

WARNING NOTES

- Care must be taken when connecting the device, as it may be destroyed if incorrectly connected.
- All details of the connection specifications must be fulfilled.
- The PE(N) must be connected for security reasons to terminal 5 on the X403.
- The leakage current of the noise filters is 22 mA in case of a 2-phase voltage lost.
- Only adequately qualified personnel should undertake the installation and commissioning.
- The relevant regulations, especially the VDE regulations, must be observed.
- The SERVICE MANUAL should be read carefully before commissioning.
- The device must be parameterised in such a way that any risk to persons or property is prevented.
- The charging device must be switched off before the battery is disconnected.
- The negative pole of the battery must be grounded at the input terminal of the switchboard. The minimum conductor cross-section is 10 mm².
- The screens of the analogue input wiring must be connected to the earth screws on the KEA cover, and must have no connection to any other metal parts.
- The supply voltage can be set to 12 or 24 V DC with a switch on the RZ 071-D.
- When the supply voltage of the control unit has been switched off, you must wait at least 20 seconds before applying it again.
- All coils must be fitted with reverse diodes to prevent high voltage peaks. All other coils or inductive loads must also be fitted with suppressor elements. The same applies for all relays and inductors that are used in the switchboard or controlled externally.
- The shielding of the analogue wiring must only be connected the earth screws beside the terminal strip X 401 and may have no galvanic connection to any other metal parts.

CONTENTS

Design	Page 2
Connection	Page 2
Operation of the display	Page 3
– Contrast setting	Page 3
– PIN number, IDENT-NUMBER	Page 3

Parameterisation	Page 4
Connection of RZ 071-D	Page 5
Technical Data	Page 7
Order number codes	Page 8

DOCUMENT HISTORY

Revision	Modification	Released	Revision	Modification	Released
11/2005	First edition	05-11-30			
01/2006	Connection of RZ 071-D	06-01-11			
06-06-06	Format	06-06-06			
06-08-07	Menu structure	06-08-07			

Changes without further notice reserved.

DESIGN

The control unit is incorporate into the front door of the switchboard. The front meets the protection class IP 44 when installed. The two rows of LEDs are marked with interchangeable labels. The relay unit is mounted on the mounting plate and linked to the control unit in the door with the supplied cable.

The control unit has an optic fibre or USB interface (selected by a toggle switch) for the connection of a PC. The following settings (password protected) and analogue readouts are possible.

PARAMETERISATION

- Mains voltage monitor,
- Mains failure monitor in parallel mode,
- Generator voltage and current monitor,
- Text input (consumer defined) for the first 19 alarms and encoding for all alarms,
- Battery monitor,
- Start-stop parameters,
- Speed sensing,
- Mains/generator change-over,
- Relay and output functions,
- Names and limit values for the analogue inputs,
- Frequency control for isolated operation,
- Voltage control for isolated operation,
- PF control for parallel operation,
- Load controller,
- Internal synchronisation unit,
- General parameters.

ANALOGUE READOUTS

- Actual values:
 - o Voltages,
 - o Currents,
 - o Active and apparent load,
 - o Power factor,
 - o Speed,
 - o Battery voltage,
 - o Actual values of the four analogue channels.
- Actual status of the digital inputs of the relay unit RZ 071-D,
- Actual status of the output relays,
- Timers' status.

CONNECTION

- **Trained experts may only make the connections of the KEA.**
- **The PE(N) must be connected for security reasons to terminal 5 on the X403.**
- **The charging device must be switched off before the battery is disconnected.**
- **When the supply voltage of the control unit has been switched off, you must wait at least 20 seconds before applying it again.**
- **The negative pole of the battery must be grounded at the input terminal of the switchboard. The minimum conductor cross-section is 10 mm².**
- **The supply voltage can be set to 12 or 24 V DC with a switch on the RZ 071-D.**
- **The screens of the analogue input wiring must be connected to the earth screws on the KEA cover, and must have no connection to any other metal parts.**
- **All coils must be fitted with reverse diodes to prevent high voltage peaks. All other coils or inductive loads must also be fitted with suppressor elements. The same applies for all relays and inductors that are used in the switchboard or controlled externally.**

The following signals (if needed) are directly applied to the control unit:

- Voltage of mains and generator,
- Current of generator,
- Four analogue sensors,
- Battery voltage for monitoring
- Pick-up,
- Two analogue output signals,
- Optical fibre or USB for parameterisation,
- Two CAN bus systems.

Although the control system is protected against reverse polarity, the correct polarity when connecting the battery voltage must be strictly observed, as reverse diodes or other electronic parts of the switchboard may possibly be damaged.

The fuse on the RZ 071-D will be blown, if the control system is connected with the wrong polarity!

Due to the fact that most of the control relays may be configured for various functions, only the status print out of the supplied control unit is to be considered as a binding document. It must be observed, that in case of a possible replacement of a unit, any modifications made after commissioning cannot be taken into account by the manufacturer.

OPERATION OF THE DISPLAY

Values or parameters are selected, as you would read a book. The further down listed groups are arranged as 'pages'. You can scroll forwards and backwards through these groups by pressing the [→] and [←] keys. The entries of each group can be read from top to bottom like lines of a text. Select a line by pressing the keys [↓] (down) and [↑] (up). The selection starts again with the other end of the 'page', when the top or bottom of the 'page' is reached.

Hold down the LED TEST button and press [←] to select directly the ACTUAL VALUES group, hold down LED TEST and press [→] to display the group CURRENT ALARMS.

To modify a parameter, first enter the relevant IDENT-NUMBER. However, parameters of group 0, -GENERAL PARAMETERS-, can be modified without entering this number. Parameters are modified as follows:

1. Select the required parameter group with the [←] and [→] buttons. One or two parameters are displayed.
2. Press OFF and LED TEST (function: PARA ON or PARA OFF) together. This opens parameterisation mode as can be seen by the specific cursor [█]. The selection of the group cannot be changed now.
3. Select the required parameter line (if two are displayed) with the [↓] and [↑] buttons.
4. Press OFF and ALARM OFF (ENTER function) together to select the parameter line. The shape of the cursor confirms the selection, as it underscores (e.g. 196) now the part of the parameter that is to be modified. The chosen parameter cannot be deselected now.
5. Select the figure or letter of the parameter that you want to modify with the [←] and [→] cursor keys. Numerical parameters can be increased or decreased by increments of 1 with the [↑] and [↓] buttons. Press the same buttons to negate parameters that are displayed with a letter (+/- signs, alarm coding etc.).
6. Press OFF and ALARM OFF together to store the displayed parameter. Press OFF and LED TEST instead of OFF and ALARM OFF to abort parameterisation.

Display contrast setting

Hold down LED TEST and press key [↑] to increase the display contrast (makes the display darker) or LED TEST and key [↓] to lower it (makes the display lighter).

PIN Number, Ident-Number

To modify a parameter, you first have to enter the relevant IDENT-NUMBER. This number is compared with the PIN NUMBER, and if they are identically, the user is authorised to parameterise the device. The user can chose any PIN NUMBER between 00000 and 50000. The PIN NUMBER and IDENT-NUMBER are factory set to 00000.

A special IDENT-NUMBER can be obtained on enquiry from the factory if you forget your PIN NUMBER, so that a new PIN NUMBER can be entered. Modify the PIN NUMBER as follows:

- Enter the currently valid IDENT-NUMBER. The pin number is now also shown.
- Enter a new PIN NUMBER.
- The IDENT-NUMBER previously entered is now no longer valid.

The IDENT-NUMBER is deleted 15 minutes after the last input, if the user has not previously set it to an invalid value.

The automatic deletion of the IDENT-NUMBER is however not carried out while 00000 is set as the PIN.

PARAMETERISATION

Menu structure *)

Group 0	Group 1	Group 2	Group 3	Group 4
KEA 101 SPL0 KUHSE GmbH	ACTUAL VALUES	ENCODING OF ALARMS	MAINS VOLTAGE MONITOR	GENERATOR VOLTAGE MONITOR
	COUNTERS		MAINS FAILURE IN PARALLEL SERVICE	GEN. CURRENT MONITOR
Group 5	Group 6	Group 7	Group 8	Group 9
ANALOGUE INPUTS	SPEED MONITORING SPEED GOVERNOR	START-STOP FUNCTIONS	PARAMETER FOR MAINS <> GEN.	RELAY / LED FUNCTIONS
ANALOGUE OUTPUTS	SPEED GOVERNOR	BATTERY VOLTAGE MONOTOR		
		ADDITIONAL PARAMETERS		
Group 10	Group 11	Group 12	Group 13	Group 14
LOAD CONTROLLER PF CONTROLLER	SYN. FUNCTION f/U CONTROL	ACTUAL VALUES VIA CAN BUS	THERE ARE NO CURRENT ALARMS	THERE ARE NO CURRENT ALARMS
PF CONTROLLER	FREQUENCY CONTROL VOLTAGE CONTROL			

*) Since software version 8

The functions and parameterisation are described in

PA100V00-E, FUNCTIONS AND PARAMETERISATION KEA 101- 112.
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This document contains all possible functions featured in the KEA Series 101-112. Please note however, that only those functions, listed in the Operation manual, are actually implemented. The PARAWIN parameterisation program also shows only the parameters that are possible for the particular control unit.

Group	Function	Section in FUNCTION AND PARAMETERISATION
2	Encoding of alarms	Alarm monitoring
3	Mains voltage monitor	Voltage monitor
3	Mains failure in parallel service	Protection of parallel operation
4	Generator voltage monitor	Voltage monitor
4	Generator current monitor	Current monitor
5	Analogue inputs	Analogue interface
5	Analogue outputs	Analogue interface
6	Speed monitoring, speed governor	Speed signals and governor
6	Speed governor	Speed signals and governor
7	Start-stop functions	Parameter for start and stop
8	Additional parameters	Additional parameters
8	Battery voltage monitor	Additional parameters
8	Counters	Additional parameters
8	Additional timers	Additional parameters
9	Parameters for mains <> generator	Transfer mains – generator supply
10	Relay / LED functions	Parameterisation of relays
11	Load controller, PF controller	Load and PF controller
11	PF controller	Load and PF controller
12	Syn. function, f/u control	Synchronisation
12	Frequency control	Synchronisation
12	Voltage control	Synchronisation
	Connection of KEA and RZ	Connection
	Operation Manual	See TA101SX3-D

CONNECTION OF RELAY UNIT RZ 071-D

The contacts for the terminals 1 to 28 must be connected to [L-] potential. Terminal 29 is provided to be connected to terminal D+ of the charging dynamo. The "running" signal is active when the voltage exceeds about 8 volts DC. An AC-dynamo receives the pre-excitation via this terminal.

The functions of several relays may be different, according to their programming. Therefore, the individual printed status report is valid for a specific control unit.

The stated contact rating of the relays must not be exceeded. Basically is valid, that all operated coils and inductivities must be provided with reverse diodes (on DC) or with suppressor components matching the inductivity of the coil.

Terminals 1–14: Input for alarms signals.

Terminal 15: Feed back signal: MAINS IS OFF.

An auxiliary contact (NC) of the mains CB (or contactor) is connected to this terminal. It shows the position of the breaker. The control unit is fitted with an interlocking circuit which prevents the generator from switching on (without synchronising) as long as the mains is supply on.

Terminal 16: Feed back signal: GENERATOR IS OFF.

An auxiliary contact (NC) of the generator CB (or contactor) is connected to this terminal. It shows the position of the breaker. The control unit is fitted with an interlocking circuit that prevents the mains from switching on (without synchronising) as long as the generator is supply on.

Terminal 17: Operation mode selection is locked.

The selection of the operation modes by the push-buttons will be locked if a signal is applied at this terminal. A key-operated switch, to prevent the selected mode from being changed by unauthorised persons or by mistake, could perform this.

Terminal 18: Remote start with load transfer.

There are two programmable modes for this input: input always active or input only active along with a mains voltage failure.

If an active command is stated, the start of genset will be initiated and the load will be transferred from mains to generator supply in the operation mode AUTO.

If the genset is already running in TEST or AUTO mode or was started by the signal REMOTE START WITHOUT LOAD TRANSFER, the generator will also takes over the load

The load will be switched back to mains supply after the re-connection delay and the genset will be shutdown (in AUTO) after cooling down period when the signal to this terminal is disconnected (the signal for REMOTE START WITHOUT LOAD TRANSFER may not be present).

Terminal 19: Immediate stop.

The genset will be immediately shut down if a signal is applied to this terminal. The control unit will be locked for any further starting attempts. To reset the control unit, the operation mode has to be set to OFF. Resetting is only possible if the signal is no longer connected, otherwise the indicator AUTOMATIC LOCKED would remain on

Terminal 20: Overlapping synchronisation active.

When an L[-] signal is connected here, the load transfer between mains and generator supply (in operation mode TEST) and the re-connection to mains supply (in operation mode AUTO) will take place without interruption, by synchronized change-over.

When an L[-] potential is not applied, the change-over between mains and generator supply will take place with configured breaks.

Terminal 21: Peak load command.

When an L[-] signal is applied, the genset (in operation mode AUTO) will be started and synchronized to mains voltage automatically. After that, the genset will be charged gradually, following a ramp characteristic.

On interrupting the peak-load demand signal, the generator set will be unloaded gradually; when the output power falls below the preset load point, the generator breaker will be opened and the genset will shutdown after cooling down period.

Terminal 22: Signal: Generator is unloaded.

This input has to be used in case an **external load controller** is applied. To activate this controller, certain relays may be configured to engage the load controller and in case of genset de-selection, initiate the unloading procedure.

When the load controller has caused the unloading of the genset down to the desired value, a signal has to be transmitted from the external load controller to this input, to initiate generator circuit breaker tripping.

Terminal 23: Sprinkler mode.

When a [L-] signal is connected to this terminal the genset starts without changing over to generator supply and all alarms serve only as warning ones. If mains fails, the consumers are also switched to generator supply.

Terminal 24: Start enable input.

Any starting attempt emitted manually or automatically, will be interlocked as long as there is no [L-] potential connected to terminal no. 24. It is therefore possible to incorporate relevant pre-start conditions before a signal is given to the starter motor for cranking. If this function is not used, a wire jumper from [L-] to terminal no. 24 has to be connected.

This function does not meet the requirements of the German Standards DIN VDE 0107, because a running genset will not be shut down; this function only protects the engine before start-up.

Terminal 25: Remote start without load transfer.

The genset starts in the automatic mode without the generator being switched on when a command is issued to this terminal. The generator breaker will only be switched on if a command is also issued to terminal 18 or mains fails. To switch off the generator breaker again, both signals (terminals 18 and 25) must be cut!

Terminal 26: External command :GENERATOR OFF.

If a command is applied here, the generator CB is immediately switched off and remains off as long as the signal is applied.

Terminal 27: not used.

This terminal can be used as an alarm input.

Terminal 28: not used.

This terminal can be used as an alarm input.

Terminal 29: Charging Dynamo, terminal D+.

Terminal D+ of the charging dynamo, if present, has to be connected here. An AC-dynamo receives the pre-excitation via this connection, and the [+] signal of the dynamo will cause the starter motor to be switched off.

TECHNICAL DATA

KEA Controller

- Device for frontal installation, dimensions: (\Rightarrow, \uparrow , depth) 260 x 170 x 100 mm,
- Weight approx. 2.2 kg, can be installed wherever required,
- Protection class (installed) IP 44,
- Ambient temperature: Storage -20°C ... +70°C, Operation 0°C ... +55°C
- Supply voltage convertible 9-12-15V or 14-24-35V DC,
- 3 customer defined relays, 35 V DC, 1 A. (e.g. for acoustic signalers),
- Standards/regulations VDE 100, Part 710.

Analogue Inputs and Outputs

- 3-phase mains and generator voltage monitor. They can be set in increments of 1 Volt. If the rotary field is incorrect, the display shows <U.
U_{Nom} 230/400 volts. They can be set from 50 to 300 volts. Accuracy class 1.
- Mains and generator frequency monitor 50 or 60 Hz. They can be set to any value between 40 and 70 Hz. Accuracy class 1.
- 3-phase generator current monitor. Accuracy class 1.
- I_{Nom} 5 Amp: measuring range 0.1 – 15 Amp. It can be set in increments of 20 mA.
- Battery voltage monitor.
- Input for pick-up.

Options:

- Four analogue inputs, which can be fitted with interface cards for
 - o PT 100 / PT1000,
 - o Current loops,
 - o 0 - 10 V DC,
 - o Thermocouple NiCr-Ni,
 - o Temperature and pressure: VDO sensor,
 - o Battery charging current*.
- Two analogue outputs 0 – 20 mA or 0 – 10 V.

*)Under development.

Relay unit RZ 071-D:

- Device for attachment on a mounting rail, dimensions: (\Rightarrow, \uparrow , depth) 300 x 100 x 90 mm,
- Weight approx. 0.7 kg, can be installed wherever required,
- Protection class IP 00,
- Fitted with:
 - o Input for charging dynamo D+ with pre-excitation for AC alternators,
 - o 14 ports for alarm contacts,
 - o 14 general control inputs,
 - o 12 relays, of which 8 can be configured, contact load:
2 relays max. 35 V, 20 A DC, 10 relays 250 V AC, 6 A.

Relay unit RZ 071-E

- Device for attachment on a mounting rail, dimensions: (\Rightarrow, \uparrow , depth) 210 x 100 x 50 mm,
- Weight approx. 0.5 kg, can be installed wherever required, protection class IP 00,
- Fitted with 15 relays, of which 14 can be configured, contact load max. 250 V AC, 6 Amps.

Serial interfaces

Optical fibre or USB interface (selected by a toggle switch) for parameterisation.

Options

- CAN bus interface to a Common Control System,
- CAN bus interface to engine management (the protocol must be known and implemented)
- Modem (analogue, ISDN, GSM),
- Bus connection to other systems, for example via Profibus.

ORDER NUMBER CODES

Order number		2A101	F	U	I
Mains	Generator				
3 x 100 Volt	3 x 100 Volt	S	1		
3 x 100 Volt	230/400 Volt	S	2		
3 x 100 Volt	3 x 400 Volt	S	3		
230/400 Volt	3 x 100 Volt	S	4		
230/400 Volt	230/400 Volt	S	5		
230/400 Volt	3 x 400 Volt	S	6		
3 x 400 Volt	3 x 100 Volt	S	7		
3 x 400 Volt	230/400 Volt	S	8		
3 x 400 Volt	3 x 400 Volt	S	9		
Special voltage or frequency		S	0		
No measurement	CT ../1 A	S		2	
No measurement	CT ../5 A	S		3	
Special current measurement		S		0	

Example:

Control unit for emergency power and peak load plants,
mains and generator voltage 230/400 V,
current transformer of generator ../5 A:
The order number is 2A101S53

Analogue Input Modules	
PT 100	3197040111
PT1000	3197040112
Current loop 0 - 20 mA	3197020110
Voltage signal 0 - 10 V DC	3197080110
Thermocouple NiCr-Ni	3197020111
VDO-sensor for pressure and temp.	3105070100
Battery charging current (shunt needed) ⁴	3197020112
Analogue Output Modules	
Output signal 0 – 20 mA	3105080100
Output signal 0 – 10 Volt	3105080110

*) Under development

Spare parts, Accessories	
Relay unit RZ 071-D	2R71D00
Relay unit RZ 071-E	2R71E00
Connecting cable between RZ 071-D and KEA, 1.0 m long	1K71100
Connecting cable between RZ 071-D and KEA, 1.5 m long	1K71150
Connecting cable between RZ 071-D and KEA, 2.5 m long	1K71250
Check synchroniser	3105050100
Voltage transformer 500/100 volts, 100 volts @ 30 mA load	1124431102