

Operating Instructions

ehb SMARTdisplay 70

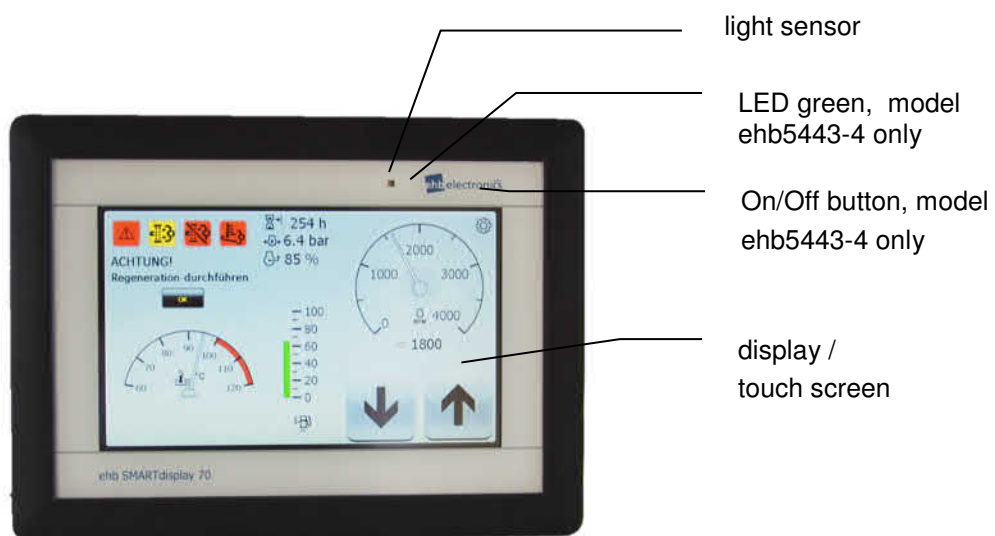


Service Personnel

Version 2.1

Quick Guide

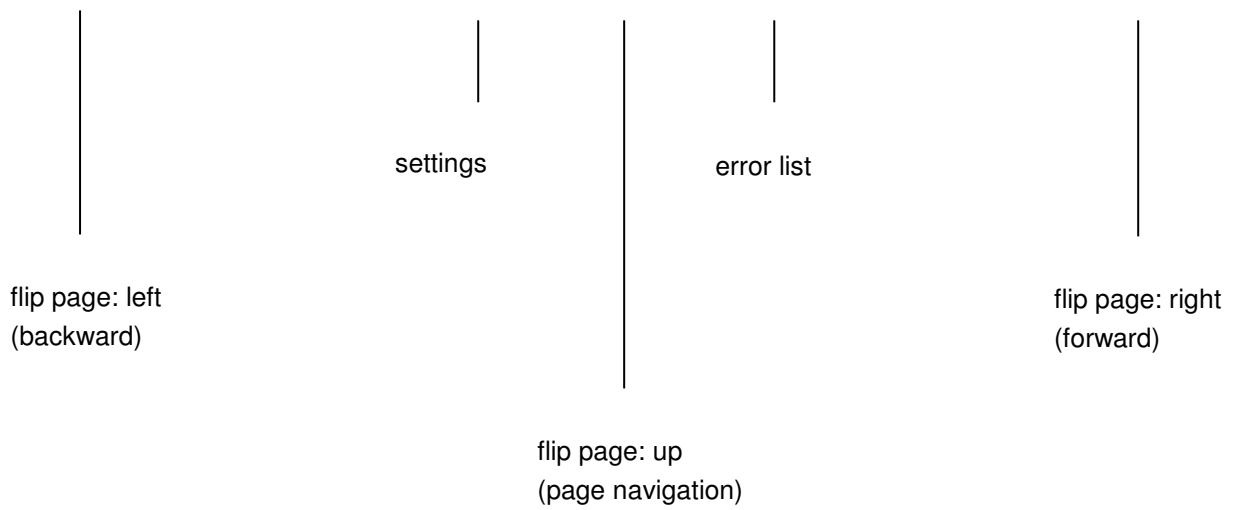
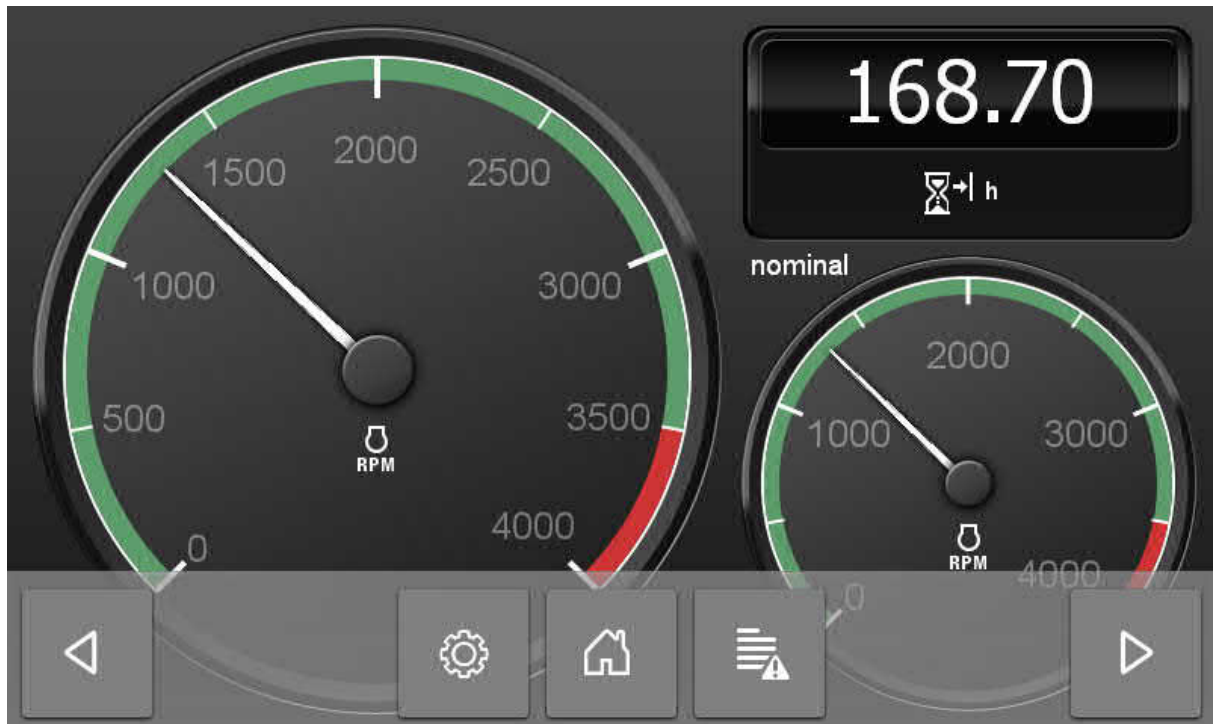
View



Show the Navigation Bar

In order to show the navigation bar (touch button menu) double tap the same position on the screen. Tap an empty position on the screen to make sure that no other function is activated. The double tap is deactivated in the bottom area (the area used by the navigation bar when shown) of the screen!

Functionality of the Navigation Bar



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1. General

1.1 Introduction

The **ehb SMARTdisplay 70** offers a variety of functions for monitoring and control for all engines and special machines equipped with CAN bus (SAE J1939). The display can be customized application specific using a configuration tool for PC (Windows XP or Windows 7) provided by ehb-electronics gmbh.

Upon detection of errors that are sent from other devices, the user is informed about the existence on the screen and can retrieve the error list. The received errors are logged with date and time stamp and are retained even after a restart of the device. More complex operations on values, logging of data, as well as execution of control tasks are possible with additional customer specific programs („Plug-ins“) that may be added to the standard software. This enables you to communicate with other components (e.g. **ehb SMARTmodule 04**) over the CAN bus, to evaluate the received data, and for example to switch the outputs of the external component.

1.2 Target Group

This documentation is addressed to service personnel for a system with built-in **ehb SMARTdisplay 70**.

1.3 Important Notes for the Use

How to use	The device must only be operated with the supplies provided. Use a mild cleaning agent to clean the device. Do not insert any objects that are not designed for the specific purpose into the openings of the unit, as this may cause problems in the electrical components. When operating the device, always observe general accident prevention regulations.
Safety	Do not operate the device within range of strong electromagnetic fields. Observe the temperature specifications listed in Chapter 7.
Storage	Devices that are not being used must be stored as described in the operating specifications.
Installation	During the installation of the device follow the directions of the manufacturers of plugs and wire harnesses.
Shipping	When shipping, equipment must always be shipped in the original packaging or in correspondingly sturdy packaging. Use of unsuitable packaging constitutes negligence, hence rendering null and void any claim to repairs under warranty.
Maintenance	The device requires no maintenance throughout its entire service life and nor does it require special care.

Opening the SMARTdisplay 70



The device does not contain any parts that can be serviced, replaced or repaired by a customer or third-party maintenance personnel.

The device is sealed to protect against any unauthorized opening. Please note that unauthorized opening will destroy the device.

CAUTION!

Do not use high-pressure cleaners to clean the device.

Service personnel are to be fully instructed that high-pressure cleaners will damage the device and void the warranty.

Display and Touch Screen



The touch screen may only be operated using fingers or special stylus with tip width of at least 2mm (e.g. stylus for PDA). **There is no warranty in case of improper operation (e.g. use of knife or screw driver on touch screen).**

A broken display is under no circumstances covered by warranty.



The small hole on the back of the housing below the connector cover is **not** used for a hardware reset!

Please **do not** insert any object into this hole! Otherwise an important membrane could be destroyed and water might soak into the housing of the device!

Damages of the device due to a broken membrane are not covered by warranty.

1.4 Repair of Devices

If a repair does become necessary, please ship the device to:

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

Please always be sure to include a written description of the problem. This will considerably simplify troubleshooting for ehb electronics gmbh service department and allow the device to be returned more quickly.

Or use our online service for returning the unit: www.ehbservice.de

NOTE!



ehb electronics gmbh is only liable for proper performance of tasks as well as for the suitable condition of the materials used. Further claims such as compensation for lost profits or compensation for direct or indirect consequential damages such as loss of data are excluded.



CAUTION!

Damage caused by unsuitable packaging of the device for shipping and/or unauthorized intervention will void the warranty.

1.5 Disposal of Devices

Product



At the end of its service life, dispose of the product in accordance with legal requirements.

Batteries



As a consumer, you are legally required (German Battery Ordinance – *Batterieverordnung*) to return all used batteries. Disposal in household waste is not permitted!

Batteries/accumulators containing hazardous substances are labelled with the symbol shown to the left, which indicates that disposal with household waste is prohibited. The markings for the respective heavy metals are:

Cd = Cadmium
Hg = Mercury
Pb = Lead

The respective marking is found on the battery/accumulator, e.g. under the rubbish bin icon shown above. Used batteries/accumulators can be returned free of charge to a collection point in your community or wherever batteries/accumulators are sold.

You will therefore be meeting your legal obligations and helping to protect the environment. Thank you for your consideration.

2. Operation

2.1 Connection

The device is affixed with four M4 screws using the included high-grade steel bracket. The electrical connection of the device is made via an M-23 plug

Pin/Contacts	
1	GND
2	AuxIN2
3	AuxIN1
4	Terminal 15
5	CAN2_L (Bus 0 in application)
6	CAN2_H
7	CAN1_L (Bus 1 in application)
8	CAN1_H
9	Terminal 30
10	GND
11	Reserve Output
12	Terminal 30

Pin configuration on device

The pin configuration of the plug on the device, and on its mating unit, is engraved on it.

For setting up and for software updates, etc., a standard USB cable can be attached to the USB port and a standard CAT.5 patch cable connected to an Ethernet socket. For operation of the unit, cables with the appropriate LTW connectors must be used. If you are not intending to use these interfaces, the cap supplied should be fitted.

2.2 Switch On/Off

The device is switched on via terminal Kl. 15 input pin (e.g. using an external ignition key switch) while terminal Kl. 30 is powered. The first boot up procedure is about 15 seconds until the Windows Embedded Compact 7 operating system is loaded. After that, the application will start automatically and the start page as set using the configuration software will be displayed.

Switching off is done by deactivating of Kl. 15. This will bring the system into a power saving standby state. When switching on again (Kl. 15 activated again), the application is resumed. In this case, there is only a minimal delay until the image appears on the display and you do not need to wait for the longer boot.

The device must be connected to a non-switched always available power source (Kl. 30) in case data needs to be saved when the device is switched off. In other words, the device is not only used for visualization purposes. In order to ensure that the device does not draw current for standby mode, it is possible to connect the input pins Kl.15 and Kl.30 of the device to terminal Kl.15 of the machine.



Important note: If the application requires the internal operating hours counter (OHC), it is possible that time may be lost in this OHC as it is only updated every 12 minutes or so in the flash memory.

2.3 Capacitive on/off button ehb SMARTdisplay 70 (Art.-No. ehb5443-4 only)



On-button ehb SMARTdisplay 70 (Model ehb5443-4 only)

Start: Touch the ehb logo on the front of the device until the green LED to the left of the ehb logo lights up.

Terminal 15 is not required.

Reset (restart): The green LED next to the ehb logo lights up. Touch the ehb logo on the front of the device until the ehb SMARTdisplay 70 restarts.

Turn it off: Via customer-specific plug-in

2.4 Calibration of the Touch Screen

Upon delivery of the device the touch screen is already calibrated correctly. It is possible to recalibrate by the user if the original calibration is not suitable any longer, e.g. due to environmental conditions. The calibration should be performed when touching of an element on the screen apparently selects another one.

In order to start calibration, please press the button quickly four times in a row. On purpose this is not easy to achieve so that the calibration screen does not disrupt the normal operation. It might be necessary to practice the sequence a couple of times. It is important that the button is not pressed too short, otherwise it will not be recognized due to debouncing. It also must not be down for too long so all four pushes fit into the time limit.

The calibration may be started on a device that has the standard application installed (delivery state). Connect a USB keyboard, then quickly press the ESC button for 4 times. This function may not be available on devices that have installed custom code.

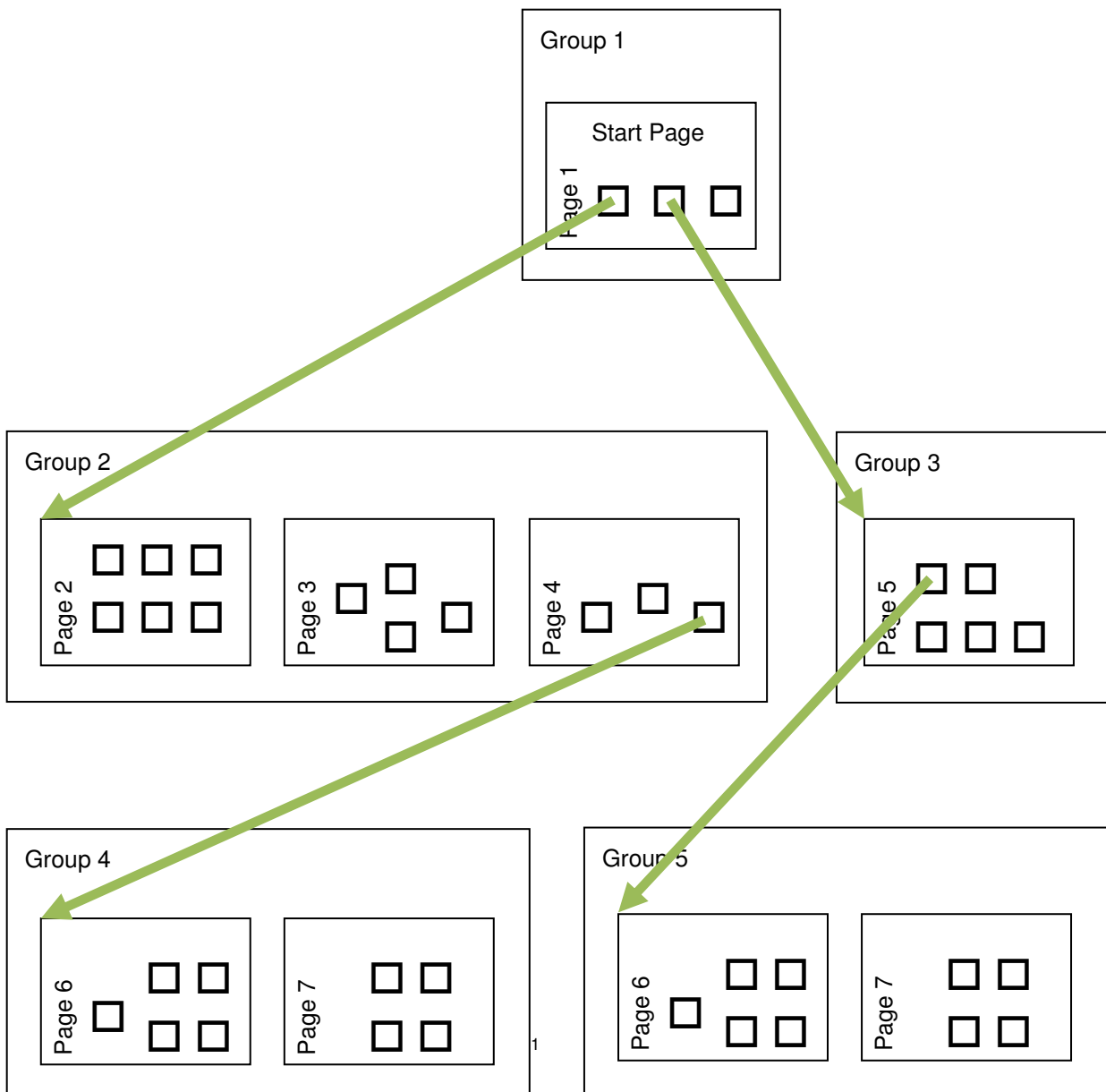
After the calibration screen is displayed, follow the instructions on the screen: Touch the center of the displayed crosses one after the other. Finally, you need to accept the new setting by touching one more time any location on the screen. A calibration may be aborted by pressing the button one more time.

2.5 Navigation of Pages


With aid of the configuration software a hierarchical structure of groups can be created on a PC. Each group consists of one or more pages. A page group always consists of at least one page - in the simplest case there is just one page in a page group. Each page group may contain several pages. The pages contain the elements to display on the screen (e.g. instruments, images, texts). Each element may be configured to trigger a change to another group if this element is touched.


An example for the structure of a project with pages and page groups is show in the figure below. The elements of a page are depicted with small squares (□). The linking from elements to page groups is shown with green arrows (→). Touching an element originating an arrow will cause display to show the first page of the group the arrow is pointing to.


Note that a page group has only one entry point. However, it is possible to have the same pages in different groups. In the example, this is the case for groups 4 and 5.



The left/right soft keys of the navigation bar are used to flip pages within a group.

Use  (forward) to change to next page in group. In Group 2 for example, you will reach Page 3 from Page 2, Page 4 from Page 3, and Page 2 from Page 4.



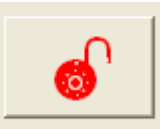



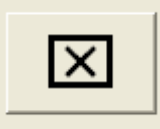
Use  (backward) to change to previous page in group. This will flip pages in reverse sequence, so Page 2 is reached from Page 3, and so on.

Use  to go up one level. Touching this button repeatedly will eventually bring you back to the start page. For example you will reach Page 5 from Group 5, Page 4 from Group 4, and from Group 2 and 3 you will reach again Page 1 which is the start page in the structure above.

3. Change of Settings

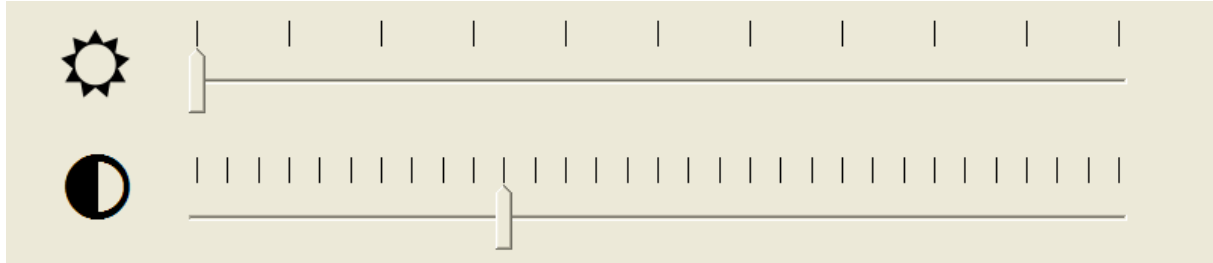
Some settings may be changed directly at the device by touching buttons on the touch screen. An overview is given in the table below.

Menu Structure of the Setup Menu

Display Information		Displayed are among others date and time, available system memory, current IP address(es), software version of modules
General Settings		Setting of brightness and contrast
Password-protected Area		More settings may be configured after entering a password. These settings should not be modified by any operator of the machine. The password should only be disclosed to authorized persons! Standard password: 915066
Date/Time Settings		Set date and time. Verify (and if necessary correct) the date first, then set the time!
Network Settings		Here you may choose if IP address should be obtained from a DHCP server, otherwise you may assign a static IP manually.
Diagnostic Tool „LiveView“		Tool to display received data to help during initial setup or trouble shooting
Close		Return to instruments view


3.1 Set Brightness and Contrast

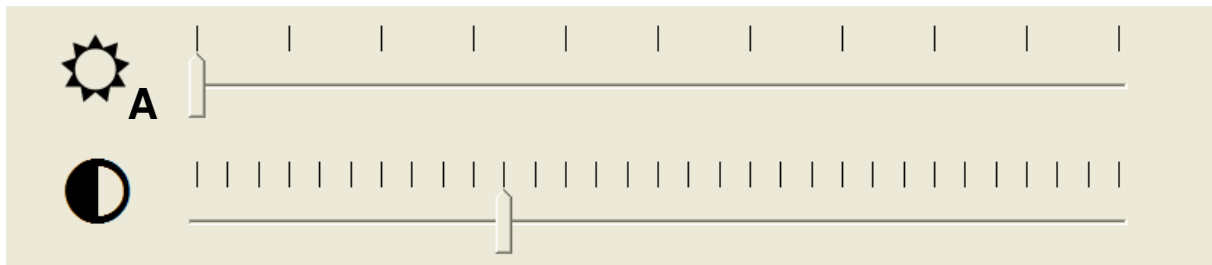
Touch the  button on setup screen.



Then you will be able to set the brightness of the screen and adjust the color using the sliders.



Note: If grayscale colors appear to be wrong (e.g. with greenish touch or with rough transitions) this is most likely due to unfavorably set display parameters rather than due to a defective display. In case of doubt, move the second slider further to the left!

Tap  to activate automatic brightness control! This is indicated by „A“. Tap again to deactivate automatic control.

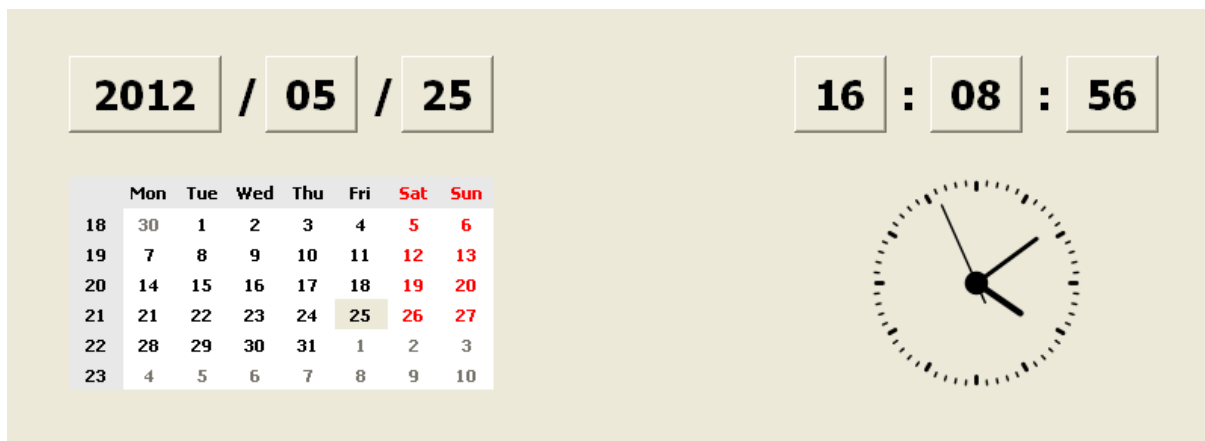



3.2 Set Date/Time

This setting is only accessible through the password protected area. The device is equipped with a real-time clock and internal backup battery. The clock will continue to operate even if the device is not connected to terminal KI.30 (Battery +). Normally, there should be no need for adjusting the date and time. Changing the internal battery requires service.

To set the clock, open setup menu by touching the  button on the navigation bar. After that, touch the  button and enter password 915066. Then buttons of the protected setup areas will appear.



Touch  button. The date/time page will be displayed:




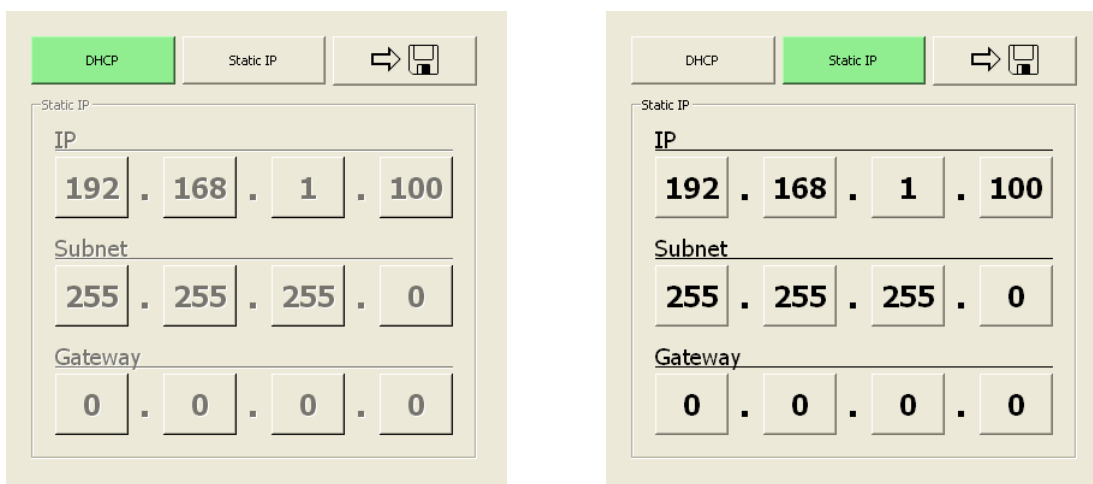
Set from left to right the year, month, day, hour, minute, and seconds! Touching one of the buttons will open a numeric input dialog. Enter the desired number and accept the input with Enter button. A valid input will then be effective immediately. You may also abort without changes using the  button if the input line is empty. Are there already digits entered, the button at top right position in dialog will change to a delete button. Touching this will then remove the last digit in the input line.

In case the date 1.1.2006, time 12:00 is displayed after booting of the device, it is possible that there is a problem with the real-time clock, or that the internal backup battery is empty. Set date and time correctly and turn off the device. Then disconnect all cables at the back of the device! Re-connect the device after 20 minutes again and check the date. Should it be in 2006 again, you will need to send the device for service.



3.3 Network (LAN) Configuration


The network configuration is only accessible through the password protected area. Open setup menu by touching the  button on the navigation bar. After that, touch the  button and enter password 915066. Then buttons of the protected setup areas will appear.

Touch the  button and you will get configuration options as shown in the screen shot below.



Use the „DHCP“ and „Static IP“ buttons to select if the IP address should be obtained from a DHCP server, or if the manually entered address should be used. It is recommended to use the setting „DHCP“, if there is a DHCP server present in your network so that address conflicts within the network may not occur. Use the static IP option if the device and the PC are directly connected with a LAN cable and no other stations are on the network. In this case also set a static IP for the PC!




The settings are activated when you touch the  button and will remain active (also after restart) until you change and save with  the next time.



Change to information page using the  button to verify if a valid IP address is set. „0.0.0.0“ is not valid and will be shown when there is no network connection. In this case, verify that the cable is plugged in firmly into the LAN ports on both sides.

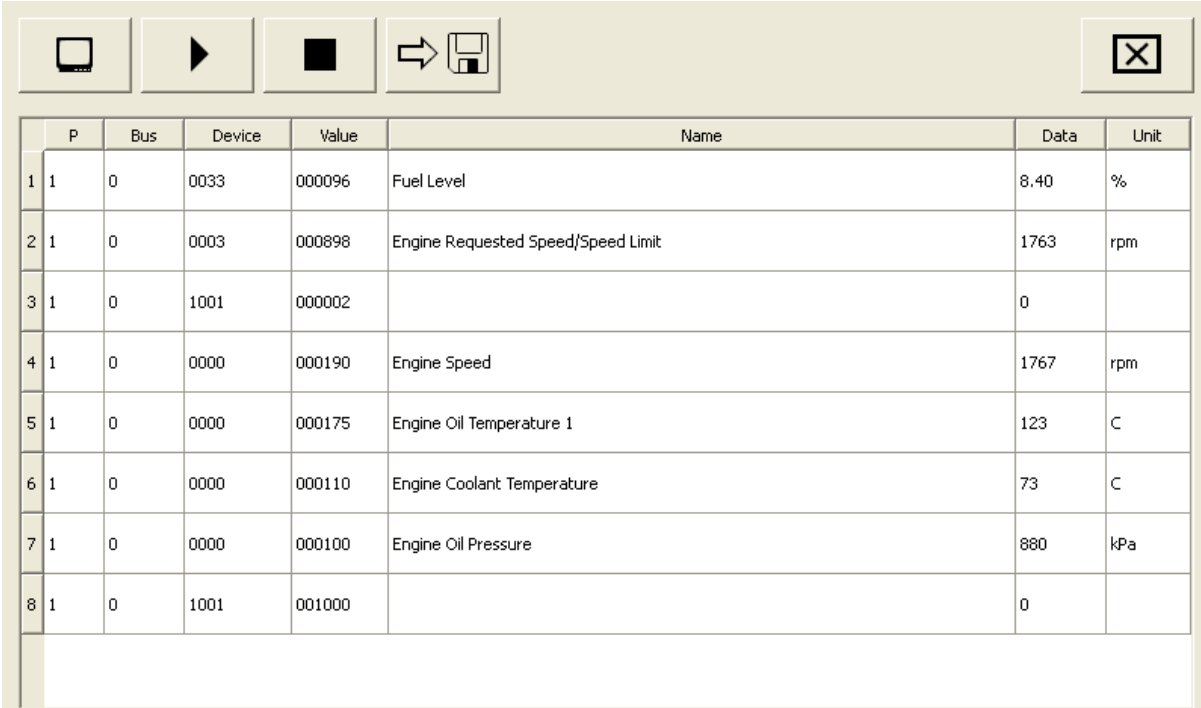
4. LiveView – Diagnostic Tool

The application has a built-in diagnostic function to display changes of values received on CAN bus as well as internally generated values of analog inputs, operating hours, etc. Values generated by customer specific additions will also be displayed.

The display is not updated in real-time, in order to minimize processor load and to ensure the proper execution of the application. A value in the list is updated, if after a period of about 3 seconds after the last change of the value, this value changes again. This tool is provided solely for the purpose of diagnosing if data is at all received, which data is available (for SAE J1939 standardized messages, the name of the objects will also be displayed). Its use to determine the current value is limited and the displayed value might not match the current value or last value that has been communicated!

The LiveView tool is only accessible through the password protected area. Open setup menu by touching the  button on the navigation bar. After that, touch the  button and enter password 915066. Then buttons of the protected setup areas will appear. Use the  button to open the LiveView window. At first, an empty table will appear and other menu buttons are shown.





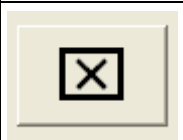
The  button will start reception and display of values. The  button stops the reception. Saving the list and opening on a PC using spread sheet software (e.g. Excel) is possible. The first four columns contain the information that is entered in the PC configuration software to visualize the data in an instrument.



	P	Bus	Device	Value	Name	Data	Unit
1	1	0	0033	000096	Fuel Level	8.40	%
2	1	0	0003	000898	Engine Requested Speed/Speed Limit	1763	rpm
3	1	0	1001	000002		0	
4	1	0	0000	000190	Engine Speed	1767	rpm
5	1	0	0000	000175	Engine Oil Temperature 1	123	C
6	1	0	0000	000110	Engine Coolant Temperature	73	C
7	1	0	0000	000100	Engine Oil Pressure	880	kPa
8	1	0	1001	001000		0	


View of LiveView Window








Menu Structure of LiveView

Clear Display		Clears all displayed data.
Start Data Reception		Starts the reception and display of data.
Stop		Stops reception of data. The data will remain in the list until cleared or the window is closed.
Save		Saves a .csv file to the USB flash drive. Connect USB flash drive first and wait a couple of seconds. Also wait a couple of seconds after filename is shown, before you remove the USB flash drive.
Close		Return to settings menu

5. Error List

The error list saves errors transmitted, die from ECUs over the CAN bus and may be read without entering a password.



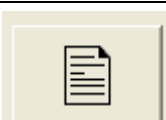


The list is opened by touching the  button in navigation bar.

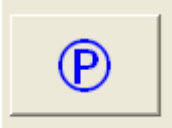
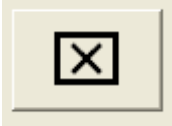
									
Date, Time	Bus	Device	Value	Failure	Source	State	Hours	Description	
1	2012/05/29, 19:04:28	0	0	110	0	Coolant	inactive	168.75	Data Valid But Above Normal Operational Range
2	2012/05/29, 19:04:22	0	0	110	0	Coolant	active->inactive	168.75	Data Valid But Above Normal Operational Range
3	2012/05/29, 19:03:52	0	0	100	18	Oil pressure	inactive	168.75	Data Valid But Below Normal Operating Range - Moderately Severe Level
4	2012/05/29, 19:03:44	0	0	100	18	Oil pressure	active->inactive	168.75	Data Valid But Below Normal Operating Range - Moderately Severe Level

The touch button menu contains in addition to clearing and detailed view four buttons to select a filter: Possible selections are to view entire list, only active errors, errors that are no longer active, or passive errors read from an engine control unit. The button for current filter option is displayed with green background.

The headings of the table, as well as error texts are configurable from the configuration tool and stored in configuration files within a project.

Menu Structure of Error List

Clear Display		Clears all displayed data.
Detailed View		The magnifying glass may be used to show data for an error entry in a separate page. This view may especially simplify reading of long error texts.
No Filter		All filters are deactivated. All entries are visible in the table.
Filter „active errors“		Only errors that are active at the present time are shown in the list.
Filter „no longer active errors“		Only errors that are not active at the present time are shown in the list.

Filter „passive errors“		Only passive errors will be displayed.
Close		Return to settings menu

At each boot of the device a new file for the error list is created. This reduces the risk of data loss, in case a file could not be closed properly and the data of the file was lost. Also, the most recent entries of the last file will be copied into the new file. So the list still holds the most recent error information after each boot. The number of error list files in memory of the device is limited and can be configured in project settings (default setting: 50 files).

6. Communication with the PC

The configuration software **ehb Workbench** (PC software) enables you to communicate with the device in order to transfer the display contents / project configuration. Application software update is possible by using FileZilla. The communication is via LAN (Ethernet).



ATTENTION!

PC and SMARTdisplay must have an IP address within the same subnet to be able to communicate with each other via Ethernet. If unsure, ask your system administrator!

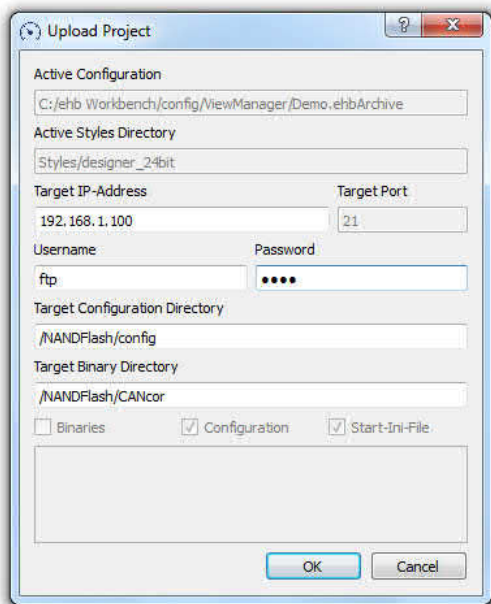
Below it is assumed that the device and PC are directly connected with an Ethernet cable. The device is configured with static IP address 192.168.1.100 and subnet mask 255.255.255.0. The PC is configured with static IP address 192.168.1.8 and the same subnet mask.



ATTENTION!

Ensure that there is sufficient and uninterrupted power supply for the duration of the update and restart afterwards.

6.1 Upload of a Project / Configuration



- Start the **ehb Workbench**
- Open a project
- Choose „Upload project data...“ in menu „Extras“
- Fill dialog fields as shown:
- Target IP-Address **192.168.1.100**
- Username **ftp**
- Password **2070**
- Target Config. Directory/**NANDFlash/config**
- Target Binary Directory/**NANDFlash/CANcor**
- Click OK
- **Restart device**





ATTENTION!

The device must be restarted after every single upload!

Note: Using this method enables you to load any project into the device. For example the demo project **Demo+Video+File_24Mhz_LS_Pin154.ehbArchive** included with the configuration software **ehb Workbench**. Therefore we recommend this method to initially upload a project into the device. In the field the device then may be updated via USB (which requires that the project name remains the same).

6.2 Update of a Project via USB

Updating a project on site at the machine requires no LAN network or PC. Just copy the updated project file (*.ehbArchive) to a USB flash disk into folder „U:\update“. Replace „U “ with the drive letter of the USB flash disk!

- Attach USB flash disk to the device
- If USB flash disk has LED: Wait until blinking stops, otherwise: wait a couple of seconds
- Go to the setup screen
- Enter the setup password (915066 after touching )
- Change setup page using 
- Touch the "Update Config" button
 - Button color changes to GREEN: everything is OK => restart device
 - Button color changes to RED: archive file was not found or is corrupt

**ATTENTION!**

A corrupt archive file will be automatically deleted from the USB flash disk (if possible) for safety reasons!

6.3 Software Update

Updating the application software is only possible while application is not running. The device is designed so that stopping/terminating of the application is impossible during normal operation. Furthermore, monitoring is activated, so that the device resets itself and restarts the application if the software crashes or the application is stopped.

To be able to install an update, you need to suppress the automatic start of the application. Connect to the FTP-server in the device by using FileZilla. Create a new server 192.168.1.100 in the server manager with user name ftp and password 2070 and establish connection.

Rename the file „CANcorApp.exe“ in folder /NANDFlash/CANcor, e.g. to „CANcorApp_backup.exe“. Then restart the device! After about 15 seconds the Windows® Embedded Compact 7 is booted up. You are then on operating system level and you are able to change application and configuration.

**ATTENTION!**

Always create a backup of the installed application first, so that you will be able to restore the current state!

It is advisable to first back up the files that are to be replaced.

Connect from PC with FileZilla and copy all folders in /NANDFlash including all sub-folders and all the contained files to the PC excluding the folder /NANDFlash/Windows.

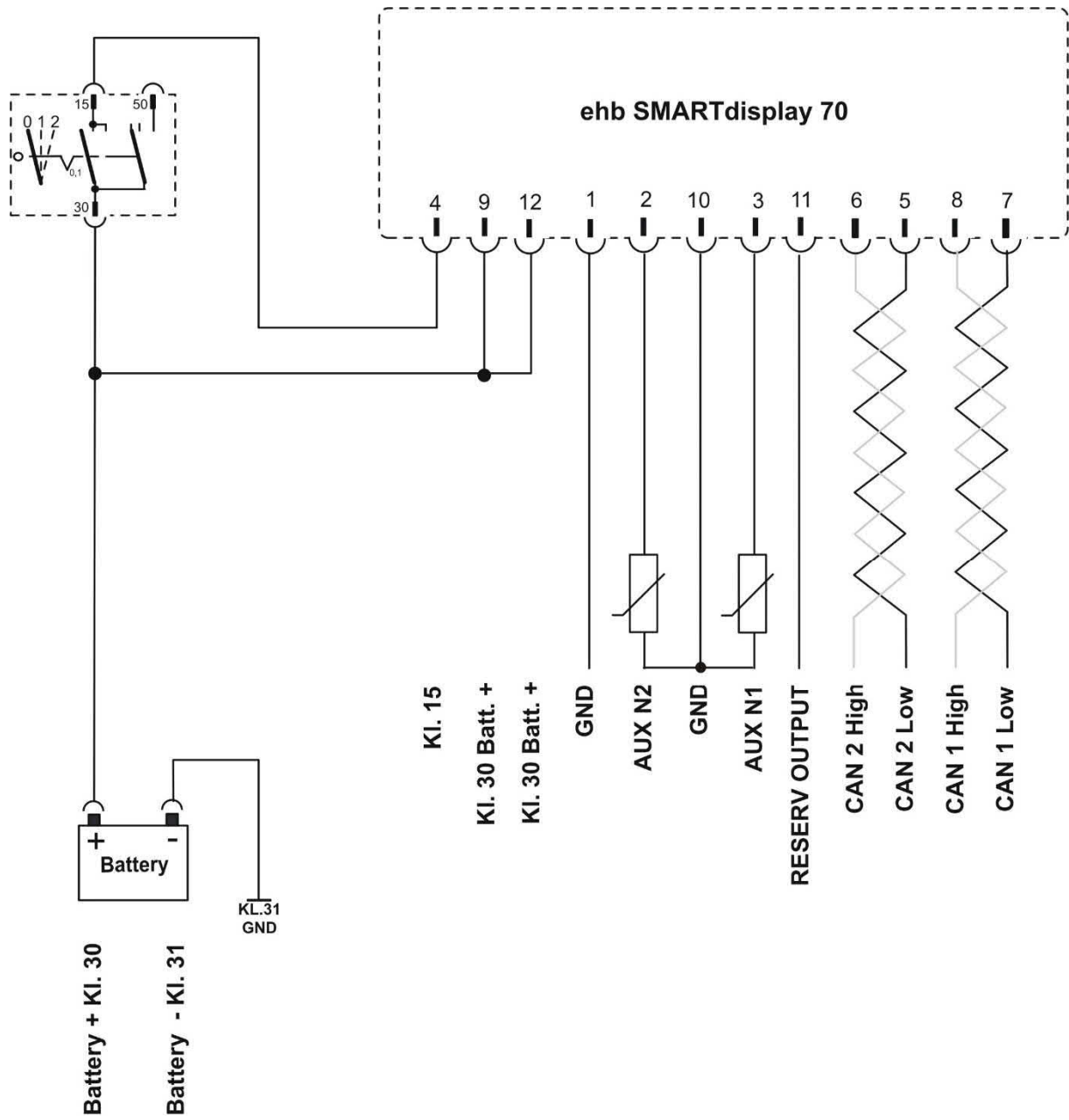
Now delete everything from „NANDFlash“ folder excluding the folder /NANDFlash/Windows!

The update (all files that go into „NANDFlash“ folder) you may copy from another directory of the PC in the same way as creating the backup. E.g. drag the new files from a Windows Explorer window into the FileZilla window.

After completion of the copy process wait at least 10 seconds, then re-start the device! It is possible that the first boot up sequence after the update needs more time than usual, since still some files might need to be extracted.

The update of the Windows® Embedded Compact 7 operating systems is only possible at **ehb-electronics gmbh**. However, since the system is running very reliably and there are no known problems, it is highly unlikely that shipped devices do need an operating system update.

7. Wiring Diagram



8. Technical Specification

Parameter	Condition	Limits			Comment
		Min.	Typ	Max.	
Supply Voltage UB		6V	12...24V	32V	
Noise Voltage at UB	6Vss, 50Hz	14V		28V	
Voltage peaks at UB	2ms		200V		
Current consumption at UB 8-24V Kl. 30 (Battery +)	ignition off/on	< 5mA (off) <50mA (standby)	350 mA		The current consumption in operation depends on wiring and display brightness
Analog Inputs AuxIn1 AuxIn2	TA 25°C				Measurement of resistance to Ground, 470R fixed pull-up resistor to 3.3V constant voltage. suitable e.g. for CT1 VDO sensor
CAN-Bus Interface			250kBit/s		CAN 2.0B, SAE J1939
Operating Temperature Storage Temperature		-20°C ¹⁾ -30°C		+70°C +80°C	
Humidity (non-condensing)	48h		95%		According SAE J1378
Vibration	6h, 10-80Hz		4g		According SAE J1378
Shock	72x, 9-13ms	44g		55g	According SAE J1378
LCD Display		800x480 Pixel, Color			
Size		Housing dimensions: (LxW) 220x162 mm Installation dimensions: (LxWxH) 205x148x40,4 mm Installation cut-out: (LxW) 205x148 mm			
Protection		IP67			
¹⁾ with additional measures: -40°C					

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

9. Document Information, History

Project:	ehb SMARTdisplay 70
Type of Document:	Technical Documentation
Version:	1.8
Created on:	03.12.2016
Author:	ehb electronics gmbh, Langenhagen

Changes:

Version:	Revising:	date:	by:
1.0	first version of instruction manual	25.05.2012	Marx
1.1	Extension	30.05.2012	Marx
1.1	Layout	07.08.2012	hag
1.2	adaption „ehb Workbench“	22.08.2012	Marx
1.3	Layout	28.08.2012	hag
1.4	Adaption	15.10.2012	hag
1.5	Layout	08.09.2014	hag
1.6	Adaption Pkt. 2.1, Pkt. 7.	03.02.2015	hag, Kle
1.7	Adaption Pkt. 2.1.	15.04.2015	Mx, hag
1.8	Adaption to ehb SMARTdisplay 70 Layout	03.12.2016 07.12.2016	Mx hag
1.8	Adaption product photo	26.06.2017	hag
1.9	Adaption Information to use and Reverence to test standards Adaption Wiring Diagram	24.01.2018	Hk/hag
2.0	Adaption Wiring Diagram, Adaption reserve out put Edited	23.10.2018 24.10.2018	Mö Hag
2.1	Extension on/off button only model ehb543-4	25.03.2019	Hk/Mö/Hag

9.1 Imprint



Customer Service:

Tel. +49-511-123207- 0
 Fax +49-511-123207-77
 Email info@ehb-electronics.de

Hans-Böckler-Str. 20
 30851 Langenhagen
 Germany
www.ehb-electronics.de
www.ehbshop.de
www.ehbservice.de