

Operating Instructions

HMCflex

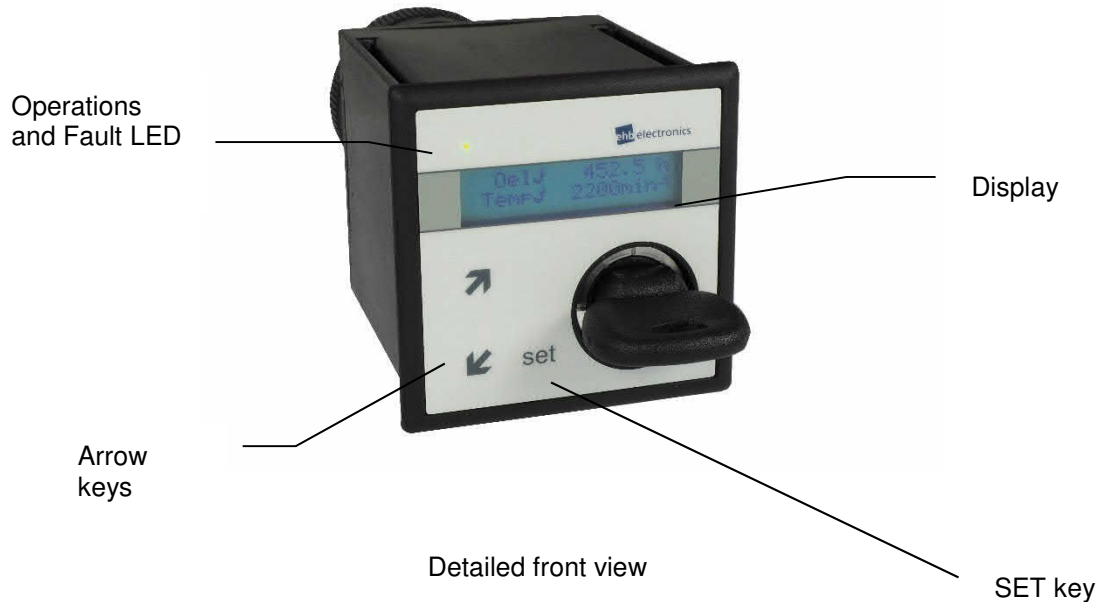


Service personnel

Version 2.9.5

Quick guide

View



Key functions

Key	Meaning
	Display of selected operational values, actuation key for parametrisation
	F2 function key: Next display; increase value and number
	F1 function key: Previous display; decrease value and number
	Display of two lines with 16 characters each

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1. General

1.1 Introduction

The **HMCflex** unit offers a multitude of functions for the control and monitoring of conventional but also electronically-controlled diesel engines. You can individually configure the settings for very diverse applications and different engine variants. **HMCflex** is capable of pre-glowing, by-glowing and after-glowing the engine to up to 70A, using time or temperature variables. Oil pressure and engine temperature can be monitored with switches or sensors. One additional input is provided for monitoring the generator. The operating solenoid is actuated by the outputs for excitation and pull-in winding. In addition, a fault output is provided and an "external stop" input (hood switch, cover or housing switch) can be used to shut down the engine.

In the event of a fault, the display returns a corresponding message after an adjustable delay time and an LED illuminates. If programmed accordingly, the engine is shut down. The input lock allows the clear identification of the cause of error and requires an active acknowledgement of the fault message.

If you use an **HMCflex** unit at the wood chopper, the draw-in shaft is also stopped when the chop blade speed drops. The draw-in function can be also deactivated with a key function. For reasons of personnel protection, the reverse mode is first activated when the manually-stopped draw-in function is restarted.

The two-line display visualises important operational parameters in addition to the engine operating hours.

Other parameters can be displayed using a customised software.

1.2 Target group

This documentation is intended for the service staff of systems with an integrated HMCflex.

1.3 Important notes about the use

- Use** This device must be operated only with the supplied accessories.
Use only mild cleaning agents.
Do not insert any foreign objects into the device openings because this could cause faults in the electronics.
Protect the lock cylinder of the key switch against the ingress of dirt and water.
All switched inductances must be provide with an interference suppression Diode. A battery disconnect switch may only switched in case of emergency or when the engine and the ehb unit is switched off.
The connection of the main power is supplied by a sufficient wire cross-section and suitable fuse directly to the battery terminals.
When operating the device, comply with the applicable accident prevention regulations
- Safety** Never operate the **HMCflex** in the vicinity of strong electromagnetic fields.
Note and comply with the temperature information provided in chapter 10.
- Installation** During the installation of the device follow the directions of the manufacturers of plugs and wire harnesses.
- Storage** A decommissioned **HMCflex** must be stored under the conditions specified.
- Shipping** The unit must be shipped only in its original packaging or alternative packaging with corresponding rigidity.
Improper packaging is considered to be a *negligent action* causing any claim for repair under warranty to be forfeited.
- Maintenance** The **HMCflex** unit is maintenance-free for its entire service life and does not require particular care.
- Opening the HMCflex** The **HMCflex** unit does not contain components that can be serviced, replaced or repaired by the operator or third-party service personnel.
The **HMCflex** unit is sealed against unauthorised opening. Please note that unauthorised opening will destroy the device.



ATTENTION!

**Never clean the device using a high-pressure cleaner.
Instruct your service personnel that any high-pressure cleaning will cause damage and voids the warranty.**

1.4 Device repair

Should a repair be required, please return the device to:

ehb electronics gmbh
Hans-Böckler-Str. 20
30851 Langenhagen
GERMANY

Always attach a written description of the fault. This will facilitate the work of the ehb electronics gmbh service department and ensure faster return of your HMCflex.

You may also use our on-line service for returning devices: www.ehbservice.de

NOTE!



ehb electronics gmbh assumes liability only for the good workmanship and proper nature of the materials used. Any further claims such as loss of profit and direct and indirect consequential damages such as loss of data are excluded.



ATTENTION!

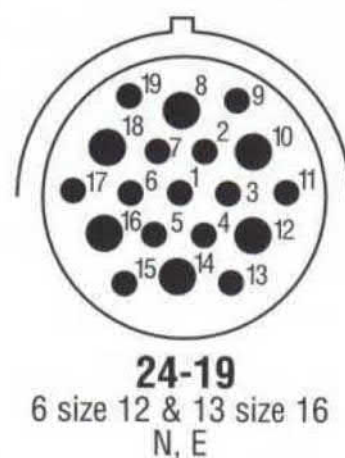
Damages arising from improper packaging of the device for shipping and/or unauthorised intervention will void the warranty.

2. Operation

2.1 Connection

The **HMCflex** unit is attached using the supplied clamping brackets or three M6 threaded bushes in the housing bottom. The **HMCflex** is electrically connected via a 19-pole D plug, Type HDP 26-24-19 SE. The standard wiring is shown below.

Low-power contacts		ehb wire code
1	Oil pressure	green 1mm ²
2	"D+" terminal (excitation)	white 1mm ²
3	Temperature	brown 1mm ²
4	Miscellaneous	grey 1mm ²
5	Terminal 31, GND, earth	blue 1mm ²
6	Operating solenoid, excitation winding	black 1mm ²
7	Auto/Manual feed off/Return stroke on (plus switching)	orange 1mm ²
9	External stop/hood or cover switch	grey/red 1mm ²
11	Feed	green/white 1mm ²
13	"W" terminal	green/grey 1mm ²
15	Return stroke	green/black 1mm ²
17	CAN Low	brown twisted pair or shielded
19	CAN High	white twisted pair or shielded



High-power contacts		
8	50f to starter	purple 2.5 mm ²
10	19/17 pre-glowing	yellow 2.5 mm ²
12	19/17 pre-glowing or Cl.15 (programmable)	yellow 2.5 mm ² or red 2.5mm ²
14	"30" terminal, battery +	brown 2.5mm ²
16	"30" terminal, battery +	brown 2.5mm ²
18	Operating solenoid, pull-in winding	black 2.5mm ²

The **HMCflex** unit can be used for engine monitoring in conventional engines. For this purpose, wire the engine parameters to be monitored according to the above diagram.

Switching on and off

Use the ignition starter switch (position 1) integrated in the controller with active terminal 30 to switch on the **HMCflex** unit. You can start the engine (position 2) when the pre-glow time has elapsed. In this manner, you directly reach the operating mode in which the speed, operating hours, oil pressure and engine temperature (or only the "OK" state, if selected) are displayed. Use the arrow keys to switch to display the daily and total operating hours.

Use the ignition key to switch off the engine and the **HMCflex** unit. The **HMCflex** will automatically run on until the engine is at standstill.

In the event of a fault, **HMCflex** automatically shuts down the engine according to the programmed parameters. The fault state is displayed by a red warning light and a full text on the display.

Possible fault causes are:

```
** Attention! **  
error : temp.
```

```
** Attention! **  
error : oilpress
```

Programmed faults (alarms) are indicated by a flashing warning light and full text on the display. The display toggles between fault and operating parameter display.

```
** Attention! **  
error : gen. D+
```

```
** Attention! **  
error : lowspeed
```

The device must be connected to steady plus (terminal 30) for the correct retention of data and settings.

After the **HMCflex** has been switched on, the following screen is displayed for a short time. It provides the installed software version.

```
ehb-electronics  
HMCflexS0522xk2
```

2.2 SET key

To configure the **HMCflex**, keep the SET key pressed when switching on the terminal 15 (ignition starter switch position 1) until the field for code input is displayed. Use the SET key to confirm the individual code digits. You use this key also to enter the various submenus in the programming or display modes and to confirm your selections.

2.3 Arrow keys

In normal operation, use the arrow keys to toggle between the display of the operating parameters and the views for daily and total operating hours counters.

In programming mode, you can navigate to the individual setting in the main and submenus. You also use the arrow keys to enter the digits in the code and to increase or decrease a value when configuring individual parameters.

3. Changing settings

If you want to change the default settings, you must program the HMCflex device after the initial set-up. The engine must be at standstill for programming.

Open the parametrisation mode by pressing the SET key and simultaneously turn the ignition key to the Ignition position. The system displays a menu listing the various main menus. Use the arrow keys to navigate to the main menus and press SET to open the required menu.

Main menu structure

[1] settings	SET	Pin No.: 1000	SET	Basic HMCflex settings, including language, I/O functions, times, limit values, etc.
[2] service	SET	Pin No.: 2000	SET	Service interval setting, service interval confirmation, fault log retrieval
[3] security	SET	Pin No.: 3000	SET	Attention! You can change the PIN number in this menu. 0000 = PIN query deactivated.
[4] day hours	SET	Pin No.: 4000	SET	Delete here the daily operating hours.
[5] total hours	SET	Pin No.: 5000	SET	Set or delete the total operating hours in this menu item.
[6] Chipper	SET	Pin No.: 6000	SET	Basic setting of the chopper functions.
Back	SET	Return to the selection		

All settings are directly saved and applied when the programming mode is closed. When the programming mode is closed, **HMCflex** will continue to operate in basic mode. The settings are also applied when you terminate programming by shutting down the device with the ignition starter key. The queries in the main menus allow you three attempts to enter the correct PIN number before automatically returning to the main menu overview. In the PIN number is not known, you have the option to terminate the query with the ignition starter switch. Schematic overview – Set-up menu (example)

3.1 Schematic overview – [1] Settings

```
***Setup Menu***
Pin Nr.: ****
```

For the factory-set code of the set-up menu, enter 1000 with the arrow keys and confirm the individual digits with SET. The system now provides the "Set-up Menu" field as shown below. Use the arrow keys to navigate into the main and submenus and to the individual setting options in "Selection/Input". Press SET to confirm the offered or selected option. Press "Back" and SET to close the submenu.

```
***Setup Menu***
Pin Nr.: 1000
```

[1] Settings

Main menu	Submenu	Selection/Input	Note
		← Arrow key →	

[1] language	Submenu	Selection/Input	Note
	Language	SET german, english, francais	SET Selection
	exit	SET Return to the selection	

[2] sensors	Submenu	Selection/Input	Note
	Oil pressure	SET 0-2bar, 0-3bar, 0-5bar, 0-10bar, 0-16bar, 0-25bar (In [10] Inputs/Output: "oil" must be set for the sensor, the menu option is suppressed with "without", "N.O." or "N.C".)	SET Selection
	Temperature	SET KTY, PT100, PT1000, 92-027-004, 92-027-006, 92-027-016, 92-027-022, 92-027-064, 92-027-081, LDW1603 (In [10] Inputs/Output: "temp" must be set for the sensor.)	SET Selection
	pulses/rev	SET 0.1 - 999.9 Impulses per rotation	SET Input
	wire W	SET PNP / (NPN) Switch to NPN, from hardware version 8.0 The system automatically detects the hardware version.	SET Selection
	exit	SET Return to the selection	

Attention: the menu selection is adjusted according to the setting under item [10] Inputs/Outputs (sensor or switch)!

[3] output	pin 6	SET	Multi-function * (Standard ETR-HC)	SET	Selection
	pin 10	SET	Multi-function * (Standard glow)	SET	Selection
	pin 11	SET	Multi-function * (Standard feedfwdETR)	SET	Selection
	pin 12	SET	Multi-function * (Standard --IG.15)	SET	Selection
	pin 15	SET	Multi-function * (Standard feedbckETR)	SET	Selection
	pin 18	SET	Multi-function * (Standard ETR-PC+3s)	SET	Selection
	pin 8	SET	Multi-function * (Standard KL.50F)	SET	Selection
	speed time	SET	In seconds 1-99	SET	Input
	CDowntime	SET	In minutes 0-15	SET	Input
	exit	SET	Return to the selection		

*Multi-functions available for selection:			
1. off	10. speedHC	19. speedHcKey	28. feedbckETS
2. ETR-HC	11. speedPC	20. speedPcKey	29 IG.15
3. ETR-PC	12. eng.running	21. spdHC Pin9	30.fuelump
4. ETR-PC+3s	13. eng.is off	22. spdPC Pin9	31.air fan
5. ETS-HC	14. speedHcCAN	23glow lamp	
6. ETS-PC	15. speedPcCAN	24. glwLmp/er	
7. IG.15	16. KL.50F	25. feedfwdETR	
8. glow	17. alarm_div	26. feedfwdETS	
9. alarm	18. KL.75	27. feedbckETR	

[4] glowntiming	temp1	SET	In celsius -40°C - 99°C	SET	Display
	temp2	SET	In celsius -40°C - 99°C	SET	Input
	time1 (temp1)	SET	In seconds 1-250s	SET	Input
	time2 (temp2)	SET	In seconds 1-250s	SET	Input
	afterG	SET	0-1.5 times pre-glowing	SET	Input
	fix time	SET	In seconds 0-250s	SET	Input
	EGR interv.	SET	In hours 0-999h	SET	Input
	EGR heat.	SET	In seconds 0-999s	SET	Input
	glwfct.	SET	off, int. sen., ext. ens, fix.time,	SET	Selection
	exit	SET	Return to the selection		

[5] altern.excita	time	SET	In seconds 1-10s	SET	Input
	exit	SET	Return to the selection		

[6] autostart	ON/OFF	SET	off (must be set to off!)	SET	Selection
	exit	SET	Return to selection		

[7] emergency	oilpress.	SET	shutd, alarm, noth., cdown	SET	Selection
	temp. max	SET	shutd, alarm, noth., cdown	SET	Selection
	gen. D+	SET	shutd, alarm, noth., cdown	SET	Selection
	disengage	SET	shutd,alarm, noth., cdown	SET	Selection
	min.speed	SET	shutd, alarm, noth., cdown	SET	Selection
	max.speed	SET	shutd, alarm, noth., cdown	SET	Selection
	housing	SET	shutd, alarm, noth., cdown	SET	Selection
	autostart	SET	shutd, alarm, noth., cdown	SET	Selection
	no wire W	SET	Shutd off, alarm, noth, Down	SET	Selection
	sleep mode	SET	pwrdn, , idle, off	SET	Selection
	exit	SET	Return to the selection		

[8] error delays	oilpress,.	SET	In seconds 1-10s	SET	Input
	temp. max	SET	In seconds 1-30s	SET	Input
	gen. D+	SET	In seconds 1-30s	SET	Input
	housing	SET	In seconds 1-30s	SET	Input
	min.speed	SET	In seconds 1-30s	SET	Input
	max.speed	SET	In seconds 1-30s	SET	Input
	divdelay	SET	In seconds 1-250s	SET	Input
	overVolt..	SET	In seconds 0.1-5.0s	SET	Input
	no wire W	SET	In seconds 1-30s	SET	Input
	sleep time	SET	In seconds 1-999s	SET	Input
	exit	SET	Return to the selection		

[9] limit values	oil min	SET	In bar 0.1 – 2.0 (per sensor type see [2] Sensors)	SET	Input
	temp. max	SET	In Celsius 0°C - 160 °C	SET	Input
	disengage	SET	100 - 9990 rpm	SET	Input
	min.speed	SET	100 - 9990 rpm	SET	Input
	max.speed	SET	100 - 9990 rpm	SET	Input
	overvolt.	SET	In volt 10 – 50 V	SET	Input
	exit	SET	Return to the selection		

[10] in/output	Haube (housing)	SET	w.out, NO, NC	SET	Selection
	diverse	SET	w.out, NO, NC	SET	Selection
	autost.	SET	switch, button1,button	SET	Selection
	alarm	SET	w.out, duration, interval	SET	Selection
	oilpress.	SET	w.out, NO, NC, sensor (see [2] Sensors)	SET	Selection
	temperat	SET	w.out, NO, NC, sensor (see [2] Sensors)	SET	Selection
	gen D+	SET	w.out, with	SET	Selection
	ropeStart	SET	w.out, with	SET	Selection
	exit	SET	Return to the selection		

Finish set-up		SET	Display returns to * Menu - Selection *	SET
----------------------	--	------------	---	------------

3.2 Schematic overview – [2] Service

```

***Service***
Pin Nr.: 2000
    
```

For the factory-set code of the service menu, enter 2000 with the arrow keys and confirm the individual digits with SET. The system now provides the "Service Menu" field as shown below. Use the arrow keys to navigate through the main menu. Leave the submenu by using the SET key to confirm the PIN number entered.

[2] Service

Settings	Submenu	Selection/Input		Note
		← Arrow key →		
[1] Service adj.	Oel@ (oilpressure)	SET	50	SET Selection
			interval: off, 50, 100, 150, ... 1000	SET Selection
			service occurred	SET Acknowledgement
			exit	SET
	LUF@ (airfilter)	SET	500	SET Selection
			interval: off, 50, 100, 150, ... 1000	SET Selection
			service occurred	SET Acknowledgement
			exit	SET
	KSFI@ (fuelfilter)	SET	1000	SET Selection
			interval: off, 50, 100, 150, ... 1000	SET Selection
			service occurred	SET Acknowledgement
			exit	SET
[2] saved errors	Fault memory	SET	Archived faults are displayed. Browse with the arrow keys. ← Arrow key →	Display
	exit	SET	Return to the selection	
End		SET	Display returns to * Menu - Selection *	SET

3.3 Schematic overview – [3] Security

```
***Security***
Pin No.: 3000
```

For the factory-set code of the security menu, enter 3000 with the arrow keys and confirm the individual digits with SET. The system now provides the "Security Menu" field as shown below. Use the arrow keys to navigate through the main menu. Use the arrow keys to change the PIN numbers. Every digit must be confirmed with SET. Leave the submenu by using the SET key to confirm the PIN number entered.

[3] Security

Settings	Submenu	Selection/Input		Note
		← Arrow key →		

[2] PIN-number		SET		SET	
	DELETE	SET	0000-9999	SET	Input
	SETUP	SET	0000-9999	SET	Input
	SERVICE	SET	0000-9999	SET	Input
	SECURITY	SET	0000-9999	SET	Input
	DAY.HOURS	SET	0000-9999	SET	Input
	ENG.HOURS	SET	0000-9999	SET	Input
	CHIPPER	SET	0000-9999	SET	Input
	STARTER	SET	0000-9999	SET	Input
	exit	SET	Return to the selection	SET	

[3] self test		SET		SET	
	selftesting	SET	no / yes	SET	
	exit	SET	Return to the selection	SET	

End		SET	Display returns to * Menu - Selection *	SET
		SET	Display returns to * Menu - Selection *	SET

3.4 Schematic overview – [4] Daily operating hours counter

```
**Day counter**
Pin No.: 4000
```

For the factory-set code of the daily operating hours counter menu, enter 4000 with the arrow keys and confirm the individual digits with SET.

[4] day hours

Settings	Submenu	Selection/Input		Note
		← Arrow key →		
**Trip Hours **	clear	SET	yes, no Display returns to * Menu - Selection *	SET Selection

3.5 Schematic overview – [5] Operating hours counter

```

***Hourmeter ***
Pin No.: ****
    
```

For the factory-set code of the operating hours counter menu, enter 5000 with the arrow keys and confirm the individual digits with SET.

[5] total hours

Settings	Submenu	Selection/Input		Note
		← Arrow key →		
***Hourmeter ***	clear	SET	The operating hours are deleted. The system is reset.	SET Deletion
	set	SET	EnH: 00000-99999 After entering the fifth digit - "Finish with SET".	SET Input
		SET	Finish with SET	

3.6 Schematic overview – [6] Chipper settings

*** Chipper ***
Pin-Nr.: 6000

For the factory-set code of the setting menu for the chipper function, enter 6000 with the arrow keys and confirm the individual digits with SET.

[6] Chipper

Settings	Submenu	Selection/Input		Note
			← Arrow key →	
Chipper	Pulses/Rev.	SET	0.1 - 999.9 Impulses per rotation	SET Input
	TopSpeed	SET	0010 – 9990 rpm or 100 - 999%	SET Input
	norm. rpm	SET	0010 - 9990 rpm	SET Input
	ret. rpm	SET	0010 – 9990 rpm or 10 - 99%	SET Input
	LowSpeed	SET	0010 – 9990 rpm or 10 - 99%	SET Input
	PushTime	SET	0 – 9999 ms in milliseconds	SET Input
	percent min ⁻¹	SET	Speed value, percentage (relative to standard speed)	SET Selection
	chipp.mode.	SET	OFF, ON	SET Selection
	rpm.ctrl	SET	OFF, ON	SET Selection
	exit	SET	Return to the selection	SET

4. Explanations to the adjustable parameters

4.1 [1] Settings

Parameter	Explanations
-----------	--------------

4.1.1 [1] Language




Language	You can select between German, English and French (subject to change).
----------	--

4.1.2 [2] Sensors

Temperature	The HMCflex unit can be factory-set to standard temperature sensors. For this purpose, the Sensor type must be selected as the temperature monitoring type under [10] Inputs/Outputs. This menu item is not displayed for the types N.C., N.O. or Without.
Oil pressure	The HMCflex unit can be factory-set to standard oil pressure sensors. For this purpose, the Sensor type must be selected as the oil pressure monitoring type under [10] Inputs/Outputs. This menu item is not displayed for the types N.C., N.O. or Without.
Impulses/rotation	Enter the number of impulses per rotation from the pulse generator or the number of pole pairs of the generator including the transmission ratio. See also chapter 5.2 for further details.

4.1.3 [3] High-power output

OFF	The selected output pin of the D plug is switched off.
ETR-HC	The selected output pin of the D plug has the function of a Operating solenoid ETR excitation winding : An operating solenoid (ETR – Energise To Run) is defined as a lifting magnet releasing the fuel supply when under power. This magnet must be switched on during engine operation.
ETR-PC	The selected output pin of the D plug has the function of a Operating solenoid ETR pull-in winding : Short activation for approx. 0.5 seconds to engage the operating solenoid.
ETR-PC+3s	The selected output pin of the D plug has the function of a Operating solenoid ETR pull-in winding : The output is activated with the starter and remains active for another 3 seconds after the starter is switched off. Specifically for HATZ engines
ETS-HC	The selected output pin of the D plug has the function of a Stopping solenoid ETS excitation winding : A stopping solenoid (ETS - energised to stop) is defined as a lifting magnet requiring voltage to stop the engine.
ETS-PC	The selected output pin of the D plug has the function of a Stopping solenoid ETS pull-in winding : Short activation for approx. 0.5 seconds to engage the stopping solenoid.
IG.15	The selected output pin of the D plug has the function of a switched output KL.15 of the HMCflex ignition starter switch. After an external stop signal at Pin 9, it is deactivated even when the HMCflex ignition starter switch is in position 1.
Glow	The selected output pin of the D plug has the function of a pre-glow output is active during pre-, by- and after-glowing.
Alarm	The selected output pin of the D plug has the function of an alarm output that is

	active during warning or fault shut-down.
SpeedHC	The selected output pin of the D plug has the function of a speed-adjusting solenoid excitation winding: It is automatically activated after the SpeedMag-Time has expired when the engine is running.
SpeedPC	The selected output pin of the D plug has the function of a speed-adjusting solenoid pull-in winding: It is automatically activated for approx. 0.5 seconds after the SpeedMagTime has expired when the engine is running.
Engine running	The selected output pin of the D plug has the function of a signal output and is active when the engine is running.
Engine stopped	The selected output pin of the D plug has the function of a signal output and is active when the engine is at standstill.
SpeedHC CAN	The selected output pin of the D plug has the function of a speed-adjusting solenoid excitation winding: A CANBUS message activates or deactivates it while the engine is running. For example, in combination with an ehb CAN module ehb5002-14.
SpeedPC CAN	The selected output pin of the D plug has the function of a speed-adjusting solenoid pull-in winding: A CANBUS message activates it for 0.5 seconds when the engine is running. For example, in combination with an ehb CAN module ehb5002-14.
KL.50F	The selected output pin of the D plug has the function of a starter output in direct connection to the starter and features a built-in starter protection. This prevents unintended starting at running or decelerating engine and protects the starter, the pinion and the engine gear ring.
ALARM_DIV	The selected output pin of the D plug has the function of a signal output and returns the status of the "Miscellaneous" input. For the example, the connection of a tank level switch combined with a horn.
KL.75	The selected output pin of the D plug has the function of a switched output KL.75 of the HMCflex ignition starter switch.
SpeedHC Key	The selected output pin of the D plug has the function of a speed-adjusting solenoid excitation winding: With running engine, activate it with the HMCflex arrow key  to and deactivate with the arrow key  .
SpeedPC Key	The selected output pin of the D plug has the function of a speed-adjusting solenoid pull-in winding: With running engine, activate it with the HMCflex arrow key  for approx. 0.5 seconds.
SpeedHC Pin9	The selected output pin of the D plug has the function of a speed-adjusting solenoid excitation winding: It is activated at running engine with an earth signal at Pin 9 of the HMCflex . When the contact is opened, the output is deactivated. For this function, the Ext.Stop (Pin 9) must be set to "Without" in the Set-up menu [10] Inputs/Outputs.
SpeedPC Pin9	The selected output pin of the D plug has the function of a speed-adjusting solenoid pull-in winding: It is activated at running engine with an earth signal at Pin 9 of the HMCflex for approx. 0.5 seconds. For this function, the Ext.Stop (Pin 9) must be set to "Without" in the Set-up menu [10] Inputs/Outputs.
glow lamp	The selected output pin of the D plug has the function of a signal output and only indicates the pre-glow function. The by-glow and after-glow functions are not indicated.
glow lamp / engine running	The selected output pin of the D plug has the function of a signal output and flashes to indicate the pre-glow function before switching to continuous light when the engine is running.
Feed forward ETR	This output is active in the chopper function when the speed is within the operating range (chopper automatic = ON).

Feed forward ETS	This output is inactive in the chopper function when the speed is within the operating range. (chopper automatic = ON)
Feed back ETR	This output is active only a short time in the chopper function when the speed drops below the lower limit. This time can be set in the Set-up menu [6] chopper under the "Time push" menu option.
Feed back ETS	This output is inactive for a short time in the chopper function when the speed drops below the lower limit. This time can be set in the Set-up menu [6] chopper under the "Time push" menu option.
IG.15*	The selected output pin of the 19-pole D plug has the function of a switched output KL.15 of the HMCflex ignition starter switch. This function remains active after an external stop signal at Pin 9. The output is deactivated if the ignition starter switch is set to Position 0 (even when the Autostart function is set to ON!). Example: Operation of a remote control supplied by the KL_15* output. Function on ON_15 and input Autostart as tip switch.
Fuel Pump	The selected output pin of the 19-pole D plug has the function to operate a fuel supply pump. This output become active when the controller is switched on. The output is switched off after a time-out of currently approx. 120 seconds without starting and immediately after an alarm shut-down or external stop.
air fan	The selected output pin of the 19-pole D plug has the function of a fan or ventilation control with two temperature limit values of the temperature measured at Pin 3. To be set with ehbTools using ... <ul style="list-style-type: none"> - Parameter 169 for min. temperature between 0-255°C (default 85°C) - Parameter 170 for max. temperature between 0-255°C (default 95°C)
SpeedMagTime	This time affects the SpeedHC or SpeedPC output functions. After a successful start and expiry of this speed magnet time, the two outputs are activated as follows: SpeedHC: The selected output pin of the D plug has the function of a speed-adjusting solenoid excitation winding: It is automatically activated after the SpeedMagTime has expired when the engine is running. SpeedPC: The selected output pin of the D plug has the function of a speed-adjusting solenoid pull-out winding: It is automatically activated for approx. 0.5 seconds after the SpeedMagTime has expired when the engine is running.
CDownTime	Setting for the run-on or cooling time of the engine. To be set between 0 and 15 minutes.

4.1.4 [4] Glow times

Temp1	Specifies the hotter value for the temperature-dependent pre-glow process. See also chapter 6.2, Temperature-dependent pre-glow.
Temp2	Specifies the colder value for the temperature-dependent pre-glow process. See also chapter 6.2, Temperature-dependent pre-glow.
Time1 (Temp1)	Specifies the glow time for the hotter Temp1 value in seconds. See also chapter 6.2, Temperature-dependent pre-glow.
Time2 (Temp2)	Specifies the glow time for the colder Temp2 value in seconds. See also chapter 6.2, Temperature-dependent pre-glow.

After-glowing	Specifies the time for after-glowing after the start. The after-glow time is the result of the determined pre-glow time times the value specified here.
Fix time	Specifies a fixed glow time in seconds. VG Fct. = fixed time)
EGR interval	Specifies the interval time of the glow plug flashing function in hours. This function removes deposits from the glow plug or helix.
EGR heat.	Specifies the glow time of the flashing function in seconds. (max. 120s)
Glow function	Select here whether <ul style="list-style-type: none"> • the pre-glow function is shut-down or the system is to pre-glow • temperature-dependent using an external sensor at Pin 3 • temperature-dependent using an internal NTC sensor • with a fixed pre-glow time.

4.1.5 [5] Generator.Er

time	As a rule, the generator excitation is switched on while the starter KL.50F is active. The additional time of generator excitation after successful start can be set. To be set between 1 and 10 seconds. Setting 0 enables a permanent excitation of the generator while the engine is running.
------	--

4.1.6 [6] Autostart

Function	This function must be set to off!
Attempts	Number of start attempts. You can program 1 to 5 attempts.
Start duration	Duration of a start attempt. You can program 1 to 45 seconds.
Start pause	Time between two start attempts. You can program 1 to 45 seconds.
Run-on time	Additional time to protect the starter preventing a restart after the system has recognised that the engine is at standstill. The display is off in this state.

4.1.7 [7] Fault event

oilpress.	The oil level monitoring can be programmed to shut down (emergency off), to warn (alarm), without monitoring (without) or as shut-down with run-on time (CDown). "error: oilpress." message
temp. max	The engine temperature (cylinder head temperature or cooling water temperature) monitoring can be programmed to shut down (emergency off), to warn (alarm), without monitoring (without) or as shut-down with run-on time (CDown). "error: temp. " message

gen. D+	The load voltage monitoring can be programmed to shut down (emergency off), to warn (alarm), without monitoring (without) or as shut-down with run-on time (CDown). "error: gen. D+ " message
disengage	The start speed monitoring can be programmed to shut down (emergency off), to warn (alarm), without monitoring (without) or as shut-down with run-on time (CDown). "error: NoSpeed" message
min.speed	The underspeed monitoring can be programmed to shut down (emergency off), to warn (alarm), without monitoring (without) or as shut-down with run-on time (CDown). "error: lowSpeed" message
max.speed	The overspeed monitoring can be programmed to shut down (emergency off), to warn (alarm), without monitoring (without) or as shut-down with run-on time (CDown). "error: maxSpeed" message
housing	The Miscellaneous input monitoring can be programmed to shut down (emergency off), to warn (alarm), without monitoring (without) or as shut-down with run-on time (CDown). "error: Haube" message
autostart	The monitoring of the autostart process with number of failed attempts can be programmed to shut down (emergency off), to warn (alarm), without monitoring (without) or as shut-down with run-on time (CDown). "error: Autstrt" message
no wire W	The monitoring of the KI.W process with number of failed attempts can be programmed to shut down (emergency off), to warn (alarm), without monitoring (without) or as shut-down with run-on time (CDown). "error :KIW.Riss".
Sleep Mode	<p>The sleep mode function is made for reducing the power consumption of the HMCflex.</p> <p>off: If the key switch is in position 1 (ignition) the display and activate outputs are always switched on.</p> <p>idle: After sleeptime timeout Display and activate outputs are switched down. Output function KL.15* and CANbus function are still working.</p> <p>pwrdsn: After sleeptime timeout Display and all outputs are switched off, output function KL.15* and CANbus too.</p>

4.1.8 [8] Fault times

oilpress.	This setting specifies the time for an active oil pressure fault to be suppressed by the controller. Upon expiry of the set time, the alarm programmed under [7] is triggered.
temp. max	This setting specifies the time for an active temperature fault to be suppressed by the controller. Upon expiry of the set time, the alarm programmed under [7] is triggered.
gen. D+	This setting specifies the time for an active generator fault to be suppressed by the controller. Upon expiry of the set time, the alarm programmed under [7] is triggered.
housing (Haube)	This setting specifies the time for a signal active at the housing input to be

	suppressed by the controller. Upon expiry of the set time, the alarm programmed under [7] is triggered.
min.speed	This setting specifies the time for the speed to be below minimum value to be suppressed by the controller. Upon expiry of the set time, the alarm programmed under [7] is triggered.
max.speed	This setting specifies the time for the speed to be above maximum value to be suppressed by the controller. Upon expiry of the set time, the alarm programmed under [7] is triggered.
divdelay	Is an additional fault time for the Miscellaneous input. This setting specifies the time for a signal active at the Miscellaneous input to be suppressed by the controller immediately after starting. Upon expiry of this time, the standard fault time for Miscellaneous will apply. Example: Water pressure switch on Miscellaneous. This is the time required by a water pump to draw in ground water and to build water pressure.
overVoltage	This setting specifies the time for an overvoltage to be applied to the controller before it automatically shuts down to protect itself and the engine components. For example, a load dump triggered by a battery isolation. "error: F.Ue.Sp." message
no wire W	This setting specifies the time for the speed signal missing during automatic start for example, before the controller shuts down and returns a fault. "error: KIW.Riss" message
sleep time	The sleep mode function is made for reducing the power consumption of the HMCflex. Is this function active, after sleeptime timeout Display and all outputs are switched off.

4.1.9 [9] Limit values

oil min	Setting the limit value for minimum oil pressure. If the pressure drops below the programmed value, the alarm programmed under [7] is triggered. For this purpose, the Sensor type must be selected as the oil pressure monitoring type under [10] Inputs/Outputs. This menu item is not displayed for the types NC, NO or w.out (without).
temp. max	Setting the limit value for maximum engine temperature. If the temperature rises above the programmed value, the alarm programmed under [7] is triggered. For this purpose, the Sensor type must be selected as the temperature monitoring type under [10] Inputs/Outputs. This menu item is not displayed for the types NC, NO or w.out (without).
disengage	Setting the limit value for start speed. If the start speed is exceeded the starter output KL.50F is deactivated. If the starting speed cannot be reached, the alarm programmed under [7] is triggered.
min.speed	Setting a lower engine speed. If the speed drops below this value, the alarm programmed under [7] is triggered.
max.speed	Setting an upper engine speed. If the speed exceeds this value, the alarm programmed under [7] is triggered.
overvolt.	Setting a maximum overvoltage permitted at the controller. If this voltage is exceeded due to, for example, a load dump caused by battery isolation, the controller protects itself by shutting down and returns a fault.

4.1.10 [10] Inputs/Outputs

All outputs are monitored for wire breaks. For this reason, operating voltage is applied to open output with a high impedance. The function of these outputs can be checked only when they are under load.

Haube (housing)	The housing input can be programmed as " NC, NO or w.out (without)." query. If one of the SpeedHC_Pin9 or SpeedPC_Pin9 output functions is used, this menu option must be set to "Without".
diverse	The Miscellaneous input can be programmed as " NC, NO or w.out (without)." query.
autost.	<p>The Autostart input can be programmed as switch, tip switch or tip switch SS. For this purpose, the function ON or ON_15 must be set in [6] Autostart.</p> <ul style="list-style-type: none"> • Switch: A plus signal at Pin 7 starts the engine. When the switch opens, the engine stops. • Tip switch: A plus signal at Pin 7 starts the engine. When the contact opens, the engine stops. The engine is stopped with the External Stop input, the ignition starter switch or pressing the SET key. • Tip switch SS (current surge): A plus signal at Pin 7 starts the engine. Another plus signal at Pin 7 stops the engine.
alarm	The Alarm output can be programmed as "duration", "interval" or "w.out" function.
oilpress.	The input for monitoring the engine oil pressure can be programmed as sensor, NC, NO or w.out (without).query.
temperat.	The input for monitoring the engine temperature can be programmed as sensor, NC, NO or w.out (without).query.
gen. D+	The monitoring of the generator with the D+ signal can be programmed as "With" or "Without" query.
ropeStart	The monitoring of the cable pull can be programmed as "With" or "Without" query. The changed starting conditions in a start with cable pull compared to a start with ignition starter switch is automatically taken into account by the controller.

4.2 [6] Chipper

Parameter	Explanations
Pulses/Rev (IPU)	<p>Enter the number of impulses per rotation from the pulse generator or the number of pole pairs of the generator including the transmission ratio. See also chapter 5.2 for further details.</p> <p>Attention: This menu option changes the same setting as the "Imp/rot" menu option in chapter 4.1.2 [2] Sensors and has been inserted at this point as requested by the customer.</p>
TopSpeed	Setting the upper speed limit. If this value is exceeded, the feed rate is deactivated.
norm. rpm	Setting the standard speed. If this value is exceeded, the chopper automatic is automatically activated.
ret. rpm	Setting the return speed. If this value is exceeded, the system re-activates the feed rate if it has been deactivated due to underspeed.
Low Speed	Setting the lower speed limit. If the speed falls below this value, the system deactivates the feed and activates the return for the defined push time.
PushTime	Setting the return stroke time. If the speed falls below lower limit, the system deactivates the feed and activates the return for this defined time.
Percent min ⁻¹	<p>Setting the speed monitoring, as to whether the speed limit values are given as real speed values or percentages relative to the standard speed.</p> <p>Example: At a set standard speed of 1000 min⁻¹, a lower speed limit of 90% equals a speed of 900 min⁻¹.</p>
Chipper mode	Setting the Chipper automatic to OFF for manual mode or mode 1 to 3. See also chapters Fehler! Verweisquelle konnte nicht gefunden werden. and 7.2.
rpm ctrl	<p>Setting the start speed control.</p> <p>The ON setting prevents a start at present speed. This setting is useful when the speed signal of the generator or a pulse generator is used by the engine.</p> <p>The OFF setting permits a start at present speed. This setting is useful when the speed of the chipper blade is measured with a pulse generator. During restart, it can happen that the decoupled chipper blade has still a significant speed.</p>

5. Definition of the terms Speed and Impulses per rotation.

The speed of an engine is the number of crankshaft rotations per minute.

In diesel engines, the speed, when present, can be taken from the "W" terminal of the generator.

There is a potential for inaccuracy due to the V-belt slip. An initiator (pick up), on the other hand, returns absolute values (comply with the manufacturer's installation instructions).

In both cases, frequency (impulses per second) is used. The frequency of these impulses is proportional to the engine speed.

5.1 Speed measurement using the impulses of the "W" terminal.

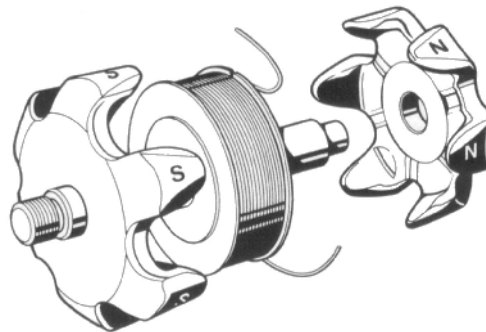
To determine the frequency ("W" generator terminal), you must know two factors. The transmission ratio of the generator to the crankshaft which can be calculated as follows:

$$\text{Transmission ratio (i)} = \frac{\text{Diameter belt pulley crankshaft}}{\text{Diameter belt pulley generator}}$$

and the number of pole pairs of the generator. At the front end of the generator, claw-shaped poles are visible that are placed next to each other alternating as North and South poles. Halve the number of these poles and you obtain the number of pole pairs (see below). For the Bosch types G1, K1 and N1, there are six pole pairs and 8 pairs for the Bosch type T1.

When the transmission ratio and the number of pole pairs are known, you can calculate the number of impulses per rotation (IPU) according to this formula:

$$\text{IPU} = i \times \text{pole pairs}$$



Schematic design of a generator

5.2 Speed measurement using an initiator (pick up)

The initiator must be at a right angle to a rotating metallic component which is directly connected to the engine's crankshaft. This can be a belt pulley or the flywheel of the engine, for example. The system captures bores or protrusion such as screw heads. The distance must be the same and within the capturing range of the initiator. When installing the initiator, ensure that multiple impulses (ideally 4 to 16 impulses) are emitted for each engine rotation per crankshaft rotation. The number of impulses should not be too low as this would result in a low resolution.

This method is suitable for applications requiring an accurate capture of the speed or when the generator is not fitted with a "W" terminal.

6. Pre-glow functions

The HMCflex supports a number of glow functions described below.

6.1 Temperature-independent pre-glowing

This pre-glow function with a fixed, temperature-independent pre-glow time can be useful when the glow plug manufacturer has defined a maximum glow time.

6.2 Temperature-dependent pre-glowing

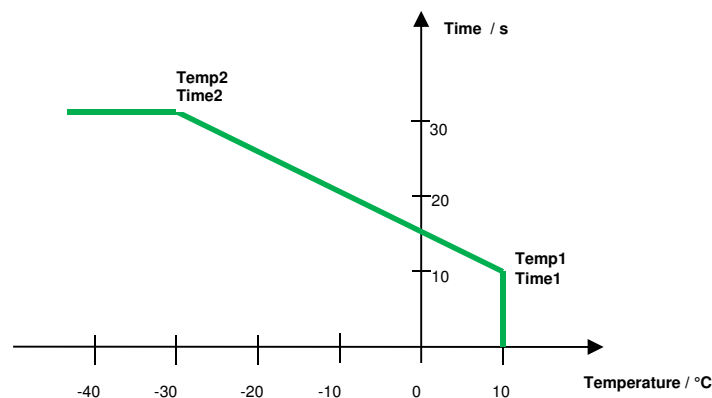
The controller supports a temperature-dependent pre-glow operation using the internal and the external sensor at Pin 3.

If the internal temperature sensor is used, you can use and monitor another temperature switch or temperature sensor at Pin 3.

Both temperatures Temp1 and Temp2 specify the temperature range in which the system pre-glows temperature-dependent. The controller linearly determines the glow times between the programmed times for Temp1 and Temp2. At lower temperatures than specified in Temp2, the system pre-glows with the maximum glow time programmed in "Time Temp2".

Example:

Temp1 = 10°C
Temp2 = -30°C
Time1 (Temp1) = 10s
Time2 (Temp2) = 30s



Temperature-dependent pre-glowing

6.3 After-glow function

The after-glow time is determined with a factor of the fixed or temperature-dependent pre-glow time and started immediately after the disengaging the starter at the KL.50F function output.

6.4 Glow plug cleaning

The glow plugs may require cleaning when for an extended time no glowing action has been completed during operation or at warm ambient temperatures. In this case, combustible deposits may occur at the glow plug or helix. To prevent this, you can set under [4] Glow times a long-term interval for flashing the glow device during operation.

7. Chipper controller

To operate a wood chipper, stump cutter, crusher or other machines with a feed and retract mechanism, where excessive material load (clogging) can cause an overload or stalling of the engine.

For this purpose, the output functions FeedfwdETR, FeedfwdETS, FeedbckETR and FeedbckETS are provided. The Pin 9 input used as external stop in the standard application, is now used to query the hood switch. When the hood is opened, the engine is shut off.



ATTENTION!

Even if the engine is immediately at standstill, the chipper blade may run on for some minutes due to its high mass. Risk of injury!

7.1 Switch release – Chipper Mode 0

Start state:

Feed and return are deactivated after the engine start. Pressing the switch on Pin 7 makes the control switch to the inactive state.

If the hood switch is released the control shows an error. In this case the control needs to be restarted and the error has to be acknowledged.

Inactive state:

Return is permanently on.

Pressing the switch on Pin 7 makes the control switch to the active state.

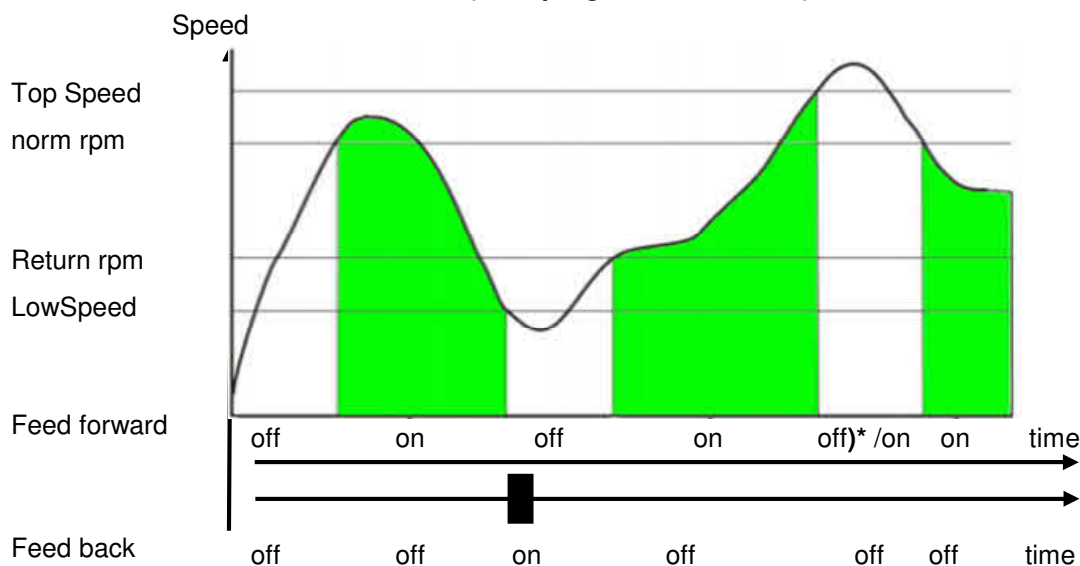
Pressing the switch on Pin 4 makes the control switch back to the start state.

If the hood switch is released the control shows an error. In this case the control needs to be restarted and the error has to be acknowledged.

Active state:

Exceeding norm RPM activates the feeder. Dropping below low speed deactivates the feeder and activates the retractor for the chosen push time. If the rpm rises above return rpm again the feeder is activated. Exceeding top rpm deactivates the feeder. The feeder is only reactivated when the rpm drops below norm rpm again.

Illustration - Feed and return stroke (both programmed as ETR)



Pressing the switch on Pin 7 makes the control switch to the inactive state.
 Pressing the switch on Pin 4 makes the control switch to the start state.
 If the hood switch is released the control shows an error. In this case the control needs to be restarted and the error has to be acknowledged.

7.2 Automatic without switches – Chipper mode 1:

Active state:

Exceeding norm RPM activates the feeder. Dropping below low speed deactivates the feeder and activates the retractor for the chosen push time. If the rpm rises above return rpm again the feeder is activated. Exceeding top rpm deactivates the feeder. The feeder is only reactivated when the rpm drops below norm rpm again.

If the hood switch is released the control shows an error. In this case the control needs to be restarted and the error has to be acknowledged.

7.3 Semi-automatic with switches – Chipper mode 2:

Inactive state:

After starting the engine feeder and retractor are deactivated. Pressing the switch on Pin 7 makes the control switch to the active state. Therefore Pin 4 needs to be connected to ground no matter if it is configured as normally open or normally close.

If the hood switch is released the control shows an error. In this case the control needs to be restarted and the error has to be acknowledged.

Active state:

Exceeding norm RPM activates the feeder. Dropping below low speed deactivates the feeder. The retractor is not activated.

If the rpm rises above return rpm again the feeder is activated. Exceeding top rpm deactivates the feeder. The feeder is only reactivated when the rpm drops below norm rpm again.

Pressing the switch on Pin 4 makes the control switch to the inactive state.

If the hood switch is released the control shows an error. In this case the control needs to be restarted and the error has to be acknowledged.

7.4 Annex: Expansion from software version "I"

7.4.1 Display of I/O diagnosis during machine commissioning for example

By using the arrow keys to navigate from the total operating hours display

Display "OGTD MASEGVZW RP"

Display "0011-00000010+00" -> IO status GNDLevel=0

Legend

O	Oil pressure	D Pin 1	
G	Generator D+	D Pin 2	
T	Temperature	D Pin 3	
D	Diverse	D Pin 4	
-	GND	D Pin 5	
M	magnet ETR-HC	D Pin 6	
A	autostart	D Pin 7	
S	starter 50	D Pin 8	
E	Ext.Stop(Haube/housing)	D Pin 9	
G	Glow plug	D Pin 10	
V	Feed forward	D Pin 11	
Z	Ignition 15	D Pin 12	
W	KI.W	D Pin 13	Static display at speed < 5 rpm
+	Battery +	D Pin 14	
R	Return, Feed back	D Pin 15	
P	magnet ETR-PC	D Pin 18	

7.4.2 Chipper modes

0	Automatic operation with switch release	See 7.1
1	Automatic operation without switches	See 7.2
2	Semi automatic operation with switches	See 7.3
3	Chipper automatic with special feed control by return speed	Special customer requirement

8. CANbus functions

The **HMCflex** supports these CANbus functions according to SAE J1939.

All measured values and fault messages of the **HMCflex** are output on the CANbus. HMCflex behaves similar to an ECU with source address 0.

The measured values are thus compatible with many standard CANbus display devices.

The compatible **ehb** devices are, amongst other, **CANcor**, **CANflex**, **CANarmatur**, **CANinfo** and **CANmonitor**.

8.1 Messages on CANbus / Transmitted Messages via CANbus

According to SAE J1939 250 kbit 29 bit identifier by address 00h (standard).

8.1.1 PGN 61444 Electronic Engine Controller 1 - EEC1

SPN 190 Engine Speed

Example:

```
0CF00400 8 FF FF FF 79 CC FF FF FF every 10ms (speed=6543.1 RPM)
```

8.1.2 PGN 65253 Engine Hours, Revolutions - HOURS

SPN 247 Engine Total Hours of Operation

Example:

```
18FEE500 8 A6 05 2C 93 00 00 00 00 every 1000ms (operating hours= 123456789.1 h)
```

8.1.3 PGN 65262 Engine Temperature 1 - ET1

SPN 110 Engine Coolant Temperature

SPN 175 Engine Oil Temperature 1

Example:

```
18FEEE00 8 7D FF C0 2C FF FF FF FF every 1000ms (cooling temperature=85°C oil temperature=85°C )
```

8.1.4 PGN 65263 Engine Fluid Level/Pressure 1 - EFL/P1

SPN 100 Engine Oil Pressure

Example:

```
18FEEF00 8 FF FF FF BC FF FF FF FF every 1000ms (oil pressure 7.5 bar)
```

8.1.5 PGN 65271 (R) Vehicle Electrical Power 1 - VEP1

SPN 168 Battery Potential / Power Input 1

Example:

```
18FEF700 8 FF FF FF FF 3A 02 FF FF every 1000ms (battery voltage=28.5V)
```

8.1.6 PGN 65269 Ambient Conditions – AMB

SPN 171 Ambient Air Temperature

Example:

```
18FEF500h 8 FF FF FF 00 25 FF FF FF every 1000ms (internal temperature= 23°C)
```


8.1.7 Active Diagnostic Trouble Codes (DM1)

Active faults with SPN and FMI number. In the first data byte, the lamp status byte is transmitted containing the information for the red stop lamp and the amber warning lamp.

Possible states of the lamp status byte are, depending on the settings during set-up,

- 00h for all lamps off,
- 04h for Amber Warning Lamp in setting warning fault and
- 10h for Red Stop Lamp in setting shut-down fault.

Examples:

```

18FECA00 8 00 00 00 00 00 00 00 00 every 1000ms SPN 0 FMI 0 No Error
For error...
18FECA00 8 10 00 64 00 07 00 00 00 oilpressure SPN 100 FMI 7 Engine Oil Pressure
18FECA00 8 10 00 6E 00 07 00 00 00 temperature SPN 110 FMI 7 Eng.Coolant Temperature
18FECA00 8 10 00 A7 00 07 00 00 00 DPlus D+ SPN 167 FMI 7 Charging Sys. Potential
18FECA00 8 10 00 BD 02 07 00 00 00 diverse SPN 701 FMI 7 Auxillary I/O 1
18FECA00 8 04 00 BE 00 11 00 00 00 lowspeed SPN 190 FMI 17 Engine Speed
18FECA00 8 10 00 BE 00 0F 00 00 00 maxspeed SPN 190 FMI 15 Engine Speed
18FECA00 8 10 00 60 00 07 00 00 00 Fuellevel SPN 96 FMI 7 Fuel Level
18FECA00 8 10 00 75 06 13 00 00 00 CANbus Info SPN 1653 FMI 19 CANmodul Start/Stop
18FECA00 8 10 00 A8 00 0F 00 00 00 Overvoltage SPN 168 FMI 15 Battery Potential
18FECA00 8 10 00 BE 00 07 00 00 00 KL.W no wire SPN 190 FMI 7 Engine Speed
18FECA00 8 04 00 93 03 0E 00 00 00 Service due SPN 915 FMI14 Service Delay

```

8.1.8 PGN 42496 (R) Auxiliary Input/Output Status 3 - AUXIO3

Internal states of the HMCflex for external evaluation in, for example, a CANmodul ehb5002-14.

Parameter Group Number: 42496 (0xA600) STATUS I/O 00=AUS 01=AN 11=NOT AVAILABLE

Pos.	Length	Parameter Name	SPN
1.1	2 bits	Auxiliary I/O #52	3875 PIN 1 / OIL
1.3	2 bits	Auxiliary I/O #51	3874 PIN 2 / D+
1.5	2 bits	Auxiliary I/O #50	3873 PIN 3 / TEMP
1.7	2 bits	Auxiliary I/O #49	3872 PIN 4 / DIV
2.1	2 bits	Auxiliary I/O #56	3879 PIN 7 / Autostart
2.3	2 bits	Auxiliary I/O #55	3878 PIN 9 / External Stop
2.5	2 bits	Auxiliary I/O #54	3877 Internal KL15
2.7	2 bits	Auxiliary I/O #53	3876 Internal KL50
3.1	2 bits	Auxiliary I/O #60	3883 Internal Up key
3.3	2 bits	Auxiliary I/O #59	3882 Internal Down key
3.5	2 bits	Auxiliary I/O #58	3881 Internal set key
3.7	2 bits	Auxiliary I/O #57	3880 Internal keyless key
4.1	2 bits	Auxiliary I/O #64	3887 Output PIN 2 (excitation)
4.3	2 bits	Auxiliary I/O #63	3886 Output PIN 8 (50F)
4.5	2 bits	Auxiliary I/O #62	3885 Output PIN 6
4.7	2 bits	Auxiliary I/O #61	3884 Output PIN 10
5.1	2 bits	Auxiliary I/O #68	3891 Output PIN 11
5.3	2 bits	Auxiliary I/O #67	3890 Output PIN 12
5.5	2 bits	Auxiliary I/O #66	3889 Output PIN 15
5.7	2 bits	Auxiliary I/O #65	3888 Output PIN 18
6.1	2 bits	Auxiliary I/O #72	3895 Output PIN 7 (Signal/Autostart)
6.3	2 bits	Auxiliary I/O #71	3894 Fct. Motor standstill
6.5	2 bits	Auxiliary I/O #70	3893 Fct. Motor running
6.7	2 bits	Auxiliary I/O #69	3892 Fct. Start
7.1	2 bits	Auxiliary I/O #76	3899 Fct. Excitation

7.3	2 bits Auxiliary I/O #75 3898	Fct. Pre-glow
7.5	2 bits Auxiliary I/O #74 3897	Fct. Magnet HW
7.7	2 bits Auxiliary I/O #73 3896	Fct. Magnet AW
8.1	2 bits Auxiliary I/O #80 3903	Fct. SpeedHW
8.3	2 bits Auxiliary I/O #79 3902	Fct. SpeedAW
8.5	2 bits Auxiliary I/O #78 3901	Fct. SpeedHW CAN
8.7	2 bits Auxiliary I/O #77 3900	Fct. SpeedAW CAN

8.2 Messages from CANbus / Transmitted Messages via CANbus

According to SAE J1939 250 kbit 29 bit identifier. Messages currently processed by HMCflex.
For example, in a CANmodul ehb5002-14.

8.3 PGN 57344 Cab Message 1 - CM1

SPN1656 Engine Automatic Start Enable Switch, Byte 6, Bit7-8
SPN1653-1655 Vehicle Limiting Speed Governor Byte 5, Bit3-8

Example:

```
0CE000003 8 FF FF FF FF 47 3F FF FF,  
Byte 6: 0x3F=Stop 0x7F=Start
```

Byte 5: 0x47=LowSpeed

9. Communication with PC (optional)

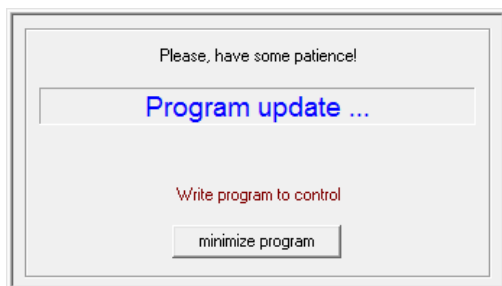
Using the **CANdongle** and the \ ehbTools ehb5365 software, communication with **HMCflex** is possible.

Also available as, for example, **HMCflex Starter kit (ehb5378)** with wire harness and power supply unit.



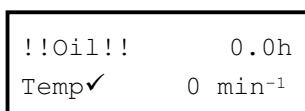
9.1 Software update

Using the above optional accessories, you can update the **HMCflex** using the CANbus interface and the integrated CANbus boot loader.



Attention!

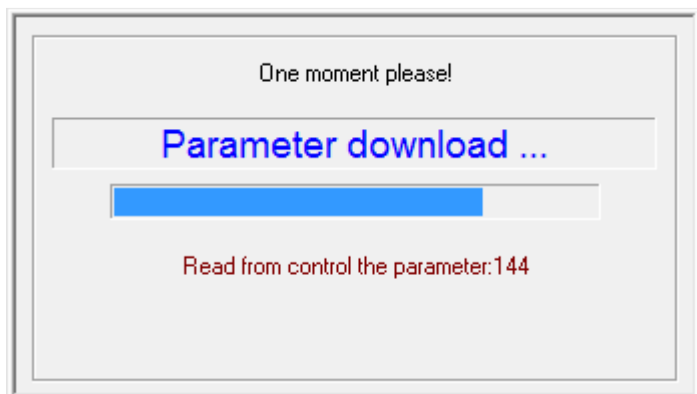
Ensure that the power supply is sufficient and uninterrupted for the entire time required for the update and the subsequent initialisation of the parameters.



As soon as the device switches to this display, you can switch off the power supply.

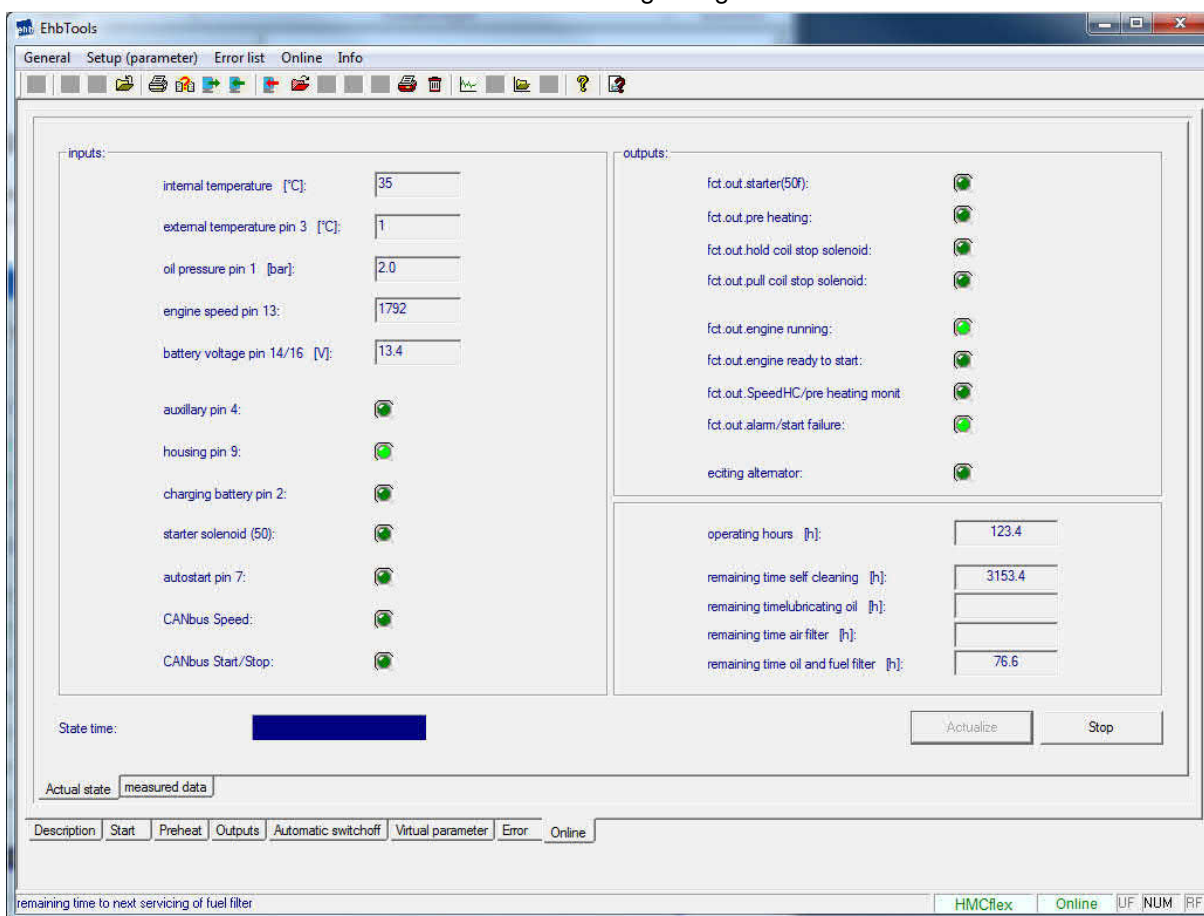
9.2 Parameter Download / Upload

Use the above optional accessories to download and upload a parameter set from and to the HMCflex. This parameter set can be saved to a PC and modified as required.



9.3 Display and recording on-line values

Using the above optional accessories, you can display processed current measuring values of the HMCflex on the PC monitor. You have also a recording or log function.



10. Technical data

Parameter	Conditions	Limit values			Remark
		Min.	Type	Max.	
Voltage range of the electronic components		6V	12...24V	32V	
Interference voltage on UB	6V _{ss} , 50Hz	14V		28V	
Voltage peaks on UB	2ms		200V		
Power consumption 8-24V	Ignition on/off	<1mA	50mA		Power consumption during operation depends on the wiring.
Outputs Pin 2 Excitation current D+ Pin 6 Multi-function Pin 15 Multi-function Pin 8 Multi-function Pin 11 Multi-function Pin 18 Multi-function Pin 10 Multi-function Pin 12 Multi-function	TA 25°C		0.5A 3.0A 3.0A 20A 20A 20A 35A 35A	0.5A (20s) 3.5A (1s) 3.5A (1s) 40A (1s) 40A (1s) 40A (1s) 70A (1s) 70A (1s)	Short-circuit proof At maximum current load, ensure the temporary limitation and cable cross-sections.
Inputs active Low Pin 1 Oil pressure Pin 2 Gen/LiMa Kl. "D+" Pin 3 Temperature Pin 4 Miscellaneous Pin 9 External Stop	TA 25°C		< 120 Ω* < 50% UB < 460 Ω* < 50% UB < 50% UB		Low level detection * can be influenced with parameter setting
Inputs active High internal ZSS Kl.15 internal ZSS-Kl.50 Pin 7 Autostart	TA 25°C		> 7V > 70% UB > 50% UB		High level detection
Frequency input Pin 13 Terminal W	TA 25°C	< 2.2V 4 Hz		>3.5V 2500 Hz	Level hysteresis
Operating temperature		-20°C		+70°C	Temporary discolouration of the display > 50°C
Storage temperature		-30°C		+80°C	
Humidity	48h		95%		According to SAE J1378
Vibration	6h, 10-80Hz		20g		According to SAE J1378
Impact	72x, 9-13ms	44g		55g	According to SAE J1378
LC display		2x16 characters			Alphanumerical
Housing dimensions	W x H x D	72 x 72 x 102 mm 72 x 72 x 130 mm			Without plug With plug
Degree of protection		IP67			

The product has been tested according to the following norms:

Emission. Measurement of radio radiation according to DIN EN 61000-6-4, DIN EN 61000-4-20

Robustness against electric static discharge (ESD) according to nach DIN EN 61000-4-2

Robustness against high frequency electro magnetic fields according to DIN EN 61000-4-3,
DIN EN 61000-4-20, ISO 11451-1

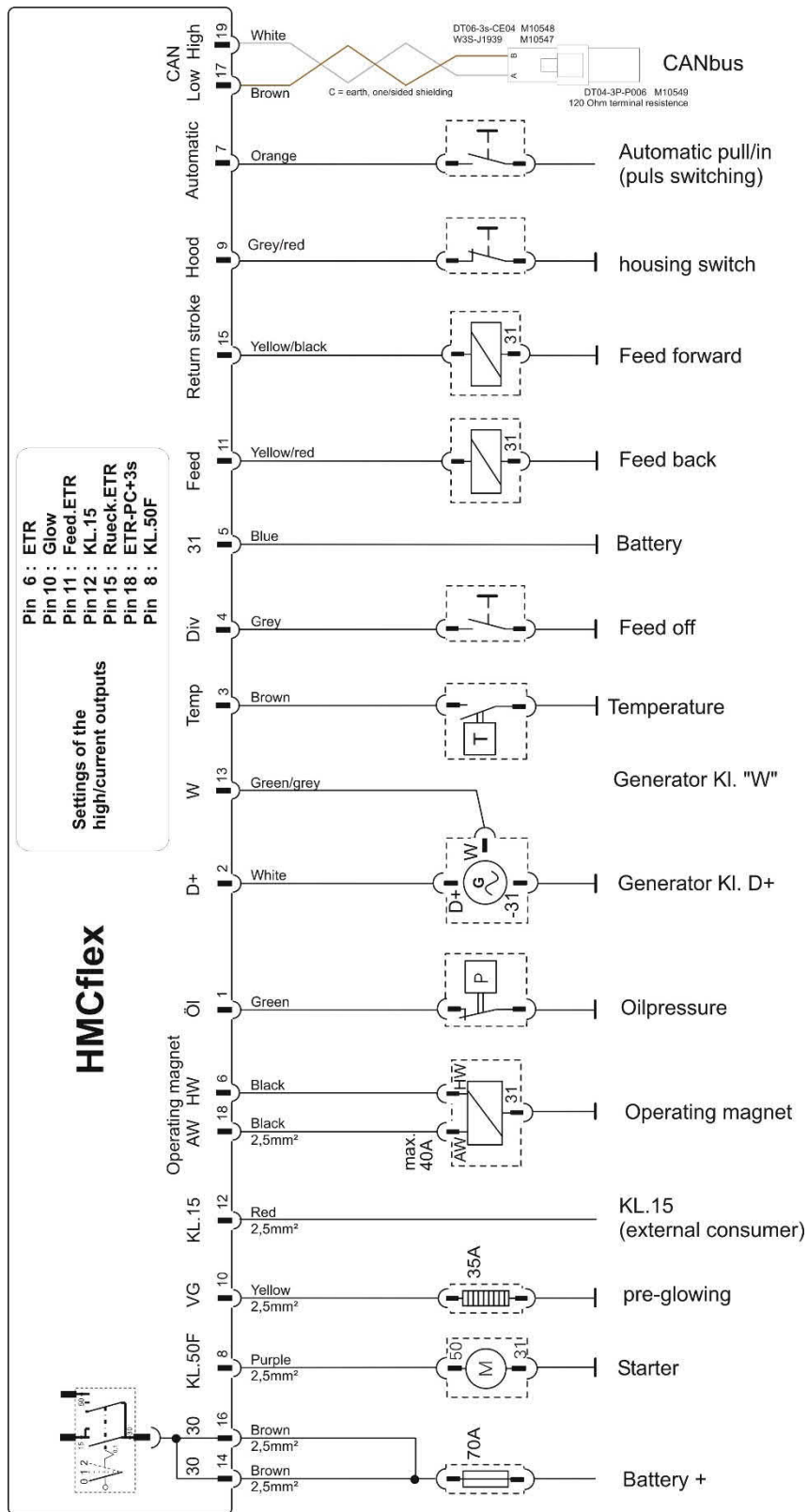
Robustness against quick transient disturbance (burst) according to DIN EN 61000-4-4

Robustness against peak current (surge) according to DIN EN 61000-4-5

Robustness against wire transmitted disturbance induced by high frequency fields according
to DIN EN 61000-4-6

Vibration according to DIN EN 60068-2-6

Wiring diagram example, HMCflex



11. IP degree of protection, test certificate

HMCflex housing identical design to MCflex

 SLG Prüf- und Zertifizierungs GmbH Prüfzeugnis / Test Certificate IP63 / IP67 Geprüfte IP-Schutzart / Tested IP-Classification	
Nr. / No.: 107167A	Datum / Date: 29.05.2012
Die Gehäusekonstruktion des unten genannten Erzeugnisses entspricht der auf diesem Prüfzeugnis angegebenen Schutzart, welche nach der unten aufgeführten Prüfgrundlage ermittelt wurde.	The casing design of the equipment specified below complies with the IP-Classification stated on this test certificate which was determined according to the basis for testing given below.
Das Prüfzeugnis basiert auf dem Ergebnis der Prüfung an einem Muster und stellt keine Bewertung der Serienproduktion dieses Erzeugnisses dar.	This test certificate is the result of tests carried out on one sample and does not represent the serial production of this equipment.
Prüfzeugnisinhaber / Test certificate holder:	ehb electronics gmbh Hans-Böckler-Str. 20 30851 Langenhagen, Deutschland / Germany
Hersteller / Manufacturer:	ehb electronics gmbh Hans-Böckler-Str. 20 30851 Langenhagen, Deutschland / Germany
Fertigungsstätte / Production facility:	ehb electronics gmbh Hans-Böckler-Str. 20 30851 Langenhagen, Deutschland / Germany
Erzeugnisbezeichnung / Equipment designation:	MCflex Motorüberwachung (mit Silikondichtung) Ident-Nr. 227421 / 227420 / 227498 / 228597 <small>Warenzeichen / Trademark: ehb electronics</small>
Prüfungsgrundlage / Basis for testing:	DIN EN 60529:2000-09 (EN 60529:1991 + A1:2000)
Prüfbericht(e) / Test report(s):	6025-12-GG-12-PB001
	
 U. Schult Zertifizierungsstelle / Certification Body	
<small>Dem Zertifikat liegt die Prüf- und Zertifizierungsordnung der SLG zugrunde. This certificate is based on the SLG Regulations for Testing and Certification.</small>	
<small>SLG Prüf- und Zertifizierungs GmbH Burgstädter Straße 20 09232 Hartmannsdorf Deutschland / Germany</small>	<small>FILE-NO.: 6025-12-GG</small>
	<small>Tel.: +49 3722 7323-0 Fax: +49 3722 7323-898 E-Mail: service@slg.de.com http://www.slg.de.com</small>

12. Document information, history

Project:	HMCflex
Type of document:	Technical documentation
Version:	2.0
Date of creation:	20/12/2011
Author:	ehb electronics gmbh, Hanover

Revisions:

Version:	Revised	on:	by:
2.0	New version of the operating manual due to comprehensive changes and functional; expansions.	20/12/2011	Klettke
2.1	Various corrections	09/01/2012	Sch./ How.
2.2	Additional KL.15* function under 4.1.3	13/02/2012	Klettke
2.3	Formatting	15/02/2012	hag
2.4.	Various expansion	16/03/2012	Klettke/hag
2.5.	In S05200h software version, the additional Fuel Pump and KL.15Auto have been added to 4.1.3 and fuel fault can now be set in 4.1.7 Fault event.	23/04/2012	Klettke
2.6	Expansions from software version "I" under 7.4	21/11/2012	Klettke/hag
2.7	Test certificate for IP degree of protection	05/12/2012	v.A./hag
2.8	Expansion with fan and KL.50F* function	14/01/2013	Klettke
2.9	Separation of the operating instructions for HMC-/MCflex	06/02/2013	Klettke
2.9.1	Expansion to software S0522xk2	14/07/2015	Klettke
2.9.2	Addition Specifications	05/01/2016	Kle/hag
2.9.3	Addition Important notes about the use	18.04.2016	Kle/HvA/hag
2.9.4	Addition "Password" page 11 deleted	04.01.2017	Be/hag
2.9.4	Adaption Chapter 7	17.07.2017	Hk/hag
2.9.5	Adaption Information to use and Reverence to test standards	04.04.2018	Hk/hag

12.1 Legal note



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