

# START - STOP – DIESEL CONTROL UNIT

## AHD 414



AHD 414 is a microprocessor controlled start-stop diesel engine control and monitoring device for control desk mounting. It is available in several versions, depending on the individual engine manufacturers and their series.

- device for control desk mounting
- integrated firing- and overspeed monitoring (depending on frequency), programmable decimally
- individual problem solutions possible
- small and robust design
- high loading capacity of the relay outputs
- low power consumption (app. 0.15A)
- designed for large fluctuations of the power supply
- pluggable 22-pole terminal block
- serial bi-directional interface
- available with front-cap, locking with turnbuckle or lock
- approved by: GL (other classification societies on request)

# Start-Stop-Diesel Control Unit

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# Start-Stop-Diesel Control Unit

## 1. General

AHD 414 is a microprocessor controlled device. The original version was designed for starting, stopping and monitoring of diesel engines. With several software variations, that can be called up by the user, the device can be adjusted to different requirements.

It has the following features:

- device for switchboard mounting
- integrated firing and overspeed monitoring (frequency-dependent)
- optional individual problem solutions
- small and robust construction
- high loading capacity of the relay outputs
- low power consumption of the electronics (0.15 A app.)
- designed for high fluctuations of power supply
- type approved by: Germanischer Lloyd

## 2. Construction

AHD 414 consists of an electronic card with a processor system and all necessary periphery components. The card is fixed with 4 spacer bolts on a front cover made of AlMg1. All ICs are plugged into mounting sockets. The program is accommodated in an EPROM 27C256, or, on request, in an EEPROM 28C256. All inputs and outputs are led to a pluggable 22-pole terminal block. The card contains a bi-directional serial interface (TTY). The following kinds of labeling are possible:

- silk-screen printing of the front panel by anodizing
- printed foil is inserted between front frame and front panel

The unit is accommodated in a housing according DIN 43700 for control desk mounting with a front-frame (dimensions: 144mm x 144mm) and an installation depth of 53mm. If required, the device can be equipped with a front-cap with turnbuckle or lock.

## 3. Main functions

### 3.1 Starting of the engine

The engine can be started directly at the device or by remote start, as long as none of the following criteria applies:

- start blocking input is active
- stop alarm is released
- engine rotates already
- operating switch at motor is activated (if available)
- lub. oil pressure is not low

Depending on the instructions in the order-related technical specification, which is attached to this description, the engine has to pre-glow or starts immediately. The pre-glowing time can be programmed arbitrarily. The start process is finished when the accordingly programmed frequency is emitted by the tachogenerator. The duration of a single start trial, as well as the number of start trials to be carried out, if the ignition is not successfully performed, are also programmable.

Just before switching-on the starter, the program checks, if the oil pressure is low or if the tachogenerator emits a signal. If at least one of the mentioned criteria is given, the starter will not be switched-on, but the automatic supervision will still be switched „on“. Thus, the starter will be optimally protected. The mentioned parameters do not lead to completion of the actual start process but prevent its initiation.

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## 3.2 Stopping of the engine

The engine can be stopped manually from the device, externally by a remote stop or by a stop alarm. As possible stop actuator, a solenoid or operating magnet can be used (programmable).

## 3.3 Acknowledgement

The function of the lower button at the device is to acknowledge horn and optics, as well as to perform a lamp test.

## 3.4 Reset

The reset button at the device resets acknowledged alarms into the original state. Furthermore, it can interrupt an active stop signal.

## 4. Programming

Part of this description is an ORDER-RELATED TECHNICAL SPECIFICATION that is the basis for our production and that is filled out by the customer according to his specific requirements. If a programming device is available (e.g. the battery operated S4 that can be supplied by us), the user can quickly modify the parameters, which might be important during commissioning.

The following parameters are programmable:

- pre-glowing time
- amount and duration of start trials
- frequency of ignition and overspeed
- solenoid or operating magnet
- stop time
- delay times
- inputs (NC or NO)
- wire break supervision of the inputs
- inputs (display or alarm)
- suppression of alarms, depending on kind of operation (e. g. oil pressure)
- inputs 7, 8 and/or 9 can be used as power switch input e.g. for release of oil pressure alarms.

Furthermore, the program includes a variety of special functions (starting at page 2 of the ORDER-RELATED TECHNICAL SPECIFICATIONS) that can be easily activated by the user by entering storage addresses. Due to customers' requirements, the possibilities are continuously extended. Thus, it is e.g. possible to assign different functions to relays (e.g. auto-stop, engine ready for start...), which are not needed in the basic version (e.g. horn, pre-glowing...).

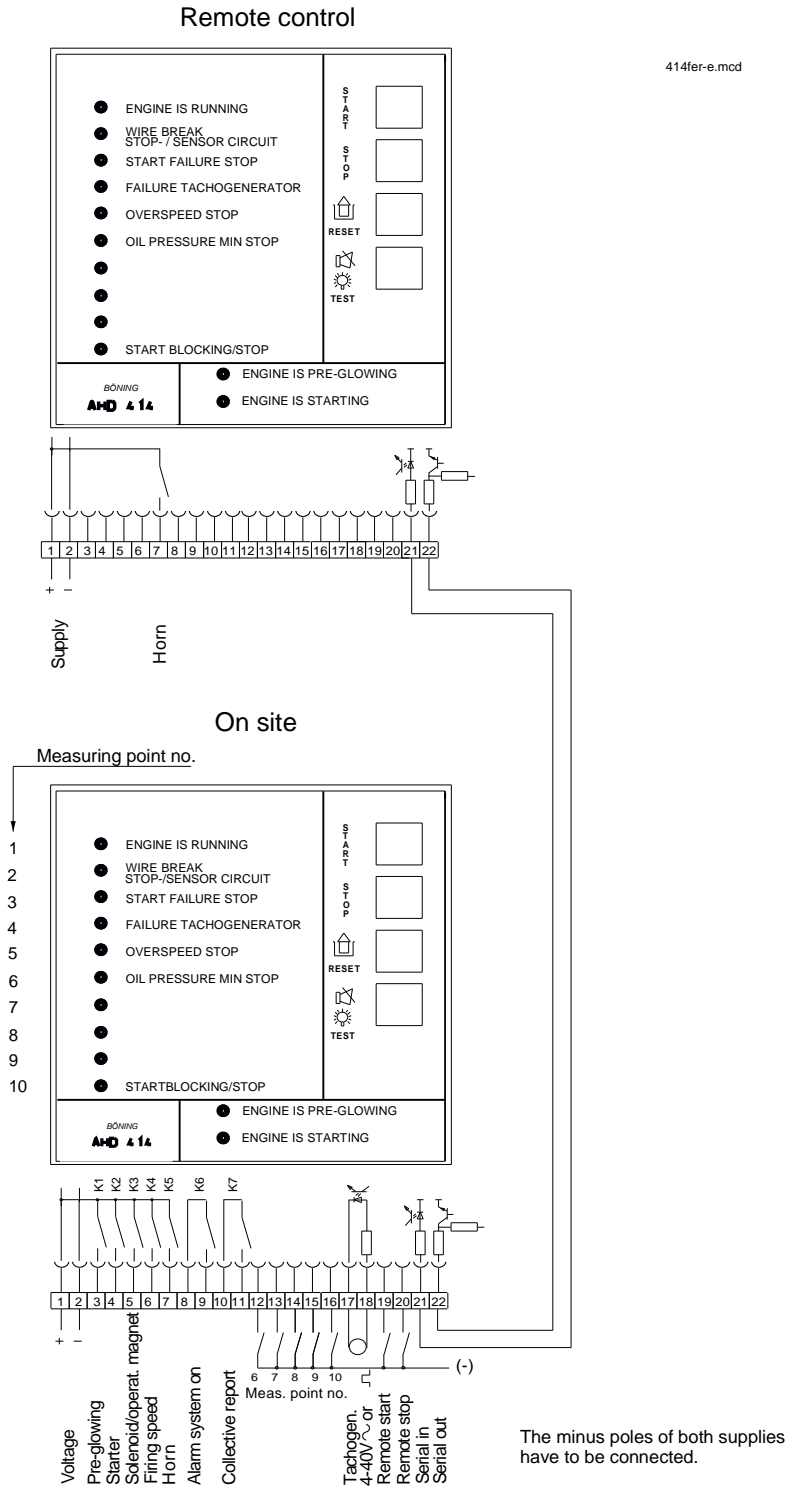
## 5. Wire break stop and sensor circuits

There is a low test voltage on the stop output continuously. If it is interrupted, the alarm „wire break stop/sensor circuit“ is released. If only this LED flashes, the stop circuit is interrupted. If a sensor conduit is interrupted, the mentioned LED flashes and additionally the interrupted circuit. For the binary alarm input Z-diodes BZX 5V6 are used. On these, cyclically a voltage of less than 5.6V (alarm mode) and of more than 5.6V (wire break mode) is switched. Thus, the wire break supervision is also used as internal system-check, since the inputs must switch in the same cycle. If a Z-diode is connected wrong, it works like a closed contact.

# Start-Stop-Diesel Control Unit

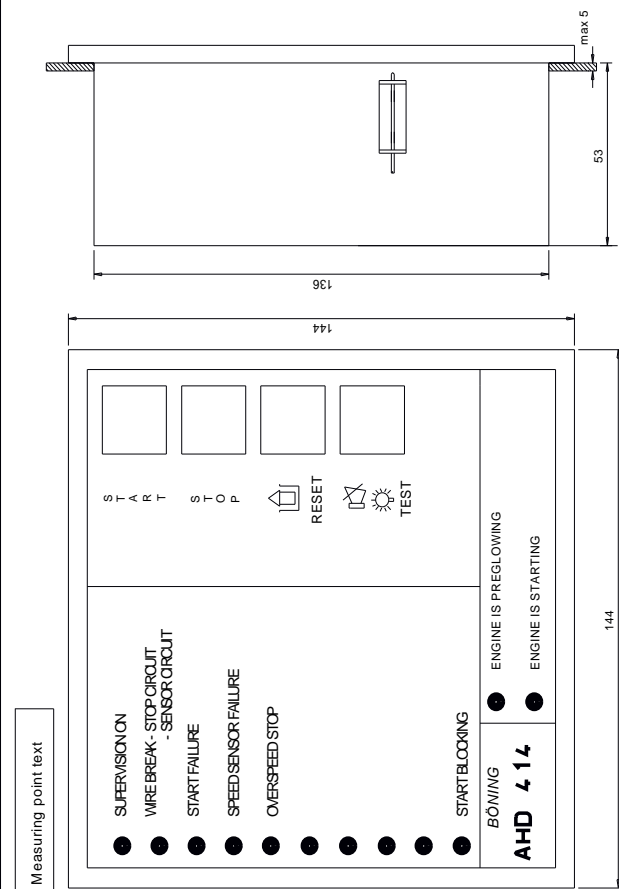
## 6. Remote control

AHD 414 has a bi-directional serial interface (TTY), over which it can communicate with other data stations. It is e.g. possible to use a second device as remote control.



# Start-Stop-Diesel Control Unit

414ers2E.MCD



Measuring point no.	DELAY	STOP	INPUT NC/NO (idle/operat.)	DISPLAY/ALARM	Suppression by meas. pt. 1	Wire break supervision	Operating switch function	Manual emerg. stop input	LED COLOR
1	3F70	-	-	-	-	-	-	-	green
2	-	-	-	-	-	-	-	-	yellow
3	-	3F82	01	-	-	-	-	-	red
4	-	-	no	-	-	-	-	-	yellow
5	-	-	-	-	-	-	-	-	red
6	3F75	3F85	3F95	3FA5	3FB5	3FC5	-	-	red
7	3F76	3F86	3F96	3FA6	3FB6	3FC6	3FE6	-	red
8	3F77	3F87	3F97	3FA7	3FB7	3FC7	4600	4600	yellow
9	3F78	3F88	3F98	3FA8	3FB8	3FC8	4601	4601	yellow
10	-	-	3F99	-	-	-	-	-	yellow

ENTERING INTO THE EPROM ADDRESSES MUST BE DONE DECIMALLY AND TWO-DIGIT. EMPTY EPROM ADDRESSES HAVE THE CONTENT "00".

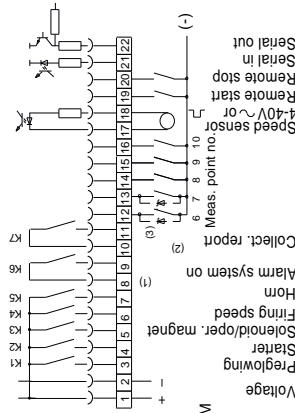
Preglowing time : min 3 Fd0 sec 3 Fd1  
 Number of start trials : 3 Fd2  
 Duration of one start trial : sec 3 Fd3  
 Frequency of the speed sensor at termination of starting procedure : Hz 3 Fd4  
 Frequency of the speed sensor at overspeed : Hz 3 Fd8  
 Stop time : sec 3 FdA

Solenoid (content 00)  
 Operating magnet (content 01)  
 Overspeed function

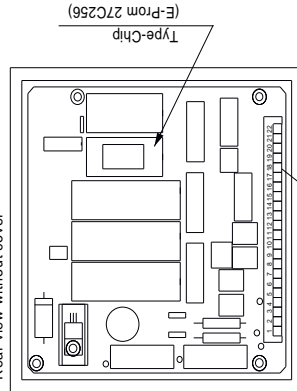
Attention: If the input start blocking is used, it must be ensured for safety reasons that the starter circuit is interrupted while this input is active.

## TECHNICAL DATA

Power supply : 24VDC ± 25% or 12VDC  
 Power consumpt. of electronics : appr. 0.15 A  
 Perm. load of relay contacts : starter- and solenoid/operating magnet circuit  
 - 20 A peak current  
 - 10 A cont. current  
 - all other relays 2 A  
 Prem. rel. air humidity : 99%  
 Panel cut-out : 138 mm x 138 mm  
 Protection class : with front cap IP 54  
 Installation depth : 53 mm  
 Weight : 0.5 Kg



STANDARD - TERMINAL DIAGRAM



Rear view without cover

pluggable terminal block

- Contact closes after switching on of the device. It opens appr. 5 s after starting of the engine in order to "arm" an eventually existing alarm system.
- Contact closes after switching on of the device. It opens in the event of an alarm. It closes for appr. 2 s, if another alarm is released and then opens again (collective alarm repetition).
- For wire break supervision of the stop alarm circuits, Z-Dioden BZX5V6/1.3W (part of delivery) are installed parallel to the contacts. Symbol: View:

ORDER-RELATED TECHNICAL SPECIFICATION (basic function, event. addit. functions, starting on page 2)

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# Start-Stop-Diesel Control Unit

4146s3E.MCD



Relay	Address	Content	Function
K6	3FE5	00	Alarm system on alert
		01	Engine stops
		02	Switches on with operating magnet and drops again after 2 seconds
		03	Switches on with starter and drops 2 seconds after start trial
		04	K6 ON at auto-stop
K7	3FE6	05	K6 OFF at auto-stop
		00	Collective alarm
		01	If supervision is activated, switching can be done for 2 sec. via input 10 (terminal 16) K7.
		02	
		03	
04			



Relay	Address	Content	Function
K1	3FE0	00	Pre-glowing
		01	Engine stopped automatically
		02	Overspeed
		03	Relay changes at each start trial
		04	Relay switches the lub.oil-pump for 20 min. after stop
K2	3FE1	00	Starter
		01	Engine stopped automatically
		02	
		03	
		04	
K3	3FDB	00	Solenoid
		01	Operating magnet
		02	
		03	
		04	
K4	3FE3	00	Firing speed
		01	
		02	
		03	
		04	
K5	3FE4	00	Horn
		01	Engine ready for start
		02	Engine not ready for start
		03	Start failure
		04	

Empty storage-addresses have the content "00".

ORDER-RELATED

TECHNICAL SPECIFICATION

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# Start-Stop-Diesel Control Unit

414ers4e.MCD

Empty storage addresses have the content "00".

## SPECIAL FUNCTIONS

address

yes = 01  
no = 00

relative stop time:

Engine stops until speed = zero plus the time that was entered into address 3FDA (see page 1).

address

yes = 01  
no = 00

Afterglow:

After starting of the engine it will be afterglowed for appr. 10s.

address

00 = Engine can be started independently of the oilpressure.  
01 = Engine can only be started, if oil pressure lower than P-oil-pressure-switch (additional starter protection).  
02 = Engine can only be started at existing oil pressure (preglow relay switches pre-lub. pump).

address

00 = Alarm speed sensor failure, if SUPERVISION ON and frequency signal failure.  
01 = Alarm same as at contentn 00 and additionally failure terminal D+, (input 9, loading control)

address

00 = Switch-off procedure is terminated after elapsing of time entered into address 3FDA (see page 1).  
01 = No time limit for stop signal; cancelling of stop signal by "Starting of Engine", or, at auto stop, please acknowledge and reset first.  
02 = No time limit for stop signal; cancelling of stop signal by reset, or, at auto stop, please acknowledge first.

address

00 = Wire break in stop circuit is monitored.  
01 = No wire break monitoring in stop circuit.

address

01 = Reset after auto stop only possible after engine has completely stalled (speed frequency smaller than 7 Hz).

address

00 = Terminal 16 start blocking

01 = Terminal 16 for conditional preglowing, e.g. thermostat (only if this input is active)



address

00 = Normal

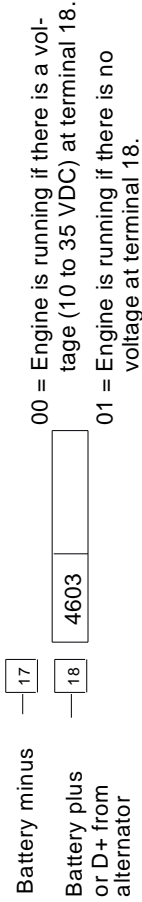
01 = Input 9 becomes remote start input (can also be monitored for wire break).

address

00 = Normal  
01 = K1 switches for 5s, if it has the function "auto stop" or "overspeed".

address

00 = Engine speed is registered as frequency signal  
01 = Engine is running is registered as voltage signal.



address

00 = Normal  
01 = If serial input is charged with 24V, this works as overspeed-test. (overspeed switching point drops appr. 17%)

ORDER-RELATED  
TECHNICAL SPECIFICATION  
(SPECIAL FUNCTIONS)

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4 PAGES



# Start-Stop-Diesel Control Unit

414ers7e.MCD

Empty storage addresses have the content "00".

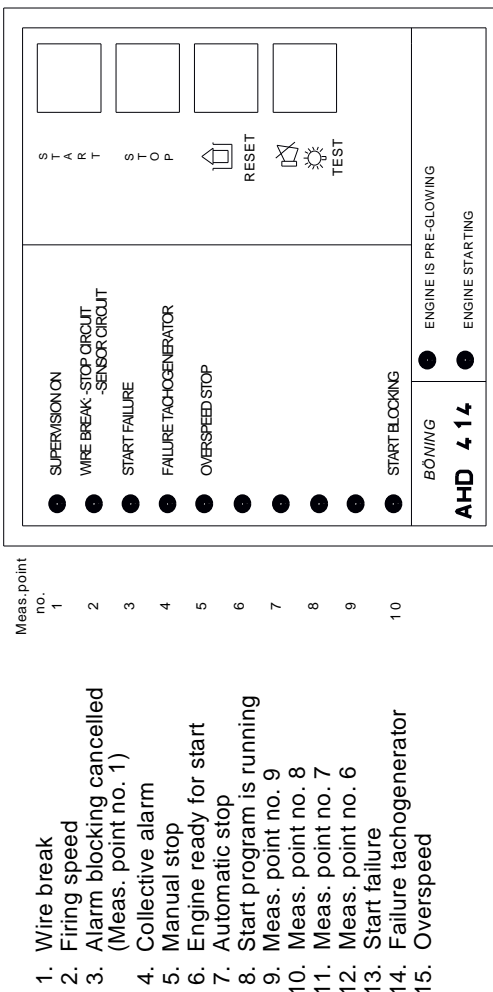
Serial communication : 3FDE

- 00 = No serial communication.
- 01 = AHD 414 is connected as remote control.
- 02 = PS 47- 1- 15 (binary data station) is connected as input station.
- 03 = Serial input over data station PS 47-1-15 and serial output to data distributor AHD W.
- 05 = On parallel display AHD 406-2
- 06 = Serial output on data distributor AHD W (see below).

Serial output to data distributor AHD W

In this output format, AHD 414 works like a data station PS47-1-15. The following protocol shows the bit-order:  
 Format: Startbit (high), 15 data bits according to the below mentioned order (high-bit, if report is active), 20 to 100 bits low,  
 1200 Baud, are transmitted between the data protocols. Thus, the bits can be programmed arbitrarily and be transferred to the alarm systems KOMPAKT EDA 47.

Output protocol if content of Eprom address 3FDE is 06



ORDER-RELATED  
 TECHNICAL SPECIFICATION  
 (SPECIAL FUNCTIONS)

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