

DRS-LIGHT

Local Operation
Using Keypad and Display

Protection



| | |
|------------------|--------------------------|
| Identification | DRS-L LOC OP KBD DIS.112 |
| Version.Revision | 1.12 |
| Date of issue | 11.06.2013 |

This document is applicable to the following product(s):

DRS-LIGHT

| | |
|-----------|--|
| DRS-LAxxx | Small Current Relay; Motor Protection |
| DRS-LVxxx | Small Voltage Relay |
| DRS-LPxxx | Small Current/Voltage Relay |
| DRS-LBB | Busbar Protection, Field Device Type 1 |
| DRS-CBB | Busbar Protection, Field Device Type 2 |
| DRS-LLD | Line Differential Relay |

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Table of Contents

| | |
|---|-----------|
| 1. General | 7 |
| 2. Function of the Keys | 9 |
| 3. Main Menu | 11 |
| 4. Password Input | 13 |
| 5. Menu "Parameter Active Functions" | 15 |
| 5.1. Viewing Parameters | 15 |
| 5.2. Modifying Operating Values | 16 |
| 5.3. Modifying Time Delays or Preset Value Parameters | 17 |
| 5.4. Modifying Selection Parameters..... | 17 |
| 6. Menu "Matrices Active Functions" | 19 |
| 6.1. Viewing Matrices | 20 |
| 6.2. Modifying Matrices..... | 21 |
| 6.2.1. Modifying the Input Matrix..... | 21 |
| 6.2.2. Modifying the Trip and LED Matrix | 21 |
| 6.2.3. Allocations with relay OUT3..... | 22 |
| 7. Menu "Display Fault Status" | 23 |
| 8. Menu "Selection Active Functions" | 25 |
| 9. Menu "Additional Functions" | 27 |
| 9.1. CT / VT Ratios | 28 |
| 9.2. Modify Password | 29 |
| 9.3. Device Label..... | 31 |
| 9.4. Chain-Address..... | 31 |
| 9.5. IEC-Interface (IEC 60870-5-103 coupling)..... | 32 |
| 9.5.1. IEC-Interface (IEC 60870-5-103 communication) | 33 |
| 9.5.2. Function Outputs | 33 |
| 9.5.3. Disturbance Data Transmission | 34 |
| 9.5.4. Delete Disturbance Data..... | 34 |
| 9.5.5. Time Traces Transmission | 34 |
| 9.5.6. Test Mode Info..... | 35 |
| 9.5.7. Alarms Lost..... | 35 |
| 9.5.8. Baud Rate | 35 |
| 9.5.9. GI Settings | 36 |
| 9.5.10. ASDU 1/2 Settings..... | 36 |
| 9.5.11. GO Settings | 36 |
| 9.5.12. Operating Measured Values | 37 |
| 9.5.13. Line Idle State..... | 37 |
| 9.6. IEC-Device Address | 37 |
| 9.7. IEC-Function Type..... | 38 |
| 9.8. IEC-Info Number..... | 39 |
| 9.9. IEC-Alarms Lost | 40 |
| 9.10. Remote Setting..... | 41 |
| 9.11. BB/LD Remote Setting | 42 |

| | |
|---|-----------|
| 10. Menu "Terminal Parameter" | 43 |
| 10.1. Terminal Language..... | 44 |
| 10.2. Display Mode | 44 |
| 10.3. Edit Mode..... | 45 |
| 10.4. Terminal Times | 46 |
| 10.4.1. Measured Value Display Time | 46 |
| 10.4.2. Measured Value Actualizing Time | 46 |
| 10.4.3. Key Repeat Delay Time | 47 |
| 10.4.4. Key Repeat Rate..... | 47 |
| 10.4.5. Password Timeout | 47 |
| 10.4.6. Modification Timeout..... | 47 |
| 10.4.7. Return Timeout | 48 |
| 10.4.8. Display Illumination Time | 48 |
| 11. Menu "Display Measured Values" | 49 |
| 11.1. Menu "Selection Meas. Values" | 49 |
| 11.2. Menu "BB-Diff. Currents" | 50 |
| 12. Menu "Display Device Infos" | 51 |
| 13. Menu "Output Event Protocol" | 53 |
| 14. Menu "System Functions" | 55 |
| 14.1. DRS System Time | 55 |
| 14.2. Frequency | 56 |
| 14.3. Binary Inputs | 56 |
| 14.4. Binary Outputs | 57 |
| 14.5. IEC-Message Test | 58 |
| 14.5.1. Message Test on IEC 60870-5-103 | 58 |
| 14.5.2. Message Test on IEC 60870-5-104 | 59 |
| 15. Examples for Relay Configuration | 61 |
| 15.1. Permanent Change of the Terminal Language (English to German)..... | 61 |
| 15.2. Temporary Change of the Terminal Language (English to German) | 61 |
| 15.3. Changing a Function Parameter (current, voltage, time, etc.)..... | 62 |
| 15.4. Changing the Input Matrix (CT/VT signals, blocking, test, other inputs) | 62 |
| 15.5. Changing the Output Matrix (alarms, trips, LED) | 63 |
| 15.6. Display of All Operating and Function Measured Values | 63 |
| 15.7. Activating or Deactivating Protective Functions | 63 |
| 15.8. Modifying the Device Label | 64 |
| 15.9. Setting the Nominal CT Secondary Relay Current..... | 64 |
| 15.10. Display Fault Status | 65 |
| 15.11. Modifying the IEC-Info Number | 65 |
| 15.12. Password Input | 66 |
| A. Further Documents | 67 |
| B. Reader´s Reactions | 69 |

CAUTION

Installing, commissioning and operating of this product may be performed only by thorough trained and

specialized personnel (*).

We explicitly will not take any responsibility for any damage on our products caused by improper installation, configuration and handling. Internal modifications must solely be carried out by specialized personnel authorized by

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During commissioning the operating instructions and also the applicable Local Safety Standards have strictly to be observed.

(*) **Definition:** specialized personnel are persons who

- are familiar with installing, mounting, commissioning and operating of the device and the system in which the device is to be installed;
- are instructed in maintenance and use of safety equipment according to standard rules and regulations of safety technology;
- passed an extensive First Aid training.


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1. General

The user interface of the DRS-LIGHT consists of a two-line LCD with 16 characters each line and a keypad with 6 keys.

During normal operation, e.g. after start up or expiring of the corresponding timeouts, the device is in the main menu, i.e. the display light is off and the first line of the display indicates the version of the device and the hardware version. The second line displays the currently measured operating values of the various CT and VT inputs as well as additional function measured values which are selected by the user.

When a monitoring routine detects a fault, the display light is switched on and the display shows **!!DRS FAULT!!** in the first line. The display light stays on until the fault condition is reset manually. Then the kind of relay fault can be viewed in the submenu [Display Fault Status](#).

| | |
|--|--------------------|
|  | Information |
| Generally the display light is switched off again after a preset time delay during local operation if no key has been pressed. | |


If the relay operates, the last alarm or trip (plant specific denomination or protective function name) is indicated on the display. On devices with terminal version 1.53 or higher it is possible to define which LED is used as alarm or trip LED and which is only used for signal purposes, e.g. for visualization of the isolator position on DRS-CBB. The function with the last alarm or trip is only shown on the display when at least one of the alarm or trip LED is on. All alarms and trips with additional information as time and stage of alarm or trip can be viewed in the submenu [Output Event Protocol](#).

The local operation is designed in a way that all relay parameters can be displayed without password input. But modification of any setting parameters can only be carried out by entering the correct password. Further the operation of the DRS-LIGHT is facilitated that only a few simple key operations are required to check the parameter settings or to display the currently measured values.

The local user interface requires a rather continuous key operation since when pausing too long the timeouts expire and the terminal reverts automatically to the main menu. All modified parameters which have not been saved are lost and the setting procedure has to be repeated via the keypad.

As display assistance during modifying parameters the readiness of the terminal for changing a parameter setting is displayed by a → symbol in the entering line. The symbol * indicates that the value has been modified, but is still not saved in the relay.

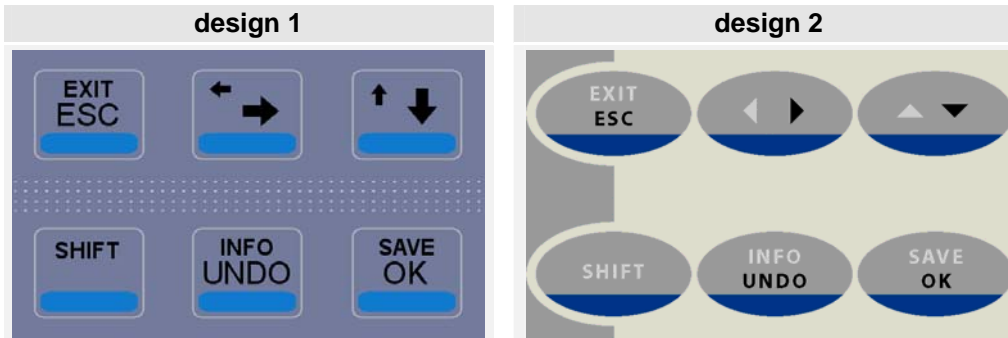
The relay's settings are stored non-volatile and so of course remain even when switching off the auxiliary power supply. During modification of the parameters the relay still uses the originally stored settings until the new settings are saved and a subsequent automatic restart of the system has been carried out.

| | |
|--|---------------|
|  | NOTICE |
| Each modification of the setting parameters whereby you store the setting via SAVE and OK results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period. | |

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2. Function of the Keys

The appearance of the arrow keys has changed between **design 1** and **design 2**.



Following the keys are presented only in **design 2**.

i

Information

The DRS-LIGHT of the first series have a keypad design 1 with a reversed arrangement of the up and down arrow key. These DRS-LIGHT need the terminal software with the letter **a** after the version number (i.e. 1.20**a**), all other DRS-LIGHT with the letter **b** (i.e. 1.43**b**). The terminal version is shown in the menu [Display Device Infos](#).

With the exception of the **SHIFT** key all other keys have different functions depending in which menu or submenu they are operated.

General meaning and function of the keys:

- SHIFT** is only used in combination with a second key to enable the second key function.
- ESC** returns to the higher level menu whereby all modified parameters in the current menu are lost.
- EXIT** returns to the main menu whereby all modified data in all submenus are lost (abort).
 - ▶ shifts the cursor one position to the right.
 - ◀ shifts the cursor one position to the left.
 - ▼ changes to the next data set, e.g. next protective function, decreases a digit of a value by 1 or the whole value by one step, or selects the previous character or value.
 - △ changes to the previous data set, e.g. previous protective function, increases a digit of a value by 1 or the whole value by one step, or selects the next character or value.
- UNDO** discards modifications and restores the initial parameter value on entering the menu or clears the last entry.
- INFO** is used for displaying further information such as plant or relay specific texts of protective functions or I/O's.
- OK** for entering a submenu, confirming of a modification or entered value and returning to the upper menu, and confirming saving of a new set of parameters into the relay.
- SAVE** starts saving a new set of parameters into the relay which are permanently stored after confirming with the **OK** key.

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3. Main Menu

Most of the time the device is in the normal operating state, i.e. ready for service and the main menu is displayed, if no key was operated or all timeouts have expired. In the main menu the display light is de-energized and the display indicates the version of the device (software version) and the hardware version in the first line. The second line displays continuously the current operating measured values and the selected function measured values.



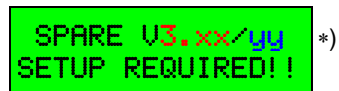
In the main menu each key, with the exception of the **SHIFT** key, is associated with a submenu.

- ▼ Menu [Parameter Active Functions](#)
- △ Menu [Matrices Active Functions](#)
- ▶ Menu [Display Measured Values](#)
- ◀ Menu [Display Fault Status](#) - When relay faults are present this is indicated in the first line of the main menu.
- OK** Menu [Selection Active Functions](#) - Functions activated or deactivated
- SAVE** Menu [Additional Functions](#) - CT/VT ratios, password modification, device label, ...
- UNDO** Menu [Terminal Parameter](#)
- INFO** Menu [Display Device Infos](#)
- ESC** Menu [Output Event Protocol](#)
- EXIT** Menu [System Functions](#) - system time, frequency, binary inputs/outputs, IEC message test, ...

By operating one of the above keys the corresponding submenu is accessed. As long as this key is pressed the title of the submenu is displayed. The first option of the selected submenu is reached after releasing the key.



When the relay is still a spare unit without any protective functions stored in the memory, instead of the main menu the display shows following:



The device is not ready for service operation since no valid data set is stored. The relay has to be configured with a PC according to the procedures for initialization of a spare unit. Appropriate instructions are in the [User's Guide](#) of [DRS-WIN4](#).

When during service operation of the relay a critical fault is detected in its data sets which prevents further execution of the configuration with the terminal, an error message is shown and the operation of the terminal stops. However, protective functions are still processed as long as this fault does not affect the protective functions.



NOTICE

In this case please contact a person especially trained on this device. Further instructions for possible faults and corresponding relay alarms especially during maintenance and software updating activities are described in the [Operation & Maintenance Manual](#) of [DRS-LIGHT](#).

*) Previous versions of the local operation software display only **SPARE-PART** without version numbers in the first line.

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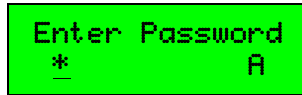
4. Password Input

Default password: **A**

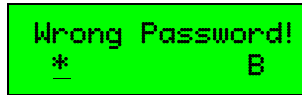
All actions when working with the relay which lead to modification of the existing configuration are protected with a password. Without entering the password the parameter settings can only be viewed but not changed.

The request to enter the password is automatically generated for all cases where a displayed value is prepared for modification with the **OK** key and there is no password authorization from previous changes, i.e. the [password timeout](#) has expired.

To enter the password following request is shown on the display:



Now the displayed character can be modified via the \triangle ∇ keys to the first character of the password. If necessary a new character can be entered by moving the cursor with the \blacktriangleright key to the next right positioned digit and can again be modified to the next password character with the \triangle ∇ keys, and so on. If a character is entered incorrectly it can be deleted with the **UNDO** key or corrected with the \triangle ∇ keys after setting the cursor with the \blacktriangleleft \blacktriangleright keys on the wrong character. After selecting the last password character the procedure is terminated with the **OK** key. When the correct password is entered any further operations are authorized. Otherwise following display is shown



and the entry has to be repeated or corrected as outlined above.

The password can contain a maximum of up to ten characters.

The factory setting of the password is **A. So only **OK** must be pressed.**

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5. Menu "Parameter Active Functions"

This menu is accessed by pressing the **▼** key in the main menu.

This menu is a two stage submenu. First the function selection menu is displayed where the active protective function can be selected whose parameters should be viewed or modified. This menu does not require a password input. After selecting a protective function with **OK** the parameter menu is called.

On devices with terminal version 1.54 or higher it is possible, that after pressing **OK** the message **not available** is shown in the second line on the display instead of opening the parameter menu. This happens when the protective function does not have any parameter or the settings cannot be displayed and modified via local operation, e.g. the mask parameters of the logic function or the function is too complex for a local parameter setting.

Following keys are available for the selection of the protective function:

- △ ▼** scrolls through the active protective functions.
- INFO** changes the display in the second line - protective function name or plant specific denomination of the protective function (if configured).
- OK** selects the protective function and calls the parameter menu, if available.
- ESC** exits menu and returns to the main menu.
- EXIT** returns to the main menu.

5.1. Viewing Parameters

This menu is called from the function selection menu after selecting the desired function with the **△ ▼** keys and confirmation with **OK**.

In this menu the parameter settings of the selected function are displayed. A password input is not required for only viewing the parameters. But to be able to alter a setting parameter, the password must be entered if no authorization still exists from a previous password input (please refer to [password timeout](#)).

The protective functions of the DRS family have generally five different parameter types which are described in detail in the corresponding functional descriptions:

Operating values..... current, voltage, etc.
Time delays time, time constants, etc.
Preset value parameters preloading, temperature, etc.
Selection parameters..... over-/under characteristic
Status parameters recording active/not active

The first line of the display indicates the name and the second line the current value of the parameter. When there is a difference between the actual displayed value and the value stored in the relay's memory, it is indicated by a ***** symbol in the second line if this does not cause overwriting of another character and the parameter is not a status parameter.

For a current or voltage parameter the indication is in the current display mode (secondary value, relative value, primary value). This mode can be changed anytime by pressing the **INFO** key. When leaving the menu the new display mode is also used in the other menus and remains that way until the next relay reset. Operating values, time delays and preset value parameters are displayed in values and units.


The value of a selection parameter (e.g. phase rotation) equals the displayed text.

For the status parameters **Fault Record** and **Event Records** the current status of the parameter is outputted. For this parameter type no * prefix symbol is set because a modification of the status is already indicated by the text.

Following four status messages are possible:

| | |
|-------------------------|---|
| Active | The protective function currently starts the corresponding recording. |
| Not Active | The protective function currently <u>does not</u> start the corresponding recording. |
| Will Be Activat. | The protective function will start the corresponding recording after saving the new parameter set. |
| Will Be Deactiv. | The protective function <u>will not</u> start the corresponding recording after saving the new parameter set. |


Following keys are available in the parameter menu:

- △ ▾ scrolls through the parameters.
 - UNDO** restores the current parameter to its stored value in the relay.
 - INFO** If this key is pressed for more than one second the first line displays the protective function name and the second line the plant specific denomination of the protective function (if configured). This display disappears when the **INFO** key is released.
If the **INFO** key is activated shorter than one second and the current parameter is such that a display in primary values or relative values is making sense the display mode is changed.
 - OK** For all parameter types, with the exception of the status parameters, the corresponding submenu is called for parameter modification. For the status parameters **Fault Record** and **Event Records** the status changes from Active to Will Be Deactiv. or from Not Active to Will Be Activat..
 - SAVE** saves the current parameters of the protective function.
-  Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.
- ESC** exits menu and returns to the function selection menu.
 - EXIT** returns to the main menu.

5.2. Modifying Operating Values

Setting changes for the particular function are only possible with the default steps and within the default setting limits and are indicated in the current display mode.

Following keys are available for modifying operating values:

- △ ▾ changes the value by one step.
 - UNDO** discards all modifications of the parameter value in this menu.
 - INFO** changes the display mode (primary, secondary or relative values).
 - OK** accepts the current parameter value and returns to the parameter menu.
 - SAVE** accepts the current parameter value and saves the new parameter set into the relay.
-  Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.
- ESC** exits menu and returns to the parameter menu.
 - EXIT** returns to the main menu.

5.3. Modifying Time Delays or Preset Value Parameters

Preset value parameters are settings which provide special adaptations of the protective function to specific conditions of the respective application via a parameter setting, e.g. matching ratio between nominal current of the protected object and the relay's nominal current for overload functions.

Modifications can be made in the step mode (default) as well as in the enter mode.

Following keys are available for modifying time delays and preset value parameters:

- ▼ When in step mode decreases the whole value by one step.
When in enter mode decreases the current digit by a value of 1 or by the minimal step.
- △ When in step mode increases the whole value by one step.
When in enter mode increases the current digit by a value of 1 or by the minimal step.
- ▶ When in enter mode positions the cursor by one digit to the right of the value.
- ◀ When in enter mode positions the cursor by one digit to the left of the value.

UNDO discards all modifications of the parameter value in this menu.

INFO alters the edit mode from step to enter mode or reverse.

OK accepts the current parameter value and returns to the parameter menu.

SAVE accepts the current parameter value and saves the new parameter set into the relay.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

ESC exits menu and returns to the parameter menu.

EXIT returns to the main menu.

5.4. Modifying Selection Parameters

Selection parameters are settings whereby the user can choose (select) from a defined number of options the most suitable value for the requirements, as for example the option whether a function should operate with an over or under detection or the vector group compensation for a transformer differential protective function, etc.

Following keys are available for modifying selection parameters:

- △ ▼ selects the previous/next selection value.

UNDO discards all modifications of the parameter value in this menu.

OK accepts the current parameter value and returns to the parameter menu.

SAVE accepts the current parameter value and saves the new parameter set into the relay.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

ESC exits menu and returns to the parameter menu.

EXIT returns to the main menu.

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6. Menu "Matrices Active Functions"

All relays of the DRS family have in common that their input and output signals of the various protective functions are freely programmable and can be arranged according to the requirements. In the operation program on the PC these possibilities are clearly outlined in matrix form and are referred to "Input Matrix" for the inputs, "Trip Matrix" for the trip output commands and "LED Matrix" for the LED indication outputs.

This menu is accessed by pressing the \triangle key in the main menu.

This menu is a two stage submenu. First the function selection menu is displayed where the active protective function can be selected whose function inputs and outputs (I/O's) should be viewed or modified. This menu does not require a password input. After selecting a protective function with **OK** the matrix menu is called.

On devices with terminal version 1.54 or higher it is possible that after pressing **OK** the message **not available** is shown in the second line on the display instead of opening the matrix menu. This happens when the protective function does not have any inputs or outputs or their matrix cannot be modified via local operation.

The function inputs are CT and VT signal, blocking, test and auxiliary inputs. The function outputs are alarms and trips, auxiliary outputs and the corresponding LED indications.

Following abbreviations are used for the function inputs, outputs and LED's:

| | |
|--|--|
| CURcurrent input | WNO alarm |
| VLTvoltage input | TRO trip |
| CHKtest input | AXO auxiliary output |
| BLKblocking input | WNL LED for an alarm |
| AXIauxiliary input | TRL LED for a trip |
| ALLbinary input of any type | AXL LED for an auxiliary output |

For multiphase or multisystem functions a phase or system identification is added. For multistage functions the respective stage is identified by **Stage 1** or **Stage 2**.

For the standard denomination of the external signals on the relay the terminal names I1 to I4 (I6) for currents, U1 to U4 for voltages, IN1 to IN4 (IN6, IN7, IN12) for binary inputs and OUT1 to OUT3.1/3.2 (OUT10, OUT12) for the relay outputs are used (see also the relay plate). Depending on the relay configuration the available binary inputs are divided between test inputs, blocking inputs or general auxiliary inputs and are presented during configuration of the input matrix for logic connections accordingly.



NOTICE

When using the output OUT3.1 and OUT3.2 care must be taken that both contacts are allocated to a single output relay. For parameter setting it must be considered that in order to control OUT3.1 and OUT3.2 both of them, i.e. OUT3.1 and OUT3.2, have to be connected in the software trip matrix, refer to section [6.2.3](#) on page [22](#).

For the LED indication the denominations are used according to the position of the LED on the relay front, e.g. for the red LED in row 3 the identification **3. Row Red**.

Following keys are available for the selection of the protective function:

- △ ▼ scrolls through the active protective functions.
- INFO** changes the display in the second line - protective function name or plant specific denomination of the protective function (if configured).
- OK** selects the protective function and calls the matrix menu (if available).
- ESC** exits menu and returns to the main menu.
- EXIT** returns to the main menu.

6.1. Viewing Matrices

This menu is called from the function selection menu after selecting the desired function with the △ ▼ keys and confirmation with **OK**.


In this menu the input and output configuration of the selected function is displayed. A password input is not required for only viewing. But to be able to modify a connection, the password must be entered if no authorization still exists from a previous password input (please refer to [password timeout](#)).

For a protective function input, e.g. CT/VT signal, test signal, blocking signal, etc., always only one corresponding relay input signal can be allocated to. Therefore for a protective function input the name of the protective function input is displayed in the first line and the allocated relay input in the second line. A * symbol in the second line indicates any modification for the displayed input.

For a protective function output a connection to several relay outputs or LED's is possible. Therefore the display in the first line shows the name of the protective function output whereas the second line shows the first connected output. If there are modifications of the matrix of the respective output, the * symbol in the second line indicates this.

The LED indication uses the same kind of display as the outputs.

Following keys are available in the matrix menu:

- △ ▼ scrolls through the inputs, outputs and LED's of the protective function.
 - UNDO** resets the matrix of the current input, output or LED to the stored matrix.
 - INFO** If this key is pressed for more than one second the first line displays the protective function name and the second line the plant specific denomination of the protective function (if configured). This display disappears when the **INFO** key is released.
If the **INFO** key is activated shorter than one second the display of the corresponding input or output changes from the terminal name to the plant specific denomination (if configured) or again back to the terminal name.
 - OK** calls the submenu for modifying the displayed protective function input, output or LED.
 - SAVE** saves the new matrices into the relay.
-  Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.
- ESC** exits menu and returns to the function selection menu.
 - EXIT** returns to the main menu.

6.2. Modifying Matrices

In this menu interconnections of protective function inputs with input signals, allocation of test and blocking signals, configurations of the alarm and trip signals to the available output relays as well as the LED indications at the relay front can be modified.

Different methods are used for modifying the different types of matrices because a function input can only be connected with one relay input, but a function output can be connected to several output relays or LED's.

6.2.1. Modifying the Input Matrix

After selecting the function input to be changed with the **OK** key, a **→** symbol in the second line indicates the readiness for modifying a connection.

For modifying the input matrix settings (currents, voltages, test signals, blocking signals, etc.) following keys are available:

◀ ▶ scrolls through the available relay inputs.

UNDO returns to the connected relay input on entering this menu.

INFO changes the display of the relay input between terminal name and plant specific denomination (if configured).

OK connects the current relay input and returns to the matrix menu.

SAVE connects the current relay input and saves the new matrices into the relay.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

ESC exits menu and returns to the matrix menu.

EXIT returns to the main menu.

6.2.2. Modifying the Trip and LED Matrix

For changes of the logic connections of the trip and LED matrix, e.g. allocation of a protective function output to the output relays or the LED indication, a different method is applied because of the multi-assignments described before. An existing connection between function output and output relay is indicated by a **+** character. In case of no existing connection a **-** symbol is shown.

Following keys for modifications of the trip and LED matrix are available:

△ logically connects the relay output/LED with the protective function output.

▼ removes existing connection between the relay output/LED and the function output.

◀ ▶ scrolls through the relay outputs and LED's.

UNDO resets any modifications in this menu.

INFO changes the display of the relay input between terminal name and plant specific denomination (if configured).

OK accepts the current connections and returns to the matrix menu.

SAVE accepts the current connections and saves the new matrices into the relay.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

ESC exits menu and returns to the matrix menu.

EXIT returns to the main menu.

6.2.3. Allocations with relay OUT3


The relay with the outputs **OUT3.1** and **OUT3.2** will only be controlled correctly from a function output, if the output of the protective function is assigned to both relay outputs. Therefore on devices with terminal version 1.26 for every protective function, and on devices with terminal version 1.43 or higher for all protective functions except function **AR-Relay** (auto reclosing relay) and **CB Control** (circuit breaker control), these two outputs are handled as a shared binary output **OUT3.1/3.2** and so are set like a normal single output.

By using one of the special functions **AR-Relay** or **CB Control** an additional hardware interlock is present for this relay. For that reason the relay can only be activated through special software routines. These two protective functions control the closing of a circuit breaker with this relay. The parameter set for this relay is predefined and cannot be changed at these special protective functions on devices with terminal version 1.43 or higher.

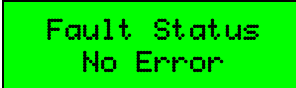
On devices with terminal version 1.50 or higher it is not possible to assign the output **OUT3.1** or **OUT3.2** to an other protective function, if one of the special protective functions for controlling the circuit breaker is used. It is not permissible to also apply a normal protective function to this relay because of the hardware interlock.

7. Menu "Display Fault Status"

This menu is accessed by pressing the ◀ key in the main menu.

| | |
|---|---|
|  | Information |
| | The left arrow ◀ is a second function key. Therefore it is accessed by pressing SHIFT plus ▶. |

When there is at least one relay fault (refer to red fault LED at the relay front and the fault message **!!DRS FAULT!!** in the first line of the main menu as well as to the fault alarm via the alarm relay), the type of fault is displayed. When there is no device fault, following display makes this clear:



```
Fault Status
No Error
```

Following keys are available in the menu **Display Fault Status**:

- △ ▼ scrolls through the faults (if present).
- ◀ ▶ scrolls through the outputs in case of a binary output fault.
- ESC** exits menu and returns to the main menu.
- EXIT** returns to the main menu.

The relay fault is also stored in the event protocol on devices with software version 3.28 or higher. To get the time of the fault when it was first recognized, take a look to the menu [Output Event Protocol](#).

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8. Menu "Selection Active Functions"

This menu is accessed by pressing the **OK** key in the main menu.

In this menu the status of the protective functions (active or inactive) is displayed which can be modified if required. For modification of a status the password must be entered if no authorization still exists from a previous password input (please refer to [password timeout](#)).

The DRS-LIGHT is delivered with certain standard functions. If some of them are not required they can be permanently blocked (deactivated). Blocking or activating can be performed in this menu. Blocked (deactivated) protective functions are no longer shown in the function parameter setting menus. Only when an inactive function is reactivated its parameters can be configured again.



NOTICE

It is highly recommended that activation of functions is to be carried out with the plant out of service since a newly activated function has still to be properly configured.

In this menu the first line displays the currently selected function and one of the four status messages outlined below is shown in the second line.

Following four status messages are possible:

| | |
|-------------------------|--|
| Active | The protective function is at present activated, i.e. is functioning. |
| Not Active | The protective function is at present deactivated, i.e. not functioning. |
| Will Be Activat. | The protective function will be activated after saving. |
| Will Be Deactiv. | The protective function will be deactivated after saving. |

Following keys are available in the menu **Selection Active Funct.:**

- △ ▼** scrolls through the protective functions.
- UNDO** resets the status of the current protective function back to the stored value.
- INFO** changes the display in the second line - protective function name or plant specific denomination of the protective function (if configured).
- OK** changes the status from Active to Will Be Deactiv. or from Not Active to Will Be Activat..
- SAVE** saves the status of all protective functions.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

- ESC** exits menu and returns to the main menu.
- EXIT** returns to the main menu.

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9. Menu "Additional Functions"

This menu is accessed by pressing the **SAVE** key in the main menu.

In this menu special additional functions can be called, which display special parameters and also give the possibility of modifying them. This menu does not require a password input.

Following additional functions can be selected:

- [CT / VT Ratios](#)
- [Modify Password](#)
- [Device Label](#)
- [Chain-Address](#) ¹⁾
- [IEC-Interface \(IEC 60870-5-103 coupling\)](#) ^{4, 6)}
- [IEC-Device Address](#) ^{5, 6)}
- [IEC-Function Type](#) ^{5, 6)}
- [IEC-Info Number](#) ^{5, 6)}
- [IEC-Alarms Lost](#) ^{4, 5, 6)}
- [Remote Setting](#)
- [BB/LD Remote Setting](#) ²⁾
- Spare Unit ³⁾
- Software Update ³⁾
- Calibration ³⁾

1) Up to terminal version 1.25 called **LIGHT-Address**.

2) Only on the bay units DRS-LBB and DRS-CBB of the DRS busbar protection.

3) Only for specialized personnel – operation described in [Operation & Maintenance Manual of DRS-LIGHT](#). These three special menu items exist in the menu **Additional Funct.** only on devices with a terminal version up to 1.32, refer to menu [Display Device Infos](#).

4) Only available on devices with terminal version 1.50 or higher.

5) On devices with terminal version 1.50 or higher these IEC submenus are not displayed, if the IEC 60870-5-103 communication is deactivated.

6) On devices with terminal version 1.54 or higher all IEC submenus are not visible, if a different protocol than IEC 60870-5-103 is used for data exchange.

Following keys are available in the menu **Additional Funct**:

- △ ▼ scrolls through the additional functions.
- OK** calls the corresponding additional function.
- ESC** exits menu and returns to the main menu.
- EXIT** returns to the main menu.

9.1. CT / VT Ratios

Default value: 1 A secondary nominal current and 100 V secondary nominal voltage

This menu is accessed from the menu **Additional Funct** by pressing the **OK** key when **CT / VT Ratios** is displayed in the second line.

In this menu are shown the CT/VT ratios of all used analog channels for the primary, secondary and relative value display. The ratios can also be modified after entering the password. After a change of a CT/VT ratio the user is asked whether a modification of all other CT's and VT's of the same type should also be carried out or not. A difference between the current CT/VT ratio and the stored value is indicated by the * symbol.



NOTICE

DRS-LIGHT relays are delivered with a standard parameter setting of 1 A CT secondary current. When using the relay's 5 A tap connection the CT secondary current must be set to 5 A in this menu. VT secondary voltages have a fixed value of 100 V and are not allowed to be modified.

For DRS-LBB the device rated current is 2.5 A. For DRS-CBB the device rated current is selectable between 2.5 A (1 A terminal) and 12.5 A (5 A terminal). DRS-LBB and DRS-CBB are the bay units of the DRS busbar protection.

On DRS-LLD for the line differential protection are available the CT secondary currents 1.667 A (1 A terminal) and 8.333 A (5 A terminal). The CT secondary currents should be preferred set on the devices DRS-LLD with DRS-WIN because of only 2 decimal places can be set on the LCD which would result in inaccuracies.

Following keys are available in the menu **CT / VT Ratios**:

- △ ▽ scrolls through the CT's and VT's.
- ◀ ▶ scrolls through the primary, secondary and relative CT/VT ratios.
- UNDO** resets the current CT/VT ratio back to the stored value.
- INFO** changes the display of the first line - standard denomination or plant specific denomination (if configured).
- OK** calls the submenu for changing the current CT/VT ratio.
- SAVE** after a modification saves all modified CT/VT ratios.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

- ESC** exits menu and returns to the menu **Additional Funct**.
- EXIT** returns to the main menu.

After selecting the desired CT or VT circuit with △ ▽ keys and the correct display mode with ◀ ▶ keys the particular CT/VT ratio can be changed via the **OK** key and subsequently entering the password if required.

Modifications of the values are only possible in the enter mode. An entered value of 0 A or 0 V is not permissible and such a value is marked with a < symbol.

Following keys are available for modifications of the CT/VT ratios:

- △ ▽ changes the current digit by a value of 1.
- ◀ ▶ moves the cursor to the preceding left or next right position.
- UNDO** discards any modification in the current menu.
- INFO** changes the display of the first line - standard denomination or plant specific denomination (if configured).
- OK** accepts the current CT/VT ratio and returns to the menu **CT / VT Ratios**.
- SAVE** saves all modified CT/VT ratios.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

- ESC** exits menu and returns to the menu **CT / VT Ratios**.
- EXIT** returns to the main menu.

9.2. Modify Password

Default password: A

This menu is accessed from the menu **Additional Funct** by pressing the **OK** key when **Modify Password** is displayed in the second line.

Under this menu item the required password for authorization to carry out modifications of the relay parameters can be changed.

Following keys are available in the menu **Modify Password**:

- △ ▽ scrolls the character on the current cursor position to the next or previous character.
- ◀ ▶ moves the cursor to the preceding left or next right position.
- UNDO** deletes the current character, or reverts it to A if only one character is present.
- OK** finishes the password input.
- ESC** exits password input and returns to the menu **Additional Funct**.
- EXIT** returns to the main menu.

Between two cases has to be distinguished when modifying the password. When the relay still has the authorization for changes from previous operations, then entering the old password is omitted and the menu immediately moves to the input of the new password. If this is not the case, then the current (old) password must be entered first.

While entering the current (old) password the request **Enter Old Passw** appears in the first display line and in the second line the cursor is positioned below the first character of the password on the left side and on the right side the first available character for the first character of the password is displayed.

The character on the current cursor position can be changed with the △ ▽ keys. The position of the cursor can be changed right or left with the ◀ ▶ keys.

```
Enter Old Passw.  
* A
```

3 times △

```
Enter Old Passw.  
* D
```

The character sequence is as follows:

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

After the last character **9** the first one **A** is shown again.

The **△ ▼** keys in this menu are provided with the auto-repeat function.

The maximum password length is ten characters. If the cursor is positioned on the tenth character and the **▶** key is pressed the cursor is moved back to the first position.

Wrong entered characters can either be deleted immediately with **UNDO** or corrected later by positioning the cursor on the wrong character with the **◀ ▶** keys and selecting the correct character with the **△ ▼** keys.

The input of the current (old) password is finished with the **OK** key. Now the entered password is compared with the stored one. If they are not identical, an error message appears in the first line. The second line and the cursor position are not affected by this error message.

```
Wrong Password!  
*      D
```

Entering the right password can be continued immediately. After entering any of the available keys the first line switches back to its previous message and the corresponding function of the key is executed.

If the password is entered correct, the new password can be specified now with the same method as entering the old password.

```
Enter New Passw.  
*      A
```

After finishing the input of the new password with **OK** the user can cancel the acceptance of the new password with **ESC**, if **OK** was pressed by mistake, and can continue immediately entering the new password. After confirmation the acceptance of the new password with **OK** it must be confirmed by entering it once again.

```
Confirm Passw.!  
*****_  A
```

After operating the **OK** key the password just entered is compared with the new password. If they are not identical the message **Wrong Password!** is displayed in the first line of the display and the procedure for confirmation of the new password must be repeated again.

When the new password has twice been entered correctly and the new password differs from the old one then the new password is stored into the memory. After saving and the afterwards initiated reset following indication is shown on the display:

```
Password Saved  
Press Key
```

Pressing any key results in a return to the main menu.

9.3. Device Label

This menu is accessed from the menu **Additional Funct** by pressing the **OK** key when **Device Label** is displayed in the second line.

In this menu viewing and changing of the device label is possible. The device label is a unique device identification preventing a download of a parameter set during PC operation which is not suitable for the relay. The device label consists of four alphanumeric characters not containing any special characters.

All relays of the same type have an equal factory set device label. When applying a relay for a plant the user has to guarantee that a device label is not allocated several times. The input of the device label is carried out similar to the password menu with the **△ ▽** and **◀ ▶** keys. The input of the password is required to modify the device label.

Following keys are available in the menu **Device Label**:

- OK** starts modifying the device label.
- ESC** exits menu and returns to the menu **Additional Funct**.
- EXIT** returns to the main menu.

And after pressing **OK** to carry out a modification:

- △ ▽** scrolls to the next or previous character at the current cursor position.
- ◀ ▶** moves the cursor to the left or right position.
- UNDO** resets the current character to the stored character.
- SAVE** saves the new device label.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

- ESC** exits menu and returns to the menu **Additional Funct**.
- EXIT** returns to the main menu.

9.4. Chain-Address

Default value: 000

This menu is accessed from the menu **Additional Funct** by pressing the **OK** key when **Chain-Address** is displayed in the second line. The term **LIGHT-Address** is used for the chain address on relays with a terminal version up to 1.25.

In this menu viewing and changing of the device address within a device loop for the serial RS485 communication port is possible. The factory setting for the address is 000 (= not a device of a device loop - single device). The permitted operational service address ranges from 001 to 032 whereby in one device loop a specific address may be allocated only once. The modification is carried out in the entry mode. The input of the password is required to modify the chain address.

Following keys are available in the menu **Chain-Address**:

- OK** starts modifying the chain address.
- ESC** exits menu and returns to the menu **Additional Funct.**
- EXIT** returns to the main menu.

| | |
|---|--------------------|
|  | Information |
| The chain address cannot be set back to 000 after modification. | |

And after pressing **OK** to carry out a modification:

- ▼ decreases the current digit by a value of 1.
- △ increases the current digit by a value of 1.
- ▶ positions the cursor right to the next digit of the address.
- ◀ positions the cursor left to the preceding digit of the address.
- UNDO** discards any modification of the address.
- SAVE** saves the current address.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

- ESC** exits menu and returns to the menu **Additional Funct.**
- EXIT** returns to the main menu.

9.5. IEC-Interface (IEC 60870-5-103 coupling)

This menu is available only on devices with terminal version 1.50 or higher!

*On devices with terminal version 1.54 or higher this menu is only visible when the protocol IEC 60870-5-103 is used. With a different protocol the **IEC-Interface** menu is disabled automatically.*

This menu is accessed from the menu **Additional Funct** by pressing the **OK** key when **IEC-Interface** is displayed in the second line.

In this menu the global settings for the serial data transfer according to IEC 60870-5-103 protocol are configured. All parameters in this menu, except the baud rate and the line idle state, are status parameters which are either activated or deactivated.

In this menu the currently selected parameter is displayed in the first line whereas the second line indicates one of the four status messages below.

Following four status messages are possible:

- | | |
|-------------------------|---|
| Active | The parameter is presently active. |
| Not Active | The parameter is presently inactive. |
| Will Be Activat. | The parameter will be activated after saving. |
| Will Be Deactiv. | The parameter will be deactivated after saving. |

Following keys are available in the menu **IEC-Interface**:

△ ▼ scrolls through the parameters.

UNDO resets the parameter status or the baud rate or the idle state to the original saved value.

OK changes the status from Active to Will Be Deactiv. or from Not Active to Will Be Activat. or the baud rate or the idle state.

SAVE saves the status of all parameters for the IEC 60870-5-103 coupling.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

ESC exits menu and returns to the menu **Additional Funct.**

EXIT returns to the main menu.

The following parameters can be configured in the menu **IEC-Interface** (IEC 60870-5-103 coupling).

9.5.1. IEC-Interface (IEC 60870-5-103 communication)

With this parameter the communication can be completely disabled, if the serial communication interface IEC 60870-5-103 is not being used. All other IEC parameters in this menu and in the menu [Additional Functions](#) are meaningless, if the IEC 60870-5-103 communication is not in use and are therefore hidden automatically.

9.5.2. Function Outputs

Deactivating the function outputs results in suppression of any time-tagged message of protective function outputs on general interrogations or spontaneous conditions. The single point messages can then only be generated manually for testing purposes via the menu [IEC-Message Test](#) (page 58). This parameter can be applied with advantage when during extensive relay testing the master should not be confronted with innumerable messages. Also when the master cannot correctly interpret the messages of the protective function outputs, it is useful to deactivate this parameter and do aimed tests of each message in the menu [IEC-Message Test](#) for faster creation of a correct configuration of the master. In any case after testing this parameter has to be activated again otherwise the function outputs are not reported during normal service operation.

On devices with IEC 60870-5-103 firmware V2.00 or higher this parameter controls also the message of the test mode. If the function outputs are not activated, than there is automatically no message about the activation or deactivation of the test mode. If this parameter is active, the use of the status message of the test mode is controlled by the message function type and information number (both 0, no test mode status message = default). The function type and the information number of the status message of the test mode cannot be modified via local operation.

9.5.3. Disturbance Data Transmission

This parameter is available only on devices with terminal version 1.55 or higher!

This parameter controls the transmission of disturbance data. If this parameter is inactive, no IEC 60870-5-103 telegrams from the master for disturbance data transmission are accepted and the IEC 60870-5-103 firmware of the DRS does not send the list of available recorded disturbances to the master, too. If this parameter is active, the disturbance records can be read out by the master and the list of recorded disturbances is sent spontaneous on a change or on request by the master.

Disturbance data which are recorded during a blocking of the monitor direction are never transmitted with IEC 60870-5-103. Those disturbance records can only be read out and sequentially deleted from the device with the DRS-WIN.

9.5.4. Delete Disturbance Data

This parameter is available only on devices with terminal version 1.55 or higher!

If this parameter is active, a disturbance record is automatically deleted in the DRS immediately after a successful transmission to the IEC 60870-5-103 master - keyword: automatic data disposal. This parameter is only effective when the transmission of disturbance data is activated. If this parameter is inactive, the disturbance records have to be deleted with the program DRS-WIN or the currently oldest disturbance record is overwritten automatically on a new record, if already the maximum amount of records is reached.

9.5.5. Time Traces Transmission

This parameter is available only on devices with terminal version 1.55 or higher!

The IEC 60870-5-103 has no specification for the transmission of the trigger time and varying time intervals between the information elements. Only the absolute time of the first information element and a constant interval in microseconds is transmitted. To be able to compensate the generated loss of information data caused by this transmission method, a possibility was created for the DRS, to transmit these time information with additional traces according to the standard.

To transmit the trigger time, the IEC 60870-5-103 firmware of the DRS generates an additional binary trace during transmission, if the parameter is active. This special binary trace starts with level 0 and has a positive edge at the trigger time to level 1. If there are no information elements before the trigger moment, which is possible in rare situations, the virtual trigger trace starts immediately with the value 1. This virtual trigger trace has always the function type 253 and the information number 65.

The real intervals between the information elements are recorded and transmitted with a resolution of 400 ns in an additional analog trace. The disturbance analyze tools used by ANDRITZ HYDRO (for example DRS-WIN) can restore the complete information from this data and can then display correct the trigger time and the recorded frequency variations.

9.5.6. Test Mode Info

With this parameter the cause of transmission of the function output messages can be configured when the DRS is in test mode, i.e. the binary input/output preset or the blocking of the protective function outputs via DRS-WIN is enabled.

With this parameter activated the messages spontaneously generated during an active test mode of the DRS-LIGHT are sent with the cause of transmission test mode (COT=7). Also manually produced time-tagged messages in the menu [IEC-Message Test](#) have then always the cause of transmission test mode.

When this parameter is deactivated, spontaneous messages and the test messages are transmitted always with the cause of transmission spontaneous (COT=1) independent of the operating mode of the DRS-LIGHT.

On devices with IEC 60870-5-103 firmware V2.00 or higher this parameter has also an affect on the transmission of disturbance data and the operating measured values. If a disturbance is recorded during test mode and this parameter is active, then the disturbance record is transmitted with bit **test** in the status of fault (SOF). It depends on the receiver of the disturbance record, how a record with a bit **test** set is handled. Some simply dismiss the whole disturbance data, some ignore the bit and save the disturbance data in normal manner.

If parameter test mode info is active on transmission of operating measured values, the measured values are transmitted with cause of transmission 7 instead of 1 (spontaneous) or 2 (cyclic) during an active test mode as specified in IEC 60870-5-103. With an inactive parameter the measured values are always send with their normal cause of transmission even during active test mode.

The test mode info must be disabled when the master cannot handle it correctly.

9.5.7. Alarms Lost

This parameter determines the report of a message loss caused by a buffer overflow in the DRS-LIGHT with a special status telegram. The parameter must be disabled in case of the master cannot process this telegram or this information is not required. When and how such a message loss occurs is outlined in [IEC-Alarms Lost](#) (page 40).

9.5.8. Baud Rate

This parameter is available only on devices with terminal version 1.62 or higher!

This parameter determines which baud rate is used for the serial coupling according to IEC 60870-5-103. A selection can be done between 9600 baud and 19200 baud on DRS-LIGHT with software version 3.32 or higher and on DRS-LLD. The other communication parameters are predetermined with 8 data bits, 1 stop bit and even parity and cannot be modified.

On DRS-LBB and DRS-CBB the IEC 60870-5-103 communication occurs via the fiber optic ring connections of the busbar protection and therefore this parameter has no significance on the bay units.

9.5.9. GI Settings

This parameter is available only on devices with terminal version 1.55 or higher!

On devices with IEC 60870-5-103 firmware V2.00 or higher it is possible to specify with the operation program DRS-WIN, which protective function outputs are not included in a general interrogation (GI). This reduces the amount of data on a general interrogation. By default all function outputs with a function type or information number unequal 0 are transmitted during a general interrogation according to the standard.

With this parameter it can be defined, whether an existing parameter set for the suppression of some messages should be used at all or not. The suppression on GI feature is disabled also with an error message despite of an active parameter, if the DRS was initialized with an older version of DRS-WIN, which does not write the required parameter set into the DRS. In this case the parameter must be deactivated or the DRS is initialized with a newer version of the DRS-WIN.

9.5.10. ASDU 1/2 Settings

This parameter is available only on devices with terminal version 1.55 or higher!

On devices with IEC 60870-5-103 firmware V2.00 or higher it is possible to specify with the operation program DRS-WIN, which protective function outputs are sent with ASDU 1 und which with ASDU 2. Messages with ASDU 2 have additionally the fault number (FAN) and the relative time (RET) in milliseconds in dependence to the time of the first alarm or trip of a fault. By default all function outputs are transmitted with ASDU 1.

With this parameter it can be defined, whether an existing parameter set for ASDU 2 should be used at all or not. The ASDU 1 or 2 feature is disabled also with an error message despite of an active parameter, if the DRS was initialized with an older version of DRS-WIN, which does not write the required parameter set into the DRS. In this case the parameter must be deactivated or the DRS is initialized with a newer version of the DRS-WIN.

9.5.11. GO Settings

This parameter is available only on devices with terminal version 1.55 or higher!

On devices with IEC 60870-5-103 firmware V2.00 or higher it is possible to specify with the operation program DRS-WIN, which protective function outputs are sent spontaneously only with message **COME** (Data Unit 2) and the message **GO** (Data Unit 1) is internally suppressed. During a general interrogation the **OFF** condition is always transmitted. By default all state changes of the function outputs are transmitted with **COME** as well as with **GO**.

With this parameter it can be defined, whether an existing parameter set for the suppression of **GO** messages should be used at all or not. The feature of suppression of **GO** messages is disabled also with an error message despite of an active parameter, if the DRS was initialized with an older version of DRS-WIN, which does not write the required parameter set into the DRS. In this case the parameter must be deactivated or the DRS is initialized with a newer version of the DRS-WIN.

9.5.12. Operating Measured Values

This parameter is available only on devices with terminal version 1.55 or higher!

On devices with IEC 60870-5-103 firmware V2.00 or higher the operating measured values (measured values of the CT's and VT's) can also be transmitted. The required settings for this feature can be only done with the operation program DRS-WIN. With this parameter it can be defined, whether the measured values are really transmitted or not. The transmission of the operating measured values is disabled also with an error message despite of an active parameter, if the DRS was initialized with an older version of DRS-WIN, which does not write the required parameter set into the DRS. In this case the parameter must be deactivated or the DRS is initialized with a newer version of the DRS-WIN.

9.5.13. Line Idle State

This parameter is available only on devices with terminal version 1.57 or higher!

On devices with software version 3.20 or higher of the DRS-LIGHT it is possible to change the line idle state of the optical communication interface for IEC 60870-5-103 from **Light ON** to **Light OFF/RS485**. The default idle state after a reset is always **Light ON** according to IEC 60870-5-103 until the initialization finished during the parameter is interpreted.

Since hardware version Rev.06 of the DRS it is also possible to use an electrical RS485 version of the communication interface for IEC 60870-5-103. The idle state has to be unconditionally set to **Light OFF/RS485** for the electrical hardware implementation.

On DRS-LBB and DRS-CBB the IEC 60870-5-103 communication occurs via the fiber optic ring connections of the busbar protection and therefore this parameter has no significance on the bay units.

9.6. IEC-Device Address

Default value: 254

On devices with terminal version 1.50 or higher this menu is not available when the [IEC 60870-5-103 communication](#) is deactivated!

This menu is accessed from the menu **Additional Funct** by pressing the **OK** key when **IEC-Device Addr.** is displayed in the second line.

In this menu viewing and changing of the IEC device address for the serial data transfer according to protocol IEC 60870-5-103 is possible. The factory setting for the address is 254. The permitted operational service address ranges from 000 to 254 whereby in one plant a specific address may be allocated only once. The modification is carried out in the entry mode. The input of the password is required to modify the IEC device address.

Following keys are available in the menu **IEC-Device Addr.**:

- OK** starts modifying the IEC device address.
- ESC** exits menu and returns to the menu **Additional Funct**.
- EXIT** returns to the main menu.

And after pressing **OK** to carry out a modification:

- ▼ decreases the current digit by a value of 1.
- △ increases the current digit by a value of 1.
- ▶ positions the cursor right to the next digit of the address.
- ◀ positions the cursor left to the preceding digit of the address.

UNDO discards any modification of the address.

SAVE saves the current address.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

ESC exits menu and returns to the menu **Additional Funct.**

EXIT returns to the main menu.

9.7. IEC-Function Type

On devices with terminal version 1.50 or higher this menu is not available when the [IEC 60870-5-103 communication](#) is deactivated!

This menu is accessed from the menu **Additional Funct** by pressing the **OK** key when **IEC-Funct. Type** is displayed in the second line.

In this menu viewing and changing of the IEC device function type for the serial data transfer according to protocol IEC 60870-5-103 is possible. The factory setting for the function type is a specific value between 001 and 127, whereby every relay with the same functionality has the same IEC device function type which is used at all protective function outputs. The modification is carried out in the entry mode. The input of the password is required to modify the IEC device function type.

When in entry mode (cursor is visible) an automatic numbering or clearing of all function types and information numbers can be executed by pressing the **OK** key and accepting the additional question. The numbering is carried out, if the current function type is not 000, otherwise the clearing sequence is executed. On automatic numbering each function output of all active protective functions is assigned the current device function type and an automatically incremented information number. The numbering of the information numbers starts with the value 1. On clearing the information set (function type and information number) of every function output of all active protective functions is set to 0, so they are ignored in the serial data transfer.



Information

Modifying the IEC device function type without automatic numbering has no effect on the information set of each function output. So the messages are still generated with the original function type.



NOTICE

Since the automatic numbering takes only the active protective functions into consideration, a later activation of a so far deactivated protective function can lead to an unintentional duplicate allocation of an information set.

Following keys are available in the menu **IEC-Funct. Type**:

- OK** starts modifying the IEC function type.
- ESC** exits menu and returns to the menu **Additional Funct.**
- EXIT** returns to the main menu.

And after pressing **OK** to carry out a modification:

- ▼ decreases the current digit by a value of 1.
- △ increases the current digit by a value of 1.
- ▶ positions the cursor right to the next digit of the value.
- ◀ positions the cursor left to the preceding digit of the value.
- UNDO** discards any modification of the IEC function type.
- OK** starts the automatic numbering or erasing of all information sets.
- SAVE** saves the current IEC function type and all information sets.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

- ESC** exits menu and returns to the menu **Additional Funct.**
- EXIT** returns to the main menu.



Information

On devices with terminal version 1.50 or higher the information set for the function output **CB ON 2** for the protective functions **AR-Relay** and **CB Control** is always set to 0 (deactivated) because the output is always set simultaneously with **CB ON 1** and both outputs are operating the same interposing relay (OUT3) to close a circuit breaker. The second output would only carry the same information as output 1 and is therefore always configured as deactivated.

9.8. IEC-Info Number


On devices with terminal version 1.50 or higher this menu is not available when the [IEC 60870-5-103 communication](#) is deactivated!


This menu is accessed from the menu **Additional Funct** by pressing the **OK** key when **IEC-Info Number** is displayed in the second line.

In this menu viewing and setting of the information sets (function type and information number) for the serial data transfer according to protocol IEC 60870-5-103 is possible. The factory setting of the information set is configured according to our standard or as per agreement, i.e. every alarm (WNO) and trip (TRO) of the implemented protective functions is allocated a definite information number. The password must be entered to modify an assignment.


The second line displays on the left side the function type and on the right side the information number of the current protective function output. Both can be changed. But care must be taken that no information set is unintentional allocated twice, i.e. two or more function outputs have the same function type and the same information number. Generally all function outputs have the same function type (please refer to [IEC-Function Type](#)), but different information numbers. A difference between the stored and displayed value is indicated by * symbol left beside the value.


Following keys are available in the menu **IEC-Info Number**:

- △ ▽ scrolls through the function outputs of all active protective functions.
 - UNDO** resets the function type and the information number to the stored values.
 - INFO** As long as this key is pressed, the first line shows the name of the protective function and the second line the plant specific denomination of the protective function (if configured), whose function output is selected now.
 - OK** calls the submenu to change the function type and the information number.
 - SAVE** saves all information sets.
-  Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.
- ESC** exits menu and returns to the menu **Additional Funct.**
 - EXIT** returns to the main menu.

| | |
|---|--------------------|
|  | Information |
| <p>On devices with terminal version 1.50 or higher the information set for the function output CB ON 2 for the protective functions AR-Relay and CB Control is always set to 0 (deactivated) because the output is always set simultaneously with CB ON 1 and both outputs are operating the same interposing relay (OUT3) to close a circuit breaker. The second output would only carry the same information as output 1 and is therefore always configured as deactivated.</p> | |

Following keys are available for modification of a function type and an information number:

- ▽ decreases the current digit by a value of 1.
 - △ increases the current digit by a value of 1.
 - ▶ positions the cursor right to the next digit of the current value or to the highest digit of the other value.
 - ◀ positions the cursor left to the preceding digit of the current value or to the lowest digit of the other value.
- UNDO** discards any modification on both values in this menu.
 - OK** accepts both values and returns to the menu **IEC-Info Number**.
 - SAVE** accepts both values and saves all information sets.
-  Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.
- ESC** exits menu and returns to the menu **IEC-Info Number**.
 - EXIT** returns to the main menu.

| | |
|--|--------------------|
|  | Information |
| <p>Details of IEC function type and IEC information numbers of the DRS-LIGHT relay models can be found in the Operation & Maintenance Manual of DRS-LIGHT.</p> | |

9.9. IEC-Alarms Lost

On devices with terminal version 1.50 or higher this menu is not available when the [IEC 60870-5-103 communication](#) is deactivated!

This menu is accessed from the menu **Additional Funct** by pressing the **OK** key when **Alarms Lost** is displayed in the second line.

In this menu the function type and the information number for the special status message on loss of messages because of a buffer overflow is configured when applying a serial communication according to IEC 60870-5-103 protocol.

Each modification of a function output configured according to IEC 60870-5-103 (function type and information number unequal 0) is stored by the relay into a buffer. This recording starts immediately after initialization when the [IEC 60870-5-103 communication](#) is activated and independent of an active connection with an IEC master. This buffer can store the information for altogether 32 events (42 on relays with IEC-FW-Version 1.50 and 1.51) after which the respective oldest record is overwritten representing an alarm message loss.

However, during normal service operation it is highly unlikely that a message loss occurs because it is hardly possible that so many protective function events (exceeding 32 or 42) are generated within a relative short time. Only in test mode it is possible to produce such a high number of alarms within a short time.

In the second menu line on the left hand side the function type (default 252) and on the right side the information number (default 160) of the status message for an alarm message loss is displayed. Both can also be modified. However, care must be taken that this information set is not used already for a different data point, e.g. protective function output, otherwise the message cannot be clearly identified by the master. When there is a difference between the current displayed value and the value stored in the relay's memory it is indicated by a * symbol left beside the value.

Following keys are available in the menu **Alarms Lost**:

- OK** starts modifying the function type and information number.
- ESC** exits menu and returns to the menu **Additional Funct**.
- EXIT** returns to the main menu.

And after pressing **OK** to carry out a modification:

- ▼ decreases the current digit by a value of 1.
- △ increases the current digit by a value of 1.
- ▶ positions the cursor right to the next digit of the current value or the highest digit of the other value.
- ◀ positions the cursor left to the preceding digit of the current value or the lowest digit of the other value.
- UNDO** discards any modification on both values in this menu.
- SAVE** accepts both values and saves the information set.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

- ESC** exits menu and returns to the menu **Additional Funct**.
- EXIT** returns to the main menu.

9.10. Remote Setting

Default value: Active

This menu is accessed from the menu **Additional Funct** by pressing the **OK** key when **Remote Setting** is displayed in the second line.

With a PC or laptop and the operation program DRS-WIN parameter setting of the DRS-LIGHT relays can be performed comfortably and with ease via the RS485 communication port on the rear side of the relay. This serial interface cannot only be used for local communication and data transfer, but can also be employed for remote operation and parameter setting with the aid of suitable data transmission media like a modem. If no parameter setting via the RS485 communication port is desired, the remote data modification feature via this interface can be disabled in this menu. Enabling of the remote parameter setting option is again only possible with this menu item. The input of the password is required to modify the status of the remote parameter setting option.

Following keys are available in the menu **Remote Setting**:

- OK** starts modifying the status of the remote parameter setting option.
- ESC** exits menu and returns to the menu **Additional Funct.**
- EXIT** returns to the main menu.

And after pressing **OK** to carry out a modification:

- UNDO** discards a modification of the status.
- OK** changes the status of the remote parameter setting option.
- SAVE** saves the current status of the remote parameter setting option.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

- ESC** exits menu and returns to the menu **Additional Funct.**
- EXIT** returns to the main menu.

9.11. BB/LD Remote Setting

Default value: Active

This menu is accessed from the menu **Additional Funct** by pressing the **OK** key when **BB Remote Set** or **BB/LD Remote Set** (prior respectively starting with terminal version 1.74) is displayed in the second line.

Like via the RS485 communication port it is also possible to perform a comfortable and easy parameter setting via the **Ring A** and **Ring B** of the busbar protection or the LD communication channel of the line differential protection with a PC or notebook and the user program DRS-WIN. If the remote data modification feature via these communication channels is not desired, it can be disabled in this menu. The entry of the password is required to modify the status of the busbar/line differential remote parameter setting option.

The available keys are the same as in the menu [Remote Setting](#).



Information

This menu exists only on a bay unit DRS-LBB or DRS-CBB of the busbar protection and a line differential unit DRS-LLD of the line differential protection.

10. Menu "Terminal Parameter"

This menu is accessed by pressing the **UNDO** key in the main menu.

In this menu those parameter settings are displayed which are relevant for the display indication and the function of the keypad. Modifications of these particular settings are only possible locally via the relay's keypad. A password input is not required for viewing only. However, to be able to alter a setting parameter the password must be entered if no authorization still exists from a previous password entry (please refer to [password timeout](#)). When there is a difference between the current displayed terminal parameter value and the value stored in the relay's memory it is indicated by a * symbol in the second line.

Following terminal parameters are displayed and can be modified if desired:

- [Terminal Language](#) *)
- [Display Mode](#)
- [Edit Mode](#)

as well as summarized in section [10.4](#) of this document the settings for

- [Measured Value Display Time](#)
- [Measured Value Actualizing Time](#)
- [Key Repeat Delay Time](#)
- [Key Repeat Rate](#)
- [Password Timeout](#)
- [Modification Timeout](#)
- [Return Timeout](#)
- [Display Illumination Time](#)

*) If a multilingual terminal data set exists in the relay.

Following keys are available in the menu **Terminal Param.:**

△ ▾ scrolls through the terminal parameters.

UNDO restores the current parameter to its stored value in the relay.

INFO changes temporary the language, when the parameter **Terminal Lang.** is selected. This terminal language is then also used in all other menus. But the stored language is used again after the next reset (power up) or parameter saving process.

OK calls the submenu to modify the current displayed parameters.

SAVE saves the new terminal parameter set.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

ESC exits menu and returns to the main menu.

EXIT returns to the main menu.


10.1. Terminal Language

Default value: English

Relays of the DRS-LIGHT family are delivered usually bilingually. The factory setting of the terminal language is English. The terminal language support can be changed via this menu item.

A change in language is indicated immediately in the first and second line of the display and is permanently used after saving.

Following keys are available for selection of the terminal language:

-  selects language.
- UNDO** chooses the language used before.
- OK** accepts the current selected language and returns to the menu **Terminal Param.**
- SAVE** accepts the selected language and saves the new terminal parameter set.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

- ESC** exits menu and returns to the menu **Terminal Param.**. The new selected language remains temporary until the next reset (power up) or parameter saving process.
- EXIT** returns to the main menu.



Information

On a monolingual special relay version the terminal language and this menu is not available.

10.2. Display Mode

Default value: Display in secondary values

This parameter determines the default display mode for the current and voltage measured values of the CT and VT signals and protective functions operating values. A display in primary, secondary and relative values can be selected.

Primary values are the current and voltage values in relation to the respective CT or VT. Secondary values are those on the secondary side and relative values refer to the nominal current of the protected object and are displayed in %. For the proper display of these values the correct input of the corresponding nominal ratios in the submenu [CT / VT Ratios](#) of the menu [Additional Functions](#) is necessary.

The display mode can be changed temporary in the menu [Display Measured Values](#) or in the submenus of [Parameter Active Functions](#) while displaying an operating value by repeatedly operating the **INFO** key. This temporary change of the display mode remains until the next reset (power up) or parameter saving process.

Following keys are available for selection of the default display mode:

△ ▼ selects the display mode.

UNDO chooses again the display mode which was used on entering this menu.

OK accepts the selected display mode and returns to the menu **Terminal Param.**

SAVE accepts the selected display mode and saves the new terminal parameter set.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.

ESC exits menu and returns to the menu **Terminal Param.**

EXIT returns to the main menu.

10.3. Edit Mode

Default value: Step Mode

This parameter determines the default edit mode after a reset of the DRS for parameter settings which are entered as a numeric value and don't have a special conversation with the CT/VT ratios as time delays, frequency, etc. It can be chosen between enter mode and step mode.

In the enter mode the digit on which the cursor is placed is edited. In this mode there is no auto-repeat function of the △ ▼ keys. The cursor position is changed with the ◀ ▶ keys. Further it is possible that the permitted setting range exceeds or falls short of the nominal range during entry. Exceeding the maximum value is indicated by a preceding > character. A value below the minimum value is marked with the < character. Terminating the submenu with the **OK** or **SAVE** key is not possible under both conditions. When changing to step mode this value is set to maximum when the setting range was exceeded or to minimum when it was below the possible minimum setting.

When in step mode the whole value is changed by one step. In this mode the auto-repeat function of the △ ▼ keys is enabled. After ten automatic key repetitions the step value is increased to the next higher digit. After further ten automatic key repetitions the step value is again increased. However, this step increasing is only carried out so far as it is making sense or is possible.

A temporary change of the edit mode with the **INFO** key when modifying a preset value parameter or time delay is possible at any time. This temporary change remains until the next device reset.

Following keys are available for selection of the default edit mode:

△ ▼ selects the edit mode.

UNDO chooses again the edit mode which was used on entering this menu.

OK accepts the selected edit mode and returns to the menu **Terminal Param.**

SAVE accepts the selected edit mode and saves the new terminal parameter set.



Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.


ESC exits menu and returns to the menu **Terminal Param.**

EXIT returns to the main menu.

10.4. Terminal Times

In these menu items the respective displayed time value can be modified within the specified setting range.

Following keys are available for the input of the time parameter settings:

- ▼ When in step mode decreases the whole value by one step.
When in enter mode decreases the current digit by a value of 1.
 - △ When in step mode increases the whole value by one step.
When in enter mode increases the current digit by a value of 1.
 - ▶ When in enter mode positions the cursor by one digit to the right of the time value.
 - ◀ When in enter mode positions the cursor by one digit to the left of the time value.
- UNDO** discards any modification of the time value in this menu.
- OK** accepts the current value and returns to the menu **Terminal Param.**
- SAVE** accepts the current value and saves the new terminal parameter set.
-  Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.
- ESC** exits menu and returns to the menu **Terminal Param.**
- EXIT** returns to the main menu.

10.4.1. Measured Value Display Time

Default value: 5 seconds

This time determines the duration for displaying a measured value in the main menu until the next measured value is displayed.

The setting range is from 2 to 10 seconds.

10.4.2. Measured Value Actualizing Time

Default value: 1 second

This time determines the refresh interval of the displayed measured value in the main menu and the menu [Display Measured Values](#).

When the actualizing time is larger than the measured value display time then the measured value is not updated during its display time.

The setting range is from 0.2 to 10 seconds.

10.4.3. Key Repeat Delay Time

Default value: 0.5 seconds

This time determines the time delay which has to expire after operating the \triangle or ∇ key before an automatic key repetition is taking place (auto-repeat function).

The setting range is from 0.1 to 1 second.

10.4.4. Key Repeat Rate

Default value: 0.5 seconds

This time determines the step speed of the auto-repeat function, i.e. how fast the next/previous value or next/previous character is displayed when pressing the \triangle or ∇ key.

The setting range is from 0.1 to 1 second.

10.4.5. Password Timeout

Default value: 180 seconds

This value represents the time period the relay is ready to accept setting changes after an input of the password. Any further operation of a valid key in one of the menus, where a modification of a parameter setting is possible, within this period restarts the time counter. When no more modifications are carried out after saving a new parameter set, the relay locks any modifications on the settings after expiring of this password timeout. When during setting changes this time is expired the session is terminated and an exit to the main menu is executed. All changes which have not been saved into the relay are thus lost.

The setting range is from 30 to 600 seconds.

10.4.6. Modification Timeout

Default value: 180 seconds

This setting is the time span during a parameter change where at least a single key operation has to be carried out. When this time expires the procedure is terminated resulting into a return to the main menu whereby all parameters not previously stored are lost.

The setting range is from 10 to 600 seconds.

10.4.7. Return Timeout

Default value: 120 seconds

This value represents the time period a valid key must be pressed within in all submenus where no password is entered, e.g. just viewing parameters or measured values, before a return to the main menu is initiated from all submenus.

The setting range is from 30 to 600 seconds.

10.4.8. Display Illumination Time

Default value: 120 seconds

This value fixes the period of the display background illumination after not operating any key, i.e. after how many seconds from the last key operation the automatic display illumination is terminated.

The setting range is from 10 to 600 seconds.



Information

The automatic switch off of the display light can be disabled by setting this value to 0.

11. Menu "Display Measured Values"

This menu is accessed by pressing the **▶** key in the main menu.

In this menu are displayed the operating measured values (currents and voltages of the CT/VT inputs), as well as the function measured values of all active protective functions. When in this menu the display mode of the measured values (primary, secondary or relative values) is changed by pressing the **INFO** key, the new mode is also used in the main menu after leaving this menu. This menu does not require a password input.

Two additional submenus can be called in this menu. With the **OK** key the submenu for the selection of those measured values can be accessed which should also be displayed in the main menu, refer to menu **Selection Meas. Values**.

The **▶** key opens the submenu for the display of the differential currents with the busbar protection in service, refer to menu **BB-Diff. Currents** (page 50). The submenu is only available on devices with terminal version 1.50 or higher.

Following keys are available in the menu **Display Meas. Values**:

- ▶** calls the submenu for the differential current display of the busbar protection.
- △ ▼** scrolls through the measured values.
- INFO** If this key is pressed for more than one second the first line displays the protective function name and the second line the plant specific denomination of the protective function (if configured) which calculates the measured value. This display disappears when the **INFO** key is released.
If the **INFO** key is activated shorter than one second, the display of the current measured value changes to primary values or relative values if applicable.
- OK** calls the submenu **Selection Meas. Values**.
- ESC** exits menu and returns to the main menu.
- EXIT** returns to the main menu.


11.1. Menu "Selection Meas. Values"

This menu is accessed from the menu **Display Meas. Values** by pressing the **OK** key.

In the menu **Selection Meas. Values** a selection is possible of function measured values to be also sequentially shown in addition to the operating measured values (currents/voltages) in the main menu. For a modification of this selection a password input is required. The selection is carried out in a way that a selected measured value indicated as **Not Active** is changed to **Will Be Activat**, with the **OK** key and subsequently saved in the relay with the **SAVE** key.

A function measured value is removed from the selection with the same procedure by changing from **Active** with **OK** to **Will Be Deactiv**, and saving the new configuration with the **SAVE** key.

Following keys are available in the menu **Selection Meas. Values**:

- △ ▼ scrolls through the measured values.
 - UNDO** restores the status of the measured value to the stored value.
 - INFO** As long as this key is pressed the first line displays the protective function denomination and the second line the plant specific denomination (if configured) of the protective function producing the measured value. The display disappears when releasing the **INFO** key.
 - OK** changes the selection status for the measured values display in the main menu.
 - SAVE** saves the new selection of function measured values for the display in the main menu.
-  Each modification of the setting parameters whereby you store the setting via **SAVE** and **OK** results in an interruption of the service operation condition for approximately 2 to 5 seconds resulting in an alarm condition during this period.
- ESC** exits menu and returns to the menu **Display Meas. Values**.
 - EXIT** returns to the main menu.

11.2. Menu "BB-Diff. Currents"

This menu is available only on devices with terminal version 1.50 or higher!

This menu is accessed from the menu **Display Meas. Values** by pressing the key ▶ and it is only called up when the busbar protection is ready for service operation. It is therefore only available on bay units and can only be opened when there is a connection to the central unit which computes the differential currents.

In this submenu the sum of plant currents and the sum of the bus section currents are displayed for each phase.

Following keys are available in the menu **BB-Diff. Currents**:

- ◀ ▶ scrolls through the measured values for each bus section.
- △ ▼ scrolls through the measured values for each phase.
- ESC** exits menu and returns to the menu **Display Meas. Values**.
- EXIT** returns to the main menu.

When there is no measured value for a phase or bus section because e.g. the corresponding bay unit has failed, then the second line is displaying the phase number and the text **No Meas. Value**. If during the menu display the connection to the central unit is interrupted the display indicates that the whole menu is not available. This may happen during failure of the central unit or by disruption or disturbance of the fiber optic ring connection. With a renewed connection build up the last selected measured value is displayed automatically.

12. Menu "Display Device Infos"

This menu is accessed by pressing the **INFO** key in the main menu.

This menu provides a display for the device identification. A password input is not required since no modifications are possible in this submenu.

Following information is displayed:

- **Manufacturer**
- **Device Type**¹⁾
- **Softwareversion** version of the protective functions
- **Hardwareversion** revision of the main board of the DRS-LIGHT
- **Terminalversion** version of the operating software for the LCD and the keypad
- **IEC-FW-Version** version of the firmware for IEC 60870-5-103¹⁾ or IEC 60870-5-104⁴⁾
- **IEC-HW-Version** revision of the module for IEC 60870-5-104⁴⁾
- **NIP-FW-Version** version of firmware for the additional module for IEC 60870-5-104⁴⁾
- **Language** GER (German) or ENG (English)
- **Options** options code of the manufacturer
- **Device Label** please refer to section [9.3](#) of this manual
- **Plant** the first 16 characters of the plant name are displayed
- **BB-I-FW-Version** version of the firmware of the busbar module²⁾
- **BB-I-HW-Version** hardware version of the busbar module³⁾

¹⁾ The IEC-FW-Version (FW = firmware) is only displayed on devices with terminal version 1.40 or higher. Therefore the device type is not shown anymore since this version (please refer to nameplate).

²⁾ On devices with terminal version up to 1.41 displayed as **BB-Version**. Is only applicable on bay units of the busbar protection.

³⁾ Is displayed only on devices with terminal version 1.43 or higher. Is only applicable on bay units of the busbar protection.

⁴⁾ Is displayed only on devices with terminal version 1.54 or higher if the modules for IEC 60870-5-104 are configured.

Following keys are available in the menu **Display Device Infos**:

- △ ▼ scrolls through the information.
- INFO** displays the release date of the software, terminal and IEC-FW-FW version.
- ESC** exits menu and returns to the main menu.
- EXIT** returns to the main menu.

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13. Menu "Output Event Protocol"

This menu is accessed by pressing the **ESC** key in the main menu.

In this menu the event recording can be viewed and also cleared. If there are entries in the protocol on entering the menu, first the most recent entry is displayed. All entries are divided in two groups: the protective function entries like alarms and trips and the relay status entries like e.g. **End Of Event Record**.

Very clear and comfortable is the output of the event protocol in the operation program DRS-WIN. A detailed description of the entries can be found in the [User's Guide of DRS-WIN4](#).

For each protective function entry following information can be viewed in the first line via the **◀** key:

- the plant specific denomination of the protective function (if configured);
- the protective function name (standard denomination);
- the stage and phase information, if this information is applicable.

After entering this submenu, for each protective function first the plant specific denomination is displayed. This setting can be changed with the **INFO** key to the protective function name thus first always the standard denomination is shown at a protective function entry.

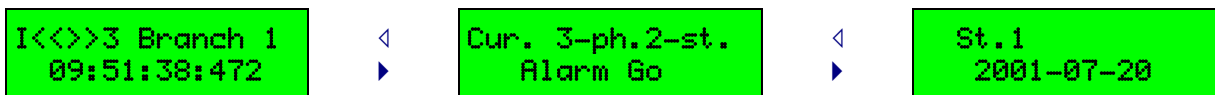
In the second line following information can be viewed for each protective function entry via the **▶** key, whereby the time of the entry is always displayed first:

- the time of the entry as absolute or relative time;
- the cause of the entry - Alarm/Trip Come/Go;
- the date of the entry as absolute or relative date.

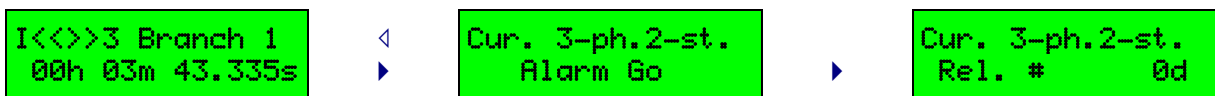
| | date | time |
|--------------------|-------------|----------------|
| absolute time set: | YYYY-MM-DD | HH:MM:SS:mmm |
| relative time set: | Rel. # DDDd | HHh MMm SS.mmm |

When the DRS-LIGHT was provided with a system time during the setting procedure or gets the time information regularly from another time source, the entries are stored with an absolute time marker. Without any initialization of time the entries are stored inside the relay with a relative time marker referenced to system start (power up). All relative time markers till the last reset (power up or parameter saving process) are automatically displayed with absolute time and date, if the system time of the DRS-LIGHT was set after the reset.

Example for a protective function entry with absolute time marker:



Example of a protective function entry with relative time set:



For relay status entries first the cause of entry is displayed in both lines. With the ◀ or ▶ key the date and time of the entry can be displayed in both lines at once, too.



To keep track on many entries, there is the possibility to view the number of the entry in the first line and the total number of entries in the second line via the **INFO** key. The entry number corresponds to the line number in the display of the operation program DRS-WIN. A currently shown entry which is overwritten by a new event record during display gets the entry number 000, which is an indicator that this entry does not exist anymore in the current event recording, but still on the display. The entry number and the total number of entries are refreshed at every call. So it is possible that the same entry is displayed with different entry number, if new entries are recorded into the protocol since the last call. The maximum amount of entries is 256 and then a new event record overwrites the oldest.

Following keys are available in the menu **Output Event Protocol**:

- ▼ scrolls downwards to the next, older entry in the protocol.
- △ scrolls upwards to the previous, younger entry in the protocol.
- ▶ changes the display in the second line on a protective function entry.
- ◀ changes the display in the first line on a protective function entry.
- ◀ ▶ switches between kind of the entry and date/time of the entry on a relay status entry like **Manual LED-Reset**.

UNDO clears the event protocol. Before the clearing process is executed, the request must be additionally confirmed and the password must be entered if required.

INFO If this key is pressed for more than one second the entry number and the total number of entries is displayed. This display disappears when the **INFO** key is released. If the **INFO** key is activated shorter than one second and the displayed entry is a protective function entry, the setting is changed whether first the protective function name or the plant specific denomination of the protective function should be displayed. The first line is switched immediately to the corresponding denomination.

OK jumps to the most recent entry which can be a different one as on entering the menu, if new entries have been recorded.

ESC exits menu and returns to the main menu.

EXIT returns to the main menu.

14. Menu "System Functions"

This menu is accessed by pressing the **EXIT** key in the main menu.

In this menu special system functions can be called. With these system functions certain system values can be viewed or modified. This menu does not require a password input.

Following keys are available in the menu **System Functions**:

- △ ▽ scrolls through the system functions.
- OK** calls the corresponding system function.
- ESC** exits menu and returns to the main menu.
- EXIT** returns to the main menu.

On devices with terminal version 1.40 or higher in menu **System Functions** are also the special menus **Spare Unit**, **Software Update** and **Calibration**. On DRS with software version 3.33 or higher in this menu is also the special menu **Meas. Trimming**. One more system function is the **Hardware Test** which is available on factory tested devices with software version 3.34 or higher and with hardware version Rev.05 or higher on devices in this menu. For more details of these menus for specialized personnel only see the [Operation & Maintenance Manual of DRS-LIGHT](#).

14.1. DRS System Time

In this menu the system time and date of the DRS-LIGHT is shown as relative or absolute time set and can be modified on demand. The input or modification of the date and time is carried out with a method which is typical for digital clocks (seconds ▶ hours ▶ minutes ▶ year ▶ month ▶ day). An input of the password is not required.

Following keys are available in the menu **DRS System Time**:

- OK** starts modifying the time and date.
- ESC** exits menu and returns to the menu **System Functions**.
- EXIT** returns to the main menu.

And after pressing **OK** to carry out a modification of time and date:

- ▽ decreases the current digit by a value of 1.
- △ increases the current digit by a value of 1.
- ▶ moves the cursor to the next input position.
- ◀ moves the cursor to the previous input position.
- OK** set date and time and returns to the display for viewing the DRS system time.
- ESC** exits menu and returns to the display for viewing the DRS system time.
- EXIT** returns to the main menu.



Information

On devices with terminal version 1.50 or higher it is not possible to set the time with this menu when a time server e.g. via IEC 60870-5-103 or IEC 60870-5-104 (NTP) is providing the correct system time for the relay.

14.2. Frequency

This menu displays permanently refreshed the synchronizing frequency of the DRS-LIGHT. If the DRS-LIGHT is unable to synchronize, e.g. no currents or voltages are supplied on the CT/VT inputs, it uses the factory set nominal frequency.

Following keys are available in the menu **Frequency**:

- ESC** exits menu and returns to the menu **System Functions**.
- EXIT** returns to the main menu.

14.3. Binary Inputs

This menu is available only on devices with terminal version 1.50 or higher!

This menu is accessed from the menu **System Functions** by pressing the **OK** key when **Binary Inputs** is displayed in the second line.

In this menu the current status of all available binary inputs can be observed, however modification of the status is not possible. This menu does not require a password input.

The first line displays either the plant specific denomination of the binary input when configured or the heading **Binary Inputs** when no denomination exists.

The second line indicates the hardware type, i.e. **BI** for binary hardware input and **VI** for virtual input, the number of the selected binary input and the current input status.

With the **INFO** key the display for the status of a single input can be changed to indicate the status for all 32 possible binary inputs. For the display of all 32 binary inputs the first line shows the status of inputs 1 to 16 and the second line the inputs 17 to 32 from left to right. Not available binary inputs are indicated by a ***** character.

Examples:

```
Binary Inputs
[BI.01] → 0
```

hardware input 1
without denomination

```
Test I>AMZ1,2
[VI.12] → 1
```

virtual input 12
with denomination
Test I>AMZ1,2

```
01001000000100**
*****0*****
```

all binary inputs
2, 5 and 12 are 1

Following keys are available in the menu **Binary Inputs**:

- △ ▽ scrolls through the available binary inputs.
- INFO** changes to the display for all binary inputs.
- ESC** exits menu and returns to the menu **System Functions**.
- EXIT** reverts to the main menu.

14.4. Binary Outputs

This menu is available only on devices with terminal version 1.50 or higher!

This menu is accessed from the menu **System Functions** by pressing the **OK** key when **Binary Outputs** is displayed in the second line.

In this menu the current status of all available binary outputs can be observed. After a password input also an inversion of the status is possible.

The first line displays either the plant specific denomination of the binary output when configured or the heading **Binary Outputs** when no denomination exists.

The second line indicates the hardware type, i.e. **BO** for binary hardware output and **VO** for virtual output, the number of the selected binary output and the current output status.

With the **INFO** key the display for the status of a single output can be changed to indicate the status for all 32 possible binary outputs. For the display of all 32 binary outputs the first line shows the status of outputs 1 to 16 and the second line the outputs 17 to 32 from left to right. Not available binary outputs are indicated by a ***** character.

Examples:

```
Binary Outputs  
[BO.02] → 0
```

hardware output 2
without denomination

```
VRT5  
[VO.14] → 1
```

virtual output 14
with denomination VRT5

```
1000010**000010*  
00000000**000001
```

all binary outputs
1, 6, 14 and 32 are 1

Following keys are available in the menu **Binary Outputs**:

- △ ▽ scrolls through the available binary outputs.
- INFO** changes to the display for all binary outputs.
- SAVE** inverts the status of the current output. This is only enabled after a password input and with a display of only a single output.
- ESC** exits menu and returns to the menu **System Functions**.
- EXIT** reverts to the main menu.

For displaying the status of the outputs it is not required to enter the password. But if the status of the selected binary output should be changed with the **SAVE** key, the password must be entered if no authorization still exists from a previous password input (please refer to [password timeout](#)). The binary output, respectively the relevant interposing relay is controlled inverted for at least 1 second or as long as the **SAVE** key is pressed. Whilst the manual control of the binary output is active the end of the second line displays **set** or **res** in accordance with the new status.



NOTICE

Inverting an output should never be performed during service operation but only during testing with the protected object taken out of service.

The inversion of a binary output is not possible when the operation program DRS-WIN is connected to the relay and the binary I/O preset or the function outputs window is opened. Then, as for the binary inputs, only the current status display of the binary outputs is possible since the DRS-WIN is overwriting the inversion of the binary output through the corresponding preset. The inversion of a binary output enables the test mode of the device until the menu is exited.

With an existing hardware interlock for relay OUT3 the outputs OUT3.1 and OUT3.2 cannot be inverted – for explanation refer to section [6.2.3](#) (page [22](#)).

14.5. IEC-Message Test

This menu is available only on devices with terminal version 1.50 or higher!

This menu is accessed from the menu **System Functions** by pressing the **OK** key when **IEC-Message Test** is displayed in the second line and after the password was entered if no authorization still exists from a previous password input (please refer to [password timeout](#)).

This menu is only available when:

- the communication protocol according to IEC 60870-5-103 is used and a master is connected, or
- the communication protocol according to IEC 60870-5-104 is used, an IEC firmware version 2.15 or higher is running, the terminal version is 1.61 or higher, and there is at least one active connection to one of the configured stations.

14.5.1. Message Test on IEC 60870-5-103

For a message test on IEC 60870-5-103 the [IEC 60870-5-103 coupling](#) (page [32](#)) must be available and is also activated as described, and the master must be connected to the relay. Moreover at least one function output of an active protective function with an information set unequal 0 must exist – also refer to sections [9.7](#) and [9.8](#) from page [38](#) onwards.

This menu now allows scrolling through all configured outputs of active protective functions whereby in the first line the name of the output and in the second line the function type (left) and the information number (right) are displayed. As long as the **INFO** key is pressed the protective function name and the plant specific denomination of the protective function of the selected function output is indicated.

Now by operating the **SAVE** key the displayed information set (message) is passed to the IEC 60870-5-103 communication firmware which sends this message with **COME** and also **GO**, if not configured that this message should be never send with the status **GO**.

Possibly it can take some time until the IEC master requests this pair of messages or the single message from the relay. The text **Please Wait** is displayed during this time. Once the IEC master has requested the test message(s) from the relay, the display disappears and the next message position can be tested. If the IEC master does not request the messages due to communication problems or the test should be aborted for any reason during the queue time, then only the **ESC** key needs to be operated.

These test messages do not affect in any way the protective functions and the normal operation according to IEC 60870-5-103. So any time these test messages can be sent. This menu is especially useful during commissioning tests since each specific function output can thus be verified whether the master processes the message accordingly, i.e. displaying correctly the text of the specific function output.

The test messages are sent with the cause of transmission **test mode** (COT=7) when parameter [Test Mode Info](#) (page 35) is active as explained. Otherwise they are sent with cause of transmission **spontaneous** (COT=1) just like a real message initiated from a protective function. Hence through corresponding configuration of parameter **Test Mode Info** both cause of transmissions can be tested and verified.

Following keys are available in the menu **IEC-Message Test** on IEC 60870-5-103:

△ ▼ scrolls through the configured function outputs.

INFO As long as this key is pressed, the first line shows the name of the protective function and the second line the plant specific denomination of the protective function (if configured), whose function output is selected now.

SAVE initiates the transfer of the test message(s) with the displayed information set as long as no test message is queued for the request of the master.

ESC exits menu and returns to the menu **System Functions** if no test message is queued for the request of the master, or aborts the allocation of the current test messages.

EXIT returns to the main menu.



Information

A return to the main menu is executed immediately after pressing any of the keys listed above when the connection to the master is lost during the message test.

14.5.2. Message Test on IEC 60870-5-104

This menu is available only on devices with terminal version 1.61 or higher when using IEC 60870-5-104!

For a message test on IEC 60870-5-104 an IEC 60870-5-104 firmware version 2.15 or higher must be used and the communication firmware must have a connection to at least one of the configured stations.

According to the parameter set for transmission of messages with protocol IEC 60870-5-104 the menu offers all outputs of the active protective functions and all fault status messages of the relay for testing the messages. Scrolling through the protective function outputs and the fault status messages is done with the △ ▼ keys.

Now by operating the **SAVE** key the message is passed to the IEC 60870-5-104 communication which sends this message with **COME** and **GO** to all stations currently having an active connection. During processing the order to send the test messages by the communication firmware the first line shows the text **Please Wait**. The display of this text is very short as a rule because the test messages are sent very quick respectively the order to transmit the test messages is processed fast.

The current operating mode of the relay, e.g. maintenance mode, and the configuration of the message is taken into account on processing the order to send the test messages. Generally in maintenance mode no messages are sent provided that there is no exception on active maintenance mode configured for the selected message. The blocking of messages during maintenance mode includes also test messages generated from this menu. Therefore it can be tested also the behavior of message processing in the active operating modes maintenance or test mode.

If the selected message is disabled according to the parameter set for all stations independent of the operating mode of the relay, the user is informed by the message **Not Available** displayed for 2 seconds on the first line of the LCD.

The test messages sent with status **COME** and **GO** have identical time tags. This is not possible in service operation mode and so messages sent from within the menu **IEC-Message Test** can be quite easily identified in the protocols of the receivers. The test messages are sent with bit **substituted** (SB) set in the quality descriptor. If the test mode should be also reported according to the configuration, the bit **test** in the cause of transmission of the test messages is also set. For default configurations the test information is not added to the cause of transmission.

These test messages do not affect in any way the protective functions and the normal operation according to IEC 60870-5-104. So these test messages can be sent any time. This menu is especially useful during commissioning tests since each specific function output respectively fault status message can thus be verified whether the distant stations can process the selected message accordingly, i.e. display correctly the text of the specific message.

Following keys are available in the menu **IEC-Message Test** on IEC 60870-5-104:

- △ ▾ scrolls through the outputs of all active protective functions or all fault status messages.
- INFO** selects the preferred display in the first line for a function output which shows either the protective function name or the plant specific denomination of the protective function if configured for the current function.
- SAVE** initiates the transfer of the two test messages of the displayed function output or fault status message as long as not waiting currently for the processing of a previous order to transmit the test messages.
- ESC** exits menu and returns to the menu **System Functions** if no test message is waiting for being processed, or recalls the order to transmit the test messages.
- EXIT** returns to the main menu.



Information

A return to the main menu is executed immediately after pressing any of the keys listed above when all connections to the stations are disconnected during the message test.

15. Examples for Relay Configuration

15.1. Permanent Change of the Terminal Language (English to German)

The factory setting of the language for the relay display is **English**. With a few steps the display language can be changed permanently to **German** to show after a reset of the relay always German texts on the LCD.

- From the main menu select the menu **Terminal Param.** with the **UNDO** key.
- Select the display **Terminal Lang. English** with the **OK** key.
- On a password request enter the password.
- With the **▼** key change to **Terminalsprache deutsch**.
- Initiate the parameter saving process with **SAVE**.
- According to the menu instruction start the process with **OK**.



NOTICE

As long as the parameter saving process is not finalized with the **SAVE** and **OK** keys the original and therefore currently used parameters are still stored in the relay.

15.2. Temporary Change of the Terminal Language (English to German)

The factory setting of the language for the relay display is **English**. With a few steps the display language can be changed also temporarily to **German**. In comparison to a permanent change of the display language a temporary change is not saved in the parameter set of the relay. The temporary chosen language is therefore only active until the next change of the language or restart of the relay.

Variation 1:

- From the main menu select the menu **Terminal Param.** with the **UNDO** key.
- When the display shows **Terminal Lang. English** press the **INFO** key.
The display switches to **Terminalsprache English**. The first line of the display is already switched to German language which is used now in all menus until next start of the protection relay or the next change of the display language. The second line displays still the language really saved in the parameter set.
- Exit the menu of the terminal parameters with **ESC** key.

Variation 2:

- From the main menu select the menu **Terminal Param.** with the **UNDO** key.
- Select the display **Terminal Lang. English** with the **OK** key.
- On a password request enter the password.
- With the **▼** key change to **Terminalsprache deutsch**.
- Exit the menu for changing the terminal language with **ESC** key.
The display **Terminalsprache English** appears. The first line on the display uses the temporary selected language which is the reason why the name of the parameter is displayed in German, while the second line still shows the display language as really saved in the parameter set.
- Return to the main menu with **ESC** key. All texts on the LCD are now displayed in German until next restart or changing the terminal language once again.

15.3. Changing a Function Parameter (current, voltage, time, etc.)

- From the main menu select the menu **Parameter Active Funct.** with the ▼ key.
- By repeatedly pressing the ▼ key select the desired function and confirm the selection with **OK**.
- By repeatedly pressing the ▼ key select the desired parameter and confirm the selection with **OK**.
- On a password request enter the password.
- By repeatedly pressing the ▲ ▼ or by use of the auto-repeat function set the new parameter and confirm the new value with the **OK** key. (Left display changes from → to *.)
- Initiate the parameter saving process with **SAVE**.
- According to the menu instruction start the process with **OK**.



NOTICE

As long as the parameter saving process is not finalized with the **SAVE** and **OK** keys the original and therefore currently used parameters are still stored in the relay.

15.4. Changing the Input Matrix (CT/VT signals, blocking, test, other inputs)

- From the main menu select the menu **Matrices Active Funct.** with the ▲ key.
- By repeatedly pressing the ▼ key select the desired function and confirm the selection with **OK**.
- By repeatedly pressing the ▼ key select the desired function input and confirm the selection with **OK**.
- On a password request enter the password.
- By repeatedly pressing the ▶ key select the desired signal and confirm with **OK**. (Left display changes from → to *.)
- Initiate the parameter saving process with **SAVE**.
- According to the menu instruction start the process with **OK**.



NOTICE

As long as the parameter saving process is not finalized with the **SAVE** and **OK** keys the original and therefore currently used parameters are still stored in the relay.

15.5. Changing the Output Matrix (alarms, trips, LED)

- From the main menu select the menu **Matrices Active Funct.** with the \triangle key.
- By repeatedly pressing the ∇ key select the desired function and confirm the selection with **OK**.
- By repeatedly pressing the ∇ key select the desired function output (please consider the abbreviations of the individual signal types) and confirm the selection with **OK**.
- On a password request enter the password.
- By repeatedly pressing the \blacktriangleright key select the desired signal (LED, relay) and set or remove a logic connection with the \triangle or ∇ key. (A **+** is displayed on the left side of the relay output if it is logically connected to the function output, otherwise a **-** character indicates that the relay output is not connected.)
- After the selection of all connections confirm the modification of the output matrix of this function output with **OK**. (A modification of the matrix is indicated with a ***** character.)
- Initiate the parameter saving process with **SAVE**.
- According to the menu instruction start the process with **OK**.



NOTICE

As long as the parameter saving process is not finalized with the **SAVE** and **OK** keys the original and therefore currently used parameters are still stored in the relay.

15.6. Display of All Operating and Function Measured Values

- From the main menu select the menu **Display Meas. Values** with the \blacktriangleright key.
- Scroll through the available measured values with the ∇ key.
- Possibly change the display mode with the **INFO** key (primary values, secondary values or relative values). Please note that this selected mode is then used in the main menu, too.

15.7. Activating or Deactivating Protective Functions

- From the main menu select the menu **Selection Active Funct.** with the **OK** key.
- By repeatedly pressing the ∇ key select the desired function and confirm the selection with **OK**.
- On a password request enter the password and according to the current status of the function the indication **Will Be Activat.** or **Will Be Deactiv.** is displayed.
- Initiate the parameter saving process with **SAVE**.
- According to the menu instruction start the process with **OK**.



NOTICE

As long as the parameter saving process is not finalized with the **SAVE** and **OK** keys the original and therefore currently used parameters are still stored in the relay.

15.8. Modifying the Device Label

The device label is for clearly identifying the device and should prevent that this relay will be overwritten accidentally with the parameters of another relay when operating with the operation program on a PC (please refer to the [User's Guide of DRS-WIN4](#)).

- From the main menu select the submenu **Additional Funct** with the **SAVE** key.
- By repeatedly pressing the **▼** key select the option **Device Label** and call it with **OK**.
- Initiate the modification of the device label with **OK**.
- On a password request enter the password.
- Now modify the displayed device label similar to entering the password.
- Initiate the saving process of the device label with **SAVE**.
- According to the menu instruction start the process with **OK**.
From this moment the relay uses the new identification.



NOTICE

As long as the parameter saving process is not finalized with the **SAVE** and **OK** keys the original and therefore currently used parameters are still stored in the relay.

15.9. Setting the Nominal CT Secondary Relay Current

The DRS-LIGHT is suitable for nominal CT secondary currents of either 1 A or 5 A. The different rated currents are made possible through an 1 A and a 5 A tap for each current input. So it must be used only the tap corresponding the nominal current. The appropriate chosen rated current has to be set in the relay according to the connection used to be taken into account on the relay's parameters and the operating measured values.



NOTICE

The DRS-LBB offers no choice. The DRS-CBB and the DRS-LLD have two terminals for each current input, but the nominal currents are not 1 A and 5 A. Further information regarding the nominal currents of these models can be found in section [9.1](#) on page [28](#).

- From the main menu select the submenu **Additional Funct** with the **SAVE** key.
- Call the displayed option **CT / VT Ratios** with **OK**.
- By pressing the **▶** key select **sec:**.
- By repeatedly pressing the **▼** key select the desired CT input and confirm the selection with **OK**.
- On a password request enter the password.
- Enter the secondary value 1 A or 5 A with the **△** and **▼** keys and terminate with **OK**.
- Confirm the subsequent question with **OK** when all CT inputs are operating with the new nominal current or reject the question with **ESC**. (**sec:*** is then displayed on the left side.)
- Initiate the parameter saving process with **SAVE**.
- According to the menu instruction start the process with **OK**.



NOTICE

As long as the parameter saving process is not finalized with the **SAVE** and **OK** keys the original and therefore currently used parameters are still stored in the relay.

15.10. Display Fault Status

In the background a series of internal monitoring routines are continuously checking the relay status and indicate a fault alarm with the red LED **Fault** and also on the display with the annunciation **!!DRS FAULT!!**. The type of fault can be viewed on the display.

- Press the **◀** key in the main menu.
- In case everything is normal **Fault Status No Error** is displayed, but when there is a relay fault, indicated by a flashing or steady-on **Fault** LED, the type of fault is displayed.
- In case there are several type of faults scroll with the **▼** key through the entries.
- Within an error message the information can be changed with the **◀ ▶** keys if necessary.

15.11. Modifying the IEC-Info Number

With **IEC-Device Addr.**, **IEC-Funct. Type** and **IEC-Info Number** the relevant parameters for the serial interface to the DCS are entered. If there are modifications to the factory settings necessary, the values can be modified with the corresponding submenus. To modify an information number following method has to be carried out:

- From the main menu select the submenu **Additional Funct** with the **SAVE** key.
- By repeatedly pressing the **▼** key select the option **IEC-Info Number** and call it with **OK**.
- By repeatedly pressing the **▼** key select the desired function output (WNO or TRO) and confirm it with **OK**. (The corresponding protective function can be viewed with the **INFO** key.)

An example for the displays shows the two windows below.

| | |
|--|--|
| <pre>WNO: Stage 1 067 006</pre> | <p>... display for modification</p> <p>... function type 67 and information number 6</p> |
|--|--|

| | |
|-------------------------------|---|
| <pre>Cur. 3-ph.2-st. US</pre> | <p>... display while pressing INFO</p> |
|-------------------------------|---|

- On a password request enter the password.
- Enter the new values for the IEC function type or the IEC information number with the keys **◀ ▶** and **▲ ▼**.
- Terminate the input for this function output with **OK** (character ***** indicates the modification) and select the next function output with the **▲** or **▼** key and repeat the value changing process.
- After all modifications are made save the new parameter set with **SAVE** and **OK** into the relay.



NOTICE

As long as the parameter saving process is not finalized with the **SAVE** and **OK** keys the original and therefore currently used parameters are still stored in the relay.

15.12. Password Input

The request to enter the password always takes place automatically after entering a specific key sequence which ultimately leads to a modification of the parameter setting stored in the relay.

When requested to enter the password:

- Select the character at the indicated cursor position with the \triangle or ∇ key.
- With \blacktriangleright select the next cursor position.
- Select the character at the indicated cursor position with the \triangle or ∇ key, etc.
- When finished terminate the entry with **OK**.
- A false input can be deleted with the **UNDO** key.

A. Further Documents

This document refers to the following documents:

Documents

| Document | | Item Number |
|-----------|--------------------------------|------------------------------------|
| DRS-LIGHT | Operation & Maintenance Manual | DIL-000-1 |
| DRS-WIN4 | User's Guide | DID-038-1 or SID-401-1.XX/93 |

Standards

| Document | |
|-------------------------------|--|
| IEC 60870-5-103 Part 5-103 | Transmission protocols Companion standard for the informative interface of protection equipment |
| IEC 60870-5-104 Part 5-104 | Transmission protocols Network access for IEC 60870-5-101 using standard transport profiles |

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B. Reader's Reactions

We designed and compiled this manual with great care and a high degree of responsibility. It was - and still is - our goal to design it in a way that it will be of greatest possible use at your work.

In order to reach this goal, we also rely on your cooperation - especially where maintenance and care of the manual are concerned.

To make this cooperation easier for you, we added a form to this section. Please make use of it.

We will try to consider your comments already in the next update of the manual.

Thank you very much for your cooperation!

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Form for Readers' Reactions

Your comments and suggestions will help us to further improve both quality and usefulness of this manual. Thank you very much for your efforts!

Please fill in this questionnaire and return it to us; we will send you the next update of this manual free of charge as soon as it is available.

What is your impression of this manual? Do you think it is complete, correct and accurate, well-structured, written in a comprehensible language, etc.?

.....
.....

Which parts, characteristics, aspects are particularly useful?

.....
.....

Does this manual meet the requirements that may reasonably be demanded? Does it come up to your expectations?

.....
.....

Did you find any mistakes in this manual? If so, please use form on the backside.

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Please send a copy of this sheet (front and back) to the below address.

ANDRITZ HYDRO GmbH
Product Management Protection

Eibesbrunnengasse 20
1120 Vienna, Austria

Correction Sheet

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Version of the document:

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Please correct the following items in the above documentation:

| page | wrong text | should read as |
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