running mode.

O: Stops the engine instantaneously. If the unit is in AUTO mode, the mode will change to LOCAL and the engine will stop.

AUT: AUTO/LOCAL running mode selector.

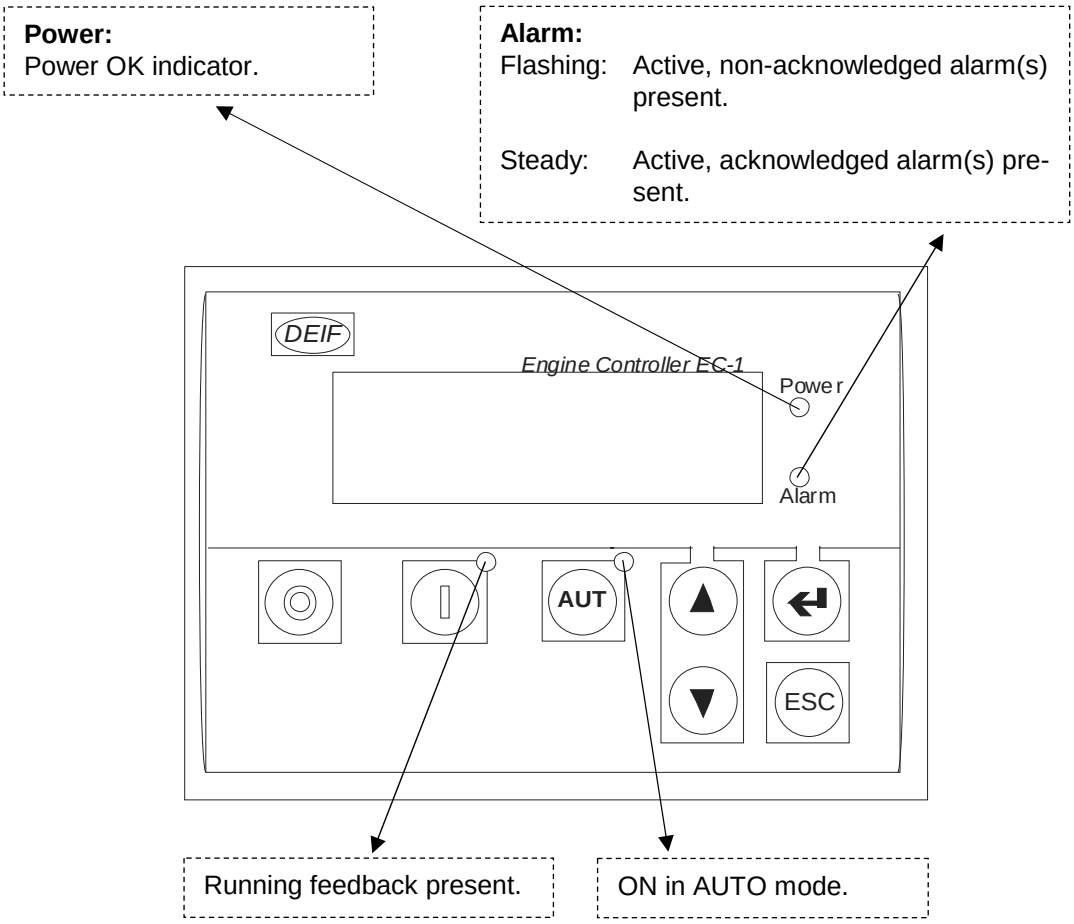
ESC: Jumps from parameter settings to display.

▲: Normal display: Scrolls the display up once. Programming: Increases set point value.

▼: Normal display: Scrolls the display down once. Programming: Decreases set point value.

↵: Enters value/acknowledges alarm.

LED functions

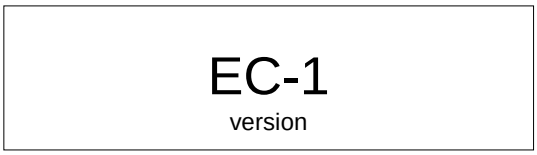


Power: Power OK indicator.

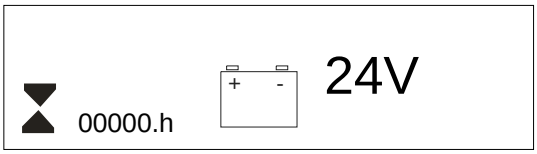
Alarm: Flashing: Active, non-acknowledged alarm(s) present.
Steady: Active, acknowledged alarm(s) present.

Display functions

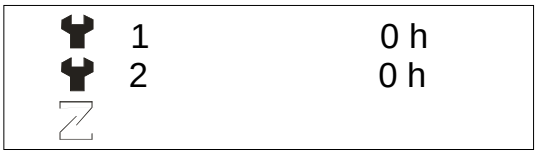
The display indicates both readings and alarms. Illustrated below are examples with icons and English language.



Type and software version.

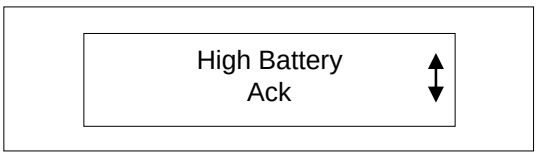


Battery voltage and running hours counter.



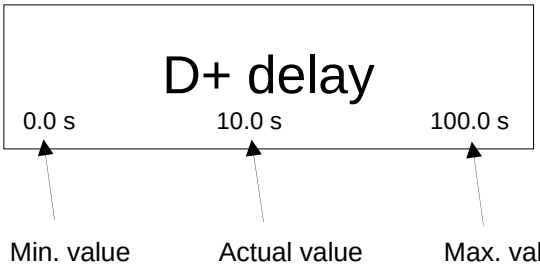
Service timer 1/2.

Press ↵ to enter the list of active alarms.



Active alarm list. The alarm list automatically pops up, when an alarm appears. When the arrow is present, more alarms are active. Press ▲ to scroll through the list. Exit the list by pressing ESC.

Press ↵ to enter the parameter setting.

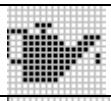
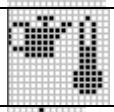
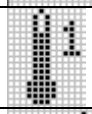
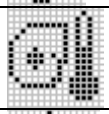
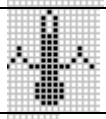
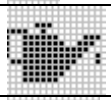
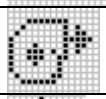
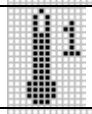
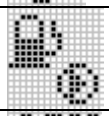
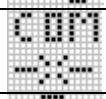
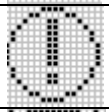
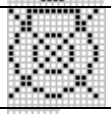
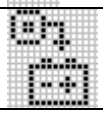


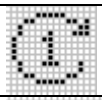
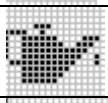
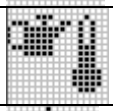
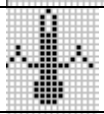
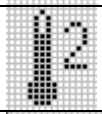
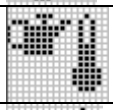
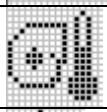
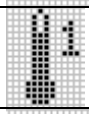
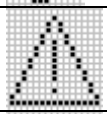
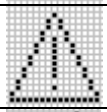
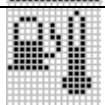
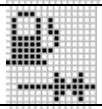
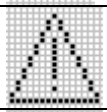
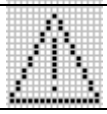
Parameter example: D+ delay setting. Use ▲ or ▼ to scroll through the settings list. If change of settings is necessary, press ↵ and enter the password. Then use ▲or▼ to change values. Press ↵ to save setting. Use ESC to leave settings.

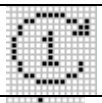
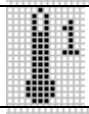
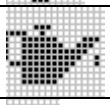
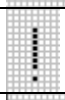
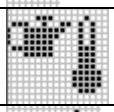
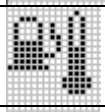
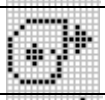
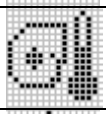
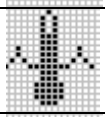
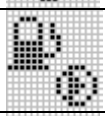
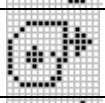
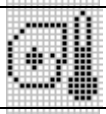
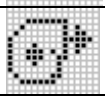
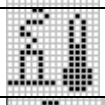
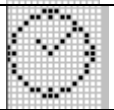
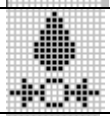
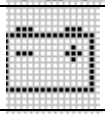
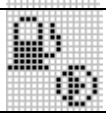
The available parameters depend on the set options. Some parameters can only be changed using the PC utility software (USW) for EC-1. The parameter list will automatically be abandoned, if no button is pressed during a 30 sec. period.

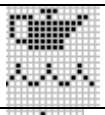
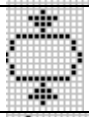
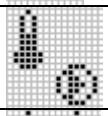
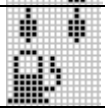
Icon list

The list covers all available icons including those related to the engine communication.

	Warning list	Icon
1	Low oil pressure warning	
2	EIC temp. lube oil	
3	High coolant temp. warning	
4	High intercooler temp.	
5	Defect coolant level switch	
6	EMR warning	
7	JDEC warning	
8	Oil pressure	
9	Intake manifold	
10	Coolant temperature	
11	Fuel injection pump	
12	EI comm. error	
13	EIC warning	
14	Stop limit exceeded	
15	EMS warning	
16	Charge 61	

	Shutdown list	Icon
17	Overspeed shutdown	
18	Low oil pressure shutdown	
19	EIC temp. lube oil	
20	Low coolant level shutdown	
21	High coolant temp. shutdown	
22	High oil temp. shutdown	
23	High charge air temp. shutdown	
24	High coolant temp. shutdown	
25	EMR shutdown	
26	JDEC shutdown	
27	Fuel temperature	
28	Fuel control valve	
29	ECU failure	
30	EIC shutdown	
31	EMS shutdown	

	Analogue readings	Icon
32	EIC speed	
33	EIC coolant temp.	
34	EIC oil pressure	
35	EIC faults	
36	EIC oil temp.	
37	EIC fuel temp.	
38	EIC boost pressure	
39	EIC air inlet temp.	
40	EIC coolant level	
41	EIC fuel rate	
42	EIC charge air pressure	
43	EIC charge air temp.	
44	EIC air inlet pressure	
45	EIC exhaust gas temp.	
46	EIC engine hours	
47	EIC oil f. diff. press.	
48	EIC battery voltage	
49	EIC fuel del. press.	

50	EIC oil level	
51	EIC crankcase press.	
52	EIC coolant pressure	
53	EIC water in. fuel	

6. Functional descriptions

This chapter includes functional descriptions for the unit's standard functions. Screen dumps and flow charts are used in order to simplify the information.

Alarm function

The unit will detect and display individual alarms which are enabled. Furthermore, it is possible to activate relays for alarm purposes. The alarms can be configured to any of the available relay outputs. Each alarm function has two output settings, namely output A and output B.

Alarms can be acknowledged in one of two ways; either the binary input 'alarm ack.' (selectable to be one of the binary inputs 13, 14, 16, 17 and 18) is used, if this is configured for alarm acknowledge, or the select button on the display is used:

- The alarm acknowledge input acknowledges all present alarms, and the alarm LED will change from flashing to steady light.

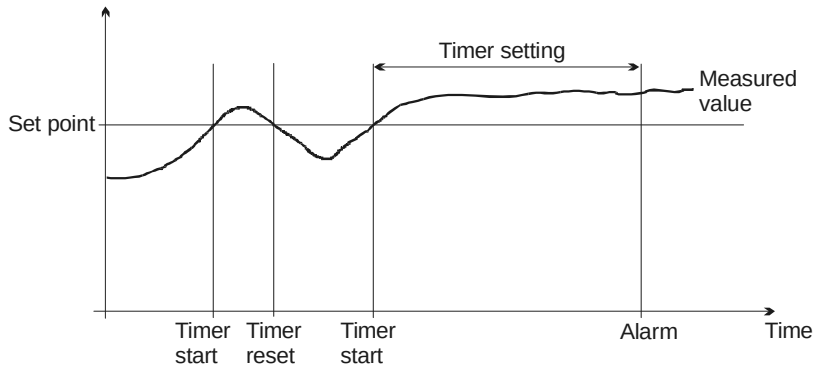
- The display can be used in the alarm information window. The alarm information window displays one alarm at a time and the alarm state whether the alarm is acknowledged or not. If it is unacknowledged, then press ↵ to acknowledge it. Use the ▲ or ▼push-buttons to scroll in the alarm list.

The alarm LED will be flashing, if unacknowledged alarms are present. The alarm relay will deactivate, when the alarm situation is reset and the alarm is acknowledged.

Timer function

The delay settings are all of the definite time type, i.e. a set point and time is selected.

If the function is e.g. overspeed, the timer will be activated, if the set point is exceeded. If the RPM value goes below the set point value before the timer runs out, then the timer will be stopped and reset.



When the timer runs out and the alarm is present, the output is activated.

Utility software input configuration

It is possible to configure the inputs indicated in the table. The unit has a number of passive binary inputs (input terminals 13-18).

Input function	Comment
Alarm acknowledge	Configurable
Parameter shift (secondary parameters)	Configurable
Start enable (OFF = start blocked)	Configurable
GB Pos on	Configurable
GB Pos off	Configurable
Access lock	Configurable
Mode shift (auto/manual)	Configurable
Fire pump	Configurable
Remote start/stop	Configurable
D+ (term. 15 only)	Configurable
Digital inputs no. 1...6 used as alarms	Configurable
Idle speed	Configurable
Inhibit EI alarms	Configurable

Input function description

1. *Alarm acknowledge*
   Acknowledges all present alarms.

2. *Parameter shift*
   Selection of this input will make the unit use the secondary set of parameters (SP2).

3. *Start enable*
   This input must be activated to start the engine.

Start enable is start control only, i.e. if removed when the engine is running, the engine keeps on running.

4. *GB Pos on*
   When this input is activated the EC-1 sees the generator breaker as closed. If the GB on and off feedback is on or off simultaneously, a GB position failure is displayed.

5. *GB Pos off*
   When this input is activated the EC-1 sees the generator breaker as open. If the GB on and off feedback is on or off simultaneously, a GB position failure is displayed.

6. *Access lock*
   Activating the access lock input deactivates the control push-buttons on the display. It will only be possible to view measurements, alarms and the log.

7. *Mode shift*
   Selection between manual and auto running. The mode is changed every time the input is activated (pulse input).

8. *Fire pump (shutdown override)*
   Deactivates all protection functions except overspeed and emergency stop protection.

9. *Remote start/stop input*
   Activating this input will start the gen-set. Deactivating it will stop the gen-set after cool down (auto mode only).

10. *D+ (terminal 15 only)*
    This input is used as a running indication of the engine. When the input is activated, the start relay is deactivated.

11. *Digital inputs 1…6*
    These inputs are configurable as alarm inputs. For terminal 15 input for running feedback from charge generator +D terminal is also possible (run when charger U > battery voltage).

12. *Idle speed*
    Activating the idle speed input holds the engine at idle speed for as long as it is set.

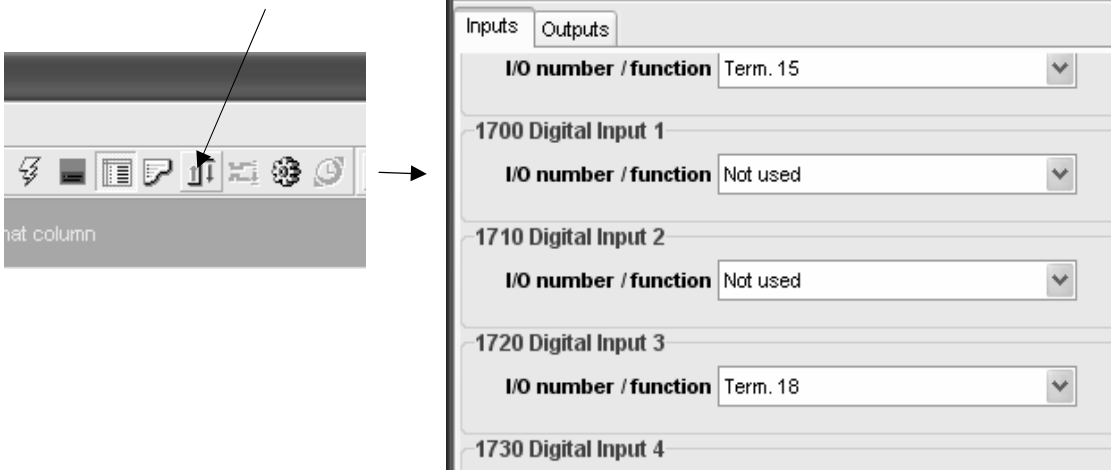
13. *Inhibit EI alarms*
    When this input is active, it will inhibit all engine interface (option H5) alarms.

Configuration

The digital inputs are configured via the utility software (USW).

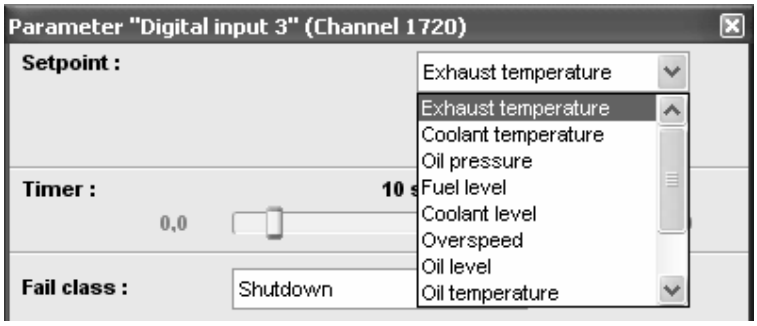
Remember to write the settings to the unit.

Use this button to upload the menu.

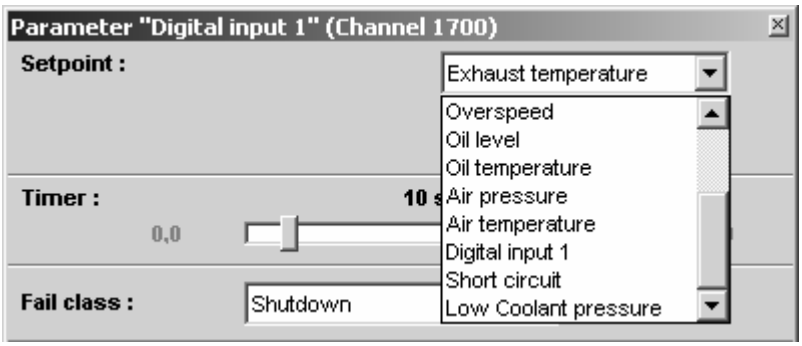


The individual I/O number and the function are now selected. In the example below '*Digital input 3*' is chosen, and a terminal number must be assigned to the input. If the input is used as alarm input, then the name can be changed to the relevant name selected from the predefined list below:

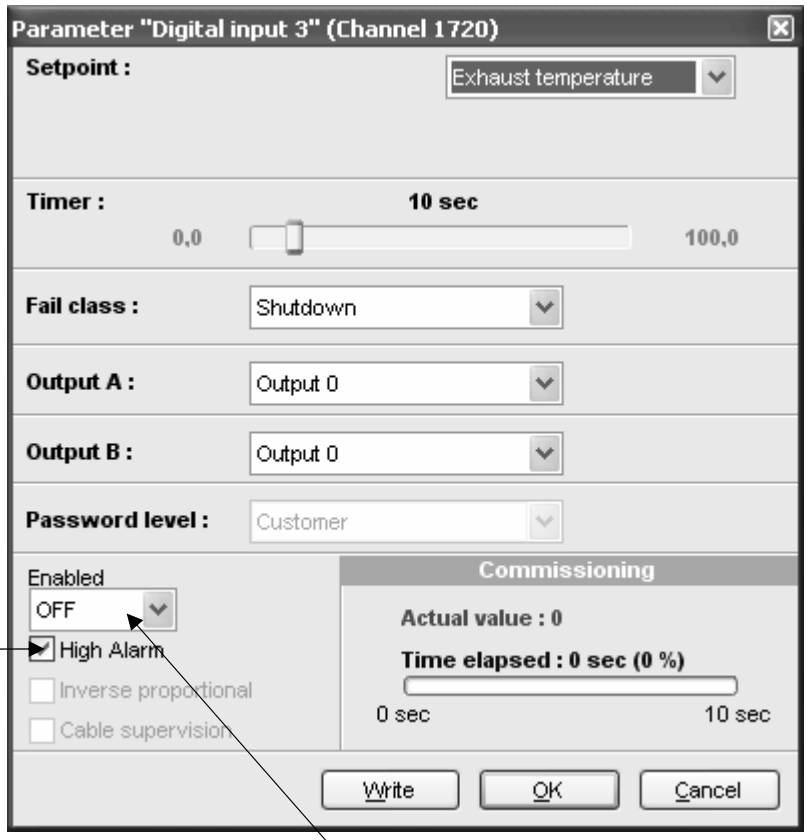
First, '*Digital input 3*' is selected from the parameter **1700-1750 Digital input term. 13-18, no cable supervision.**



Then name the input from the list below.



Complete the input settings and select the appropriate fail class and outputs. The outputs A and B can be used to activate one or two of the configurable relay outputs. If the relay function is set as a limit relay, no warning pop-up will be shown in the display. The relay 0 is a virtual relay, so both output A and B must be set to limit relays if no warning in the display is wanted.

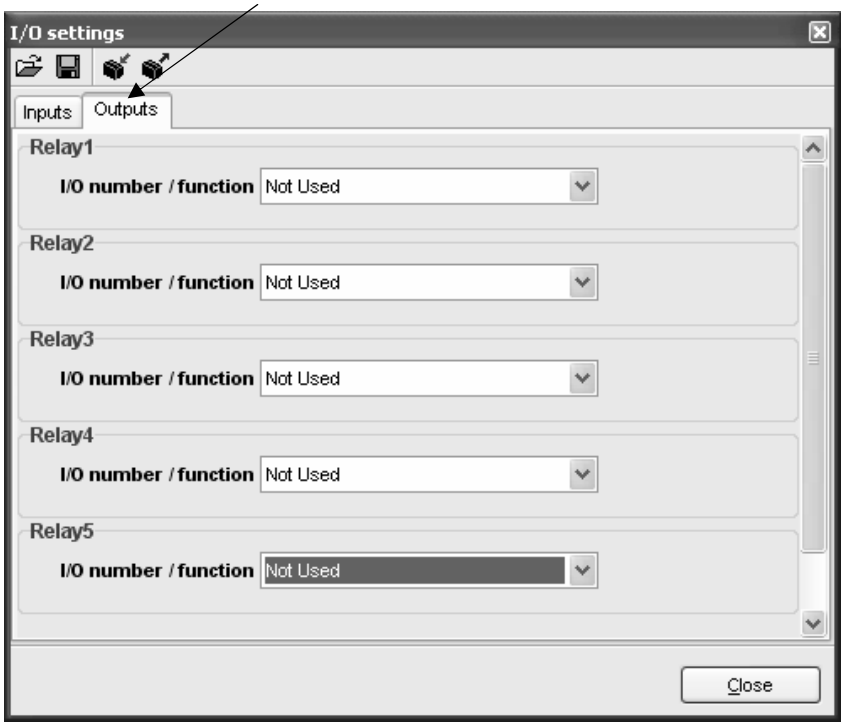


Remember to activate the function by changing OFF to ON or RUN. If RUN is selected, then the alarm will only be active, when the engine is running.

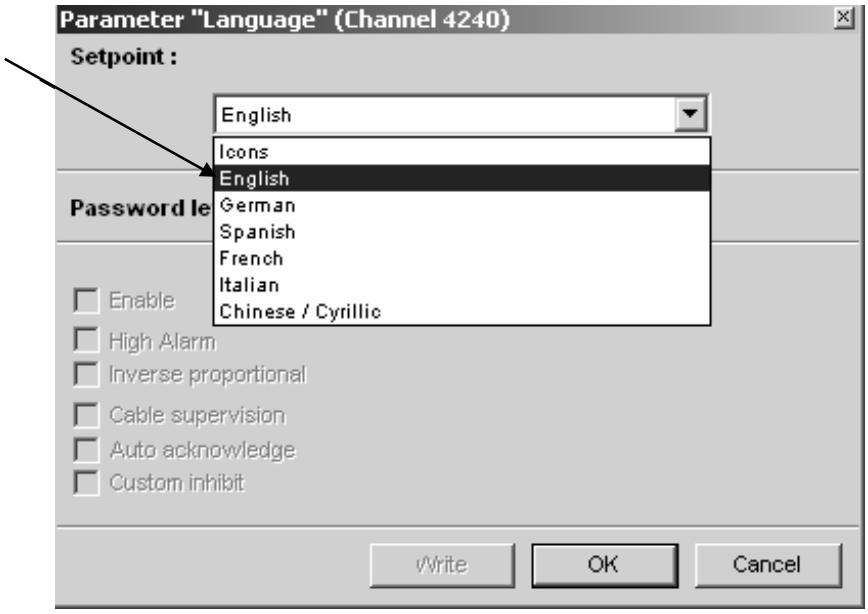
If the High Alarm is set, then the alarm will be registered upon a closing contact. If the High Alarm is not set, then the alarm will be registered upon an opening contact.

After configuration of the input parameter, it is possible to assign a relay. Use the dialog box below for configuration of the output relay.

Remember to write the settings to the EC-1 before closing the dialog box.



In the language dialog box select the language.



Please notice that the language used in the USW will still be English, even if the language is changed. The selection Chinese/Cyrillic is dependent on the software version. The software contains either Chinese or Cyrillic. This is selected when the EC-1 is ordered or upon application software download from www.deif.com.

Fail class

All the activated alarms of the EC-1 must be configured with a fail class. The fail classes define the category of the alarms and the subsequent action of the alarm.

Four different fail classes are available:

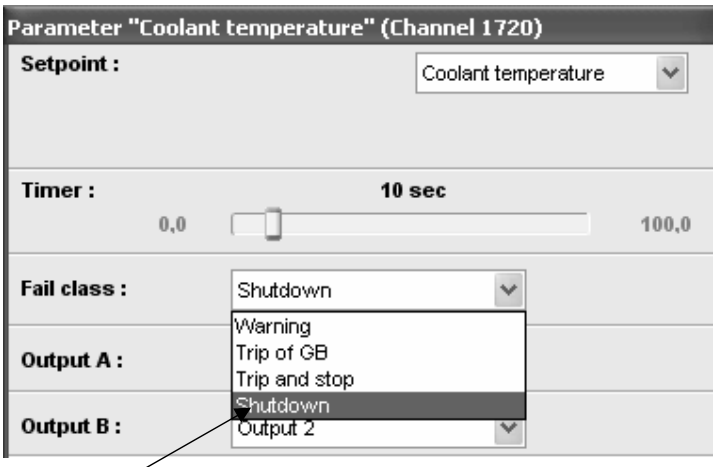
Fail class	Action						
	Alarm horn relay*	Alarm display	Block engine start	Open gen. breaker (if present)	Stop engine	Cooldown	Shutdown
0 Warning	X	X					
1 Trip of GB	X	X		X			
2 Trip and stop	X	X	X	X	X	X	
3 Shutdown	X	X	X	X	X		X

* When alarm horn relay output is selected active.

Fail class configuration

The fail class can be selected for each alarm function via the USW (PC software).

To change the fail class via the PC software, the alarm function to be configured must be selected. Select the desired fail class in the fail class roll down panel.



The fail class roll down panel is activated, and the individual functions are ready for selection.

Service timers

The controller can monitor two different maintenance intervals:

Service timer 1
Service timer 2

Both timers operate on either:

1. Running hours (counting up) or
2. Elapsed time (counting down)

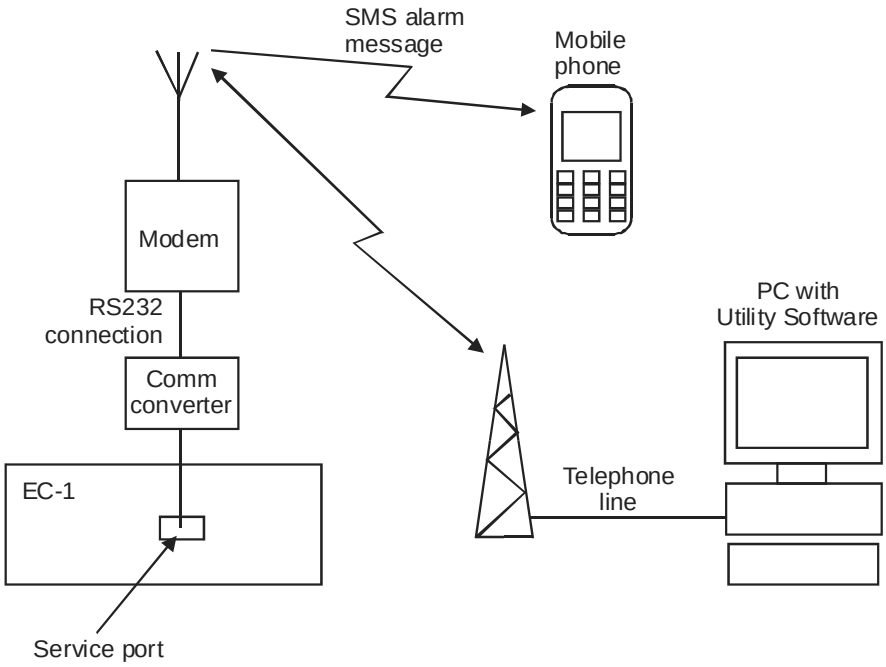
When the adjusted time for elapsed timer expires, the EC-1 will display an alarm. Activating the alarm acknowledge resets this alarm. From the alarm to the time of acknowledgement, the timer counts on. When acknowledging the alarm the timers will be reset, and a new service timer alarm will only reoccur after the adjusted time has elapsed. The running hours and elapsed time is counting, when the running feedback is present.

GSM communication

GSM communication can be used for 2 purposes:

1. Sending SMS alarm messages to up to 5 different mobile phones. The messages will be sent in clear text, representing the alarm in question (e.g. 'Overspeed').
2. Communicate with the EC-1 PC utility software.

Connection:



The connection is based on an RS232 connection to a GSM modem via the service port on the EC-1. Since the connection on the EC-1 is a TTL communication, the interface box PI-1 (option J5) is needed to convert the signals to RS232. The PI-1 connects via a cable with SUB-D 9-pin female connector on the modem side.

We recommend using Siemens MC35 modem. The easiest way to get the modem is to purchase it through a local dealer. The SIM card needed comes from your local mobile net provider. Setting the PIN code in the modem itself is easiest done by mounting the SIM card in a mobile phone and changing the PIN code there. The SIM card will remember the PIN code, when it is installed in the modem.

Siemens recommends a short power interruption (30 sec.) once a day to prevent lock-up of the modem. This is easiest done using a 24 hour watch.

Should an alarm occur during the interruption, the multi-line unit will retransmit it when the modem starts again, so no messages are lost.

Utility software connection via modem

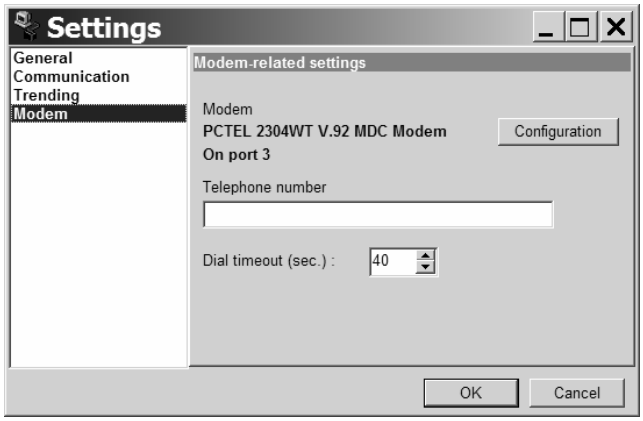
If a PC utility software connection is required, then the SIM card must support data transfer. Contact your GSM provider for details.

When ASCII mode is selected, the USW must also be set to ASCII mode. This selection is not needed, if the modem is used for SMS messages only.

PC utility software

Press the application settings push-button.

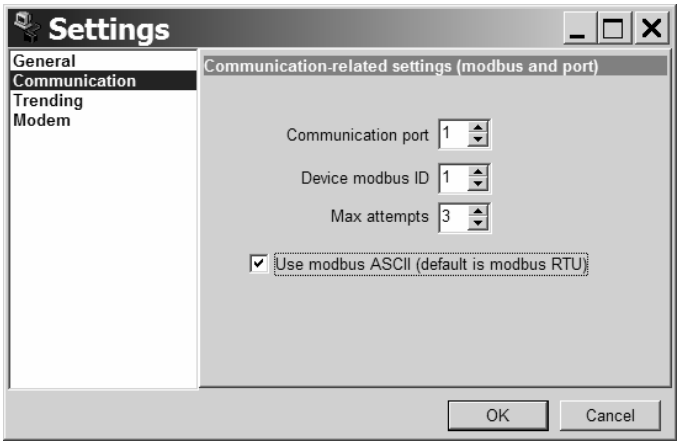
The settings dialog box appears:



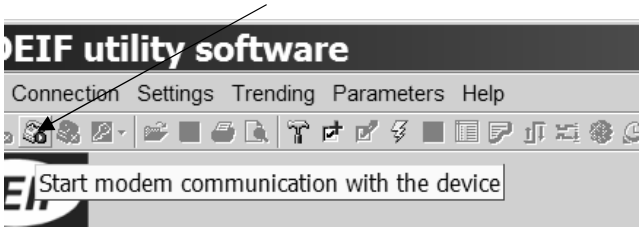
Select modem and key in the telephone number of your GSM modem connected to the unit.

In the above example the modem is selected automatically by the PC USW (internal modem in the PC).

When you want to use modem dial-up, the PC USW must also be set to run ASCII communication:



After this, dial-up can be used: Click on the telephone button:

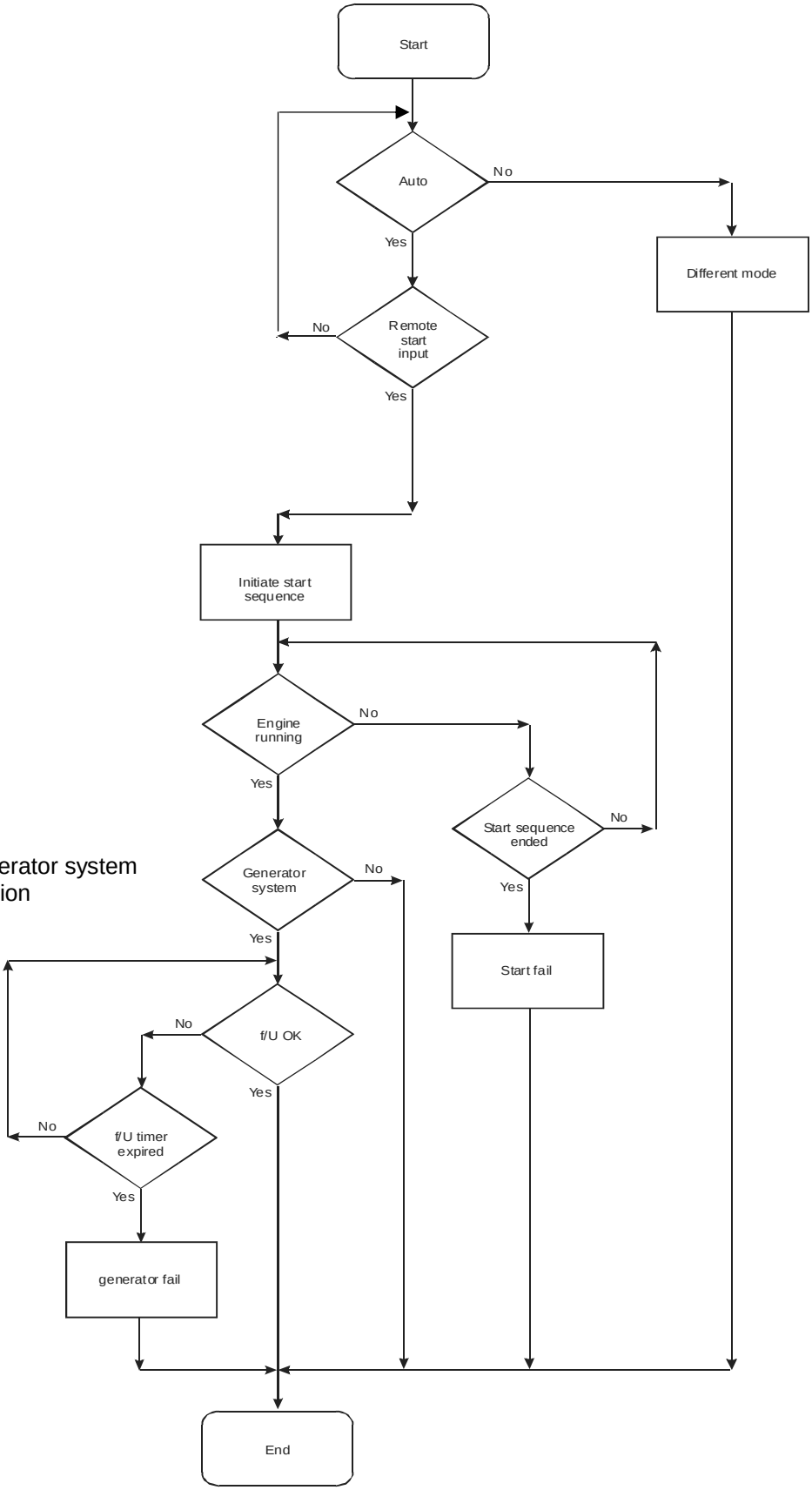


The modem communication is very much slower than the normal direct connection, so please be patient. It is not recommended to download the entire setting list. Use single setting downloads.

PC utility software communication safety

If the communication fails, the EC-1 unit will operate according to the received data. If e.g. only half of the parameter file has been downloaded, when the communication is interrupted, the settings are going to be a mix.

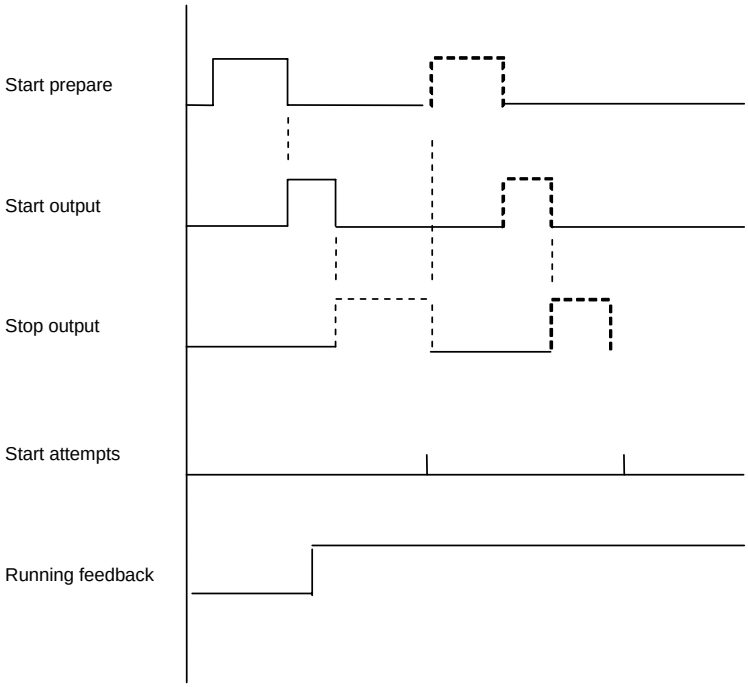
Auto engine start



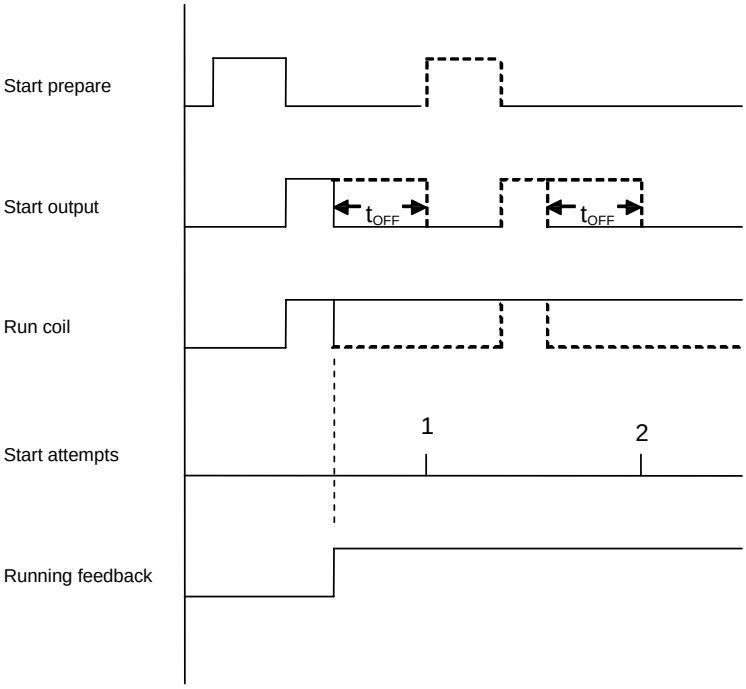
The generator system is an option

Start sequences

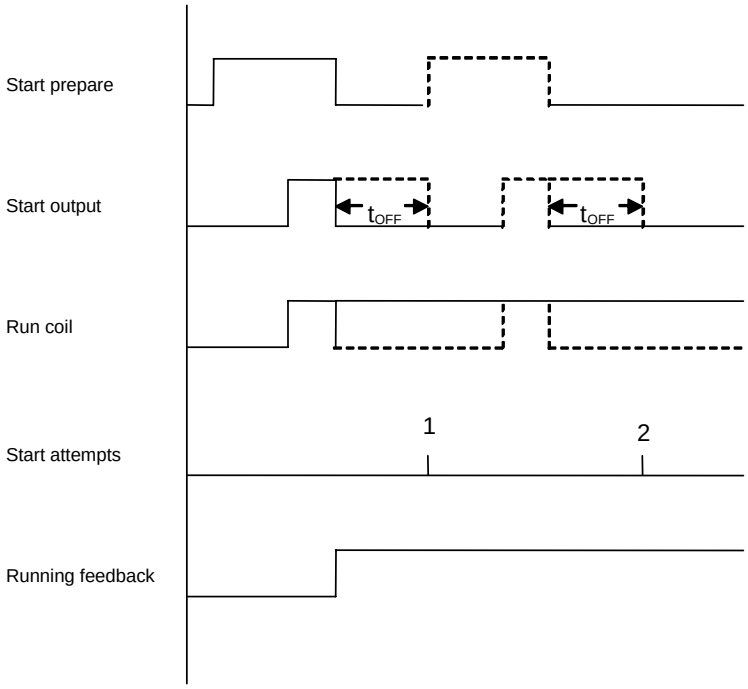
Start sequence
Stop coil/normal prepare



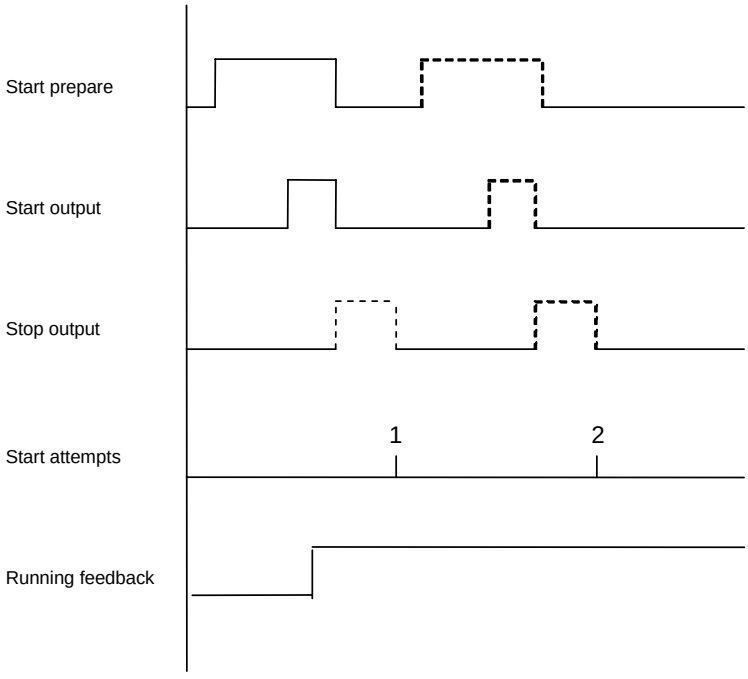
Start sequence
Run coil/normal prepare

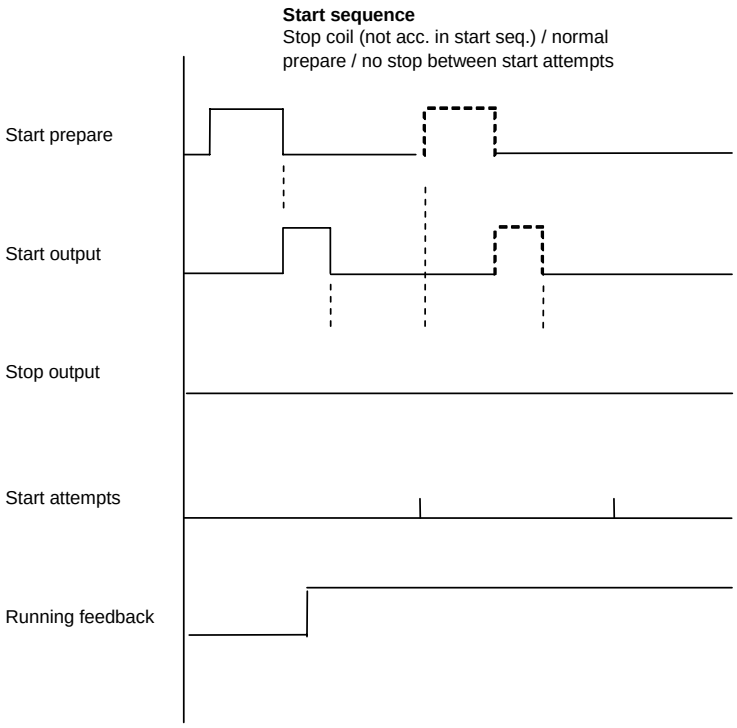


Start sequence
Run coil/extended prepare



Start sequence
Stop coil/extended prepare




Start sequence
Stop coil (not acc. in start seq.) / normal
prepare / no stop between start attempts
Start prepare
Start output
Stop output
Start attempts
Running feedback

Interruption of start sequence

The start sequence is interrupted in the following situations:

Event	Comment
Auto mode stop	Removal of start cause (binary input) or shutdown.
Start failure	
Running feedback	Tacho set point, menu 4341 (option M17).
Running feedback	Binary input, D+.
Running feedback	Frequency measurement above 30Hz (only if generator voltage measurement option is present, option B2). The frequency measurement requires a voltage measurement of 30% U_{NOM}. So the running feedback based on the frequency measurement can only be used where the voltage builds up rapidly.
Running feedback	Oil pressure RUN detect menu 4480 (option M17).
Emergency stop	
Stop push-button on the display	In manual as well as auto operation.

Start failure alarm (4370 Start attempts)

The start failure alarm will occur, if the engine has not started after the last start attempt. A start failure will activate the HORN output and relay outputs if selected.

Start prepare (4351 Starter)

There are two possibilities for use of the start prepare timer:

Normal start prepare	The start prepare relay is activated, when the start sequence is initiated for the adjusted time and before each start attempt. It deactivates before cranking.
Extended start prepare	The start prepare relay is activated, when the start sequence is initiated, and it stays activated when cranking.

Idle mode (4360 Idle mode)

Idle mode can be selected in 2 ways:

1. Configurable binary input
2. Timer setting

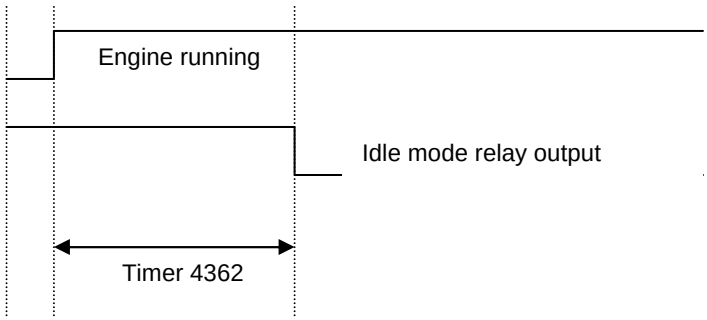
If a binary input for idle mode is used, activating this will hold the engine in idle mode for as long as the input is activated. This works for both manual and auto mode. Any time the idle mode is activated, the generator breaker will be opened.

In both cases a relay must be selected to idle in the output list. If a binary input is not used, a timer function can be set to hold the engine in idle upon start, until the timer runs out. This function can be selected to be:

Off (no idling of engine upon start)

Active for:
- both manual and auto: Select Man./Aut.
- manual only: Select Man.
- auto only: Select Aut.

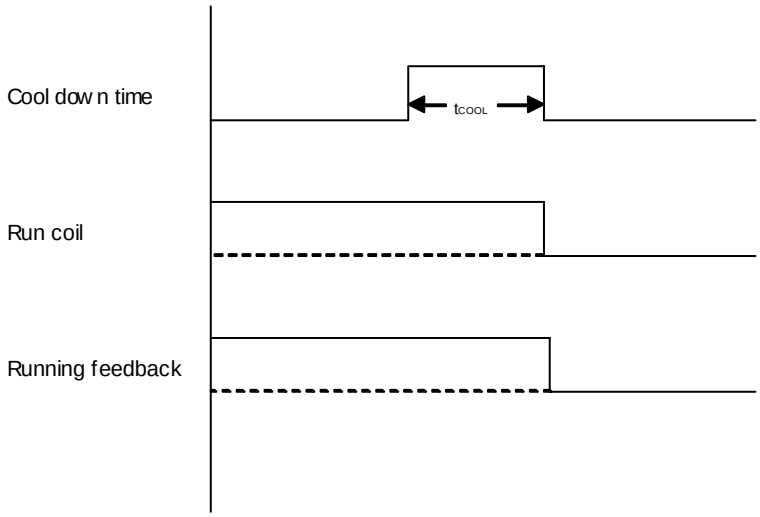
When idle mode is selected, a delay where the engine is running on low RPM is given. The delay is controlled by the EC-1, and a relay output will activate the idle control on the engine.



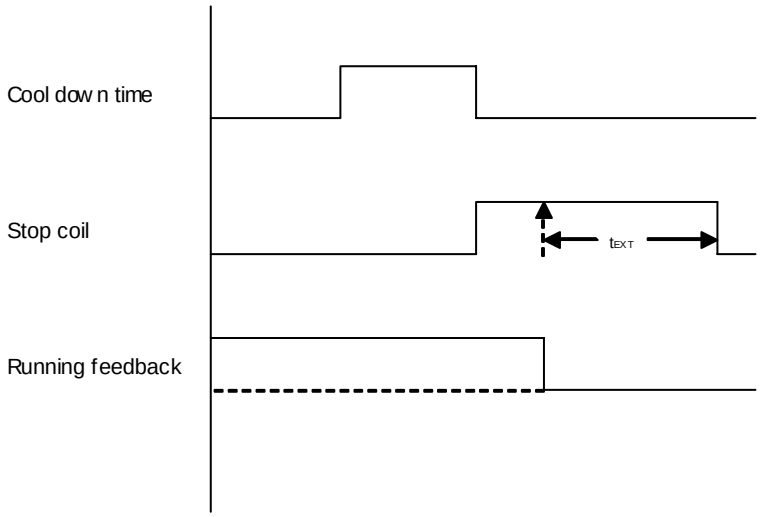
Stop sequences

The illustrations indicate the stop sequence schematically.

Stop sequence / RUN coil



Stop sequence / Stop coil and
Stop coil (not acc. in start seq.)



Stop sequence

The stop sequence will be activated, if a stop command is given. The stop sequence can include the cool down time, if the stop is a normal or controlled stop.

Description	Cool down	Stop	Comment
Auto mode stop	X	X	
Trip and stop	X	X	Only if option G6 is implemented
Stop button on display		X	
Binary shutdown input		X	
Emergency stop		X	Engine shutdown and GB opens, if present

The stop sequence can only be interrupted during the cool down period. Interruptions can occur in these situations:

Event	Comment
Start button is pressed	Manual mode only Engine will run in idle speed, if idle is ON
Binary start input	Auto mode
GB close button is pressed	Manual mode only. (Only if option G6 is implemented)

Stop failure alarm (4410 Stop failure)

A stop failure alarm will occur, if the running feedback (or the generator voltage and frequency) are still present. The stop failure timer is adjusted in menu 4410. Stop failure will activate the HORN output, and relay outputs if selected. Factory setting is no relay outputs besides horn.

7. Parameter list

This chapter includes a complete standard parameter list for setup. Therefore, this chapter is to be used for reference, when information about specific parameters is needed.

Parameter group

The parameter group can be enabled and disabled in the parameter 4250. If the parameter group is enabled, the parameters will be accessible from the display of the EC-1. To see the specific parameter, see the parameter list. If a parameter is marked (P1), it is available from the display if parameter group 1 is enabled. The default display parameter settings are the parameter settings which will always be present in the display parameter list. These parameters are marked with a *.

Setup

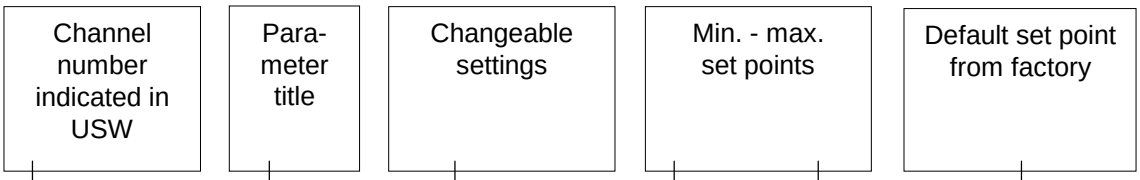
The setup of parameters is performed via the display or the PC utility software (USW). Therefore, the default settings can be changed to the relevant settings through the utility software or by means of the push-buttons on the display.

The settings can be entered through the setup menu. If no entry has taken place before, then the first display to appear is the password display. Enter the factory setting password to gain access to the menus.

The factory Customer password is 2000. The factory Service password is 2001.

If no action has been taken after 30 seconds, then the password entry will be deactivated, and a new password entry is needed. (If entry via the USW is used, the password is only needed once per connection).

Each parameter description is structured according to the same principles. Under the parameter title heading, the detailed parameter descriptions are illustrated and presented. First, a table indicating the parameter facts related to the individual parameter title is presented:



1350 VDO input – oil pressure 2.x

No.	Setting		Min. setting	Max. setting	Factory setting
1350	Oil pressure 2.1	Set point	0.0 bar	10.0 bar	4.0 bar
1351	Oil pressure 2.1	Delay	0.0 s	100.0 s	5.0 s
1352	Oil pressure 2.1	Output A	R0 (none)	R3 (relay 3)	R0 (none)
1353	Oil pressure 2.1	Output B	R0 (none)	R3 (relay 3)	R0 (none)
1354	Oil pressure 2.1	Enable	OFF	ON	OFF
1355	Oil pressure 2.1	Fail class	1 Warning	4 Shutdown	2 Trip of GB

The first column indicates the channel number in the USW.

The second column indicates the changeable setting in the PC utility software.

The third and fourth column indicates the minimum/maximum set point available for this setting.

The fifth column indicates the default set point of the unit from the factory.

When it is necessary, additional information will be supplied after the table in order to make the individual parameter descriptions as informative as possible.

Parameter overview

Protection

1460 Emergency stop (terminal 8)

1700-1750 Digital input term. 13-18, no cable supervision

System

1860 Run status

1870 D+ input (term. 15)

4120 Running hour counter

4220 Battery low voltage

4230 Battery high voltage

4240 Language

4250 Parameter group 1

System

4320 Diode compensation

4350 Starter

4360 Idle mode

4370 Start attempts

4400 Run/stop

4410 Stop failure

4460 Alarm horn

4610...4650 Relay functions

4790 GSM pin code and dial-up numbers

4800 Sleep mode

4910 Service timer 1

4920 Service timer 2

The available parameters are dependent on the options chosen. Some parameters can only be changed using the PC utility software for EC-1. The parameters available in the display are shown with a *.

Parameter table description

The table consists of the following possible adjustments:

Set point: The alarm set point is adjusted in the set point menu. The setting can be in percentage of the nominal values.

Timer: The timer setting is the time that must expire from the alarm level is reached until the alarm occurs.

Relay output A: A relay can be activated by output A.

Relay output B: A relay can be activated by output B.

Enable: The alarm can be activated or deactivated. ON means always activated, RUN means that the alarm has run status. This means it is activated when the running signal is present.

Fail class: When the alarm occurs, the unit will react depending on the selected fail class.

Small differences due to the character of the parameters may exist between the individual tables.

Fail class

The fail class settings for the protections have the following possibilities:

Value	Comment
0: Warning	Shown in alarm popup window and activates the chosen relays.
1: Trip	Shown in alarm popup window and activates the chosen relays. Trips the breaker (if breaker is present; if not, it works like warning).
2: Trip and stop	Shown in alarm popup window and activates the chosen relays. Trips the breaker (if breaker is present; if not, it works like warning), cools down the engine and stops it.
3: Shutdown	Shown in alarm popup window and activates the chosen relays. Trips the breaker (if breaker is present; if not, it works like warning) and shuts the engine down immediately.

Engine alarm settings

1460 Emergency stop (terminal 8)

No.	Setting		Min. setting	Max. setting	Factory setting
1461	Emergency STOP	Timer	0.0 s	60.0 s	0.2 s
1462	Emergency STOP	Relay output A	R0 (none)	R5 (relay 5)	R0 (none)
1463	Emergency STOP	Relay output B	R0 (none)	R5 (relay 5)	R0 (none)
1464	Emergency STOP	Enable	OFF	ON	ON
1465	Emergency STOP	Fail class	See fail class description		

1700-1750 Digital input term. 13-18, no cable supervision

No.	Setting		Min. setting	Max. setting	Third setting	Factory setting
17X1	Dig. input no. XX	Timer	0.0 s	100.0 s	-	10.0 s
17X2	Dig. input no. XX	Relay output A	R0 (none)	R5 (relay 5)	-	R0 (none)
17X3	Dig. input no. XX	Relay output B	R0 (none)	R5 (relay 5)	-	R0 (none)
17X4	Dig. input no. XX	Enable	OFF	ON	RUN	OFF
17X5	Dig. input no. XX	Fail class	See fail class description			
17X6	Dig. input no. XX	NO/NC	NO	NC		NO

System settings

1860 Run status

No.	Setting		Min. setting	Max. setting	Factory setting
1861	Run status	Timer	0.0 s	60.0 s	5.0 s
1862	Run status	Relay output A	R0 (none)	R5 (relay 5)	R0 (none)
1863	Run status	Relay output B	R0 (none)	R5 (relay 5)	R0 (none)
1864	Run status	Enable	OFF	ON	OFF

The running status detection has two purposes:

1. When the time delay period expires, all the alarms which have Enable selected to 'RUN' will be activated.
2. An output relay can be selected, if one is available. In that case, the settings Output A and Output B must be set according to the desired relay. To avoid an unwanted display alarm, 'RUN STATUS ALARM', the function of this relay must be selected to 'Limit' function to avoid the alarm, when the engine starts. Notice that both output A and output B must have the same settings, when the function of the relay is set only as limit switch.

1870 D+ input (term. 15)

No.	Setting		Min. setting	Max. setting	Factory setting
1871	D+ input *	Timer	0.0 s	100.0 s	10.0 s
1872	D+ input	Relay output A	R0 (none)	R5 (relay 5)	R0 (none)
1873	D+ input	Enable	OFF	ON	OFF
1874	D+ input	NO/NC	NO	NC	NO

If the D+ input is selected to be ON, this will be used as a running feedback. The D+ output from the charge generator must be connected to input terminal 15, since this is prepared for the purpose, and the terminal 12 (common for terminals 13-18) must be connected to +, otherwise the D+ input does not work.

4120 Running hour counter

No.	Setting		Min. setting	Max. setting	Factory setting
4121	Counter*	Running time	0	20000	0
4124	Counter	Reset counter	OFF	ON	OFF

4220 Battery low voltage

No.	Setting		Min. setting	Max. setting	Factory setting
4221	Battery low V*	Set point	6.0V	24.0V	16.0V
4222	Battery low V*	Timer	0.0 s	10.0 s	1.0 s
4223	Battery low V	Relay output A	R0 (none)	R5 (relay 5)	R0 (none)
4224	Battery low V	Relay output B	R0 (none)	R5 (relay 5)	R0 (none)
4225	Battery low V	Enable	OFF	ON	ON

4230 Battery high voltage

No.	Setting		Min. setting	Max. setting	Factory setting
4231	Battery high V*	Set point	15.0V	40.0V	28.0V
4232	Battery high V*	Timer	0.0 s	10.0 s	1.0 s
4233	Battery high V	Relay output A	R0 (none)	R5 (relay 5)	R0 (none)
4234	Battery high V	Relay output B	R0 (none)	R5 (relay 5)	R0 (none)
4235	Battery high V	Enable	OFF	ON	OFF

The * indicates parameters that can be changed via the push-buttons/display.

4240 Language

No.	Setting		Setting	Factory setting
4241	Language	English	English	English
		German		
		French		
		Spanish		
		Icon		
		Italian		
		Chinese/Cyrillic		

4250 Parameter group 1

No.	Setting		Min. setting	Max. setting	Factory setting
4250	Parameter group 1	Enable	OFF	ON	OFF

If a parameter list is enabled, the parameters marked (P1) are available in the display parameter list.

4320 Diode compensation

No.	Setting		Min. setting	Max. setting	Factory setting
4320	Diode compensation	Set point	0V	1V	0V

The parameter 4320 can add an offset to the supply voltage measurement displayed. This can be useful, if a diode is mounted in the supply connection.

4350 Starter

No.	Setting		Min. setting	Max. setting	Factory setting
4351	Starter (P1)	Start prepare	0.0 s	600.0 s	5.0 s
4352	Starter (P1)	Start ON time	1.0 s	30.0 s	5.0 s
4353	Starter (P1)	Start OFF time	1.0 s	99.0 s	5.0 s

The settings 'start prepare', 'start ON time' and 'start OFF time' are the periods in which the start relay is activated.

The start prepare output can e.g. be used for prelubricating or preheating. The start relay output is for activating the engine starter. The start sequence can be activated manually by pressing the 'START' push-button in local (hand) mode.

If no output relay has been chosen as starter relay, the start and stop sequences (cooling down) will be ignored, the EC-1 will only operate as a safety stop device.

4360 Idle mode

No.	Setting		Min. setting	Max. setting	Factory setting
4361	Idle mode	Enable	OFF	ON	OFF
4362	Idle mode	Timer	1.0 s	300.0 s	5.0 s
4363	Idle mode	Active	Man.	Man./Aut.	Aut.

Idle mode can be controlled via a binary input. If this is selected, the idle mode remains for as long as the input is ON. If a binary input is not used, the idle mode can be selected to be active for manual or auto or both running modes.

- Both manual and auto: Select Man./Aut.
- Manual only: Select Man.
- Auto only: Select Aut.

4370 Start attempts

No.	Setting		Min. setting	Max. setting	Factory setting
4370	Start attempts	Attempts	1	10	3
4371	Start attempts	Relay output A	R0 (none)	R5 (relay 5)	R0 (none)
4372	Start attempts	Relay output B	R0 (none)	R5 (relay 5)	R0 (none)

The outputs A and B are activated at a start failure.

4400 Run/stop

No.	Setting		Min. setting	Max. setting	Factory setting
4401	Run/stop (P1)	Cool down time	0.0 s	999.0 s	240.0 s
4402	Run/stop (P1)	Extended STOP	1.0 s	99.0 s	5.0 s

4410 Stop failure

No.	Setting		Min. setting	Max. setting	Factory setting
4411	Stop failure	Timer	10.0 s	120.0 s	30.0 s
4412	Stop failure	Relay output A	R0 (none)	R5 (relay 5)	R0 (none)
4413	Stop failure	Relay output B	R0 (none)	R5 (relay 5)	R0 (none)

If the engine has not stopped within the delay time, output A and B will activate and a *stop failure* alarm occurs.

4460 Alarm horn

No.	Setting		Min. setting	Max. setting	Factory setting
4460	Alarm horn*****	Timer	0.0 s	990.0 s	20.0 s

According to factory setting the horn output will activate for 20 seconds, when an alarm appears. If the timer setting is adjusted to 0, the horn relay will be activated continuously, until the alarm is acknowledged.

4610...4650 Relay functions

No.	Setting		First/min. setting	Second/max. setting	Factory setting
46X1	Relay X	Function	Alarm	Limit	Alarm
46X2	Relay X	Off delay	0.0 s	999.9 s	5.0 s

The relays can be configured in the two different ways described below.

Alarm relay function: When an alarm activates the relay, it is activated as long as the alarm is present and unacknowledged. If the off delay is set different from 0.0 s, a short reset of the relay will take place upon arrival of a new alarm.

Limit function: When an input activates the relay, no alarm message is displayed. After the condition activating this relay has returned to normal, the relay will deactivate, when the off delay has expired.

4790 GSM pin code and dial-up numbers

No.	Setting		Min. setting	Max. setting	Factory setting
4791	GSM	GSM pin code	0	9999	0
4792	GSM	SMS telephone no.	0	+9999999999999	+4511223344
	GSM	Enable	OFF	ON	OFF
4793	GSM	SMS telephone no.	0	+9999999999999	+4511223344
	GSM	Enable	OFF	ON	OFF
4794	GSM	SMS telephone no.	0	+9999999999999	+4511223344
	GSM	Enable	OFF	ON	OFF
4795	GSM	SMS telephone no.	0	+9999999999999	+4511223344
	GSM	Enable	OFF	ON	OFF
4796	GSM	SMS telephone no.	0	+9999999999999	+4511223344
	GSM	Enable	OFF	ON	OFF

A telephone number set to 0 means not used. The prefix + and country code must always be entered, e.g. +45.

4800 Sleep mode

No.	Setting		Min. setting	Max. setting	Factory setting
4801	Sleep	Timer	0 min.	1800 sec.	600 sec.
4802	Sleep	ON/OFF	OFF	ON	OFF

The sleep mode is a standstill power save mode. If the engine is stopped and nothing has happened within the time setting, the unit will enter sleep mode, i.e. the most power consuming functions (e.g. display) are turned off. As soon as an event occurs (button activated, input state change), the sleep mode is ended.

4910 Service timer 1

No.	Setting		Min. setting	Max. setting	Factory setting
4911	Service timer 1	Type	OFF	Run hours	Run hours
4912	Service timer 1*	Set point hours	10	10000	150
4913	Service timer 1*	Set point days	1	1000	365
4914	Service timer 1	Fail class	See fail class description		
4915	Service timer 1	Output A	Relay 0	Relay 5	Relay 0
4916	Service timer 1	Reset	OFF	ON	OFF

4920 Service timer 2

No.	Setting		Min. setting	Max. setting	Factory setting
4921	Service timer 2	Type	OFF	Run hours	Run hours
4922	Service timer 2*	Set point hours	10	10000	150
4923	Service timer 2*	Set point days	1	1000	365
4924	Service timer 2	Fail class	See fail class description		
4925	Service timer 2	Output A	Relay 0	Relay 5	Relay 0
4926	Service timer 2	Reset	OFF	ON	OFF

The setting 41 days 16 hours equals 1000 hours.

9000 Password

No.	Setting		Min. setting	Max. setting	Factory setting
9001	Password	Customer	0	9999	2000
9002	Password	Service	0	9999	2001

User password

If you forget the password, contact DEIF Support for details.

The parameters marked with a * can be changed by means of the push-buttons and the display, all other parameters can only be changed via the USW.

DEIF A/S reserves the right to change any of the above