

KWG-3HMI



User Manual – English –

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Revision History

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Table 1 Revision History

Revision	Date	Description
1.0	11.12.2018	Applies HMI V2.6.0

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List of Abbreviations

DI	Digital Input
DO	Digital Output
EMC	Electromagnetic Compatibility
GEMA	Generator for Magnet plates
HMI	Human Machine Interface
NavButton	Navigation-Button
REL	Relay
RoHS	Restriction of Hazardous Substances
YB	YellowBox

1 General Information

1.1 Manufacturer address

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1.2 About this manual

This manual refers to the series KWG-3HMI.
The notes on safety and risks as well as the general data shall be applicable to all KWG-HMI modules and shall be complied with in any case for reasons of liability.
No part of this operating manual shall be copied, published or disclosed – irrespective of the type and means – unless the explicit consent of KW-Generator GmbH & Co. KG has been obtained. Modifications after printing have not been taken into account.
Right to technical modifications reserved. Status of manual: V1.0.

1.3 Standards and regulations

KWG-3HMI modules are in conformity with RoHS and EMC standards. For detailed information, see “Chapter 1.11 – Technical data and special features”.

1.4 Application and use of KWG-3HMI modules

KWG-3HMI modules are components of machines and systems intended for industrial and professional use and thus cannot be treated as retail goods.
The KWG-3HMI shall be used only according to the technical data of the nameplate and/or the data sheet or a specific release.
KWG-3HMI shall be operated only in water-protected areas. They shall not be operated in unprotected open-air areas, and must not be cleaned by means of high-pressure cleaners, wet brushes or wet tissues.
KWG-3HMI modules shall be used only for the applications specified here and only in compliance with this operating manual. Any other use is deemed misuse and thus not allowed. Improper or unauthorized use is not allowed. No liability will be accepted by KW-Generator GmbH und Co. KG in this case.

The KWG-3HMI shall be connected only with components of KWG systems like GEMA-systems and DVRs.

1.5 Warranty

Unless specific warranty regulations are defined in writing for type-related applications and customers, we will grant a warranty according to the general European regulations.

1.6 General Safety Instructions



DANGER



KWG-3HMI is applicable for machineries like electric machines including dangerous components which are either under voltage or rotating during operation. Except the switching relays, the KWG-3HMI is wear and maintenance-free. Repairs are only allowed by KWG.

Thus:

- Improper use,
- Demounting protective lining, disassembly and open the housing,
- heavy dirtiness,

may cause serious property damage and malfunction.

The safety officer shall convince himself and ensure that transport, installation, commissioning, operation, inspection, maintenance and repair of the machine are carried out by qualified personnel with the following qualifications:

- Specific technical qualification and experience.
- Knowledge of technical standards and applicable laws.
- Knowledge of the general national and local system-specific safety regulations.
- Ability to detect and avoid dangerous situations.

Work at electric machines shall not be carried out without the approval given by the safety officer; this is also applicable to idle machines where all poles are separated from the mains and the machine is secured against re-connection (including auxiliary circuits).

The KWG-3HMI shall not be operated in environments subject to explosion hazards. The relevant regulations shall be followed!



The KWG-3HMI is an electrical component. If the device is overheating, smoking, burning, smelling burned, making undefined noises or seeming like any hazardous state, stop the machinery immediately. However before stopping the machinery, take into account the further danger possibilities (like damage to persons and objects) and perform the necessary steps to eliminate the danger situation.



On the backside of the HMI there are two strong magnets mounted. Protect your sensitive objects like credit cards or magnetically readable objects from these magnets. Risk of death can occur for persons with pacemakers.

To avoid crush injuries on hand and fingers, put the HMI with the strong magnets *carefully* on the mounting plate or metal plate. If necessary, take here for auxiliary tools in use.



The HMI must be mounted on a plane area with the magnets or the mounting bracket, so that a drop off due to vibrations or unintended shocks is prevented. This prevents damage to persons or objects.

1.7 General structure

The KWG-3HMI module is made of a shock-resistant housing. All components, which are necessary for the HMI functions, are located within the HMI itself. All electric connections are pluggable at the outer housing.

One plug contains the power supply and communication to the top-level KWG system. The other plugs are interfaces for the customer, like I/O ports and further interfaces.

At the backside of the HMI are two very strong magnets mounted. By means of these magnets, it is possible to mount the HMI either directly on a ferrous plane area, or on the KWG mounting bracket, see “Chapter 1.12 – Mounting Bracket”.

1.8 Description of function

The KWG-3HMI can be used for control, diagnosis and visualization of operational data. The control of the HMI is possible through the touch display of the HMI.

The systems’ operational states, warnings and errors are shown on the main page. Further data and settings are shown on subpages. More details follow within the software description of this document. The control of the KWG system is possible either through the touch display or the I/O-ports of the HMI. The HMI does not contain any batteries and does not need any additional power supply. The supply power is given by the KWG system or KWG cable harness. The communication between the HMI and the KWG top-level system occurs exclusively with CAN-bus. The interface to the customer application is usually a 4 or 8 pin M12 circular connector (see “Chapter 1.10 – Plug Assignment”). This interface can provide an external supply power, 2 potential-free relay contacts, 4 digital inputs, 1 analogue input, 4 solid state outputs, 1 additional galvanically separated CAN-bus and other communication protocols, like Profibus.

1.9 Commissioning

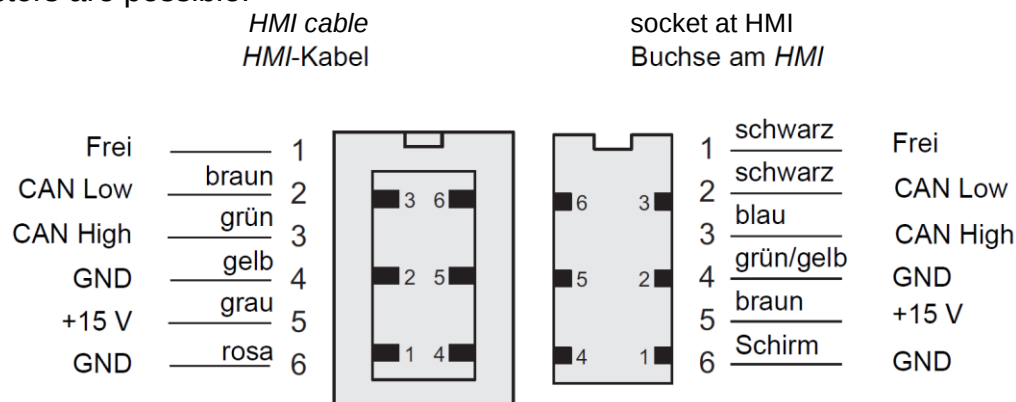
For the installation of the system, refer to “Operating manual KWG generators”, “Operating manual KWG GEMA” and “Operating manual KWG DVR”. After the installation, make sure that all cables and connectors are plugged properly into the HMI. **With the magnets the HMI must be mounted on a plane area or on the mounting bracket, so that a drop off due to vibrations or unintended shocks is prevented. This prevents damage to persons or objects. Make sure that the name plate of the HMI fits your specific application.**



1. The machinery can be started under the upper safety guidelines.
2. The Start-up page is shown for 10 seconds on the HMI.
3. After that the Main page is shown.
4. Make sure that all operational values are shown properly on the display.
5. Test the interface at the customer side, e.g. buttons, joysticks or further inputs for their functionality with consideration of the environment (e.g. position of the magnet plate, output voltage of the generator, ...).
6. If your commissioning routing differs from the upper specifications, please contact KWG.

1.10 Plug Assignment

The graphic below shows the plug assignment for the Harting plug, which is the standard connector version (at the lower side of the HMI). Customer specific connectors are possible.



Translation: HMI cable (left part of the upper graphic)

Table 2 HMI Harting Cable Assignment

Pin	Color	Assignment	Function
1	-	Not assigned	This pin is not assigned
2	Brown	CAN Low	CAN-Low signal of the CAN-Bus
3	Green	CAN High	CAN-High signal of the CAN-Bus
4	Yellow	GND	Power GND for the HMI
5	Grey	+15 V	Power +15 V for the HMI
6	Pink	GND	Shielding for the CAN-Bus

Translation: socket at HMI (right part of the upper graphic)

Table 3 HMI Harting Socket Assignment

Pin	Color	Assignment	Function
1	Black	Not assigned	This pin is not assigned
2	Black	CAN Low	CAN-Low signal of the CAN-Bus
3	Blue	CAN High	CAN-High signal of the CAN-Bus
4	Green / Yellow	GND	Power GND for the HMI
5	Brown	+15 V	Power +15 V for the HMI
6	Shield	GND	Shielding for the CAN-Bus

The plug for the customer interface (e.g. joystick) is located at left side at the HMI. Usually this plug is realized as a “**SACC-E-MS-4CON-M16/0,5 SCO**” (4 poles, 12mm plug diameter). However it is also possible to realize the connection as an 8-pin plug.

This example shows the assignment of the GEMA customer interface connection:

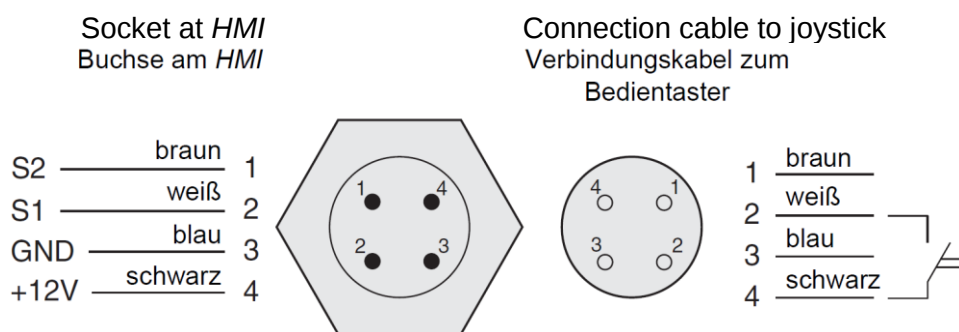


Figure 2 Customer Plug Assignment

Table 4 HMI Cable Assignment Example

Pin	Color	Assignment	Function
1	Brown	Input S2	Extended input for special functions. Not used
2	White	Input S1	Input for button „Magnet On/Off” at the joystick
3	Blue	GND	GND for external voltage supply
4	Black	+ 12 V	+ 12 V to the joystick or to external voltage supply

1.11 Technical data and special features

Table 5 Technical Data & special Features

constructive data	
housing dimensions (l x w x h):	144 mm x 112 mm x 43 mm
weight:	Approx. 530 g
mounting:	magnet / mounting bracket
electric data supply circuit	
nominal voltage supply (range):	12 – 24 V (9 – 36 V) DC
mains frequency:	DC
power consumption:	max. 2,5W
current consumption @12V:	0,18 A
CAN interface to the KWG system (see KWG CAN description)	
standard:	no galvanic separation
transmission rate:	CAN J1939 (Peer-to-Peer and Broadcast) 250kB/s
Electric data output	
relay:	
Max. switching voltage:	24 V
Max. contact load:	2,5 A
transistor:	
Max. switching voltage:	24 V
Max. switching current per channel:	2 A
Max. current of all channels:	2 A
Electric data input	
inputs 0 - 4: nominal voltage (range):	24 V (12-24 V)
input resistance:	4 kOhm
input current @ 12V:	3 mA
digital input 0 – 3: high level:	>2,3V
analogue input 4: measuring range:	0 – 10V DC
Safety function	
supply power– and CAN–Interruption:	no malfunction due to interruption no malfunction due to reconnecting automatic restart of HMI
Display	
resolution:	272 x 480
size:	4,3 “
touch:	resistive
Permissible climatic conditions	
temperature during operation:	-20°C to +60°C
temperature during storage and transport:	-30°C to +85°C
air humidity:	10% to 90%
regulations	
electromagnetic interference:	EN 61000-6-3:2007 + A1:2011 / AC:2012 class: B
electromagnetic immunity:	EN 61000-6-2:2005 + AC:2005-09 grade: industrial
Restriction of Hazardous Substances:	Guideline 2011/65/EU (RoHS 2)

1.12 Mounting Bracket

The function of the Mounting Bracket is to provide a ferrous surface to mount the HMI by means of the magnets on the HMI's backside. This is necessary if the HMI shall be mounted on a non-ferrous surface (e.g. plastic). Hereby the Mounting Bracket is bolted to the non-ferrous surface by the 4 screw holes with 5 mm diameter screws and afterwards the HMI is attached to the Mounting Bracket.

Caution, the magnets are strong!

Notice that there are 4 recesses (holes) on the backside of the HMI, in which the screw heads fit perfectly after attaching the HMI to the Mounting Bracket. This design prevents the HMI from twisting or shifting due to vibrations during operation.

The Mounting Bracket consists of ST37 (steel) with a material thickness of 2 mm. The surface is galvanically zinc-plated. The dimensions of the Mounting Bracket are shown in the graphic below:

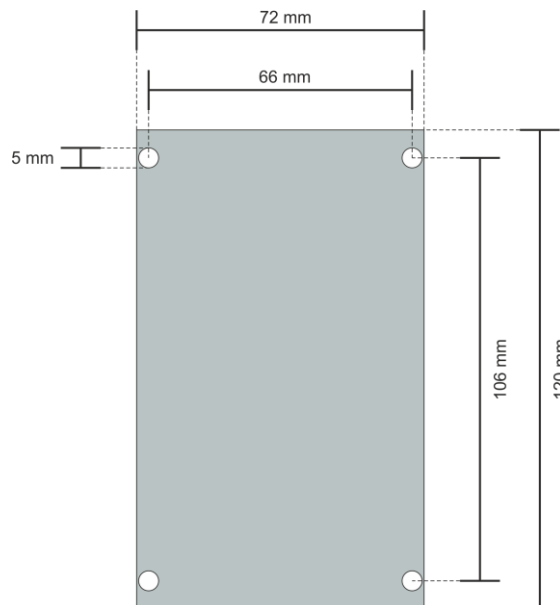


Figure 3 Mounting Bracket

1.13 Dimensions

The dimensions of the HMI are shown in the graphic below:



Figure 4 HMI Dimensions

1.14 Dismantling



To prevent malfunctions during dismantling due to unintentionally pressing of the touch screen, shut down the machinery or KWG system. Unplug all electric plugs. Carefully remove the HMI from the mounting plate / metallic surface. If necessary, use auxiliary tools here for.

1.15 Disposal instructions

For proper disposal, comply with the local regulations for electrical waste.

2 HMI Software Description for GEMA application

2.1 Overview

2.1.1 Users

Within the application of the HMI, there are several User-Logins, which have different permissions. These User descriptions are listed below:

Table 6 User Groups

User-Name	User group
User1	Unexperienced operator
User2	Experienced operator
Admin	Project Manager
Supervisor	KWG Staff only

2.1.2 Permissions

The following graphic shows the Navigation overview for the HMI pages:

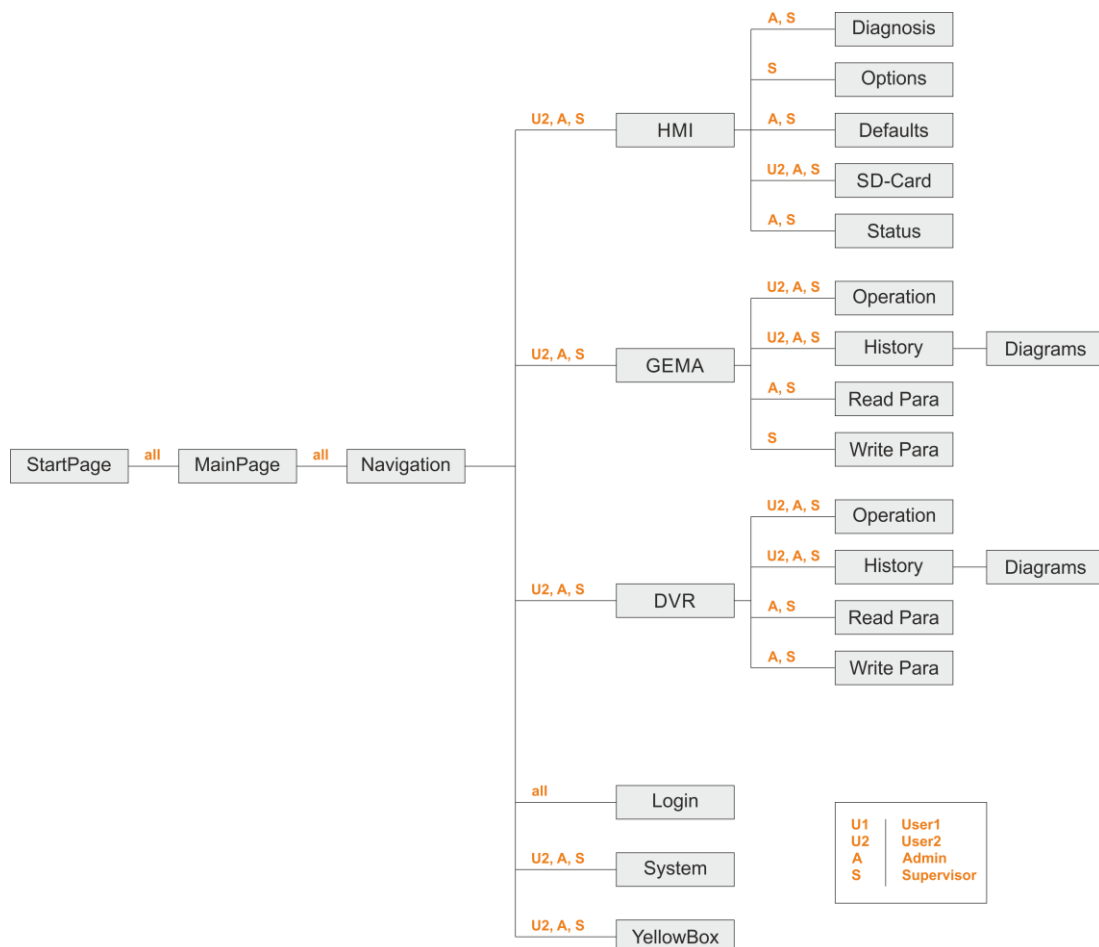


Figure 5 Overview

2.2 Standard Page Layout

The following graphic shows the standard layout for every page:

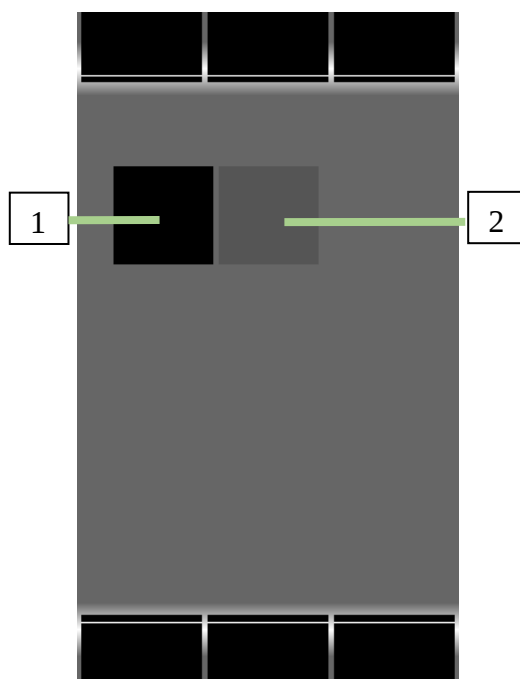


Figure 6 Standard Page Layout

The six black squares on the rim of the page are push able standard buttons. Every button has a different function, depending on the actual page. The naming of the buttons is the same on every page:

Button0 :	top left	Button3:	bottom left
Button1:	top middle	Button4:	bottom middle
Button2:	top right	Button5:	bottom right

The individual function of each button is described in every chapter for the corresponding page.

The black squares in the middle of the page are extra push able buttons. Not every page has these extra buttons. The colour of these buttons indicate if the button is working or not. This is due to the permission of the currently logged in user.

1. A black button indicates, that the button works.
2. A grey button indicates, that the button does not work.

2.3 Start Page

The Start Page is always the first page called after system start-up. After 10 seconds have passed on this page, the Main Page is called. This waiting time cannot be skipped, because some components of the KWG system might need 10 seconds to be accessed by the HMI. The Start Page is shown below:

Start		
1	[bool] YB req.	0
2	[bool] YB inst.	0
3	[bool] SD-Card act.	Yes
4	[bool] SD-Card avail.	Yes
5	Para HMI	12
6	SW-HMI	2.6.0
7	SW-GEMA	50
8	SW-DVR	16.13
9	Para DVR	27
10		
	4	11

Figure 7 Start Page

1. "YellowBox required": This flag indicates, if the GEMA requires a YellowBox. If this flag is true, the magnet can only be powered, if the YellowBox is installed.
2. "YellowBox installed": This flag indicates, if a YellowBox is currently active in the system.
3. "SD-Card activated": This flag indicates, if the HMI is a service HMI or not. The usage of the SD-Card is only possible, if this flag is set to 1.
4. "SD-Card available": This flag indicates, if a SD-Card is installed within the HMI.
5. "Parameter HMI": This indicates the current HMI Parameter.
6. "Software-HMI": This indicates the current software version of the HMI. This documentation is valid since V2.6.0.
7. "Software-GEMA": This indicates the software version of the GEMA within the system.
8. "SW-DVR": This indicates the software version of the DVR within the system.
9. "Parameter DVR": indicates the current parameter within the DVR.
10. The KWG logo is shown only in standard HMI Parameters.
11. This number indicates the timer in seconds until the MainPage is called.

2.4 Main Page

The graphic below shows the Main Page of the HMI. This page is the key page to operate the magnet.

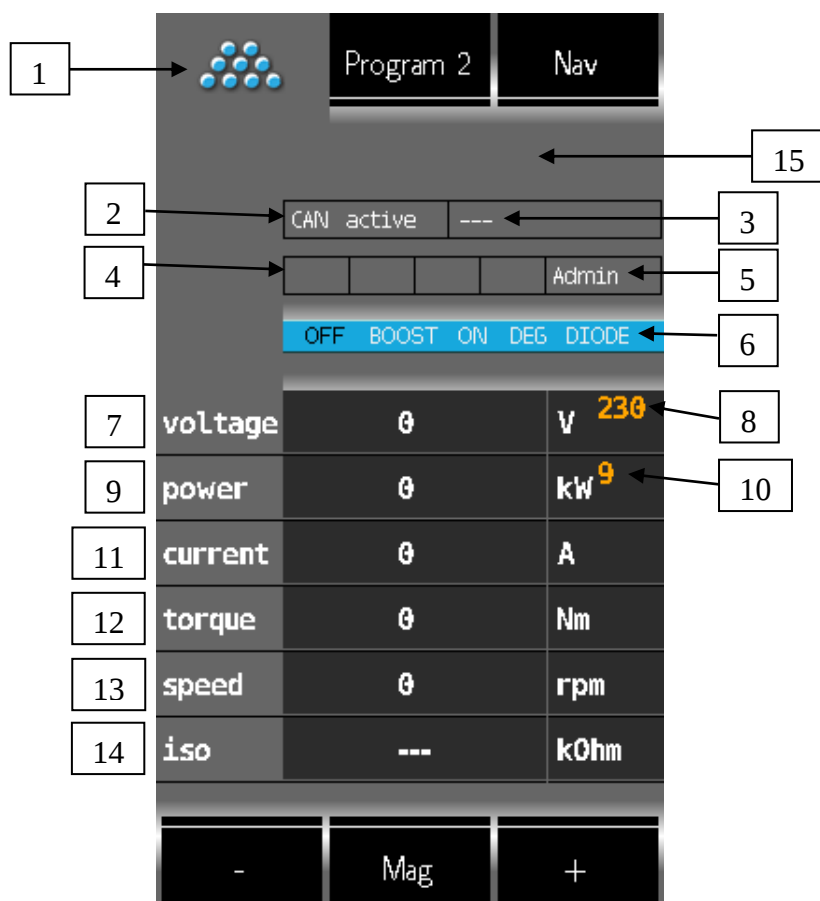


Figure 8 Main Page

1. This symbol indicates the current program to magnetize. The active program is equal to the text in Button1. See the table "Programs" for detailed information.
2. This square indicates the status of the CAN communication. "CAN active" means that the CAN is connected successfully. "CAN missing" indicates, that the CAN bus is missing (e.g. not plugged in), and "CAN error" indicates that there is an incompatible combination of HMI parameter and GEMA parameter.
3. This square indicates the status of the YellowBox. "---" indicates that the YB is not available and not required. "YB OK" indicates that the YellowBox is available. "YB missing" indicates that the YB is required but not available.
4. The four squares indicate the state of the digital inputs (DI) and relays (REL).
5. This square indicates the user, which is currently logged in.
6. This blue bar indicates the state of the magnet. "OFF" - magnet is not powered. "BOOST" - magnet is being powered with boost voltage. "ON" - the magnet is fully charged. "DEG" - the magnet is demagnetizing with counter voltage. "Diode" - the magnet is demagnetizing with diode operation.
7. "voltage": This indicates the actual voltage at the magnet.
8. This orange value indicates the voltage setpoint for the magnet.
9. "power": This indicates the actual power at the magnet.

10. Indicates the max. available power for the magnet.
11. "current": This indicates the actual current through the magnet.
12. "torque": Indicates the actual torque at the generator.
13. "speed": Indicates the actual speed of the generator. This value is coloured yellow if over- or underspeed occurs.
14. "ISO": Indicates the insulation resistance of the system. This value is coloured yellow, if $23\text{k}\Omega < \text{ISO} < 100\text{k}\Omega$ (warning). This value is coloured red, if $\text{ISO} < 23\text{k}\Omega$ (error).
15. In this row is shown the error codes and the warnings. See table 9 and 10 "displayed text". (If no error or warning is currently active, this row is empty).

Table 7 Main Page - Standard Buttons

Button0	Not available.
Button1	Change the active program.
Button2	Go to Navigation Page.
Button3	Removes 5 V from the voltage setpoint of the GEMA (min. 130).
Button4	Magnetize the magnet (depending on the active program).
Button5	Adds 5 Volt to the voltage setpoint of the GEMA (max. 230).

Programs

Table 8 Programs

Program	Application	Boost-Function	Fast Demagnetization	Joystick Function
1	Heavy material	Yes	Yes, 40 % *	On / Off
2	Light material	Yes	Yes, 50 % *	On / Off
3	Very light material	Yes	Yes, 60 % *	On / Off
5	Sorting operation	No	No	Tap
6	Very heavy material	Yes	Yes, 0 % *	On / Off

*Specification of the alternating demagnetization,
e.g. 40 % = fast demagnetization with 40 % alternating current.

The programs 1 to 5 are used very often for common applications.

Program 5 is ideal for sorting materials, because the magnetic force is directly proportional to the switch-on duration (On- / Off- ratio) of the pushbutton. This means, that the duration of the keypress and the frequency of switching on and switching off control the magnet force directly.

Example for very heavy materials: railway tracks.

Example for very light materials: shavings or stamp leftovers.

Error-Code descriptions:

Table 9 Error Codes

Code	Displayed Text	Meaning	Cause
HW1	Error: internal SC	Shortcut within output transistor T1	Output stage or Down-clock stage indicates shortcut, possible through water or damaged down-lock resistors.
HW2	Error: internal SC	Shortcut within output transistor T2	
HW4	Error: internal SC	Shortcut within output transistor T3	
HW8	Error: internal SC	Shortcut within output transistor T4	
HW16	Error: internal SC	Down-clock transistor T5	
HW32	Error: external SC	Connected magnet, load cable or plug connector has a shortcut. Optional: YellowBox has triggered (depending of Firmware of GEMA).	
HW48	Error YellowBox	YellowBox has triggered (depending of Firmware of GEMA).	
HW64	Error: over-voltage	Protection mechanism to prevent controller damage	Overspeed, Chopper resistor defect.
HW128	Error: over-temp		Air supply: too hot or too less cooling-air
HWxxx	Error	In this case a multiple error occurred. Hereby the displayed error code is the sum of the single errors. For example: HW96 is the sum of HW32 and HW64. This enables an unambiguous error identification.	

It should be noticed, that an error is a severe issue, which must be fixed. After an error occurred, the system must be shut down before it is possible to power the magnet again.

Warning-Code descriptions:

Table 10 Warning Codes

Displayed Text	Meaning
Warn: controller over-temp	Controller temperature is over 90°C. While this warning is active, the output power is reduced (230 V → 180V). This warning is cleared when the controller temperature is below 90°C.
Warn: magnet plate open	Interruption within the magnet or the load cable. This warning is shown 2 seconds after the interruption detection. Press the "Magnet On/Off"-button to clear this warning.

2.5 Navigation Page

The Navigation page displays all other available pages and provides direct access to them (compare with the page structure overview in “Chapter 2.1 – Overview”). The following graphic shows the Navigation page:

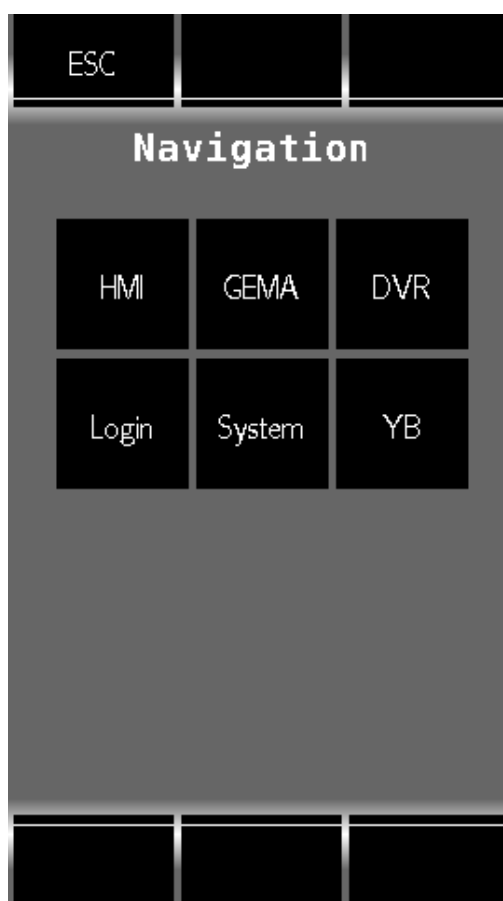


Figure 9 Navigation Page

Table 11 Navigation Page - Standard Buttons

Button0	Go back to the Main Page.
---------	---------------------------

The Buttons in the middle of the page are called “Navigation Buttons”. Every Navigation button changes the actual page on click. For example, if you click the “Login” button, the Login page is loaded. The NavButtons are described below:

Table 12 Navigation Page - NavButtons

NavButton0	Go to page “HMI Navigation”
NavButton1	Go to page “GEMA Navigation”
NavButton2	Go to page “DVR Navigation”
NavButton3	Go to page “Login”
NavButton4	Go to page “System”
NavButton5	Go to page “YellowBox”

2.6 HMI Navigation Page

The HMI Navigation displays all HMI specific pages and provides direct access to them. This page is shown in the graphic below:

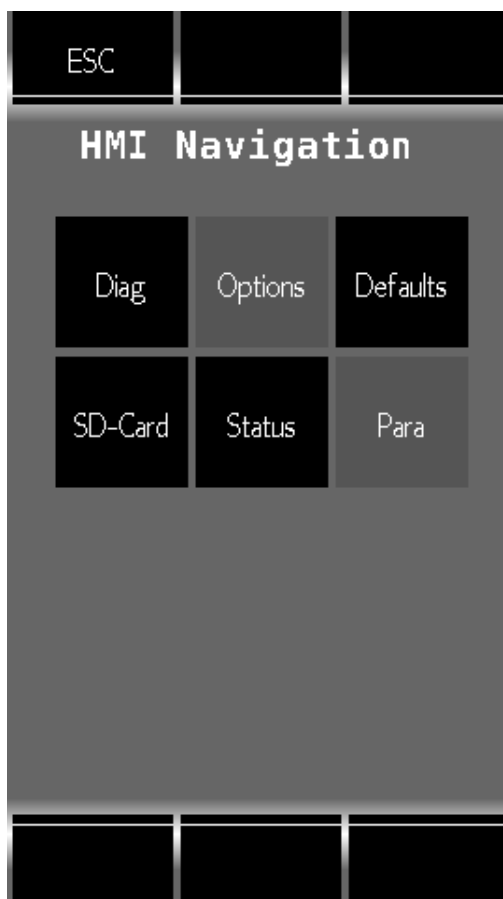


Figure 10 HMI Navigation Page

Table 13 HMI Navigation Page - Standard Buttons

Button0	Go back to the Main Page.
---------	---------------------------

Table 14 HMI Navigation Page - NavButtons

NavButton0	Go to page "Diagnosis"
NavButton1	Go to page "Options" (only as Supervisor)
NavButton2	Go to page "Defaults"
NavButton3	Go to page "SD-Card"
NavButton4	Go to page "Status"
NavButton5	Go to page "HMI Parameter" (only as Supervisor)

2.7 Diagnosis Page

The Diagnosis Page holds the functionality to test the I/Os and relays. This is shown in the graphic below. **Caution: Activating / Deactivating outputs or relays, as well as sending a CAN test message, might influence your application.**

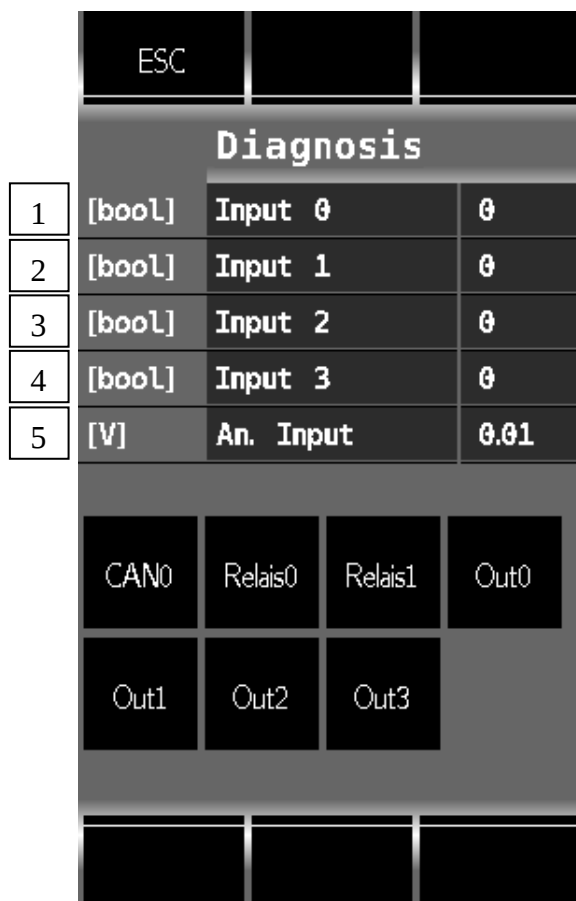


Figure 11 Diagnosis Page

1. This flag indicates the value of Input0. (High or Low)
2. This flag indicates the value of Input1.
3. This flag indicates the value of Input2.
4. This flag indicates the value of Input3.
5. This indicates the value of the analogue Input. (AIN)

Table 15 Diagnosis Page - Standard Buttons

Button0	Go back to the Navigation Page.
---------	---------------------------------

Table 16 Diagnosis Page - Control Buttons

ControlButton0	Send a test CAN message to CAN-Bus 0.
ControlButton1	Activate / deactivate Relais0.
ControlButton2	Activate / deactivate Relais1.
ControlButton3-6	Activate / deactivate DO0-3.

2.8 Defaults Page

The following graphic shows the Defaults page:

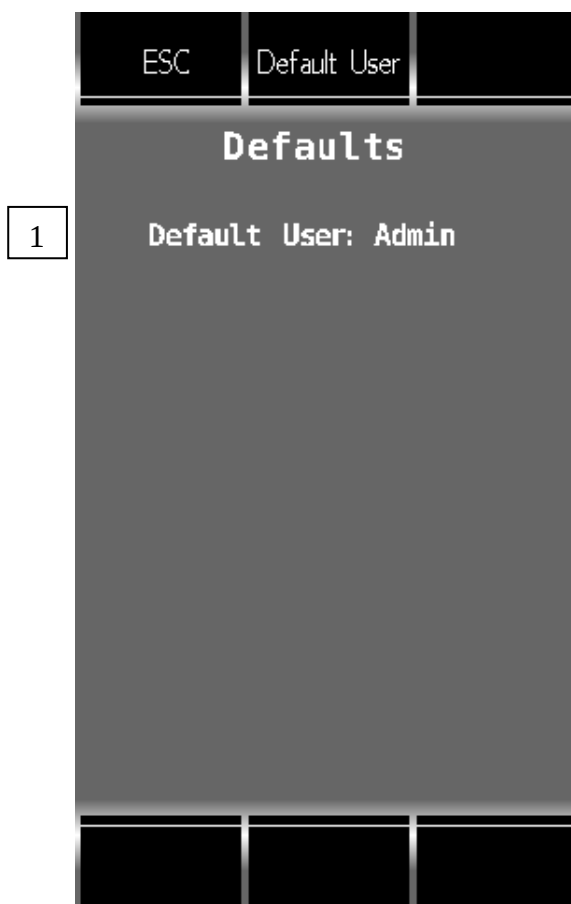


Figure 12 Defaults Page

1. “Default User”: This indicates, which user shall be logged in, after the HMI is restarted.

Table 17 Defaults Page – Standard Buttons

Button0	Go back to the Navigation Page.
Button1	Changes the Default User (User1 / User2 / Admin) and saves it directly.

2.9 SD-Card Page

The following graphic shows the SD-Card page:

ESC				Screenshot	
SD-Card					
1	[bool]	activated		Yes	
2	[bool]	available		Yes	
3	[kByte]	total space		3939	
4	[kByte]	free space		3928	
5	[n]	data logs		140	

Figure 13 SD-Card Page

1. This flag indicates if the SD-Card is activated (Service HMI).
2. This flag indicates if the SD-Card is available.
3. This indicates the maximum total space on the SD-Card.
4. This indicates the currently free space on the SD-Card.
5. This indicates the current number of data logs on the SD-Card.

Table 18 SD-Card Page – Standard Buttons

Button0	Go back to the Navigation Page.
Button2	Show the latest Screenshot*.

*Generally it is possible to make a screenshot of the currently active page. Simply press the HMI display 3 (or more) times on a spot where no button is located. Note that a data log on the SD-Card is performed with every screenshot, if the SD-Card is available and activated.

2.10 Status Page

The Status Page shows the three most important CAN-messages from the GEMA in raw data format. This is shown in the graphic below:

	ESC		
	Status		
		op. data 1	
1	ID	0C208C87	
	data	00000000 00000010	
		state magnet	
2	ID	0CFA1487	
	data	00000600 0f32674f	
		op. data 3	
3	ID	0C228C87	
	data	f60024f4 0bbe0310	

Figure 14 Status Page

1. These lines show the content of the CAN message “operational data 1”, which has the ID 0x0C208C87
2. These lines show the content of the CAN message “state magnet”, which has the ID 0x0CFA1487
3. These lines show the content of the CAN message “operational data 3”, which has the ID 0x0C228C87

For detailed information about the content of these CAN messages, see the document “CAN-Protocol Description for Generators & GEMA Systems”.

Table 19 Status Page - Standard Buttons

Button0	Go back to the Navigation Page.
---------	---------------------------------

2.11 GEMA Navigation Page

The following graphic shows the GEMA Navigation page:

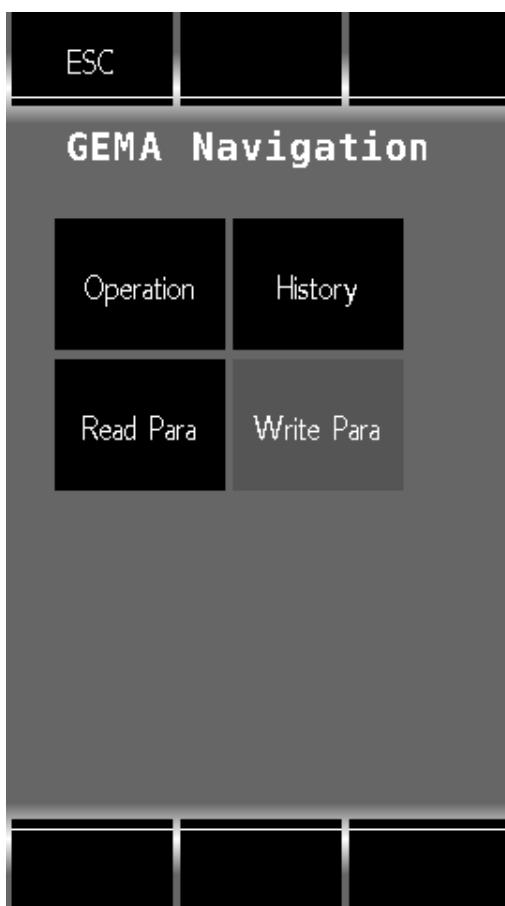


Figure 15 GEMA Navigation Page

Table 20 Navigation Page - Standard Buttons

Button0	Go back to page "Navigation"
---------	------------------------------

Table 21 GEMA Navigation Page - NavButtons

NavButton0	Go to page "GEMA Operation"
NavButton1	Go to page "GEMA History"
NavButton2	Go to page "GEMA Read Parameter"
NavButton3	Go to page "GEMA Write Parameter" (only as Supervisor)

2.12 GEMA Operation Page

The following graphic shows the GEMA Operation page:

	ESC		
	GEMA Operation		
1	[V]	act. Voltage	0
2	[A]	act. Current	0
3	[kW]	act. Power	0
4	[Nm]	act. Torque	0
5	[V]	act. DC-Link	246
6	[°C]	act. Temp.	23
7	[rpm]	act. Speed	3060
8	[kOhm]	act. Resist.	949

Figure 16 GEMA Operation Page

1. This value indicates the actual voltage of the GEMA.
2. This value indicates the actual current of the GEMA.
3. This value indicates the actual power of the GEMA.
4. This value indicates the actual torque of the GEMA.
5. This value indicates the actual DC-link voltage of the GEMA.
6. This value indicates the actual temperature of the GEMA.
7. This value indicates the actual speed of the GEMA.
8. This value indicates the actual ISO resistance of the GEMA.

Table 22 GEMA Operation - Standard Buttons

Button0	Go back to page "Navigation"
---------	------------------------------

2.13 GEMA History Page

The following graphic shows the GEMA History page:

ESC			Counters	
GEMA History				
1	[h]	hours		71
2	[%]	magnet off		91
3	[%]	magnet on		9
4	[n]	startup		70
5	[n]	error-SC		0
6	[n]	error-OV		0
7	[n]	error-temp		0
8	[n]	warn-open		3
9	[n]	warn-temp		0
10	[n]	warn-ISO		4
11	[n]	ISO test		11
Current		Temp.	Freq.	

Figure 17 GEMA History Page

1. "hours": This indicates the total number of operational hours of the GEMA.
2. "magnet off": This indicates how much percent of the total GEMA operational time the magnet was off (value between 0% – 100%).
3. "magnet on": This indicates how much percent of the total GEMA operational time the magnet was on (value between 0% – 100%).
4. "open": This indicates the total number of open magnets.
5. "error-ShortCut": This indicates the total number of shortcuts within the magnet.
6. "error OverVoltage": This indicates the total number of over-voltages within the magnet.
7. "error-temperature": This indicates the total number of over-temperature errors within the GEMA.
8. "warn-open": This indicates the total number of warnings, in which the magnet had an interruption.
9. "warn-temp": This indicates the total number of warnings, in which the GEMA had an overtemperature.
10. "warn-ISO": This indicates the total number of warnings, in which the magnet had an insulation warning.
11. "ISO test": This indicates the total number of ISO tests, which were performed.

Table 23 GEMA History Page - Standard Buttons

Button0	Go back to the GEMA Navigation Page.
Button1	Shows the GEMA History Counters.
Button2	No Function
Button3	Shows the GEMA History Graphic "Load-Current".
Button4	Shows the GEMA History Graphic "Temperature".
Button5	Shows the GEMA History Graphic "Frequency".

2.13.1 GEMA Load-Current History

The following graphic shows the GEMA History Graphic “Load-Current”:

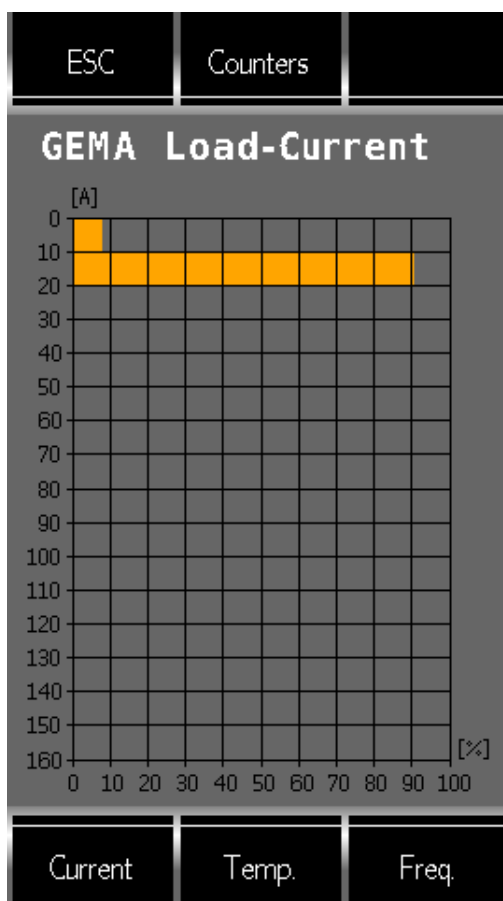


Figure 18 GEMA Load Current History

In the upper example, the system was driving a current of 10-20 A in 92% of the operational hours and a current of 0-10A in 8% of the operational hours.

Table 24 GEMA History Load Current Graphic - Standard Buttons

Button0	Go back to the GEMA Navigation Page.
Button1	Shows the GEMA History Counters.
Button2	No Function
Button3	Shows the GEMA History Graphic “Load-Current”.
Button4	Shows the GEMA History Graphic “Temperature”.
Button5	Shows the GEMA History Graphic “Frequency”.

2.13.2 GEMA Temperature History

The following graphic shows the GEMA History Graphic “Temperature”:

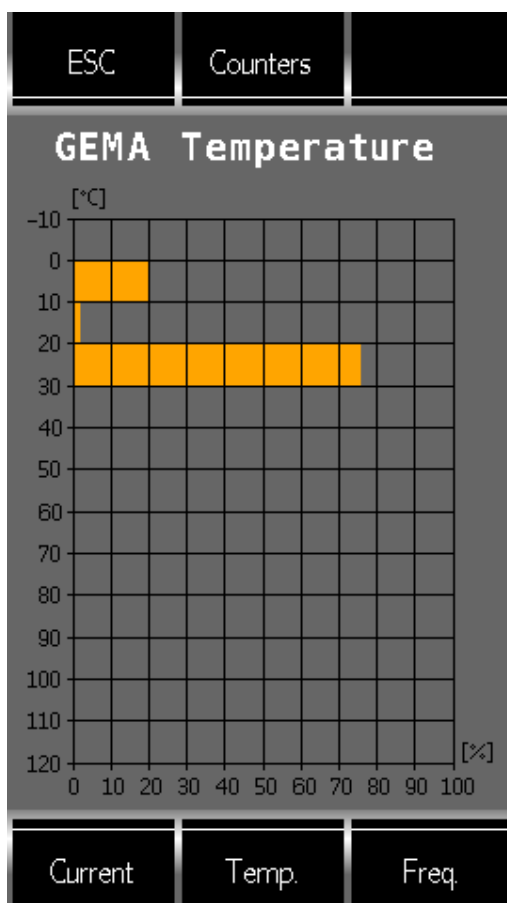


Figure 19 GEMA Temperature History

In the upper example, the temperature of the GEMA was 0-10 °C in 20 % of time, 10-20 °C in 2 % of time and 20-30 °C in 78 % of time.

Table 25 GEMA History Temperature Graphic - Standard Buttons

Button0	Go back to the GEMA Navigation Page.
Button1	Shows the GEMA History Counters.
Button2	No Function
Button3	Shows the GEMA History Graphic “Load-Current”.
Button4	Shows the GEMA History Graphic “Temperature”.
Button5	Shows the GEMA History Graphic “Frequency”.

2.13.3 GEMA Frequency History

The following graphic shows the GEMA History Graphic “Frequency”:

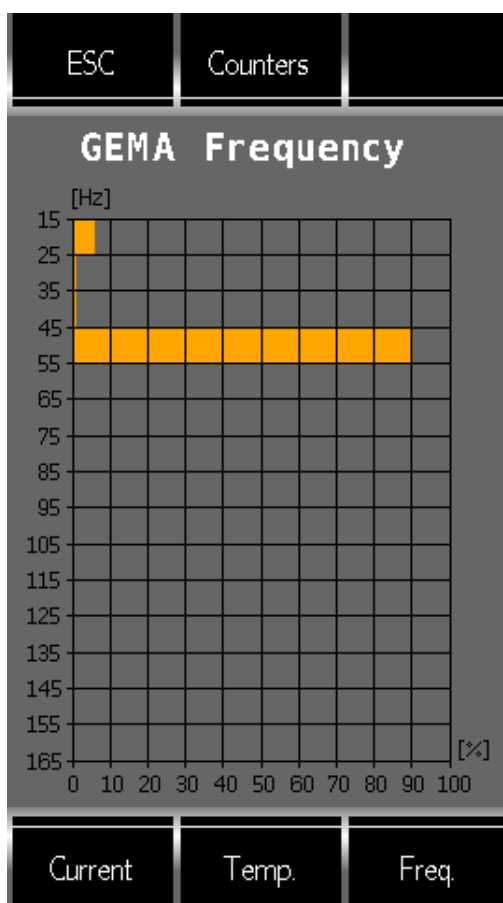


Figure 20 GEMA Frequency History

In the upper example, the frequency of the system was 15-25 Hz in 8 % of time, 25-35 HZ in 1 % of time, 35-45 Hz in 1 % of time and 45-55 Hz in 90 % of time.

Table 26 GEMA History Frequency Graphic - Standard Buttons

Button0	Go back to the GEMA Navigation Page.
Button1	Shows the GEMA History Counters.
Button2	No Function
Button3	Shows the GEMA History Graphic “Load-Current”.
Button4	Shows the GEMA History Graphic “Temperature”.
Button5	Shows the GEMA History Graphic “Frequency”.

2.14 GEMA Read Parameter Page

The following graphic shows the Read Para GEMA page:

	ESC		
	Read Para GEMA		
1	P0	GEMA Typ	9
2	P1	Serien-Nr.	20327
3	P2	I-Kali	100
4	P3	MPE	0
5	P20	U_Nenn	230
6	P21	P_Limit	9000
7	P22	M_Limit	115
8	P04H	Kunde	0
9	P04L	Feature	68
10	P05	YB req.	0

Figure 21 GEMA Read Parameter Page

This page shows the current software parameters within the GEMA (read only).

1. "GEMA Type": Indicates the type of the GEMA.
2. "Serial-Nr.": Indicates the serial number of the GEMA.
3. "I-Kali": Indicates the calibration.
4. "MPE": Indicates if the magnet plate recognition is active.
5. "U_Nenn": voltage setpoint (nominal voltage)
6. "P_Limit": maximum power
7. "M_Limit": maximum torque
8. "Kunde": Customer flag
9. "Feature": Feature flag
10. "YellowBox required": This flag indicates, if the Yellowbox is required.

Table 27 GEMA Read parameter Page - Standard Buttons

Button0	Go back to the GEMA Navigation Page.
---------	--------------------------------------

2.15 DVR Navigation Page

The following graphic shows the GEMA Navigation page:

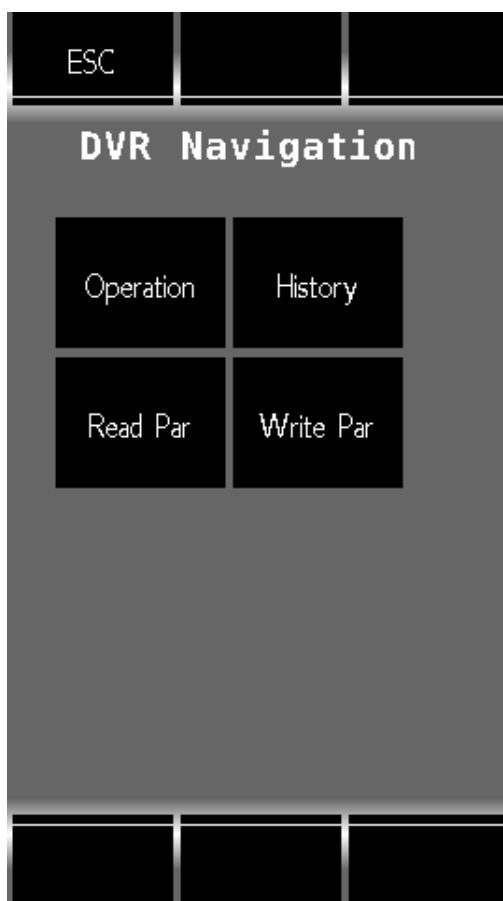


Figure 22 DVR Navigation Page

Table 28 DVR Navigation Page - Standard Buttons

Button0	Go back to page "Navigation"
---------	------------------------------

Table 29 DVR Navigation Page - NavButtons

NavButton0	Go to page "DVR Operation"
NavButton1	Go to page "DVR History"
NavButton2	Go to page "DVR Read Parameter"
NavButton3	Go to page "DVR Write Parameter"

2.16 DVR Operation Page

The following graphic shows the GEMA Navigation page:

	ESC		
	DVR Operation		
1	[V]	Voltage	100
2	[A]	Exc.Current	2
3	[Hz]	Frequency	50
4	[kOhm]	ISO-value	949
5	[flags]	status 1	0
6	[flags]	status 2	0
7	[flags]	error	0
8	[flags]	mode	0
9	[date]	para date	8.5.18

Figure 23 DVR Operation Page

1. "Voltage": This indicates the current DVR output voltage.
2. "Exciting Current": This indicates the current DVR output current.
3. "Frequency": This indicates the current DVR operation frequency.
4. "ISO-value": This indicates the current ISO value (measured by the ISO guard).
5. "status 1": These flags indicate the value of the CAN message* "status 1".
6. "status 2": These flags indicate the value of the CAN message* "status 2".
7. "error": These flags indicate the value of the CAN message* "error".
8. "mode": These flags indicate the value of the CAN message* "mode".
9. "parametrization data": This indicates the data of latest DVR parametrization (only overwritten if a computer did the parametrization to the DVR).

* For detailed information about the content of these CAN messages, see the document "CAN-Protocol Description for Generators & GEMA Systems".

Table 30 DVR Operation Page - Standard Buttons

Button0	Go back to page "DVR Navigation"
---------	----------------------------------

2.17 DVR History Page

The following graphic shows the DVR History page:

ESC		Max.Values		
DVR History				
1	[h]	operation time	2	
2	[°C]	max Gen temp.	0	
3	[°C]	max DVR temp.	28	
4	[°C]	max EMA temp.	20	
5	[Hz]	max freq.	53	
6	[A]	max Ex.Current	0.6	
7	[V]	max termin. V	258.6	
Current		Temp.		Freq.

Figure 24 DVR History Page

1. Operation time of the DVR in hours
2. Maximum temperature of the Generator in °C
3. Maximum temperature of the DVR in °C
4. Maximum temperature of the EMA (exciter windings) in °C
5. Maximum frequency of the DVR in Hz
6. Maximum exciting Current of the DVR in A
7. Maximum terminal voltage of the DVR

Table 31 DVR History Page - Standard Buttons

Button0	Go back to the DVR Navigation Page.
Button1	Shows the DVR History Counters.
Button2	No Function
Button3	Shows the DVR History Graphic "Load-Current".
Button4	Shows the DVR History Graphic "Temperature".
Button5	Shows the DVR History Graphic "Frequency".

2.17.1 DVR Exciting Current History

The following graphic shows the DVR History Graphic “Exciting Current”:

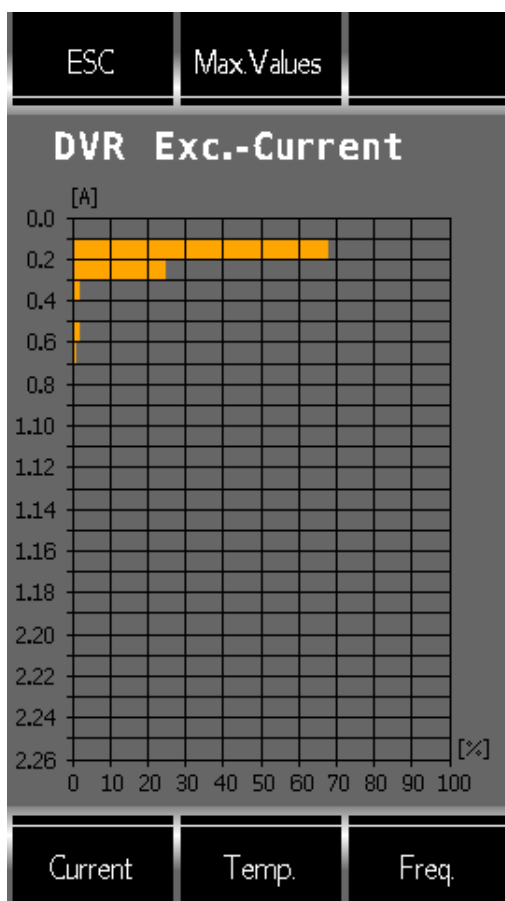


Figure 25 DVR Exciting Current History

In the upper example, the exciting current of the DVR output was 0,1-0,2 A in 68 % of time, 0,2-0,3 A in 25 % of time, 0,3-0,4 A in 3% of time, 0,5-0,6 A in 3 % of time and 0,6-2,7 A in 1 % of time.

Table 32 DVR Exciting Current History - Standard Buttons

Button0	Go back to the DVR Navigation Page.
Button1	Shows the DVR History Counters.
Button2	No Function
Button3	Shows the DVR History Graphic “Load-Current”.
Button4	Shows the DVR History Graphic “Temperature”.
Button5	Shows the DVR History Graphic “Frequency”.

2.17.2 DVR Temperature History

The following graphic shows the DVR History Graphic “Temperature”:

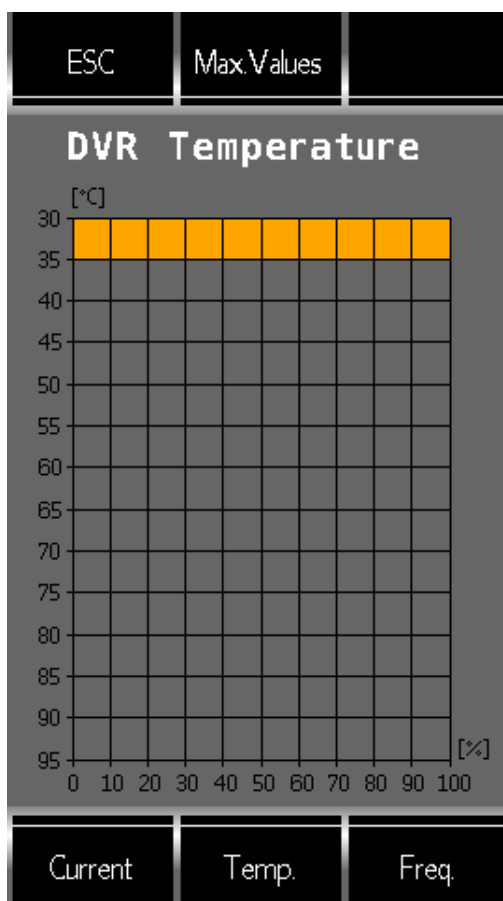


Figure 26 DVR Temperature History

In the upper example, the temperature of the DVR was 30-35°C in 100 % of time.

Table 33 DVR Temperature History - Standard Buttons

Button0	Go back to the DVR Navigation Page.
Button1	Shows the DVR History Counters.
Button2	No Function
Button3	Shows the DVR History Graphic “Load-Current”.
Button4	Shows the DVR History Graphic “Temperature”.
Button5	Shows the DVR History Graphic “Frequency”.

2.17.3 DVR Frequency History

The following graphic shows the DVR History Graphic “Frequency”:

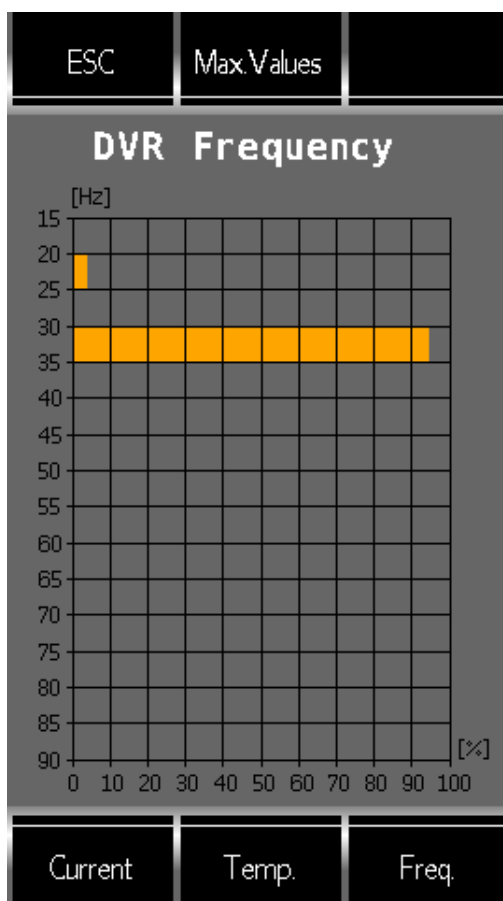


Figure 27 DVR Frequency History

In the upper example, the DVR frequency was 20-25 Hz in 5 % of time and 30-35 Hz in 95% of time.

Table 34 DVR Frequency History - Standard Buttons

Button0	Go back to the DVR Navigation Page.
Button1	Shows the DVR History Counters.
Button2	No Function
Button3	Shows the DVR History Graphic “Load-Current”.
Button4	Shows the DVR History Graphic “Temperature”.
Button5	Shows the DVR History Graphic “Frequency”.

2.18 DVR Read Parameter Page

The following graphic shows the DVR Read Parameter page:

	ESC		
	DVR Parameter		
1		Parameter	50
2	[cm]	LFE	190
3		no. of poles	2
4		ISO module	1
5		CAN mode	2
6		sense mode	4
7		gen temp src	1

Figure 28 DVR Read Parameter Page

1. "Parameter": This indicates the currently active parameter of the DVR.
2. "LFE": This indicates the iron length of the generator.
3. "number of poles": This indicates the number of poles of the generator.
4. "ISO module": This flag indicates if the ISO module is installed within the system.
5. "CAN mode": This indicates, which CAN mode is currently active.
6. "sense mode": This indicates the sense mode.
7. "generator temperature source": This indicates, which temperature measurement method is currently active.

Table 35 DVR Read Parameter Page - Standard Buttons

Button0	Go back to page "DVR Navigation"
---------	----------------------------------

2.19 DVR Write Parameter Page

The following graphic shows the DVR Write Parameter page:

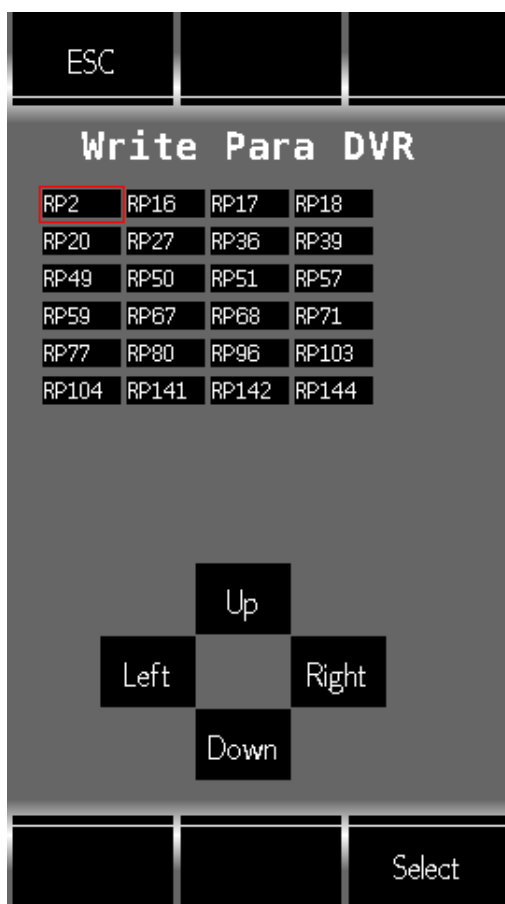


Figure 29 DVR Write Parameter Page

The purpose of this page is to provide an interface for the user to select a parameter from a pool of parameters and show its single values. The black squares “RP2”, “RP16”,... indicate the available DVR Parameters (“RP” = “Regulator Parameter”). The red square indicates the desired parameter to select. The parameter is selected with the “Select” button. The red square is shifted by help of the Select buttons.

Table 36 DVR Write Parameter Page - Select Buttons

SelectButton0	“Up” - this button moves the red square one element upward.
SelectButton1	“Right” - this button moves the red square one element to the right.
SelectButton2	“Down” - this button moves the red square one element downward.
SelectButton3	“Left” - this button moves the red square one element to the left.

Table 37 DVR Write Parameter Page - Standard Buttons

Button0	Go back to the DVR Navigation Page.
Button5	Selects and shows the currently selected DVR parameter. This opens the page shown in “Chapter 2.20 DVR Write Parameter Selection”.

Notice that the magnet must be in “Off” state, to parametrize the DVR.

2.21 Login Page

The Login Page provides an interface to change the active user. This is shown in the graphic below:

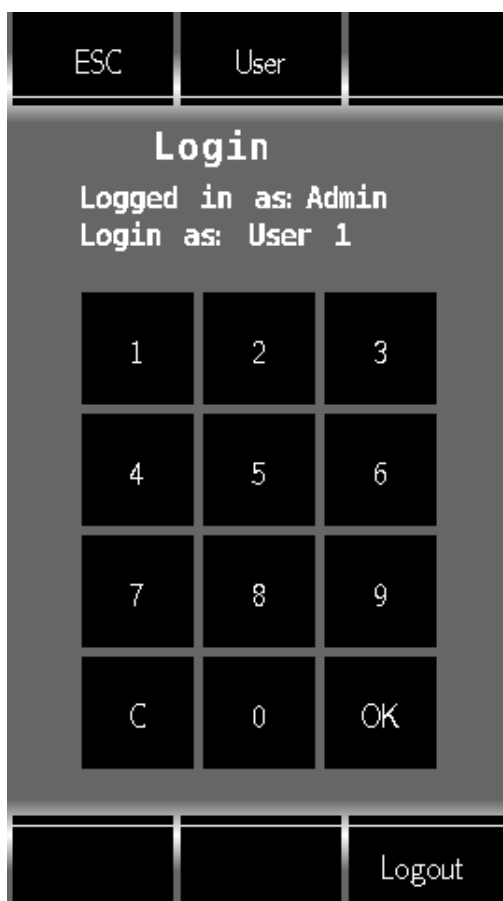


Figure 31 Login Page

1. “Logged in as:” Indicates the currently active user.
2. “Login as:” Indicates the selected desired user to be logged in. This user is changed by pressing the “User” button.

Table 39 Login Page - NumPad Buttons

NumPadButtonX	“0”-“9”: By pressing a button with a number on it, the digit is added to the password.
NumPadButtonC	“C”: This clears the displayed password.
NumPadButtonOK	“OK”: This enters the displayed password. If it is correct, the user of the “Login as” row is logged in.

Table 40 Login Page - Standard Buttons

Button0	Go back to the Navigation Page.
Button1	Change desired user to login (affects the “Login as” row)
Button5	Logout (Change to Default User, which is set within the “Defaults” page)

2.22 System Page

The following graphic shows the System page. This page contains an overview about general information of the systems' components.

ESC			ISO-Test
System			
1	[h]	GEMA-hours	222
2	[n]	GEMA-startup	81
3		GEMA-SW	50
4		GEMA-SNO	6665
5		GEMA-type	9
6		HMI-SW	2.6.0
7		HMI-par	12
8		DVR-SW	16.13
9		DVR-par	2
10	[kOhm]	ISO value	65535
11	[bool]	ISO test	0

Figure 32 System Page

1. "GEMA-hours": This indicates the number of operational hours of the GEMA.
2. "GEMA-startup": This indicates the number of start-ups of the GEMA.
3. "GEMA-SW": This indicates the software version of the GEMA.
4. "GEMA-SNO": This indicates the serial number of the GEMA.
5. "GEMA-type": This indicates the type of the GEMA.
6. "HMI-SW": This indicates the software version of the HMI.
(This document is valid for **V2.6.0**).
7. "HMI-par": This indicates the currently active HMI parameter.
8. "DVR-SW": This indicates the current software version of the DVR.
9. "DVR-par": This indicate the currently active DVR parameter.
10. "ISO value": This indicates the current ISO value (same as MainPage).
11. "ISO test": This flag indicates, if the ISO test is currently active.

Table 41 System Page - Standard Buttons

Button0	Go back to the Navigation Page.
Button2	Starts / Stops the ISO-Test. (The ISO-Test is also stopped, when Button0 is clicked).

2.23 Yellow Box

The following graphic shows the YellowBox page:

	ESC		
	Yellow Box		
1	[bool]	required	0
2	[bool]	available	0
3		SW-Version	0
4	[bool]	current trigger	0
5	[bool]	temp trigger	0

Figure 33 Yellow Box Page

1. "YellowBox required": indicates if the YellowBox is required (Info by GEMA).
2. "YellowBox available": indicates if the YellowBox is available (Info by GEMA).
3. "Software Version YellowBox": Indicates the software version of the YellowBox.
4. "current trigger": Indicates if the YellowBox has triggered by fault in application.
5. "temperature trigger": Indicates if temperature triggered (this is a self-protecting mechanism of the YellowBox if it gets too hot).

Table 42 YellowBox Page - Standard Buttons

Button0	Go back to the Navigation Page.
---------	---------------------------------

3 Notes

- The Supervisor login is restricted to KW-Generator staff only, because this user can change fundamental settings of the HMI.
- The Options Page is restricted to the Supervisor, thus it is not described within this document.