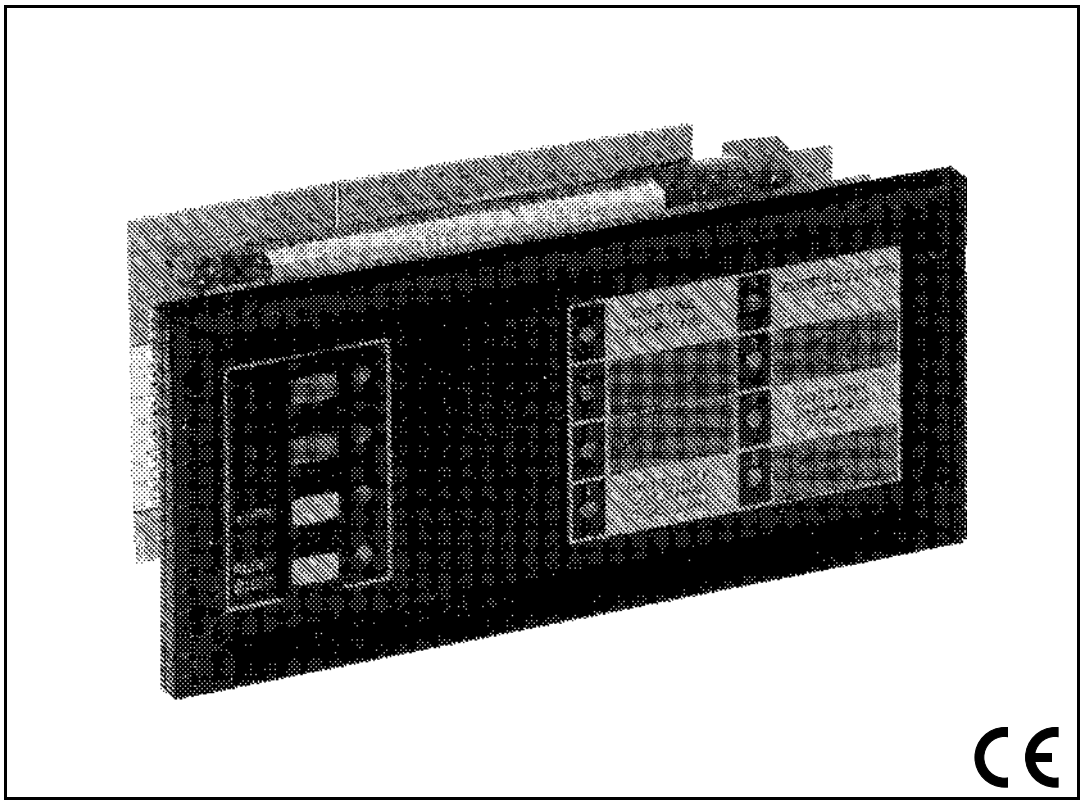
WOODWARD

DU2 - Engine Supervision Unit



Contents

1 General

SEG function unit *DU2* can supervise diesel, petrol and steam engines as well as complete sets. Furthermore, it gives start and stop commands. Operational modes and failures are optically and audibly indicated and can initiate switching functions. These functions are defined by code plugs.

If the engine is at a standstill, there is no current consumption by the *DU2* due to an automatic shut-off device. CMOS technology guarantees low power consumption during operation.

Integrated power relays are used e.g. for direct actuation of the shut-off magnet.

Furthermore, the engine supervision unit *DU2* has a proven high reliability in service, with maintenance free operation under arduous conditions and extreme ambient temperature.

It is insensitive to interference voltages according to IEC 255 class II as well as VDE 0874 and 433.

In addition to the standard signals ENGINE RUNNING and SUPERVISION ON the function unit *DU2* is available with 4 or 6 free signals. The basic unit *DU2* can be extended by connecting up to 7 extension modules ED2 with 8 supervision circuits each.

Furthermore, an automatic start of the engine is possible, if the *DU2* is supplied with a start module DX. For more information about the additional modules see separate descriptions ED2 and DX.

2 Mode of Operation

2.1 Indication of the Signals and Function of the Keys

The front cover of *DU2* is fitted with 8 LEDs to indicate incoming faults. Space is provided for fault description labels. If a horn is connected, an audible alarm also occurs at each signal. Indication no. 1 is reserved for the ENGINE RUNNING signal. The LED lights when a voltage exists at the dynamo or when the ignition relay closes. Indication no. 2 is the signal SUPERVISION ON. The LED lights up on release of the delayed supervision circuits (e.g. for oil pressure). The other 4 or 6 indications can be used as required.

2.2 Function Sequences

The front cover of *DU2* is also fitted with 4 keys and LEDs with the following functions:

By pressing key "I" the start signal is given to the gen.-set. It is cancelled automatically at signal ENGINE RUNNING. Cranking into the running engine is not possible.

The LED lights up during the start command until signal ENGINE RUNNING is reached.

By pressing key "0" the shut-down signal is given to the gen. set.
Note: The key must be actuated until standstill.

The LED lights up during the shut-down command.

By pressing key HORN the audiable signal transmitter is shut down. With renewd failure signal a new horn signal is issued.

The LED lights up at all failure signals until key HORN is pressed again.

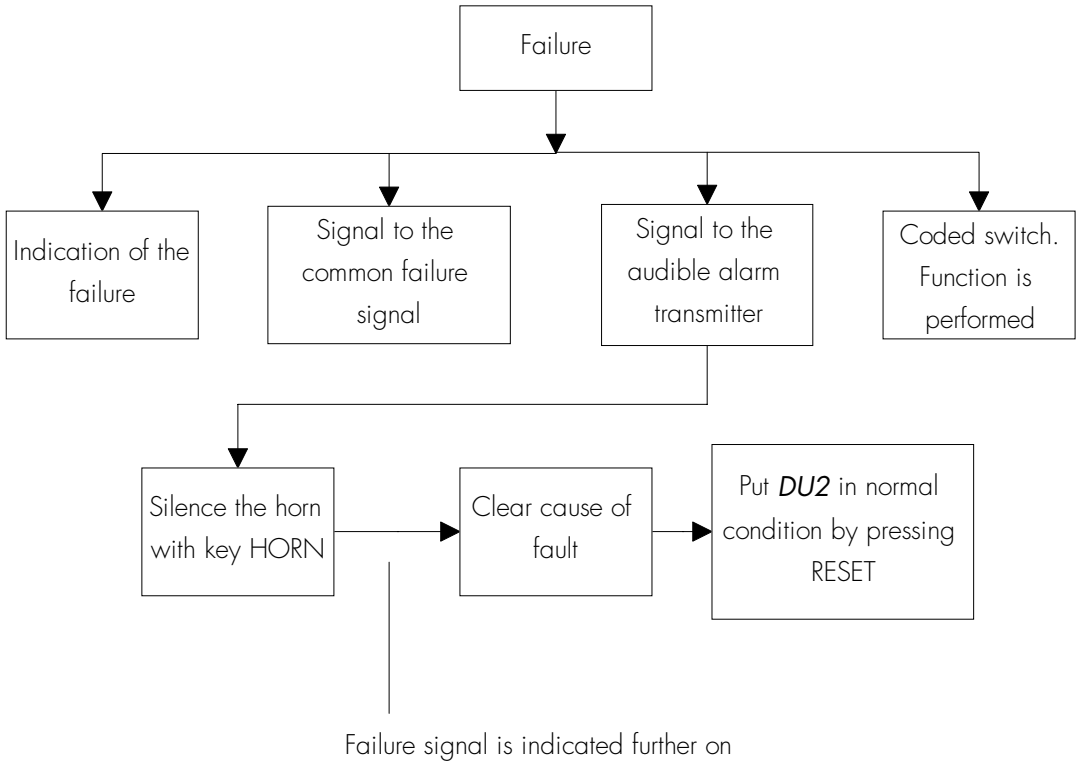
Key RESET / TEST has two functions:

a) to reset failure signals
b) to test all LEDs.

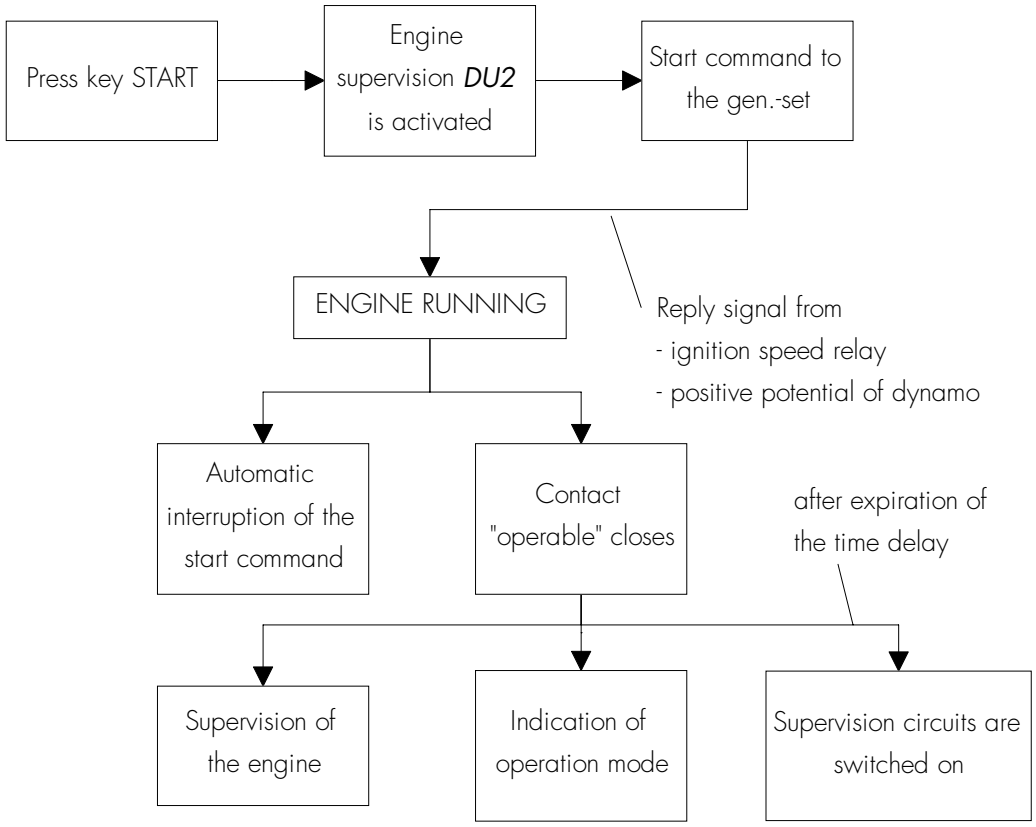
The LED is emitting light at all failure signals until key RESET is pressed

Note:
A failure can only be reset after the failure is cleared.

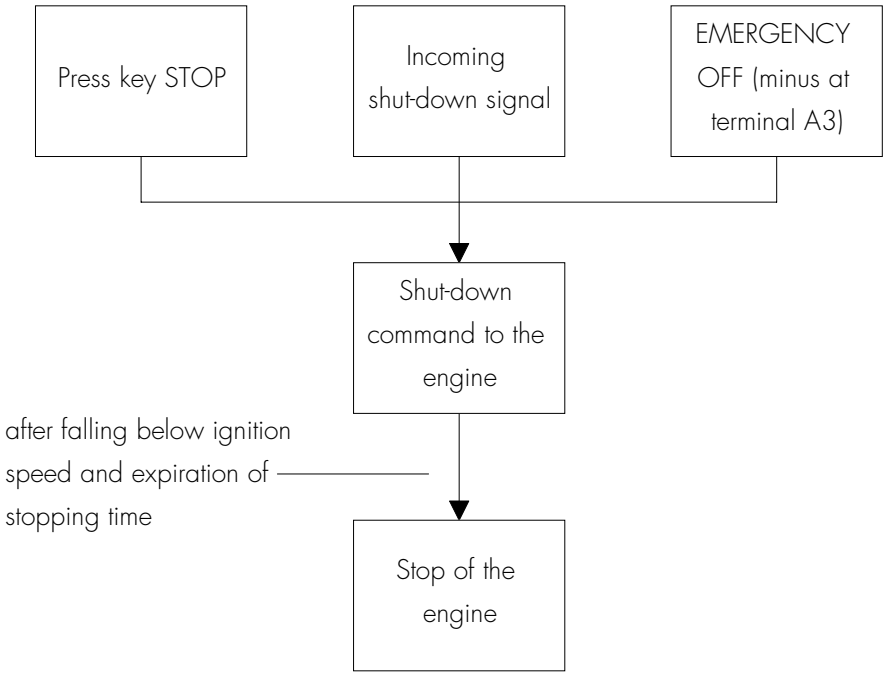
Incoming Failure Signal



Start of the Engine

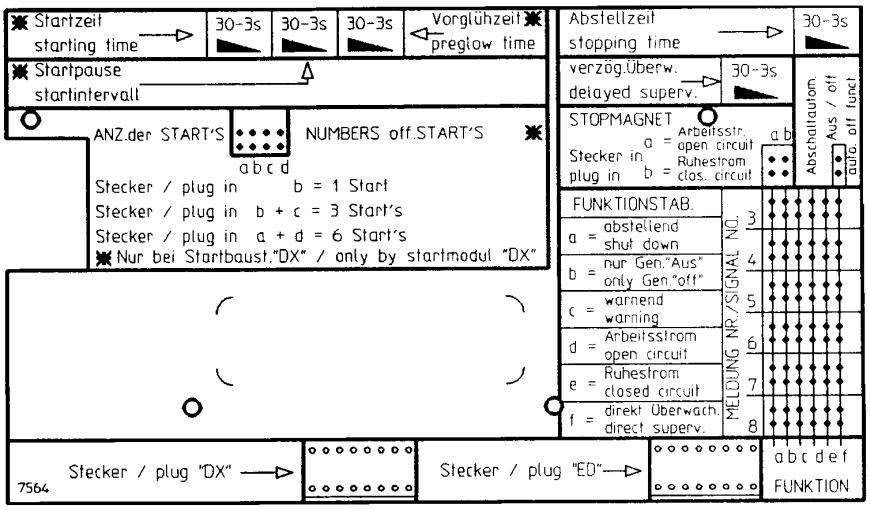


Stop of the Engine



2.3 Coding

Fig. 1 shows the positions of the coding strips on the PCB of *DU2* function unit.



** In combination with start module DX adjustable*

*Fig. 1: Position of the code plug-in strips, potentiometers and plugs on the 2nd PC board of the **DU2** module*

Coding of the Shut-down Function

Shut-down can be achieved alternatively by open circuit operation or closed circuit operation. By inserting a coding plug at the first coding strip the following function is selected at position

a: stopmagnet in open circuit operation
b: stopmagnet in closed circuit operation

"Stopmagnet in open circuit operation" means that to turn off the stopmagnet is energized, where as "stopmagnet in closed circuit operation" means the magnet is energized during starting and during operation.

Coding of the Signals

The function of each supervision circuit is determined by inserting a coding plug at the other 6 coding strips (signals no. 3 to 8):

a: shut down
b: only gen. c.b. off
c: warning
d: open circuit operation
e: closed circuit operation
f: direct supervision

(For more information see explanations and examples)

Explanations:

Shut down: The gen.-set is shut down at once.

Only gen. c.b. off: A stop signal is not given.

Alarm: Visual indication and audible alarm

Open circuit: The monitoring circuit is activated by a negative current applied at the input terminal (NO contact).

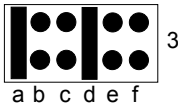
Closed circuit: The monitoring circuit is activated when the negative current is removed from the input terminal (NC contact).

Direct supervision: The supervision circuit is activated without delay. With the plug, this circuit is activated after the adjusted time delay.

1. Example

Signal no. 3 should be coded for supervision of "Oil Pressure". On contact signal (signal in open circuit operation) and after the time for "Delayed Supervision" has expired, the engine is switched off.

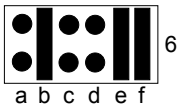
Coding: Insert plugs into 3 a (shut down) and 3 d (open circuit operation)



2. Example

Signal no. 6 should be coded for the supervision of "overload" (load shedding without stop). The signal is given by opening of a contact.

Coding:
Insert plugs into 6 b (only gen.-c.b. off), 6 e (closed circuit operation) and 6 f (direct supervision)



Coding of the automatic shut-off device

DU2 contains an automatic shut-off device which switches the unit off when the engine is at standstill and no fault exists. As long as the failure has not been eliminated, the *DU2* remains in operation. All failures occuring after the *DU2* is switched off are not indicated. *DU2* is activated again after pushing of the keys

Fig. 2

START
STOP
RESET/TEST

as well as after the signal ENGINE RUNNING.

In some cases failure signals have to be indicated with the engine at standstill e.g. PREHEATING FAILURE or EXHAUST GAS FLAP CLOSED. By inserting a coding plug in the automatic switching device the *DU2* is prevented from switching off automatically. If the *DU2* is activated constantly, it uses about 0.3A from the battery.

2.4 Adjustment of the Time Circuits

On the PCB of the *DU2* (Fig. 1) there are 2 potentiometers for adjusting time delays:

- Stopping time:
  If the ignition speed is not reached, the stopmagnet is switched off after a delay of between 3 and 30s.
- Delayed supervision:
  After ENGINE RUNNING signal the supervision circuits (e.g. oil pressure) are activated after a delay of between 3 and 30s. Signals which are not coded with a plug in position "f" are supervised without a time delay.

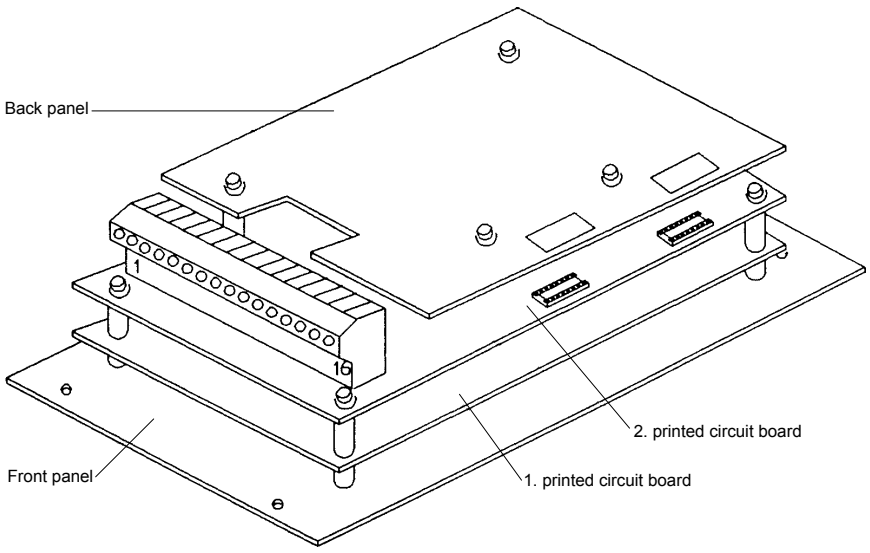


Fig. 2:

3 Mounting and Connecting of the *DU2* Function Unit

The *DU2* engine supervision unit is designed for installation on a switchboard. A ribbon cable connects the *DU2* with the start module DX and the extension modules ED2.

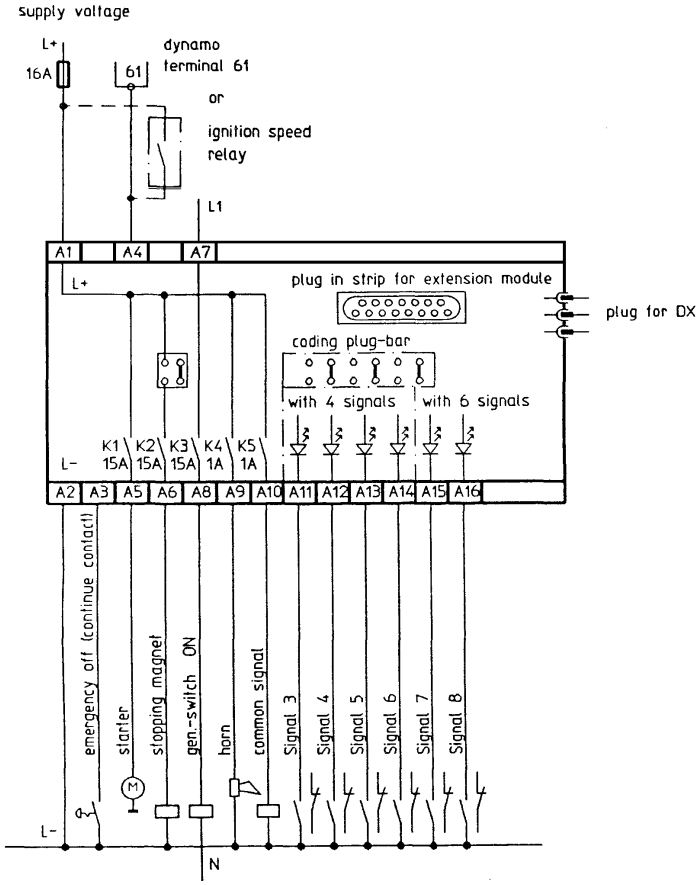


*Fig. 3: Connection of engine supervision unit **DU2**. Here with start module **DX** (see also separate description **DX**)*

Depending on the version the *DU2* a supply voltage of 12V or 24 V has to be connected to terminals A1 and A2.

Terminal A3 is intended for the EMERGENCY STOP. The command must be given as a permanent signal (no latching). In case of an engine at standstill, starting is inhibited. In case of a running engine the engine is stopped.

Terminal A4 is the input of signal ENGINE RUNNING from terminal 61 of the dynamo or from the contact of the ignition speed relay.

Terminal A5 is for the connection of the auxiliary relay of the starter.

Terminal A6 is for the stopmagnet.

Between terminals A7 and A8 is a potential free contact for the signal OPERABLE (e.g. for release of the generator c.b.). On stop and failure this contact opens, if the signal is coded at position a or b.

Terminal A9 is for the connection of the audible alarm.

Terminal A10 is for the common fault signal. A positive potential is supplied to terminal A10 if there is an incoming fault signal.

Terminals A11 to A16 are the inputs for the fault signals.

4 Technical Data

General Data

Maintenance:	maintenance free
Duty:	continuous
Mounting position:	optional
Options:	module **DX** for automat. start up to 7 extension modules **ED2** can be connected

Input circuits

Supply voltage:	7-17 V/DC	15-34 V/DC
Nominal voltage:	12 V/DC	24 V/DC
Input voltage short-time:	6.3V/DC	10.5V/DC
Guaranteed operational reliability if auxiliary voltage fails, without impairment of function:	50 ms approx.	
Dynamo threshold voltage for the detection of the ignition speed:	6.5 V/DC	8 V/DC
Rated power supply by operation:	4.0W	7.8W
Max. power input:	8.2W	13.2W
Protection against wrong connection:	fitted	
Signal circuit:	4 or 6	

Possibility of coding

Coding: function setting by coding plug:

- switch off
- only generator c.b. off / no stop
- warning
- operating current
- stand-by current
- direct monitoring
- automatic shut-down
- magnet stop

Output circuits

Contacts:	K1, K2, K4, K5 internally connected to positive, K3 potential free
Indication:	optical via LEDs audible via external horn

relays K1, K2, K3

• switching capacity:	4000VA / 480W (ohmic load)
• max. switching voltage:	380V/AC, 250V/DC
• max. switching current (16ms):	64A
• max. continuous current:	16A
• contact material:	AgCdO
• contact service life with 4000 VA:	$> 10^5$

relay K4 for horn

• switching capacity:	1000VA (AC)/ 100W (DC)
• max. switching voltage:	250V/AC, 30V/DC
• max. switching current (16ms):	20A
• max. continuous current:	5A
• contact service life:	> 10^5 switching operations at 1000VA

relays K5

• switching capacity (ohmic load):	50VA (AC)/ 60W (DC)
• max. switching voltage:	250V/AC, 30V/DC
• max. continuous current:	2A
• contact service life:	> 10^5 alternations with 50VA

Tests

noise-level test:	insensitive to interference voltages accord. to IEC 225 class III, VDE 0874 und 433

Ambient conditions

Limits of ambient temperature:

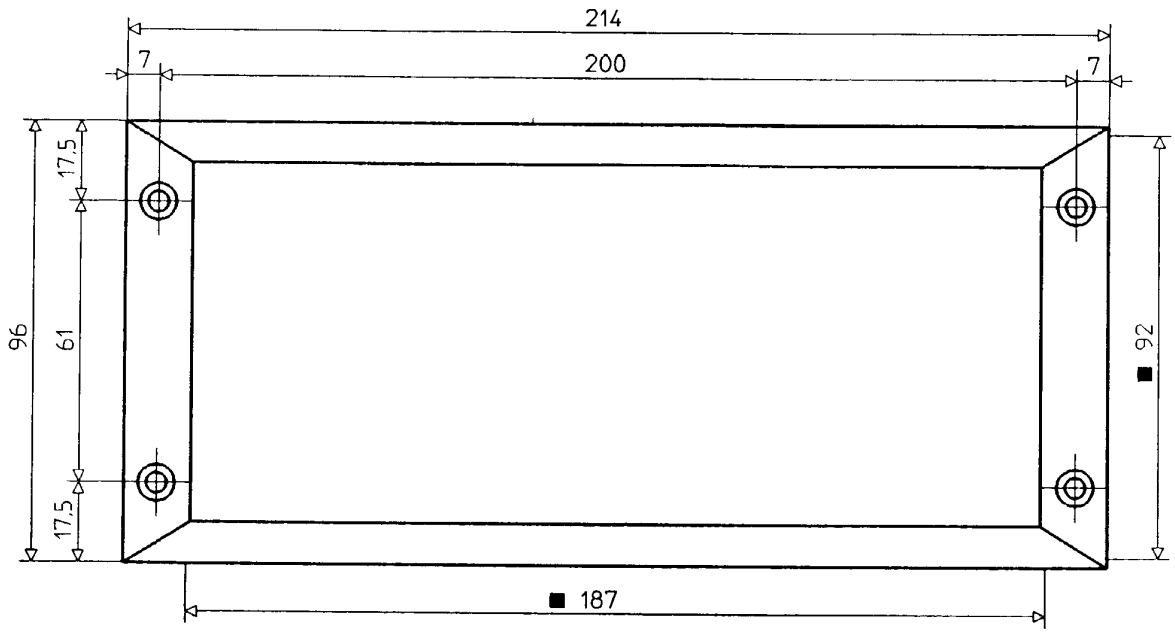
• storage:	- 40°C to + 70°C
• operation:	- 20°C to + 70°C
Humidity resistance:	Class F to DIN 40040, tested to DIN IEC 68 part 2-3 (56 days 40°C and 93 % R.H.)

Case, Dimensions,Weight and Installation

Construction:		for through-panel mounting
Material	front cover:	aluminium
	rear cover:	macrolon/sheet metal
Width x height x depth:		214 mm x 96 mm x 45 mm
Switchboard cut-out (W x H):		187 mm x 92 mm
Mounting:		screwed
Weight:		ap. 550 g with DX-module: ap. 680 g
Protection	front cover:	IP 54
	rear cover:	IP 00

Technical data subject to change without notice

Dimensional Drawing
(each values in mm)



Depth (behind panel): 45 mm
■ = switchboard cut-out (W x H): 187 mm x 92 mm

5 Order form

Please use the form when ordering and mark the required options. If a DX unit for auto-start is required, or an extension unit ED2, please use additionally the separate ordering forms in the leaflets DX and ED2.

General Data:

Coding ☐ yes ☐ no

Labels ☐ yes ☐ no

Coding:

Signal number	3	4	5	6	7	8
a = switch off						
b = only generator c.b. off (no stop)						
c = warning						
d = N.O. contact *1						
e = N.C. contact *2						
f = direct monitoring						

stop solenoid ☐ N.C. contact *3 ☐ N.O. contact *4

automatic shut-down in operation ☐ yes *5 ☐ no

Time:

Time	Current	Standard	as required
Delay. monitoring	3 s - 30 s	10 s	
shut-down time	3 s - 30 s	10 s	

Remarks:

*1 N.O. contact: Fault indication if "minus" is switched to the input terminals (making contact).
*2 N.C. contact: Fault indication if "minus" is interrupted to the input terminal (breaking contact).
*3 The stop solenoid activated during shut down.
*4 The stop solenoid activated excited during start order and operation
*5 The *DU2* interrupts its power consumption if the diesel engine is not in operation.

Labels:

Please enter the required inscription. Please remember that size of the label is 35 mm x 15 mm. Therefore 3 text lines with max. 15 letters each are possible.
Please mark the required colour of inscription (R = red, Y = yellow, Gr = grey). The numbers indicate the number of the signal. Fault indication no. 3 is occupied with START FAILURE for all **DX** units.

1	Engine running	R Y Gr
2	Supervision on	R Y Gr
3		R Y Gr
4		R Y Gr

5		R Y Gr
6		R Y Gr
7		R Y Gr
8		R Y Gr

Languages:

☐ German ☒ English ☐ French ☐ Spanish ☐ .....

Order form

Diesel Supervision	***DU2***		
with gen.-set with manual Start/Stop			
2 Standard Signals			
with 4 free available signals		**4**	
with 6 free available signals		**6**	
Auxiliary voltage 12 V DC			**12**
24 V DC			**24**

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