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Operating instructions EN

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Manufacturer address

KW-Generator GmbH

Bänglesäcker 24

73527 Schwäbisch Gmünd - Lindach

Phone +49 (0) 7171 104 17 - 0

Mail: info@kw-generator.com

Internet: www.kw-generator.com

Protective note

List of changes

Index	Modified by	Stand	Amendment
3.1	T. Kurz	05/2024	New layout; adaptation of texts

1 TABLE OF CONTENTS

1.1 List of illustrations

1.2 List of tables

2 FOREWORD AND GENERAL INFORMATION

2.1 About these operating instructions

The purpose of these operating instructions is to familiarize you with the *GEMA system* and its intended use, and to install and operate it safely, properly and efficiently.

Observing the instructions given in this operating manual helps to avoid hazards, repair costs and downtime caused by incorrect installation or operation. It also ensures a high level of reliability and a long service life for the *GEMA system*.

Keep the instructions for the *GEMA system* accessible to personnel at all times at the place of use until the product is disposed of.

The persons responsible for the installation, maintenance and servicing of the GEMA *system* must have read and understood this manual before installing and commissioning the system and must follow the instructions given in it. At all times during operation of the GEMA *system, follow* the📖 chapter "3 Safety instructions".

Before operating the *GEMA system for the* first time, operators must read and understand the following parts of the operating instructions and follow the instructions given therein:

📖 Chapter 2 "Foreword and general information" on page 9

📖 Chapter 3 "Safety instructions" on page 13

📖 Chapter 4 "Description" on page 19

📖 Chapter 7 "Operation" on page 48

📖 Chapter 8 "Maintenance" on page 57

The *GEMA system* may only be installed and used in compliance with all applicable national safety regulations and regulations on accident prevention and environmental protection.

We reserve the right to change the content of this documentation without prior notice. The illustrations do not necessarily correspond to the actual product.

The document is double-sided. The document must therefore be printed double-sided / duplex.

2.2 Display of warnings

For better differentiation, hazardous risks are identified in the instructions by the following warning signs and signal words.

DANGER

Disregarding such warnings can lead to serious injury or even death.

WARNING

Disregarding such warnings can lead to serious injury or even death.

CAUTION

Disregarding such warnings can lead to minor to moderate injuries.

ATTENTION

Indicates a potentially harmful situation that can lead to damage to the device or the surrounding area.

NOTE

This information provides you with additional advice and tips to make your work easier.

2.3 Presentation conventions

The following presentation conventions are used:

Name	Representation	Function
Instruction for action 1st level	1), 2) etc.	Prompts an action.
Instruction for action 2nd level	a), b) etc.	Designates a section in a sequence of actions.
Enumeration in safety instructions	➢	Indicates individual elements of the enumeration in safety instructions.
Enumeration	•	Indicates individual elements of the enumeration.
Emphasis	▪	Indicates important remarks.
Cross reference	🕮	Reference within this document to another chapter or to a more detailed document.
Illustration reference	🗏	Reference to an illustration.

2.3.1 Extended symbolism

1 **Definition of components**

defines components or parts.

2.4 Intended use of the GEMA system

The *GEMA system* is a modular generator system for magnetic disks. It is intended for permanent installation in excavators or in conjunction with power or hydraulic units and may only be used for the purpose of generating power for magnetic disk systems in accordance with the specifications in these operating instructions.

The *GEMA system* may only be used for the applications specified here and only in accordance with the information in these operating instructions. Any other use is improper and not permitted.

Single-bearing generators are intended exclusively for mounting on an internal combustion engine that complies with the applicable standards, regulations and provisions.
Two-bearing generators are usually driven via belts, clutches or directly from the drive unit.

The *GEMA system is* intended for permanent installation. Commissioning is prohibited until it has been established that the entire system complies with the provisions of all applicable directives.

Never connect the GEMA *system* to the public power supply network or to other power generation systems. Never connect several GEMA *systems* together. Danger to life and risk of destruction due to high voltages and currents.

The *GEMA system complies* with DIN EN 60034/VDE0530 and is RoHS compliant.

2.5 Warranty

KW-Generator GmbH accepts no liability for improper or abusive use of the system or individual components of this system.

No modifications may be made to the *GEMA system* or to individual components of the system. Any modification, improper repair or use of unsuitable third-party parts will invalidate any warranty claims. The manufacturer accepts no liability in this case.

3 SAFETY INSTRUCTIONS

Always observe the safety instructions listed in this chapter when working with the *GEMA system.* These are supplemented by additional specific warnings that only apply to certain actions and activities. These specific warnings are indicated at the relevant points in the manual and highlighted accordingly.

3.1 Qualification of staff

Installation, maintenance and repair work on the *GEMA system* may only be carried out by authorized and electrically trained personnel.

3.2 General safety instructions and symbols attached to the system

The meaning of the warning symbols on the *GEMA system* is explained below.

Labeling	Explanation
	**Warning of dangerous electrical voltage** ➢ means "Stop" in front of hazardous areas in which live parts are located; ➢ Warning signs are used wherever there is no direct danger from electrical voltage. ➢ Never touch the generator or the connected magnetic plate with wet hands during operation.
	**Warning of hot surfaces** ➢ Parts of the generator can be very hot during and after operation. Do not touch the generator during operation and allow it to cool down completely after use.

3.3 Safe operation - safety instructions

The following safety instructions must be observed when operating the *GEMA system.*

DANGER

Non-compliance with warnings and safety instructions

Death or serious injury

- All safety and warning instructions must be followed!
- Before carrying out any work on the appliance, switch it off completely and secure it against unintentional restarting.
- The *GEMA system* may only be operated with correctly fitted protective covers for the drive.
- Never switch on the magnetic plate if it is not required for the work. A magnetic plate that is switched on and floating in the air can inadvertently attract or eject material.
- Do not operate the *GEMA system in* potentially explosive atmospheres.
- Never carry out visual inspections for maintenance purposes and cleaning work on the *GEMA system* during operation.
- No persons are allowed in the swivel and working area of the magnetic plate.

DANGER

Strong electromagnetic fields

Death or serious injury due to strong electromagnetic fields

- Before working on the appliance, it must be disconnected from the power supply!
- Wearers of pacemakers must not carry out any work on the *GEMA system* and must always ensure a sufficient safety distance from the magnetic plate and the *HMI control unit* when operating the system.

CAUTION

Hot surfaces

Risk of burns

- Parts of the generator can be very hot during and after operation. Do not touch the generator during operation and allow it to cool down completely after use.

ATTENTION

Never expose the components of the *GEMA system to* the jet of a high-pressure cleaner. This could damage the system.

3.4 Safe operation - safety rules

The following safety instructions must be observed when installing and carrying out work on the *GEMA system.*

3.4.1 Safety rules for working on electrical systems

Always follow the five safety rules for working on electrical systems when working on the *GEMA system:*

- Unlock.
- Secure against restarting.
- Check that there is no voltage.
- Earthing and short-circuiting.
- Cover or block off neighboring live parts.

3.4.2 Safety instructions for installation, maintenance and repair

DANGER

Non-compliance with warnings and safety instructions

Death or serious injury

- All safety and warning instructions must be followed!
- Before carrying out any work on the appliance, switch it off completely and secure it against unintentional restarting.
- Work on electrical installations and the *GEMA system* may only be carried out by trained specialist personnel and in accordance with the applicable national regulations.
- Never switch on the magnetic plate if it is not required for the work. A magnetic plate that is switched on and floating in the air can inadvertently attract or eject material.
- Do not operate the *GEMA system in* potentially explosive atmospheres.
- Never carry out visual inspections for maintenance purposes and cleaning work on the *GEMA system* during operation.
- No persons are allowed in the swivel and working area of the magnetic plate.

DANGER

Strong electromagnetic fields

Death or serious injury due to strong electromagnetic fields

- Before working on the appliance, it must be disconnected from the power supply!
- Wearers of pacemakers must not carry out any work on the *GEMA system* and must always ensure a sufficient safety distance from the magnetic plate and the *HMI control unit* when operating the system.

DANGER

Dangerous electrical voltage

Death or serious injury due to electric shock

- Before working on the appliance, it must be disconnected from the power supply!
- Work on electrical systems and the *GEMA system* may only be carried out when the system is switched off and de-energized. Switched-off drive units must be secured against unintentional restarting (e.g. by removing and storing the ignition key).
- Connecting the load line at the output of the *GEMA system* (positive or negative conductor to the magnetic plate) to earth cancels the "protective separation" protective measure.

3.1 Personal protective equipment

Personal protective equipment is required and must be used for various activities on the device/system.

The specialist companies must provide sufficient protective equipment for their personnel and supervisors must check that it is worn.

Commandment sign	Meaning	Explanation
	Use eye protection M004	Eye protection must be used wherever biological, chemical, thermal, mechanical, optical or electrical hazards occur that can enter the eyes and damage them in a fraction of a second.
	Use foot protection M008	Safety shoes must be used wherever slippery floor coverings, falling or protruding sharp objects, obstacles of any kind, cold, wet, heat, aggressive liquids, dust and much more must be expected. Safety shoes in different categories offer acid-resistant, waterproof, nail penetration-resistant, slip-resistant or heat-resistant soles. Steel toecaps protect the toe area from broken bones, bruises and contusions.

Commandment sign	Meaning	Explanation
	Use hand protection M009	Safety gloves must be used wherever injuries caused by stabs, cuts, burns or hypothermia as well as other harmful effects, such as substances that can permanently damage the skin and above all severely damage the hands. Under no circumstances should safety gloves be used when working on rotating parts such as drills etc.
	Use protective clothing M010	Protective clothing must be used wherever special work tasks have to be carried out in extreme working conditions and the body may be damaged. Depending on the design, they can protect the wearer from heat, cold, moisture, vapors, radiation, electrical energy, flames, sparks, flammable liquids and chemical substances. High visibility vests, on the other hand, help to ensure that you are not overlooked.
	Use head protection M014	A safety helmet must be worn wherever falling, swinging, toppling or flying objects are likely to hit your head and cause injury. Long hair can cause serious accidents if it is caught by machines or machine parts. Hoods, scarves, caps or close-meshed hairnets are therefore required in appropriate work areas.

4 DESCRIPTION

4.1 System overview

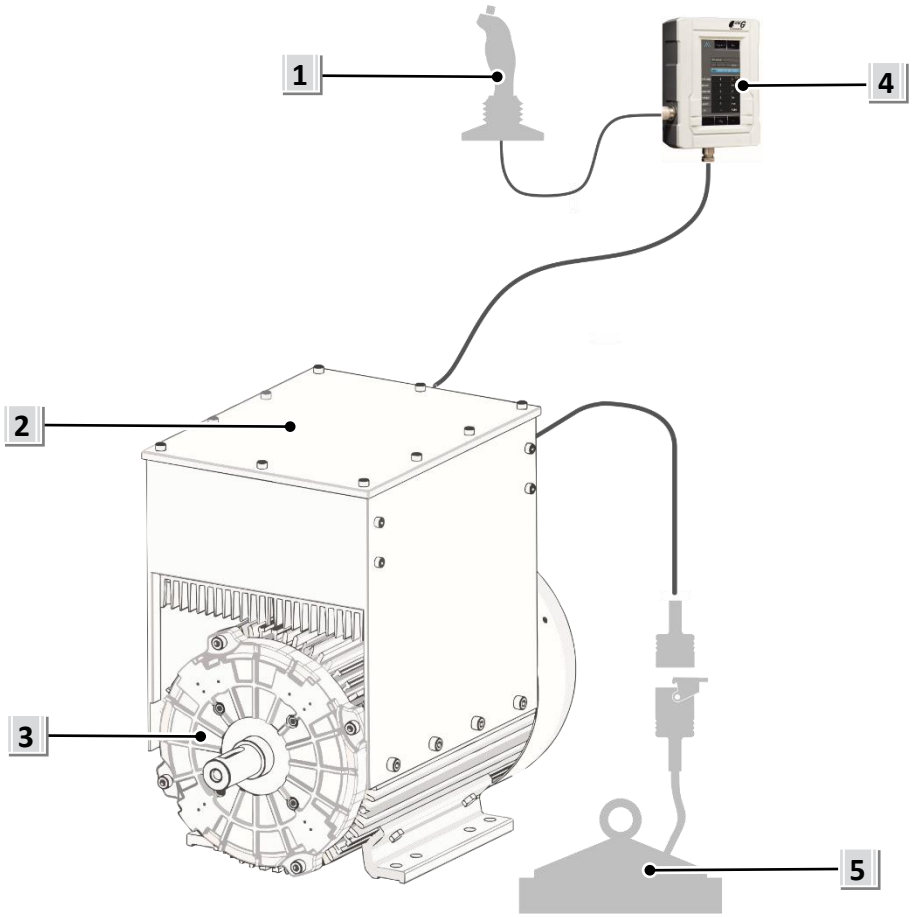


Illustration 1*GEMA* system *overview*

No.	Designation	Function
1	Hand control unit	Operating button (joystick)
2	Controller box	Contains the complete control electronics fully encapsulated.
3	Generator	Brushless, electronically controlled synchronous generator.
4	HMI *operating device*	*HMI control unit for displaying* system statuses and operating the generator functions via the touch display. Interface for connecting the operating button (joystick).
5	Magnetic disk	Magnetic disk system (third-party manufacturer).

Table 1Components of the GEMA *system*

The *GEMA system* is a modular generator system for magnetic plates and can be used, for example, in excavators or in conjunction with power or hydraulic units. The splash-proof and maintenance-free IP54 system consists of a generator with attached control electronics and an *HMI* (Human Machine Interface) *control unit.*

The generators are available as single and dual-bearing generators. With 2-pole and 4-pole versions, models from 9 - 30 kW are available for a wide speed range (1500 - 3600 rpm).

The *HMI control unit* transmits the operator's commands to the generator's control electronics and also serves as a display unit for all system data and operating statuses. It also contains the interface for connecting the operating button (joystick).
The control electronics ensure that the generator outputs the appropriate voltages or currents to the connected magnetic plate.

There are various options for driving the generator. The most common drive type is the belt drive. As an alternative to this type of drive, the generator can be driven by a direct drive, a direct flange-mounted drive or a hydraulic motor. You can find more details on this in the📖 chapter "6.6.5 Drive types and flanges".

4.2 Advantages of the system

In addition to the well-known properties of electronic magnetic disk systems (e.g. rapid magnetization, rapid demagnetization, flexible installation options), the *GEMA system* is characterized above all by the following advantages:

- Precise visualization of all system data on the *HMI operating device*.
- Effective and fast operation with completely different materials thanks to preset, selectable programs.
- Magnetic force can be adjusted by simply pressing a button on the *HMI control unit.*
- Wide speed range for the drive speed, as all *GEMA systems are available in both* 2-pole and 4-pole versions.
- Extremely quiet generator operation thanks to special housing design.
- Simple connection to higher-level control systems via CAN bus (SAE J1939) based communication of the *GEMA components*.
- Maintenance-free thanks to brushless, electronically controlled generator and self-protecting electronics (in the event of cable breakage, short circuit, underspeed, overspeed and overtemperature).

4.3 Normal mode and jog mode

The preset programs of the *GEMA system are* divided into the operating modes "*Normal mode"* and "*Inching mode*".
What is the difference?

The operating mode affects the behavior of the system when the ***Mag.*** button on the *HMI control unit* or the corresponding button on the joystick is pressed. While the magnetic disk is switched on and off with the Mag***. button in "****Normal mode"*, the button must be held down in "Jog *mode" for* as long as the magnetic disk is to be switched on. When the ***Mag.*** button is released in "Jog *mode",* the magnetic plate is switched off immediately (using the magnetization parameters set for the currently selected program).

The following Illustration 2 shows two preset example programs of the two operating modes with the respective current and voltage characteristics on the solenoid.

Program 3: "Normal 50"

Operating mode: Normal operation

Property: Demagnetization with 50 % counter magnetization

Program 5: "TIP 2"

Operating mode: Inching mode

Property: During demagnetization no counter counter-magnetization is activated

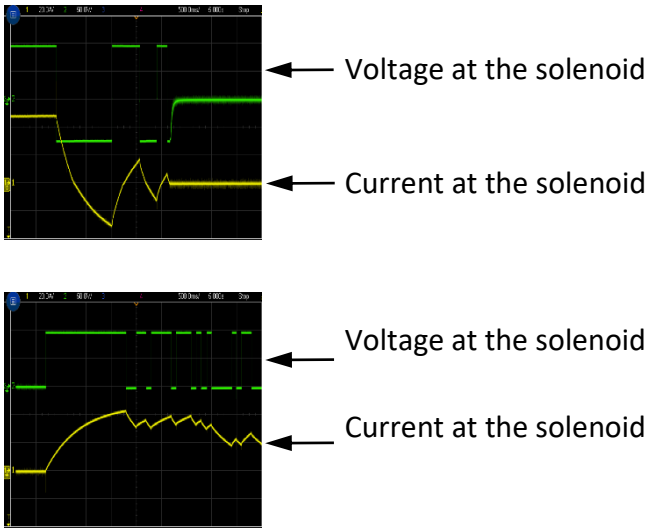


Illustration 2Example programs and their function

4.4 Advantages of the system

4.4.1 Overview of HMI *operating device*

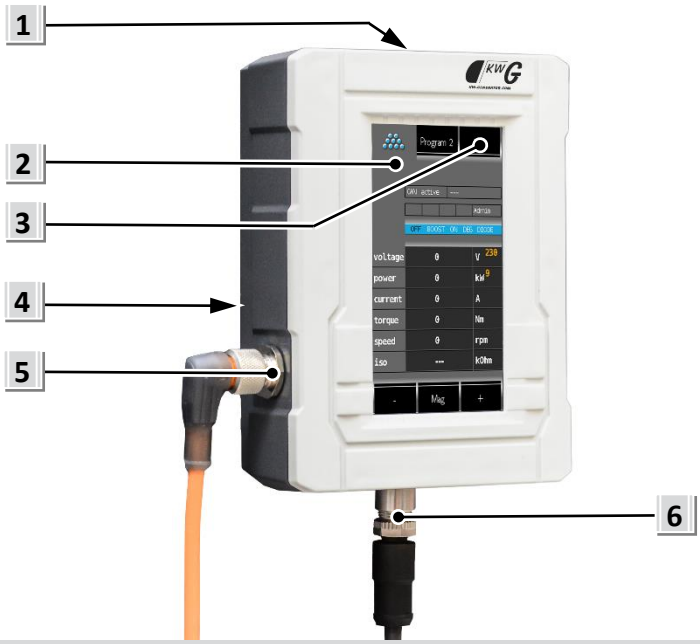


Illustration 3*HMI* operating *device*

No.	Designation	Function
1	Type plate	Type plate with serial number and software version.
2	Touch display with operating buttons	Display for showing system/operating data and error messages, with integrated control buttons for operating the system.
3		
4	Holding magnets	Two holding magnets (on the back or side) for attaching the *HMI control unit*.
5	Connection socket	Socket for connecting the operating button (joystick) (🕮 see chapter 4.4.3).
6	Connection socket (symbolic)	Socket for connection to the generator (🕮 see chapter 4.4.3).

Table 2Components of the HMI control unit

The *HMI control unit* (Human Machine Interface) transmits the operator's commands to the generator's control electronics and also serves as a display unit for all system data and operating statuses.
The *HMI control unit* is mounted within the operator's field of vision so that they can check the operating status of the system displayed on the *HMI* and intervene quickly if necessary.

The operator selects the desired program on the HMI control unit and switches the solenoid on and off. In addition, the solenoid voltage can be changed and programming tasks can be carried out. Further information on the available programs can be found at🕮 Chapter "7.3 Programs and their function".

4.4.2 Display and operating elements on the HMI control unit

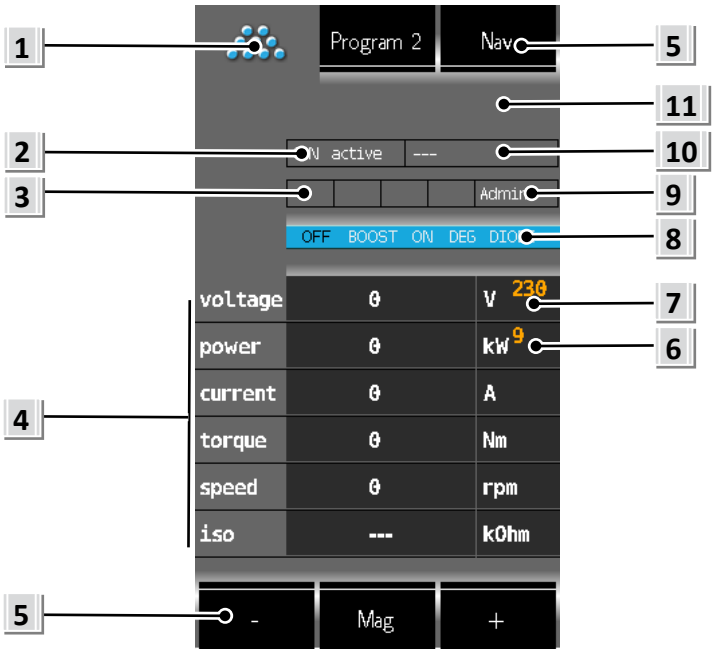


Illustration 4Operating and display elements on the HMI *control unit*
(Main page of the software interface)

No.	Designation	Function
1	Program icon	Displays the currently selected program as an icon.
2	CAN status	Indicates whether the CAN bus is active.
3	Status of the inputs and outputs	Indicates whether inputs are active (i.e. operating button on the joystick is pressed) and whether relay outputs are active (i.e. external LEDs are lit).
4	Display of actual values	Displays the current actual values: **voltage:** Current voltage at the solenoid. **power:** Current power at the solenoid. **current:** Current current through the solenoid. **torque:*Actual** torque on the generator drive. **speed:*Current** speed of the generator drive. **iso:** Current insulation resistance between the phases and the housing. * For applications in which the GEMA system is fed by an energy grid instead of a generator is supplied by an energy grid instead of a generator, the torque is not displayed, but the grid frequency is displayed here in [Hz].

No.	Designation	Function
5	Control buttons	Control buttons for operating the system. Button "**-**": Reduces the target voltage for the magnetic plate by 5 V per step. For display of the target voltage, see no. **7** . Button "**+**": Increases the target voltage for the magnetic plate by 5 V per step. For display of the target voltage, see no. **7** . ***Mag.*** button: Switches the magnetic plate on or off. ***Nav*** button: Switches to the navigation page. ***Program*** button: Selects a preset program. The currently selected program is displayed in the button (e.g.: "Program 2"). The selected program is also indicated by the symbol to the left of it. You can find a detailed description of the programs in🕮 Chapter "7.3 Programs and their function".
6	Rated power	Rated power of the system in [kW].
7	Target voltage	Target voltage at the magnetic plate in [V].
8	Status of the magnetic disk	Displays the current status of the magnetic disk: **OFF:** Off **BOOST:** Boost **ON:** On **DEG:** Demagnetization with counter voltage
9	Users	Displays the user currently logged in.
10	Status of the *Yellow Box*	Indicates whether the Yellow Box (YB) is installed and whether it has been triggered. **YB OK:** Yellow Box is installed. **YB missing:** Yellow Box is not installed. **YB trig.** (red): Yellow box protective circuit has triggered. **---**: No yellow box provided.
11	Display area for error and warning messages	Displays error and warning messages. You can find more information on this in🕮 chapter "9 Troubleshooting".

Table 3Operating and display elements on the HMI control unit

NOTE

🗏 Illustration 4 shows an example of the main page of the software interface. The main page contains the most important system and operating data as well as the operating buttons required to operate the system. Information on the other pages of the *HMI* software interface can be found in the document🕮 "KWG-3HMI User Manual".

These pages include event logs, operating hours counters and diagnostic functions.

4.4.3 Connections on the HMI *control unit*

Available variant 1

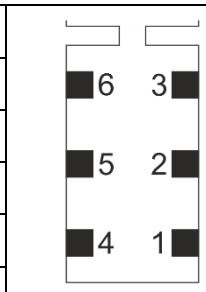
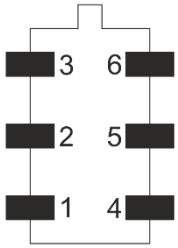
Socket on the *HMI*				**Plug on the connection cable**			
Type: HARTING STAF 6 STI-S				Type: HARTING HAN 3A-GW-PG11 STAF 6 FE-L			
1	Free	-		1	Free	-	
2	CAN0_L	Brown		2	CAN0_L	Brown	
3	CAN0_H	Green		3	CAN0_H	Green	
4	Shield_GND	Yellow		4	Shield_GND	Yellow	
5	+15 V	Gray		5	+15 V	White	
6	GND	Pink		6	GND	Shield	

Table 4CAN bus and supply; connection to GEMA-Controllerbox_V1

Available variant 2

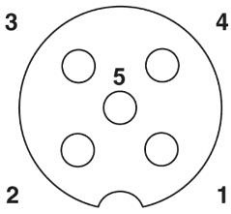
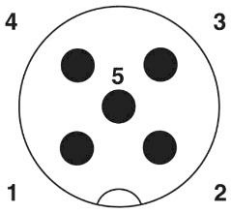
Socket on the *HMI*				**Plug on the connection cable**			
5-pin M12 round plug connector, Socket contacts Type: SACC-E-FS-5CON-M16/0.5 SCO				5-pin M12 round plug connector, Pin contacts			
1	Shield_GND	Brown		1	Shield_GND	Brown	
2	CAN0_L	White		2	CAN0_L	White	
3	CAN0_H	Blue		3	CAN0_H	Blue	
4	GND	Black		4	GND	Black	
5	+15 V	Gray		5	+15 V	Gray	

Table 5CAN bus and power supply; connection to GEMA-Controllerbox_V2

Available variant 3

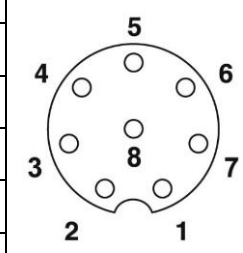
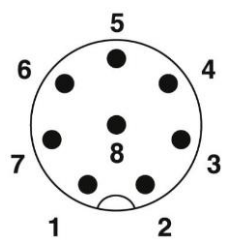
Socket on the *HMI*				**Plug on the connection cable**			
8-pin M12 round plug connector, Socket contacts Type: SACC-E-FS-8CON-M16/0.5 SCO				8-pin M12 round plug connector, Pin contacts			
1	Unused	White		1	Unused	White	
2	CAN0_L	Brown		2	CAN0_L	Brown	
3	CAN0_H	Green		3	CAN0_H	Green	
4	Shield_GND	Yellow		4	Shield_GND	Yellow	
5	+15 V	Gray		5	+15 V	Gray	
6	GND	Pink		6	GND	Pink	
7	Unused	Blue		7	Unused	Blue	
8	Unused	Red		8	Unused	Red	

Table 6CAN bus and power supply; connection to GEMA-Controllerbox_V3

Available variant 1 (standard)

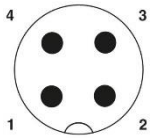
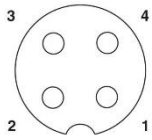
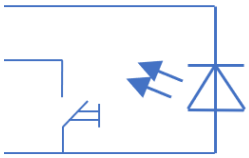
Socket on the *HMI*	Plug on the connection cable	Pin assignment			
		Pin	Function	Color	Wiring
4-pole M12 Circular connector, Pin contacts SACC-E-MS-4CON-M16/0.5 SCO 	4-pole M12 round connector, Socket contacts 	1	Out	Brown	
		2	S1	White	
		3	GND	Blue	
		4	+12 V	Black	
		Pin 1 and pin 3 are connected to each other in the *HMI.* This supplies the externally connected LED.			

Table 7Connection for operating button (joystick)_V1

Available variant 2 (2 inputs)

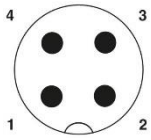
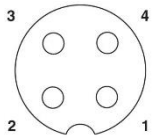
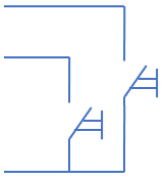
Socket on the *HMI*	Plug on the connection cable	Pin assignment			
		Pin	Function	Color	Wiring
4-pole M12 Circular connector, Pin contacts SACC-E-MS-4CON-M16/0.5 SCO 	4-pin M12 round plug connector, Socket contacts 	1	S2	Brown	
		2	S1	White	
		3	GND	Blue	
		4	+12 V	Black	

Table 8Connection for operating button (joystick)_V2

NOTE

Other variants with a larger number of contacts are available on request.

4.5 Advantages of the system

4.5.1 Overview of generator with control electronics

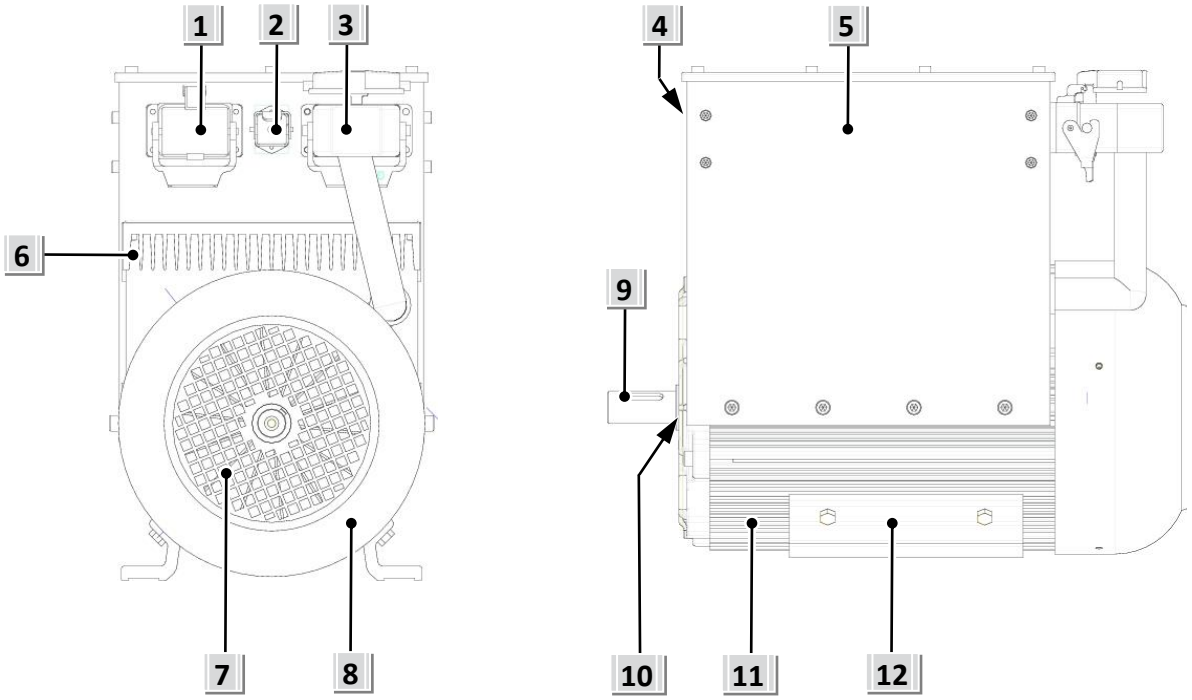


Illustration 5Generator with control electronics (schematic diagram)

No.	Designation
1	Connection for magnetic plate.
2	Connection for HMI operating device (symbolic).
3	Connection for generator cable (plugged in in the illustration).
4	Controller box nameplate.
5	Controller box with control electronics and generator regulator fully encapsulated.
6	Cooling element for cooling the control electronics.
7	Cooling air inlet with protective grille.
8	Fan cover to cover the fan wheel.
9	Drive shaft
10	Generator nameplate.
11	Cooling profiles.
12	Mounting foot with variable mounting dimensions.

Table 9Components of the generator with control electronics

4.5.2 Description Generator

The generators are brushless, electronically controlled synchronous generators that are designed for continuous operation, are maintenance-free and have a long service life.

The generator housing has been optimized for noise reduction, is splash-proof to IP54 and has highly effective ventilation. For cooling, the fan wheel mounted on the rear draws in the cooling air and blows it forwards through the cooling profiles running along the generator housing.

In addition to the reinforced bearing system, the generator offers connection options to all common drives using various adapter flanges.

The generator is mounted on two generator feet with variable mounting dimensions, either directly to the ground or movably on rails (depending on the type of drive).

The controller box attached to the generator contains the power electronics for controlling the voltages and currents for the magnet plate as well as the control electronics for the generator itself. For improved protection against water damage and vibrations, the electronics in the controller box are fully encapsulated.

The electronic control unit can be integrated into existing engine management systems via a CAN interface. The control electronics do not require a separate power supply; they are supplied by the generator.

4.5.3 Connections on the *GEMA* controller *box*

Available variant 1

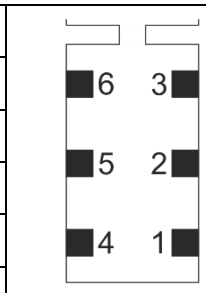
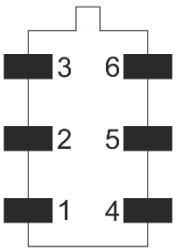
Socket on the *GEMA* controller *box*				**Plug on the connection cable**			
Type: HARTING STAF 6 STI-S				Type: HARTING HAN 3A-GW-PG11 STAF 6 FE-L			
1	Free	-		1	Free	-	
2	CAN0_L	Yellow		2	CAN0_L	Brown	
3	CAN0_H	Blue		3	CAN0_H	Green	
4	Shield_GND	Gray		4	Shield_GND	Yellow	
5	+15 V	Orange		5	+15 V	White	
6	GND	Gray		6	GND	Shield	

Table 10CAN bus and supply to the HMI *operating device_V1*

Available variant 2

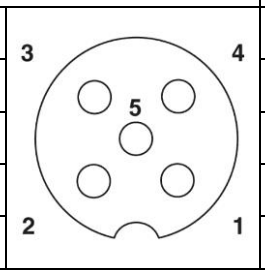
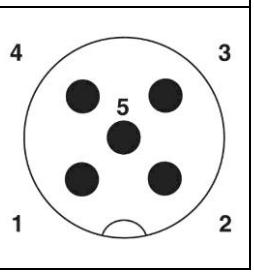
Socket on the GEMA *controller box*				**Plug on the connection cable**			
5-pin M12 round plug connector, Socket contacts Type: SACC-E-FS-5CON-M16/0.5 SCO				5-pin M12 round plug connector, Pin contacts			
1	Shield_GND	Brown		1	Shield_GND	Brown	
2	CAN0_L	White		2	CAN0_L	White	
3	CAN0_H	Blue		3	CAN0_H	Blue	
4	GND	Black		4	GND	Black	
5	+15 V	Gray		5	+15 V	Gray	

Table 11CAN bus and supply to the HMI *operating device_V2*

Available variant 3

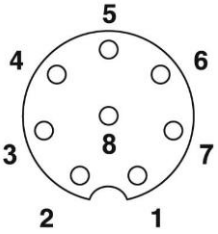
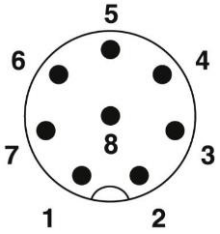
Socket on the *GEMA* controller *box*				**Plug on the connection cable**			
8-pin M12 round plug connector, Socket contacts Type: SACC-E-FS-8CON-M16/0.5 SCO				8-pin M12 round plug connector, Pin contacts			
1	Unused	White		1	Unused	White	
2	CAN0_L	Brown		2	CAN0_L	Brown	
3	CAN0_H	Green		3	CAN0_H	Green	
4	Shield_GND	Yellow		4	Shield_GND	Yellow	
5	+15 V	Gray		5	+15 V	Gray	
6	GND	Pink		6	GND	Pink	
7	Unused	Blue		7	Unused	Blue	
8	Unused	Red		8	Unused	Red	

Table 12CAN bus and supply to the HMI *operating device_V3*

4.5.4 Connection for magnetic plate

DANGER

Dangerous electrical voltage

Death or serious injury due to electric shock

- Before working on the appliance, it must be disconnected from the power supply!
- Work on electrical systems and the *GEMA system* may only be carried out when the system is switched off and de-energized.
- Connecting the load line at the output of the *GEMA system* (positive or negative conductor to the magnetic plate) to earth cancels the "protective separation" protective measure.

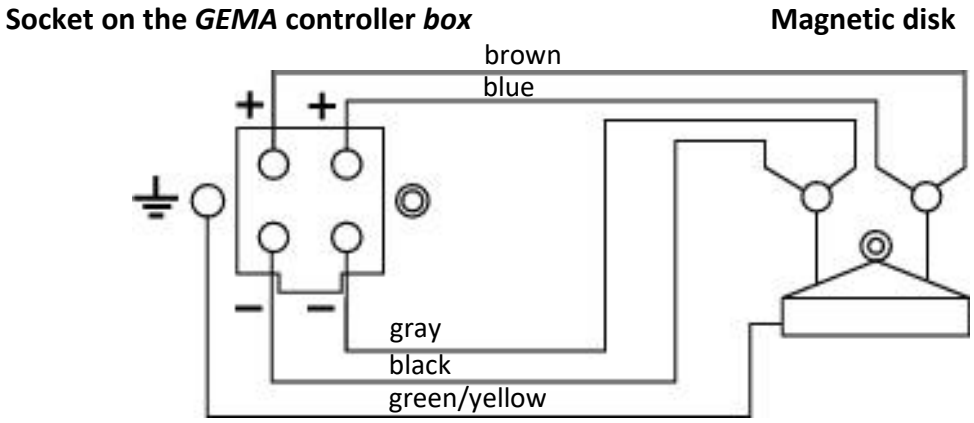


Illustration 6Connection for magnetic plate

Socket on the *GEMA* controller *box*	Plug on the connection cable
GEMA 9, GEMA 15, GEMA 20: HARTING HAN 6	**GEMA 9, GEMA 15, GEMA 20:** HARTING HAN 6
GEMA 25, GEMA 30: HARTING HAN 16	**GEMA 25, GEMA 30:** HARTING HAN 16

Table 13: Connection for magnetic plate - connector types

ATTENTION

Damage to the connection cable or loss of power at the magnetic plate possible due to insufficient cable cross-sections.

- It is recommended that you always use the pre-assembled connection cables from KW-Generator GmbH.
- When using other connection cables, ensure that the required cable cross-sections are observed.
  These can be found at📖 chapter 4.7 "Technical data".

4.5.5 Connection for generator

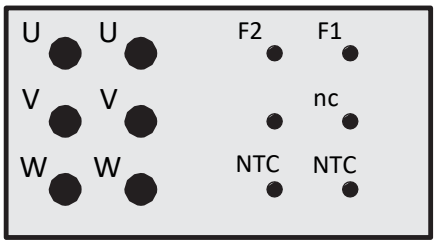
DANGER

Dangerous electrical voltage

Death or serious injury due to electric shock

- Before working on the appliance, it must be disconnected from the power supply!
- Work on electrical systems and the *GEMA system* may only be carried out when the system is switched off and de-energized.
- Connecting the load line at the output of the *GEMA system* (positive or negative conductor to the magnetic plate) to earth cancels the "protective separation" protective measure.

Socket on GEMA controller box for GEMA 9, GEMA 15, GEMA 20



Socket on GEMA controller box for GEMA 25, GEMA 30

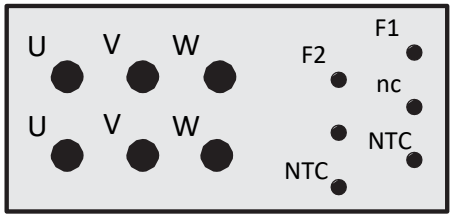


Illustration 7Connection for generator

Socket on the *GEMA* controller *box*	**Plug on the connection cable**
GEMA 9, GEMA 15, GEMA 20: HARTING HAN 10	**GEMA 9, GEMA 15, GEMA 20:** HARTING HAN 10
GEMA 25, GEMA 30: HARTING HAN 16	**GEMA 25, GEMA 30:** HARTING HAN 16

Table 14Connection for generator - plug types

4.6 Type designations and serial numbers

Each GEMA system has unique type designations and individual serial numbers. These are described in the following chapters.

NOTE

Please have the relevant serial number and type designation of the GEMA component in question to hand if you have any queries or need to order spare parts.

4.6.1 Type plate on the GEMA *generator*

Each *GEMA generator* has a unique type designation and an individual serial number. Both numbers can be found on the type plate of the generator.

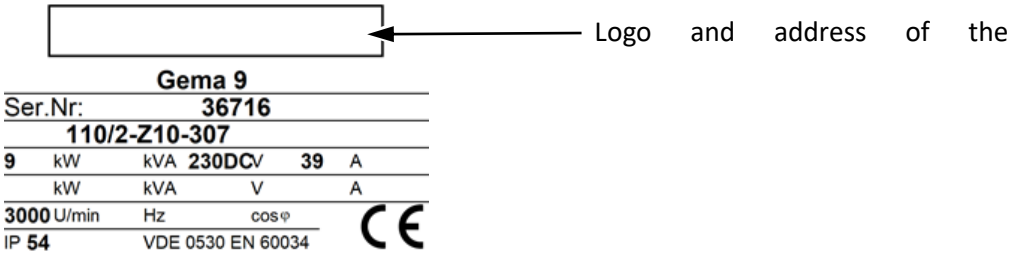


Illustration 8Example of a rating plate for a *GEMA 9* generator

175/4-Z10-XXX

Accessory key
for customized versions

Size and housing shape
10: BG132 standard housing
20: BG160 standard housing

Design
Z: Two-bearing generator
E: Single-bearing generator

Number of generator poles
2-pole generator
4-pole generator

Power key
Iron length in mm

Table 15Structure of the generator type designation (type code)

4.6.2 Type plate on the GEMA controller box

The type plate on the GEMA controller box contains the name and serial number of the controller box as well as information on the software version of the control electronics.

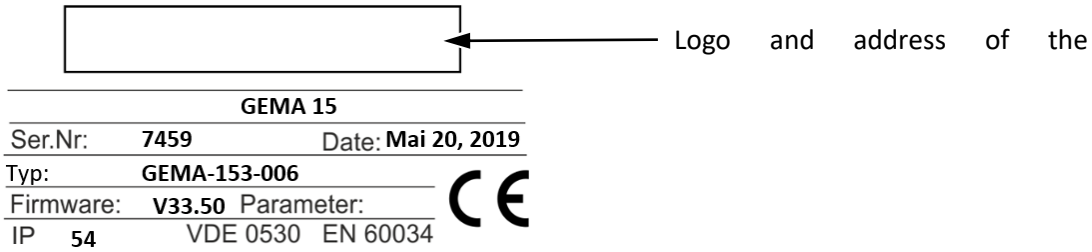


Illustration 9Example of a type plate on the *GEMA* controller *box*

4.6.3 Nameplate on the *HMI* control *unit*

The type plate is attached to the top of the housing of the HMI control unit (see Illustration 3 on page 22). The type plate contains the designation and serial number of the *HMI* as well as information on the software version of the device (firmware version and parameter set).

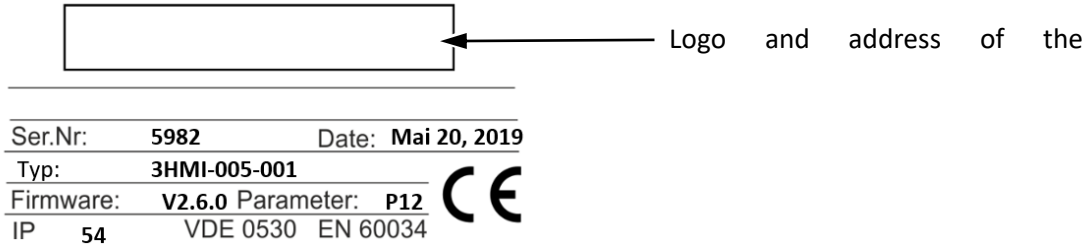


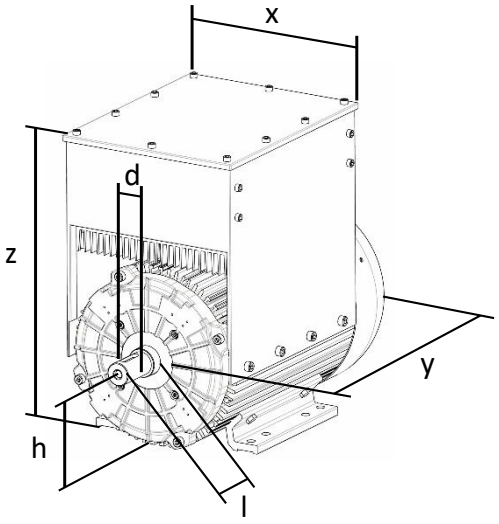
Illustration 10Example of a type plate on the HMI *operating device*

4.7 Technical data

The following table provides an overview of the available *GEMA systems* and their technical data.

	GEMA 9		***GEMA 15***		***GEMA 20***		***GEMA 25 / GEMA 30***	
Number of poles	2-pole	4-pole	2-pole	4-pole	2-pole	4-pole	2-pole	4-pole
Rated power Duty cycle 100% - S1	9 kW		15 kW		20 kW		25 kW/ 30 kW	
Nominal voltage Boost voltage	230 V 280 V							
Rated current	39 A		65 A		86 A		108 A/ 130 A	
Recommended speed (rpm) Speed range (rpm)	3000 2700- 3600	2000 1800- 2500	3000 2700- 3600	2000 1800- 2500	3000 2700- 3600	2000 1800- 2500	3000 2700- 3600	1800 1500- 2500
Dimensions (mm) d x l h x y z	 28 x 60 132 264 425 427	 32 x 60 132 264 434 427	 28 x 60 132 264 450 427	 32 x 60 132 264 459 427	 32 x 60 132 264 525 505		 42 x 110 160 324 466 565	
Weight (mass)	75 kg		95 kg		118 kg		180 kg	
Recommended conductor cross-section of the load cable to the solenoid	5 x 4 mm^2		5 x 4 mm^2		5 x 6 mm^2		5 x 10 mm^2	

Table 16Technical data



The corresponding dimensions are shown in the above Table 16 above.

Illustration 11Dimensions *GEMA* system

5 TRANSPORTATION AND STORAGE

WARNING

Danger from falling objects

Death or serious injury

- To lift the generator, only use the eyebolts provided and suitable for this purpose.

The *GEMA system is* delivered ready for installation and screwed onto a pallet. The components are sealed with a protective film to protect them from water and dirt. The HMI and connecting cables are included.

It is recommended that the *GEMA system is* carefully checked for transportation damage on arrival at its destination. Any visible damage must be reported immediately to the transport company involved and to KW-Generator GmbH.

Only use lifting slings with sufficient load-bearing capacity to lift and move the generator. Ensure that all devices and aids used for lifting the GEMA system are designed to withstand the weight of the *GEMA system* and that all safety precautions have been taken for transportation.

The weights of the various *GEMA systems* can be found at📖 Chapter 4.7.

The ball bearings do not require maintenance during the storage period. Turning the shaft manually from time to time prevents contact corrosion and hardening of the grease.

ATTENTION

Components may be damaged by moisture.

If the connecting cables are disconnected, water and moisture can penetrate the GEMA system through open connectors.

- During transportation and storage, ensure that the cover caps of the plug connectors are properly closed.
- If the generator is not put into operation immediately, it must be stored in a protected, clean, dry and vibration-free location.

Permissible temperatures:	
Transportation	-25 °C to +60 °C
Storage	-20 °C to +50 °C
Permissible relative humidity:	
Transportation	95 %, non-condensing
Storage	95 %, non-condensing

Table 17Storage and transportation conditions

6 INSTALLATION AND COMMISSIONING

This chapter describes the installation and initial commissioning of the *GEMA system*.

The GEMA system may only be installed by authorized and qualified personnel.

Before installing and commissioning the *GEMA system,* carefully read the📖 chapter 3 "Safety instructions".

6.1 Standard scope of delivery

The components included in the standard scope of delivery of the *GEMA system* are listed below. Please check that the delivery is complete before installing the system.

NOTE

Please note that various options are available for the *GEMA system,* which may result in different order scopes. This chapter only lists the standard scope of delivery.

Standard scope of delivery of the *GEMA system*:

- *GEMA generator* with controller box
- HMI *operating device*
- Connecting cable *GEMA generator* <-> *HMI operating* device
- Connecting cable *GEMA generator* <-> magnetic plate
- Connection cable *HMI operating device* <-> joystick

6.2 Preparatory measures

Carry out the following work and checks before installation:

- Remove the protective film and transport locks.
- Check whether the data specified on the type plate of the generator corresponds to the system data.
- Check that all nuts and bolts on the generator are tight and that the mechanical structure is correct.
- Check whether there is sufficient cooling air at the installation location and whether it is ensured that the generator does not draw in any hot air.
- Ensure that there is sufficient space at the installation site for inspection and maintenance work.
- Ensure that the system is secured against access by unauthorized persons and animals and is equipped with the necessary safety devices in accordance with the statutory regulations.
- Check that the connections and connections on the terminal board and on the magnet plate comply with the applicable regulations and that there are no short circuits between the generator and external switches.

6.3 Installing the HMI *operating device*

The *HMI control unit* is mounted in the operator's field of vision. This allows an optimum view of all system data and quick operation of the control functions on the touch display.

The *HMI control unit* is attached to an existing ferromagnetic surface or metal plate using two permanent magnets on the back of the *HMI.*
The metal plate is optionally available in two versions:

- with fixing holes
- self-adhesive.

DANGER

Strong electromagnetic fields

Death or serious injury due to strong electromagnetic fields

- ➢ Before working on the appliance, it must be disconnected from the power supply!
- ➢ Wearers of pacemakers must not carry out any work on the *HMI* control *unit* and must always ensure a sufficient safety distance from the magnetic plate and the *HMI control unit* when operating the system.

CAUTION

Sudden attraction of the permanent magnets

Crushing of the fingers

When placing the *HMI control unit* on the metal plate or ferromagnetic surface, the force of the magnets may cause the *HMI control unit to* be suddenly attracted to the surface.

- ➢ Be careful when placing the *HMI control unit* on the metal plate or ferromagnetic surface.
- ➢ When installing the *HMI control unit*, hold it by the side panels so that your fingers cannot get under the magnets or the rear panel of the *HMI* control unit.

6.3.1 Mounting with metal plate (screw fastening)

Proceed as follows to install the *HMI* with the metal plate:

1. Mount the metal plate to the wall with four screws.
2. Attach the *HMI control unit* to the metal plate using the magnets on the back of the HMI.

The screw heads of the four fastening screws engage in the recesses on the back of the *HMI* and thus serve as an additional locking mechanism.

6.3.2 Mounting with metal plate (self-adhesive)

Proceed as follows to install the *HMI* with the self-adhesive metal plate:

1. Clean the surface onto which the metal plate is to be glued. It must be free of dust and grease.
2. Peel off the film on the adhesive side of the metal plate.
3. Press the metal plate with the adhesive side firmly onto the cleaned surface.
4. The metal plate must not be loaded for at least 4 hours after installation.
5. Then attach the *HMI control unit to* the metal plate using the magnets on the back of the *HMI.*

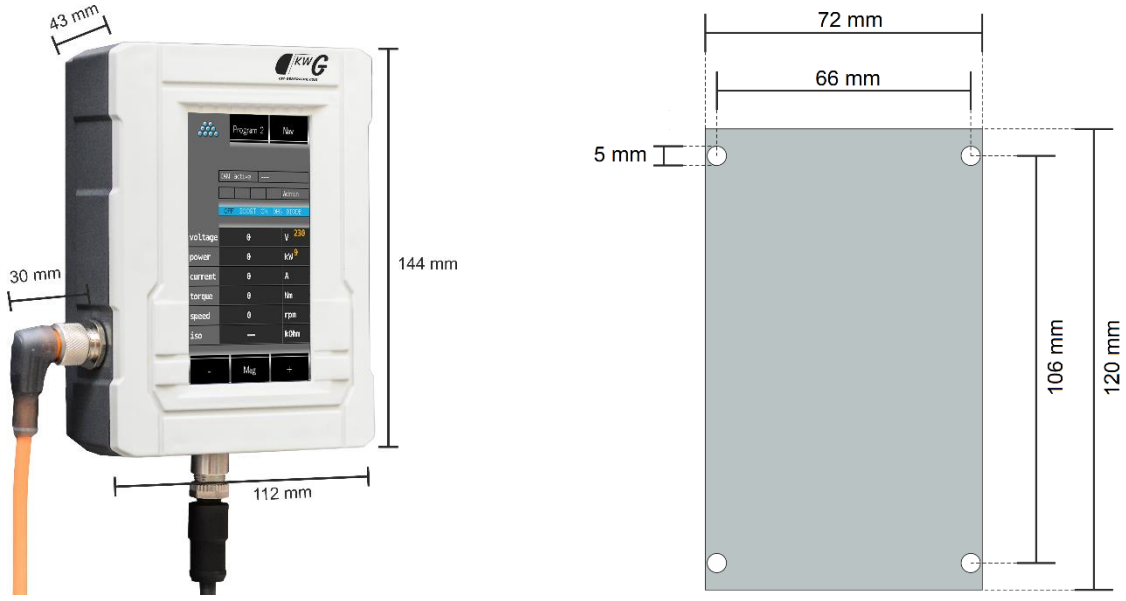


Illustration 12Dimensions of the *HMI control unit* and the metal plate

6.4 Installing the cabling

NOTE

The pin assignments of the individual connection cables can be found in
📖 Chapter 4 "Description".

6.5 Pre-assembled connection cables

It is recommended that you always use the pre-assembled connection cables supplied by KW-Generator GmbH. These cables have been specially selected and carefully tested for the requirements of the systems described and therefore offer the best possible conditions for fault-free and trouble-free operation.

The connection cables *HMI* <-> joystick and *HMI* <-> *GEMA generator* (generator cable) as well as the connection cable for the magnetic plate (load cable) are supplied pre-assembled with connection plugs.

ATTENTION

Damage to the connecting cable to the magnetic plate or loss of power at the magnetic plate possible due to insufficient cable cross-sections.

- ➢ It is recommended that you always use the pre-assembled connection cables from KW-Generator GmbH.
- ➢ When using other connection cables, ensure that the required cable cross-sections are observed.
- ➢ These can be found at📖 Chapter 4.7 "Technical data".

NOTE

If you are not using the cables supplied, please contact the KW-Generator GmbH service department.

6.5.1 Regulations for the laying of connecting cables

All connecting cables must be laid in accordance with the mechanical requirements and protected against damage, adequately fastened and, if necessary, provided with suitable strain relief.

- Do not lay cables over edges without suitable measures to protect them from damage or with direct mechanical contact!
- The total length of the connecting cable between the generator and the magnet plate must not exceed 30 m. If longer connecting cables are required, the cable cross-sections must be adapted accordingly. In this case, please contact the service department of KW-Generator GmbH.

6.6 Installation of the GEMA *generator*

To install the *GEMA generator,* proceed as described in this chapter.

Before installing and commissioning the *GEMA system,* carefully read the📖 chapter 3 "Safety instructions".

6.6.1 Requirements for the installation location

The GEMA *generator* can be mounted at any suitable location, e.g. in the engine compartment of the excavator or on a generator set. The GEMA *generator* is protected against splash water in accordance with IP54 and can therefore also be mounted on the outside of vehicles.

Preferably, the generator should be installed in such a way that even an accidental
Spraying with high-pressure cleaners is not possible.

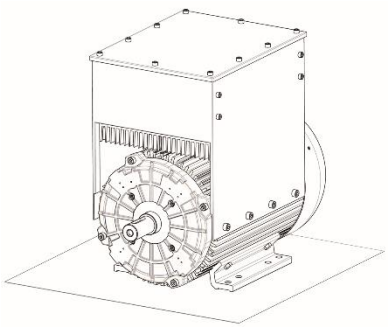
The direction of rotation of the generator is not important for its function. It can be operated both clockwise and counter-clockwise.

The generator must be mounted firmly and securely on an absolutely level surface with sufficient load-bearing capacity for the weight class of the generator. If a belt drive is used, it is advisable to mount the generator in an adjustable manner, e.g. on rails, to allow the belt tension to be adjusted.

The installation location must be selected so that the required minimum distances are maintained, sufficient ventilation is ensured at all times and the temperature of the cooling air does not exceed 40 °C.

6.6.2 Installation position and mounting

The *GEMA generator* must be mounted on a horizontal surface on the generator feet, as shown opposite.



In the normal installation position, the switch box attached to the generator is located on the top of the generator. At the customer's request, the switch box can also be mounted on the generator rotated by 90°.

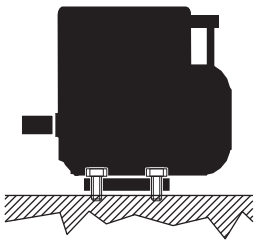
Any other installation position is not permitted!

The following table provides an overview of the tightening torques in Nm for various fastening applications:

Application	Tightening torque for thread size				
	M5	M6	M8	M10	M12
Fastening with light load e.g. terminal board, electrical connections	5 Nm	6 Nm	12 Nm	30 Nm	36 Nm
Fastening with normal load e.g. terminal box cover	5 Nm	8 Nm	14 Nm	24 Nm	39 Nm
Fastening with high load e.g. foot, flange	6.5 Nm	11 Nm	25 Nm	48 Nm	83 Nm

Table 18Tightening torques

The generator must be fastened with four screws (at least M10). The fastening must be permanent and resistant to shocks and vibrations. Screws must be secured against loosening by suitable means, e.g. with a clamping ring in accordance with DIN 128.



4 x M10 fixing screws

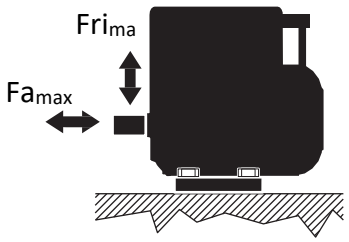


Illustration 13Mounting points and shaft forces

Tightening torque for fastening screws according to the specifications in Table 18.

Permissible load on the shaft:

	Fri_{max}	Fa_{max}
GEMA 9/GEMA 15 (2-pole)	3500 N	175 N
GEMA 9/GEMA 15 (4-pole) and GEMA 20 (2/4-pole)	4000 N	200 N
GEMA 25/GEMA 30 (2/4-pole)	6500 N	325 N

Table 19Permissible load on the shaft

ATTENTION

Damage to the generator, the drive unit or the adapter unit (clutch) possible.

Incorrect alignment can lead to vibrations, bearing damage, damage to the drive unit, damage to the adapter unit (clutch) and unnecessary noise.

- Ensure that the generator is correctly aligned with the drive motor.
- Carry out the alignment carefully and check it after completing the installation.

NOTE

The maximum radial shaft load (Fr_{max}) refers to the center of the shaft end.

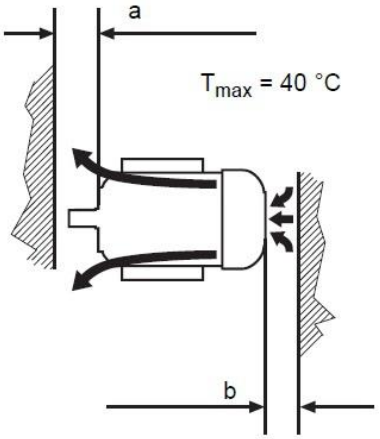
When using single-bearing generators, the dimensions of the connection housing/connection flange and flywheel/shaft cone of the drive motor must be checked. In addition, the dimensions of the flange and the coupling disk/shaft cone of the generator must be checked.

During installation, the minimum clearances and regulations for cooling specified in the following chapter must be observed. The dimensions of the various GEMA generators can be found in the📖 chapter 4.7 "Technical data".

6.6.3 Minimum distances and cooling

The *GEMA generator requires* sufficient ventilation for cooling. The cooling air is drawn in at the rear of the generator through the fan wheel and blown along the front of the housing through the cooling profiles. Appropriate air inlet and outlet openings must be provided.

It is essential that the following minimum distances to fixed parts or walls are observed during installation:



Distance at the front: a = 200 mm

Illustration 14Minimum distances and cooling

ATTENTION

The following instructions for cooling the generator must be observed. Otherwise there is a risk of overheating!

The temperature of the supplied cooling air must not exceed 40 °C. If this temperature threshold is exceeded, the output power of the system is automatically and continuously reduced.

The circulation of the cooling air must not be impaired by other air flows (e.g. from the front or from the side).

6.6.4 Fitting the pulley

WARNING

Danger from moving parts

Death or serious injury

- Never touch the running drive belt or the rotating belt pulley.
- Never operate the GEMA system without suitable protective covers for the drive belt and pulley.
- Always fit the protective covers before commissioning.

To install the pulley, follow the pulley manufacturer's instructions.

The pulley is protected against twisting by a feather key and secured by screwing a screw into the end face of the shaft. The screw must be secured against unintentional loosening by placing a suitable lock washer underneath it.

Threaded hole in the shaft: DIN 332-DS

Tightening torque: see Table 18 on page 41

Illustration 15Mounting the pulley

Please also observe the following instructions for installing the *GEMA system* with belt drive:

- The belt pulley must be pushed onto the drive shaft as far as possible.
- The axis of the driving shaft must be absolutely parallel to the axis of the *GEMA generator.*
- The pulleys of both axles must be flush with each other so that the belt runs absolutely straight.
- For belt drives, the maximum radial forces must be observed.

6.6.5 Drive types and flanges

The generator can be driven in various ways. Special flanges must be fitted to the generator for certain drive types. The available flange types are described below. If you have any questions about the flanges or special drives, please contact KW-Generator GmbH.

V-belt drive

The most commonly used drive type is the belt drive. The generator is connected to the drive machine via a pulley and a belt. The belt drive is a particularly simple, inexpensive and effective

type of drive. It also offers the advantage that the speeds of the drive machine and generator can be optimally matched by selecting the transmission ratio. The flange for the V-belt drive is fitted to the alternator as standard. This can also be used for cardan and clutch drives.

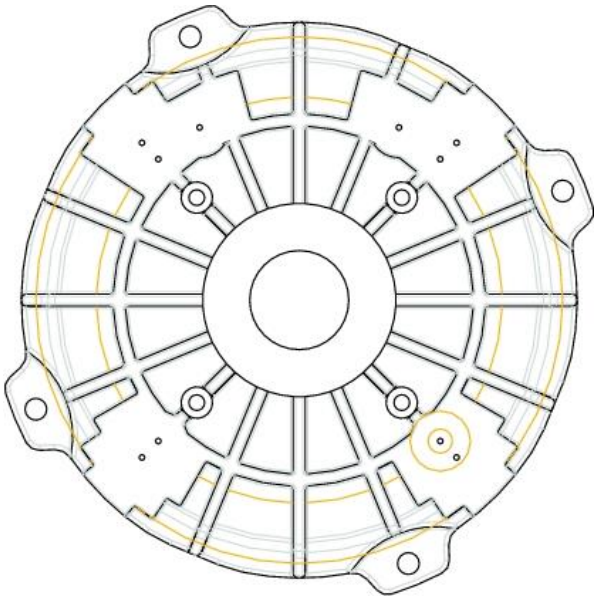


Illustration 16Standard flange for V-belt, cardan and clutch drives

Hydraulic drive / Europe

With the hydraulic drive, the generator is driven by a hydraulic motor that is fed from the vehicle's hydraulic system.

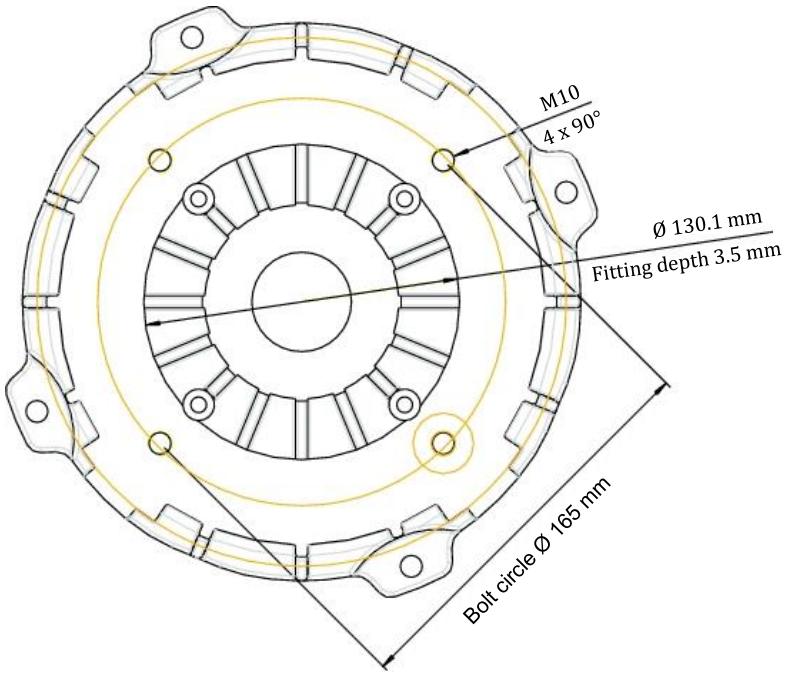


Illustration 17Flange for hydraulic and gear drives

ATTENTION

Damage to the generator due to water ingress possible.

- Close all M10 threaded holes (see Illustration 17) that are not required for installation with a sealing screw.

Drive via direct flange connection / hydraulic drive USA

With the direct flange connection, the shafts of the generator and drive machine are connected via a connection bell. As with the direct drive, the prime mover must also have a suitable speed here, as otherwise the generator will be operated at underspeed or overspeed, which can restrict the function of the system.

NOTE

Suitable SAE connection bells are available as accessories. Please contact the service department of KW-Generator GmbH.

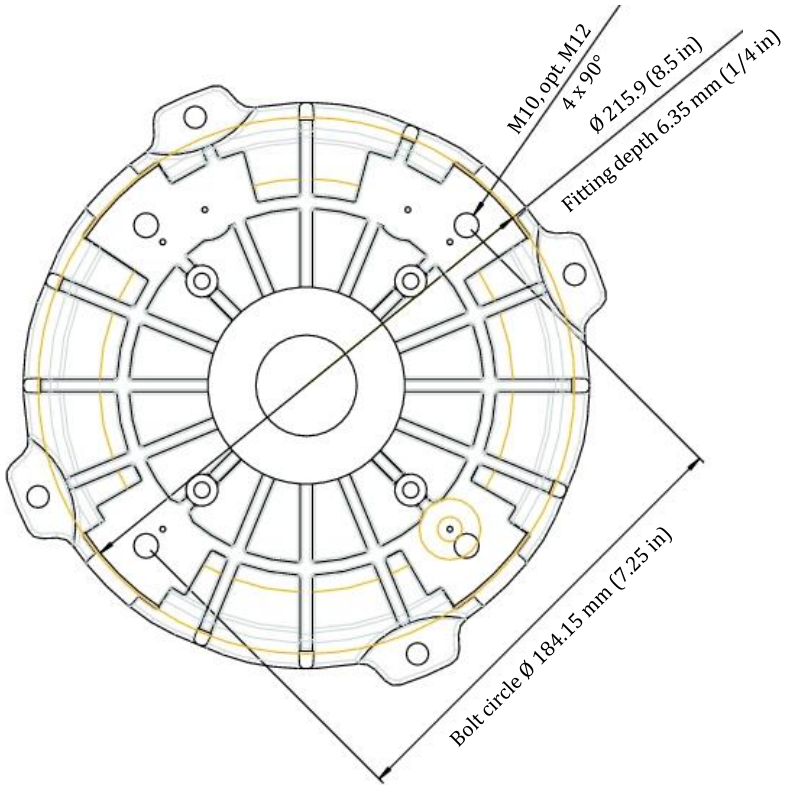


Illustration 18Flange for USA standard and SAE connection bells

ATTENTION

Damage to the generator due to water ingress possible.

- Close all M10 threaded holes (see Illustration 18) that are not required for installation with a sealing screw.

6.7 Commissioning

Carry out the following checks before commissioning the *GEMA system for the* first time. Any defects must be rectified before commissioning.

Before installing and commissioning the *GEMA system,* carefully read the📖 chapter 3 "Safety instructions".

1. Ensure that the *GEMA generator* is mounted correctly and securely (📖 see chapter 6.6).
2. Ensure that the protective covers of the generator drive and the drive itself are correctly fitted.
3. Ensure that all connection and connection cables are laid correctly and protected in accordance with the mechanical requirements (📖 see chapter 6.4)
4. Check that all plug connectors on the *GEMA control box* and on the *HMI control unit* are correctly plugged in and locked.
5. Ensure that the connection cable between the *HMI control unit* and joystick is correctly plugged in and locked.
6. Ensure that the *HMI control unit* is mounted correctly and within the user's field of vision (📖 see chapter 6.3).
7. Check whether the safety precautions for starting the drive machine (e.g. excavator, power unit, hydraulic unit) are complied with in accordance with the applicable guidelines.
8. Start the drive unit and bring it up to the speed that is intended for operating the *GEMA generator.*
9. Read the speed on the *HMI control unit* and compare it with the permissible speed range (📖 see chapter 4.7).

NOTE

If the speed displayed on the *HMI control unit deviates* from the permissible speed range of the generator, either the transmission ratio of the belt drive or the speed of the drive machine or hydraulic drive must be adjusted.

If the generator speed is within the recommended speed range, you can start working. In this case, the speed is displayed in white on the *HMI control unit.* If you leave the recommended speed range, the display of the speed value changes from white to yellow. The operation of the *GEMA system* is described in chapter 6.

NOTE

After initial commissioning, complete the "Installation and acceptance protocol" at📖 Chapter 13 .

In addition to the work specified here, checks must be carried out on the system in accordance with the specifications and regulations of the respective drive/system manufacturer. This also includes the correct installation of protective covers. The person responsible for the system is responsible for carrying out this work.

7 OPERATION

Thanks to the fast magnetization and demagnetization times, the *GEMA system* offers maximum efficiency in material handling. Nevertheless, the time to complete magnetization can take several seconds for large magnetic plates.

To achieve maximum efficiency when working with the GEMA *system,* you should only switch on the magnetic plate after you have placed it on the material to be lifted and not while it is still in the air. The rapid magnetization with shock excitation used in the GEMA *system allows* you to achieve a faster load pick-up.

You can find more detailed explanations of the various operating modes and the processes involved in switching the magnetic disk on and off at📖 Chapter 4.3 "Normal mode and jog mode".

Before installing and commissioning the *GEMA system,* carefully read the📖 chapter 3 "Safety instructions".

DANGER

Non-compliance with warnings and safety instructions

Death or serious injury

- All safety and warning instructions must be followed!
- Before carrying out any work on the appliance, switch it off completely and secure it against unintentional restarting.
- Never switch on the magnetic plate if it is not required for the work. A magnetic plate that is switched on and floating in the air can inadvertently attract or eject material.
- No persons are allowed in the swivel and working area of the magnetic plate.

DANGER

Strong electromagnetic fields

Death or serious injury due to strong electromagnetic fields

- Before working on the appliance, it must be disconnected from the power supply!
- Wearers of pacemakers must not carry out any work on the *GEMA system* and must always ensure a sufficient safety distance from the magnetic plate and the *HMI control unit* when operating the system.

DANGER

Dangerous electrical voltage

Death or serious injury due to electric shock

When disconnecting or connecting plug connections under load, electric arcs can occur which can lead to burns or electric shocks.

- Before working on the appliance, it must be disconnected from the power supply!
- Never disconnect or connect plug connections during operation.

ATTENTION

Risk of damage to the system due to arcing or overheating.

- The *GEMA system* may only be used under the specified ambient and cooling conditions (📖 see chapter 6.6.3 "Minimum distances and cooling") and in compliance with📖 chapter 4.7 "Technical data" must be observed.
- When disconnecting or connecting plug connections under load, electric arcs can occur which can damage the plug contacts.

7.1 Switching on the system

To switch on the *GEMA system,* proceed as follows:

1. Start the drive unit and bring it up to the speed that is intended for operating the *GEMA generator.*
2. You can start working as soon as the "CAN active" information is displayed on the *HMI control unit* (see Illustration 4 "No.2"). Continue with📖 Chapter 7.2 and carry out the self-test of the integrated insulation monitoring (option).

7.2 Self-test of the insulation monitoring (option)

The insulation monitoring self-test is used to check whether the integrated insulation monitoring is working properly. Prerequisite: The generator must be powered.

NOTE

During the insulation monitoring self-test, operation of the *HMI control unit is* only possible to a limited extent.

Proceed as follows for the test:

1. **Press the Nav** button on the HMI control unit in the main page of the software interface. The navigation page is displayed.
2. Press the **System** button on the navigation page of the *HMI control unit*. The system page is displayed.
3. This page shows the current resistance value of the insulation monitoring ("ISO value") and whether the insulation test is currently active or not ("ISO test").
4. Press the **ISO test** button. The self-test is started. The "ISO test" display shows the value 1 for the duration of the test.
5. A test resistor is automatically connected in the controller box, which is used to measure the current value of the insulation resistance (nominal value: 23 kΩ).
6. Use the "ISO value" display to check whether the newly measured resistance value is within the permissible range of 18 kΩ to 28 kΩ. If this is the case, continue with the next step.

   If the resistance value is outside the permissible value range, switch the system off immediately. In this case, contact the KW-Generator GmbH service department immediately.
7. Press the **ESC** button to exit the system page.
8. Press the **ESC button to** exit the navigation page.
9. The *HMI control unit* now displays the main page again.
10. Select your desired program (📖 see chapter 7.3 "Programs and their function")

7.3 Programs and their function

This chapter provides an overview of the preset programs and their functions. The programs have been created and optimized by KW-Generator GmbH and can be used, for example, for automatic sorting and for working quickly and cleanly with different materials.

No.	Name	Properties	Application
1	Normal 40	• Normal operation • Fast magnetization with boost voltage • Demagnetization with 40 % counter-magnetization	Large or heavy materials
2	Normal 50	• Normal operation • Fast magnetization with boost voltage • Demagnetization with 50 % counter-magnetization	Medium-sized or medium-heavy materials
3	Normal 60	• Normal operation • Fast magnetization with boost voltage • Demagnetization with 60 % counter-magnetization	Small or lightweight materials
4			
5	TIP	• Inching mode • Magnetizing without boost voltage • Demagnetization without counter-magnetization	Variable use for manual sorting The inching time determines the solenoid current
6	Normal	• Normal operation • Fast magnetization with boost voltage • Demagnetization with 1x counter-magnetization	Very large or very heavy materials at maximum working speed

Table 20Program overview

7.3.1 Selecting a program

NOTE

An overview of the display and operating elements can be found at📖 chapter 4.4.2 "Display and operating elements on the HMI control unit".

To select a program, proceed as follows:

1. Switch off the magnetic disk by pressing the **Mag.** button on the *HMI control unit* or the corresponding button on the joystick. The display for the magnetic disk status must show "OFF".
2. Press the **Program button** repeatedly until the desired program is shown on the touch display.

   When you release the **Program** button, the selected program is automatically accepted after a short time (indicated by the displayed program number and the corresponding symbol).

NOTE

After program 6, program 1 is automatically displayed again.

7.4 Operation in normal mode

7.4.1 Switching the magnetic plate on and off

Normal operation

In normal operation, the magnetic plate is switched on by briefly pressing and then releasing the Mag. button. The magnetic disk is switched off again by pressing the **Mag. button** again.

Inching mode

In jog mode, the magnetic plate remains switched on as long as the **Mag.** button is actually pressed**.** The magnet is switched off immediately when the button is released.

7.4.2 Change solenoid voltage

In normal mode, the solenoid voltage can be temporarily changed in 5 V increments in the range from 130 V to 230 V during operation. Press the **+** plus button to increase the solenoid voltage and the **-** minus button to decrease the voltage.

NOTE

After restarting the *GEMA control unit,* the default value for the solenoid voltage is automatically active again.

7.5 Extended functions of the HMI operating device

In addition to the main page displayed during normal operation, the software interface of the HMI control unit has additional pages with further information, such as the history of the *GEMA controller*, the built-in DVR generator controller or the parameterizations. Further information on these pages of the software interface can be found in the document📖 "KWG-3HMI User Manual".

ATTENTION

Unintentional modification of preset programs possible through the use of programming functions.

The changes made in programming mode affect all preset programs.

- ➢ Be careful when using the programming function.

7.6 Integrated protection functions of the GEMA *system*

This chapter describes the internal protection functions of the *GEMA system*.

7.6.1 Underspeed/overspeed of the drive unit

The *GEMA system has* a protective function that protects the generator from damage if the speed of the drive machine is outside the permissible speed range. In the event of underspeed and overspeed, the output power of the system is automatically and continuously reduced. This is indicated on the *HMI control unit* by a color change of the speed display from white to yellow.

ATTENTION

Damage to the generator possible in the event of overspeed.

The integrated protective function can only protect the *GEMA system* electrically in the event of overspeed. It offers no protection against mechanical damage to the generator if the mechanical load limit of the generator is exceeded due to extreme overspeed.

- ➢ Ensure that the speed of the drive unit does not significantly exceed the permissible range. The permissible speed range of the generator can be found at📖 Chapter 4.7 "Technical data".

7.6.2 Short circuit in magnetic plate/load cable

In the event of a short circuit, the *GEMA generator* is switched off immediately. The *HMI control unit* then displays the message "Error: external SC" in **red.** This status remains until the GEMA *system* is restarted (📖 see chapter 7.7 "Restarting (resetting) the GEMA control unit".

DANGER

Dangerous electrical voltage

Death or serious injury due to electric shock

When disconnecting or connecting plug connections under load, electric arcs can occur which can lead to burns or electric shocks.

- ➢ Before working on the appliance, it must be disconnected from the power supply!
- ➢ Never disconnect or connect plug connections during operation.

CAUTION

Hot surfaces

Risk of burns

- ➢ Parts of the generator can be very hot during and after operation. Do not touch the generator during operation and allow it to cool down completely after use.
- ➢ Wear safety gloves.

Proceed as follows to localize a short circuit:

1. Stop the drive unit and wait until the touch display of the *HMI control unit* goes out.
2. With the drive unit switched off, unplug the load cable from the *GEMA generator.*
3. Start the drive unit and switch on the magnetic plate.
   - If the error message is displayed again on the HMI control unit when the load cable is disconnected, there is a defect in the control electronics of the *GEMA system.* In this case, please contact KW-Generator GmbH.
   - If the message "Warn. magnet plate open" is displayed on the *HMI control unit* when the load cable is unplugged, the cause of the short circuit is in the load cable or on the magnet plate. In this case, continue with step 4.
4. Find and eliminate the cause of the short circuit.
5. Plug the load cable back into the *GEMA generator* and then start the drive unit.
6. Make sure that no more error messages are displayed on the *HMI control unit.*

7.6.3 Interruption in magnetic plate/load cable

If an interruption in the load line is detected after the solenoid is switched on, the *GEMA system switches* off automatically. The *HMI control unit* then displays the message "Warn. magnet plate open" in ***yellow.***

An interruption may be due to a defect in the load cable or the solenoid or an incorrectly locked plug connection. The error message is also displayed if the system is operated without a load solenoid.

The error message must be reset by pressing the **Mag.** button**.**

7.6.4 Overtemperature

The controller electronics and the generator are cooled by the generator fan. If this is defective, the air inlet is blocked or the ambient temperature is too high, the system is protected from overheating by two different protective functions:

- Generator temperature measurement: If the temperature measured at the generator is too high, the controller automatically and continuously reduces the output power. Once it has cooled down, the full output power is also automatically available again.
- Measurement of the electronics temperature: If the temperature inside the controller box is too high, the generator output is automatically switched off. The HMI control unit then displays the message "Error overtemp." in ***red.*** After cooling down, the error message disappears and the system is ready for operation again.

NOTE

If the temperature inside the controller box rises, the message "Warn: Controller overtemp." is displayed on the *HMI control unit* before the switch-off temperature is reached. If the temperature rises by a further 10 °C, the output is switched off.

7.6.5 Earth fault/insulation fault

The *GEMA system is* protected against earth faults in the load cable and the magnet plate (e.g. due to age-related breakdown of the windings).

DANGER

Dangerous electrical voltage

Death or serious injury due to electric shock

- ➢ In the event of an earth fault, there is an insulation fault and the protective measure "protective separation" is canceled. The *GEMA system* may then no longer be used.

7.6.6 Multiple faults in the load circuit

If an insulation fault and an interruption in the load line occur at the same time, very high voltages can occur which can destroy the control electronics, the plug connections or the load solenoid.

The installation of the optionally available Yellow Box prevents damage to the above-mentioned components by limiting the voltage generated in the event of a fault and simultaneously switching off the GEMA system.

For further information, please contact KW-Generator GmbH.

The status of the Yellow Box is displayed on the HMI control unit (see Illustration 4no. 10 in the picture).

7.7 Restarting (resetting) the GEMA control unit

In certain cases, it may be necessary to restart (reset) the *GEMA control unit* (e.g. in the event of a short circuit in the load cable).

Proceed as follows to restart the system:

1. Stop the drive unit and wait until the touch display of the *HMI control unit* has completely gone out.
2. Then restart the drive unit and wait until the CAN status "CAN active" is displayed on the HMI control unit (see Illustration 4no. 2 in the picture).
   The system is then ready for operation.

8 MAINTENANCE

The components of the *GEMA system* are basically maintenance-free. Nevertheless, the maintenance work listed in this chapter must be carried out regularly to ensure reliable operation of the system.

In addition to the work specified here, inspections must be carried out on the system in accordance with the specifications and regulations of the respective drive/system manufacturer. This also includes installed protective covers. The person responsible for the system is responsible for carrying out this work.

Damage and defects in the *GEMA system* must be rectified immediately. The system may not be put into operation until the defects have been rectified.

Maintenance and repair work on the *GEMA system* may only be carried out by authorized and qualified personnel.

Before installing and commissioning the *GEMA system,* carefully read the📖 chapter "3 Safety instructions".

DANGER

Dangerous electrical voltage

Death or serious injury due to electric shock

- Visual inspections and cleaning work on the *GEMA system* for maintenance purposes must never be carried out during operation.

CAUTION

Hot surfaces

Risk of burns

- Parts of the generator can be very hot during and after operation. Do not touch the generator during operation and allow it to cool down completely after use.
- Wear safety gloves.

ATTENTION

Damage to parts of the system possible.

- Neither the generator nor the controller box contain any parts that can be replaced or repaired by the user. Only the work described in these instructions may be carried out.
- Do not open or dismantle the generator or the controller box. The generator and the controller box may only be opened by the manufacturer or an authorized body.

ATTENTION

Damage to components due to water ingress possible.

- Never expose the components of the *GEMA system to* the jet of a high-pressure cleaner.

8.1 Maintenance schedule

The following maintenance work must be carried out in good time by the relevant persons.

Interval	Maintenance work	Executing person
working day	• Check the generator system for unusual noises by listening. • Check insulation monitoring (option) for correct function (📖 see chapter 7.2 "Self-test of the insulation monitoring (option)"). • Visual inspection for defects on the load cable, especially in the area of the magnetic plate.	Users
weekly	• Visually check for dirt or damage and clean if necessary. • Check cooling air openings for dirt and blockages and clean if necessary.	Users
every 5000 operating hours	• Check the ball bearing by listening and replace if necessary (unusual running noises).	Qualified specialist

Table 21Maintenance schedule

9 TROUBLESHOOTING

Malfunction	Possible cause	Remedy
Generator makes noise.	Foreign object in the fan cowl.	Remove foreign bodies.
	Ball bearing is defective.	Have the ball bearing checked by a specialist.
	The drive unit is not working correctly.	Replace the V-belt or adjust it to the correct tension. Check the drive for running noises.
Mechanical damage to the generator.	Damage to the generator detected during maintenance work.	Contact KW-Generator GmbH and, if necessary, show the damage with a photo. Take the generator out of operation until the matter has been clarified in order to prevent further consequential damage.
Display on the *HMI control unit* without function.	Generator does not turn.	Start the drive unit.
	Generator cable or HMI cable is not plugged in.	Plug in the cable.
	HMI cable is defective.	Replace cable.
	HMI control unit defective.	Replace the control unit.
	GEMA controller defective.	Replace controller.
HMI control *unit* displays "CAN active". Joystick is without function.	Connection cable or joystick defective.	Check whether the system can be operated using the Mag. button on the HMI control unit. If yes, check or replace the connection cable to the joystick.
HMI control unit displays "Warn. magnet plate open".	Load cable or magnetic plate is interrupted.	Check the connecting cable and magnetic plate for interruptions and eliminate them.
HMI control unit displays "Error: overtemp".	Controller has switched off the generator because the temperature has been exceeded.	Switch off the system. Wait until the generator has cooled down.
HMI control unit displays the message "YB trig".	Yellow Box has triggered due to a multiple error.	Switch off the system. Eliminate the insulation fault and interruption.
HMI control unit displays the message "Error: overvoltage".	Permanent overspeed of the generator or temporary speed peak above the permissible speed range.	Check speed. Check belt transmission. Check the speed of the drive unit. Check the hydraulic circuit.

Malfunction	Possible cause	Remedy
System is working, but has too little power. The solenoid voltage is below the set target value.	Drive speed not within the valid range (most common cause).	Check the drive unit.
	Setting for solenoid voltage, power or torque too low.	Check the setpoint settings and correct if necessary.
	Generator is too hot.	Wait until the generator has cooled down.
	Magnetic plate has winding faults.	Magnetic plate current on the *HMI* control unit is greater than the rated current specified on the magnetic plate rating plate. Replace the magnetic plate.
	Magnet is very hot.	Magnetic plate current on the *HMI* control unit is significantly lower than the rated current specified on the magnetic plate rating plate. Replace the magnetic plate.
System works, performance is uneven.	Slippage occurs in systems with a belt drive.	Check belt tension, correct if necessary.
	In systems with hydraulic drive, the hydraulic motor cannot maintain the speed (most common cause).	Check the hydraulic circuit.

Table 22Typical causes of errors and possible remedial measures

For further troubleshooting measures, please contact KW-Generator GmbH or request the relevant documents from them.

10 REPAIR

The user is not permitted to carry out any repair or maintenance work on the components of the *GEMA system.* This type of work may only be carried out by authorized and qualified specialist personnel. We strongly recommend that the GEMA *system is* removed for this work and sent to KW-Generator GmbH.

To carry out maintenance work on the *GEMA system,* follow the📖 chapter 3 "Safety instructions".

11 DECOMMISSIONING, DEINSTALLATION, DISPOSAL

Carry out the decommissioning and uninstallation of the *GEMA system* according to the descriptions in📖 chapter 6.6 "Installation of the GEMA *generator*".

A *GEMA system* that is still functional must be uninstalled according to the descriptions in📖 chapter 5 "Transportation and storage" must be packed and stored.

Observe the applicable legal regulations when disposing of or recycling generator systems that are no longer functional. If necessary, commission a disposal company. Further information can be obtained from the relevant environmental authorities or from KW-Generator GmbH.

Designation	**Material**
GEMA generator *housing*	Aluminum
Fan cover	Iron/steel
Fan wheel	Polypropylene
Rotor/shaft	Iron/steel
Windings/insulation	Copper, cured impregnating resins
Circuit boards/electronic components	Disposal as electronic waste
HMI *housing*	ASA (acrylonitrile-styrene-acrylate copolymer)

Table 23Maintenance schedule

12 SPARE PARTS

Please contact KW-Generator GmbH directly for spare parts due to the possible wide range of variants.

13 INSTALLATION AND ACCEPTANCE PROTOCOL

The installation and testing of the correct function of the *GEMA system must be* confirmed by the person responsible. The following installation and acceptance protocol must be completed in full for this purpose.

Installation site: □ Excavator □ Aggregate □ Magnetic disk
□ Other:

Manufacturer: Type:

Installed system: □ GEMA 9/2 □ GEMA 9/4 □ GEMA 15/2 □ GEMA 15/4
□ GEMA 20/2 □ GEMA 20/4 □ GEMA 25/4 □ GEMA 30/2
□ GEMA 30/4 □ Other:

Special features Structure:

Serial numbers: GEMA generator:
GEMA control box:
HMI:

Program version: Generator controller:
GEMA control box electronics:
HMI:

Yellow Box: □ Installed □ Not installed

Installation accessories (e.g. cable sets, tension pulley, belt pulley):

Installed magnetic disk:
Manufacturer:
Type:
Performance:
Cable connection:

HMI cable: Plug type: Cable length:

Load cable: Type :Cross-section: Cable length:

***HMI version*:** □ Magnet bottom □ Magnet left □ Magnet right

Position of operating button connection:

Accessories: □ Metal plate for *HMI* Position:

Function test (conditions): Speed: Power:
Voltage: Current:

Installation by:

Perform a functional test:

Acceptance by:

Notes on installation and commissioning: