SUPPLEMENT

HighPROTEC | PROTECTION TECHNOLOGY MADE SIMPLE

MRA4-2xxxxx+G | DIRECTIONAL FEEDER PROTECTION

DIRECTIONAL FEEDER PROTECTION

G99-Type-Tested Variant

SW version: 3.6.g (Build 49274)

English (Original document)

SUPPLEMENT MRA4-3.6-EN-G99 |

Manual (original)

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1   Introduction

SEG offers a special G99-type-tested variant of the MRA4. It has some protection settings fixed or restricted to the value ranges that are specified and required in the Engineering Recommendation G99 (Issue 1 Amendment 6).

If you need this MRA4 variant make sure to use the order code MRA4-2xxxxx**+G** (with a trailing "+G") when you place your order.

(Note, however, that this "+G" is not shown as part of the typecode of the MRA4.)

This document details all the differences between this G99-type-tested variant and an ordinary MRA4, but without repeating the all the features that both have in common. Therefore it is a supplement to the ordinary Technical Documentation of the MRA4, not a replacement.

Background

The Engineering Recommendation G99 distinguishes the following types of power engineering modules that have been installed after April 27th, 2019:

- Type **A** — connection point below 110 kV, 0.8 kW … 1 MW

- Type **B** — connection point below 110 kV, 1 MW … 10 MW

- Type **C** — connection point below 110 kV, 10.8 MW … 50 MW

- Type **D** — connection point ≥ 110 kV and/or registered capacity > 50 MW

Depending on the type to be protected, the EREC G99-1-6 makes the following requirements for the voltage and frequency protection settings:

- The frequency and Loss of Mains (LoM) protection settings are fixed in the firmware of the protection device and cannot be changed. The settings that must be predefined by the manufacturer are explicitly given in Table 10.1 of the EREC G99-1-6.

- The voltage protection settings are predefined in the firmware of the protection device. These default values are dependent on the type (defined above) and given in Table 10.1 of the EREC G99-1-6. These settings, however, may be modified by appropriately qualified personnel.

- Moreover, all settings that are permitted to be modified must be password-protected. This way it can be ensured that only qualified users are able to alter these settings.

  Password-protected settings are a standard feature of all HighPROTEC devices, i. e. not restricted to the G99-type-tested variant.

  For the password-protection in general, see the "Security" chapter in the generic MRA4 User Manual.

2 G99-Specific Protection Settings

In general, all protection functions that are required for an Interface Protection device by the EREC G99-1-6 are enabled in the [Device planning] menu. All other protection functions are disabled by default, but can be enabled.

Besides this, only the protection functions that are needed for Types A, B and C HV protection are set to "active" by default. (See the parameter lists in the following chapters.)

Furthermore, all the protection functions (for all these Types) are assigned to the circuit breaker module in the menu [Control / SG / SG[1] / Trip Manager]. (See also ⮫ "3 G99-Specific Switchgear / Control Settings".)

2.1 G99-Specific Voltage Protection Settings

The MRA4 features six instances of the voltage protection module, that are pre-configured as follows:

- »V[1]« is pre-configured as an undervoltage protection according to the LV requirements.

- »V[2]« is pre-configured as overvoltage protection stage 1 according to the LV requirements.

- »V[3]« is pre-configured as overvoltage protection stage 2 according to the LV requirements.

- »V[4]« is pre-configured as an undervoltage protection according to the HV requirements.

- »V[5]« is pre-configured as overvoltage protection stage 1 according to the HV requirements.

- »V[6]« is pre-configured as overvoltage protection stage 2 according to the HV requirements.

    This stage is optional for Type D applications and may be disabled for these.

During commissioning the user has to check the interconnection constraints and disable the instances in the [Device planning] menu that are not needed for the application.

2.1.1   V[1]: Voltage Protection Pre-Configured According to the LV Requirements

V[1] . **Mode**	[Device planning]	
V<	*Voltage protection instance number 1: Pre-configured as undervoltage protection for LV connections.* For the password-protection (of access level "S.3"), see the "Security" chapter in the generic MRA4 User Manual.	S.3

V[1] . **Function**	[Protection Para / Set 1…4 / V-Prot / V[1]]	

• *Set 1:*   inactive
• *Set 2:*   inactive
• *Set 3:*   inactive
• *Set 4:*   inactive
	Permanent activation or deactivation of module/stage: This instance V[1] is pre-configured for LV applications.
	
	It is inactive by default because the MRA4 factory-preset has the HV settings enabled. This means that for an LV protection, you have to make the following settings:
	
	  • *»V[1] . Function«* = "active",
	
	   and the same for »V[2]«, »V[3]«
	
	  • *»V[4] . Function«* = "inactive",
	
	   and the same for »V[5]«, »V[6]«
	
	For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.
		P.2

V[1] . **Measuring Mode**	[Protection Para / Set 1…4 / V-Prot / V[1]]	
• *Set 1:* Phase to Ground • *Set 2:* Phase to Ground • *Set 3:* Phase to Ground • *Set 4:* Phase to Ground	*Measuring/Supervision Mode: Determines if the phase-to-phase or phase-to-earth voltages are to be supervised.* For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

V[1] . **V<**	[Protection Para / Set 1...4 / V-Prot / V[1]]	
• *Set 1:* 0.80 Vn • *Set 2:* 0.80 Vn • *Set 3:* 0.80 Vn • *Set 4:* 0.80 Vn	*If the pickup value is exceeded, the module is started. The definition of Vn is dependent on both the Field Parameter »VT con« and the Setting Group Parameter »Measuring Mode«:* *If the measuring inputs of the voltage measuring card are fed with phase-to-ground voltages (»VT con« = "Phase to Ground") then »Measuring Mode« = "Phase to Ground" means that Vn = VT sec / √3̄, and »Measuring Mode« = "Phase to Phase" means that Vn = VT sec.* *However, if the measuring inputs of the voltage measuring card are fed with phase-to-phase voltages (»VT con« = "Phase to Phase") then the setting of* "*Measuring Mode*" *is ignored and internally set to "Phase to Phase" instead, so that Vn = VT sec.* Set to the required threshold by default, but can be modified by qualified users. For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

V[1] . **t**	[Protection Para / Set 1...4 / V-Prot / V[1]]	
• *Set 1:* 2.5 s • *Set 2:* 2.5 s • *Set 3:* 2.5 s • *Set 4:* 2.5 s	*Tripping delay*: Set to the required value by default, but can be modified by qualified users. For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

2.1.2 V[2]: Voltage Protection Pre-Configured According to the LV Requirements

V[2] . **Mode**	[Device planning]	
V>	*Voltage protection instance number 2: Pre-configured as overvoltage protection for LV connections.* For the password-protection (of access level "S.3"), see the "Security" chapter in the generic MRA4 User Manual.	S.3

V[2] . **Function**	[Protection Para / Set 1…4 / V-Prot / V[2]]	

• *Set 1:* inactive
• *Set 2:* inactive
• *Set 3:* inactive
• *Set 4:* inactive
	Permanent activation or deactivation of module/stage: This instance V[2] is pre-configured for LV applications.
	
	It is inactive by default because the MRA4 factory-preset has the HV settings enabled. This means that for an LV protection, you have to make the following settings:
	
	    • *»V[1] . Function«* = "active",
	
	      and the same for »V[2]«, »V[3]«
	
	    • *»V[4] . Function«* = "inactive",
	
	      and the same for »V[5]«, »V[6]«
	
	For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.
		P.2

V[2] . **Measuring Mode**	[Protection Para / Set 1…4 / V-Prot / V[2]]	
• *Set 1:* Phase to Ground • *Set 2:* Phase to Ground • *Set 3:* Phase to Ground • *Set 4:* Phase to Ground	*Measuring/Supervision Mode: Determines if the phase-to-phase or phase-to-earth voltages are to be supervised.* For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

V[2] . **V>**	[Protection Para / Set 1...4 / V-Prot / V[2]]	
• *Set 1:* 1.14 Vn • *Set 2:* 1.14 Vn • *Set 3:* 1.14 Vn • *Set 4:* 1.14 Vn	*If the pickup value is exceeded, the module is started. The definition of Vn is dependent on both the Field Parameter »VT con« and the Setting Group Parameter »Measuring Mode«:* *If the measuring inputs of the voltage measuring card are fed with phase-to-ground voltages (»VT con« = "Phase to Ground") then »Measuring Mode« = "Phase to Ground" means that Vn = VT sec / √3̄, and »Measuring Mode« = "Phase to Phase" means that Vn = VT sec.* *However, if the measuring inputs of the voltage measuring card are fed with phase-to-phase voltages (»VT con« = "Phase to Phase") then the setting of "Measuring Mode" is ignored and internally set to "Phase to Phase" instead, so that Vn = VT sec.* Set to the required threshold by default, but can be modified by qualified users. For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

V[2] . **t**	[Protection Para / Set 1...4 / V-Prot / V[2]]	
• *Set 1:* 1.0 s • *Set 2:* 1.0 s • *Set 3:* 1.0 s • *Set 4:* 1.0 s	*Tripping delay*: Set to the required value by default, but can be modified by qualified users. For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

2.1.3   V[3]: Voltage Protection Pre-Configured According to the LV Requirements

V[3] . **Mode**	[Device planning]	
V>	*Voltage protection instance number 3: Pre-configured as overvoltage protection for LV connections.* For the password-protection (of access level "S.3"), see the "Security" chapter in the generic MRA4 User Manual.	S.3

V[3] . **Function**	[Protection Para / Set 1…4 / V-Prot / V[3]]	

• *Set 1:* inactive
• *Set 2:* inactive
• *Set 3:* inactive
• *Set 4:* inactive
	Permanent activation or deactivation of module/stage: This instance V[3] is pre-configured for LV applications.
	
	It is inactive by default because the MRA4 factory-preset has the HV settings enabled. This means that for an LV protection, you have to make the following settings:
	
	  • *»V[1] . Function«* = "active",
	
	    and the same for »V[2]«, »V[3]«
	
	  • *»V[4] . Function«* = "inactive",
	
	    and the same for »V[5]«, »V[6]«
	
	For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.
		P.2

V[3] . **Measuring Mode**	[Protection Para / Set 1…4 / V-Prot / V[3]]	
• *Set 1:* Phase to Ground • *Set 2:* Phase to Ground • *Set 3:* Phase to Ground • *Set 4:* Phase to Ground	*Measuring/Supervision Mode: Determines if the phase-to-phase or phase-to-earth voltages are to be supervised.* For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

V[3] . **V>**	[Protection Para / Set 1...4 / V-Prot / V[3]]	
• *Set 1:* 1.19 Vn • *Set 2:* 1.19 Vn • *Set 3:* 1.19 Vn • *Set 4:* 1.19 Vn	*If the pickup value is exceeded, the module is started. The definition of Vn is dependent on both the Field Parameter »VT con« and the Setting Group Parameter »Measuring Mode«:* *If the measuring inputs of the voltage measuring card are fed with phase-to-ground voltages (»VT con« = "Phase to Ground") then »Measuring Mode« = "Phase to Ground" means that Vn = VT sec / √3̄, and »Measuring Mode« = "Phase to Phase" means that Vn = VT sec.* *However, if the measuring inputs of the voltage measuring card are fed with phase-to-phase voltages (»VT con« = "Phase to Phase") then the setting of* "*Measuring Mode*" *is ignored and internally set to "Phase to Phase" instead, so that Vn = VT sec.* Set to the required threshold by default, but can be modified by qualified users. For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

V[3] . **t**	[Protection Para / Set 1...4 / V-Prot / V[3]]	
• *Set 1:* 0.5 s • *Set 2:* 0.5 s • *Set 3:* 0.5 s • *Set 4:* 0.5 s	*Tripping delay*: Set to the required value by default, but can be modified by qualified users. For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

2.1.4 V[4]: Voltage Protection Pre-Configured According to the HV Requirements

V[4] . **Mode**	[Device planning]	
V<	*Voltage protection instance number 4: Pre-configured as undervoltage protection for HV connections.* For the password-protection (of access level "S.3"), see the "Security" chapter in the generic MRA4 User Manual.	S.3

V[4] . **Function**	[Protection Para / Set 1…4 / V-Prot / V[4]]	

• *Set 1:* active
• *Set 2:* active
• *Set 3:* active
• *Set 4:* active
	Permanent activation or deactivation of module/stage: This instance V[6] is pre-configured for HV applications.
	
	It is active by default. This means that if you need to switch to LV protection, you have to make the following settings:
	
	   • *»V[1] . Function«* = "active",
	
	     and the same for »V[2]«, »V[3]«
	
	   • *»V[4] . Function«* = "inactive",
	
	     and the same for »V[5]«, »V[6]«
	
	For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.
		P.2

V[4] . **Measuring Mode**	[Protection Para / Set 1…4 / V-Prot / V[4]]	
• *Set 1:* Phase to Phase • *Set 2:* Phase to Phase • *Set 3:* Phase to Phase • *Set 4:* Phase to Phase	*Measuring/Supervision Mode: Determines if the phase-to-phase or phase-to-earth voltages are to be supervised.* For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

V[4] . **V<**	[Protection Para / Set 1…4 / V-Prot / V[4]]	
• *Set 1:* 0.80 Vn • *Set 2:* 0.80 Vn • *Set 3:* 0.80 Vn • *Set 4:* 0.80 Vn	*If the pickup value is exceeded, the module is started. The definition of Vn is dependent on both the Field Parameter »VT con« and the Setting Group Parameter »Measuring Mode«:* *If the measuring inputs of the voltage measuring card are fed with phase-to-ground voltages (»VT con« = "Phase to Ground") then »Measuring Mode« = "Phase to Ground" means that Vn = VT sec / √3̄, and »Measuring Mode« = "Phase to Phase" means that Vn = VT sec.* *However, if the measuring inputs of the voltage measuring card are fed with phase-to-phase voltages (»VT con« = "Phase to Phase") then the setting of* "*Measuring Mode*" *is ignored and internally set to "Phase to Phase" instead, so that Vn = VT sec.* Set to the required threshold by default, but can be modified by qualified users. For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

V[4] . **t**	[Protection Para / Set 1…4 / V-Prot / V[4]]	
• *Set 1:* 2.5 s • *Set 2:* 2.5 s • *Set 3:* 2.5 s • *Set 4:* 2.5 s	*Tripping delay*: Set to the required value by default, but can be modified by qualified users. For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

2.1.5 V[5]: Voltage Protection Pre-Configured According to the HV Requirements

V[5] . **Mode**	[Device planning]	
V>	*Voltage protection instance number 5: Pre-configured as overvoltage protection for HV connections.* For the password-protection (of access level "S.3"), see the "Security" chapter in the generic MRA4 User Manual.	S.3

V[5] . **Function**	[Protection Para / Set 1…4 / V-Prot / V[5]]	

• *Set 1:* active
• *Set 2:* active
• *Set 3:* active
• *Set 4:* active
	Permanent activation or deactivation of module/stage: This instance V[5] is pre-configured for HV applications.
	
	It is active by default. This means that if you need to switch to LV protection, you have to make the following settings:
	
	    • *»V[1] . Function«* = "active",
	
	      and the same for »V[2]«, »V[3]«
	
	    • *»V[4] . Function«* = "inactive",
	
	      and the same for »V[5]«, »V[6]«
	
	For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.
		P.2

V[5] . **Measuring Mode**	[Protection Para / Set 1…4 / V-Prot / V[5]]	
• *Set 1:* Phase to Phase • *Set 2:* Phase to Phase • *Set 3:* Phase to Phase • *Set 4:* Phase to Phase	*Measuring/Supervision Mode: Determines if the phase-to-phase or phase-to-earth voltages are to be supervised.* For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

V[5] . **V>**	[Protection Para / Set 1…4 / V-Prot / V[5]]	
• *Set 1:* 1.10 Vn • *Set 2:* 1.10 Vn • *Set 3:* 1.10 Vn • *Set 4:* 1.10 Vn	*If the pickup value is exceeded, the module is started. The definition of Vn is dependent on both the Field Parameter »VT con« and the Setting Group Parameter »Measuring Mode«:* *If the measuring inputs of the voltage measuring card are fed with phase-to-ground voltages (»VT con« = "Phase to Ground") then »Measuring Mode« = "Phase to Ground" means that Vn = VT sec / $\sqrt{3}$, and »Measuring Mode« = "Phase to Phase" means that Vn = VT sec.* *However, if the measuring inputs of the voltage measuring card are fed with phase-to-phase voltages (»VT con« = "Phase to Phase") then the setting of* "*Measuring Mode*" *is ignored and internally set to "Phase to Phase" instead, so that Vn = VT sec.* Set to the required threshold by default, but can be modified by qualified users. For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

V[5] . **t**	[Protection Para / Set 1…4 / V-Prot / V[5]]	
• *Set 1:* 1.0 s • *Set 2:* 1.0 s • *Set 3:* 1.0 s • *Set 4:* 1.0 s	*Tripping delay*: Set to the required value by default, but can be modified by qualified users. For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

2.1.6 V[6]: Voltage Protection Pre-Configured According to the HV Requirements

V[6] . **Mode**	[Device planning]	
V>	*Voltage protection instance number 6: Pre-configured as overvoltage protection for HV connections.* For the password-protection (of access level "S.3"), see the "Security" chapter in the generic MRA4 User Manual.	S.3

V[6] . **Function**	[Protection Para / Set 1…4 / V-Prot / V[6]]	

• *Set 1:* active
• *Set 2:* active
• *Set 3:* active
• *Set 4:* active
	Permanent activation or deactivation of module/stage: This instance V[6] is pre-configured for HV applications.
	
	It is active by default. This means that if you need to switch to LV protection, you have to make the following settings:
	
	    • *»V[1] . Function«* = "active",
	
	      and the same for »V[2]«, »V[3]«
	
	    • *»V[4] . Function«* = "inactive",
	
	      and the same for »V[5]«, »V[6]«
	
	Furthermore, this stage is optional for Type D applications and may be set to inactive for these.
	
	For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.
		P.2

V[6] . **Measuring Mode**	[Protection Para / Set 1…4 / V-Prot / V[6]]	
• *Set 1:* Phase to Phase • *Set 2:* Phase to Phase • *Set 3:* Phase to Phase • *Set 4:* Phase to Phase	*Measuring/Supervision Mode: Determines if the phase-to-phase or phase-to-earth voltages are to be supervised.* For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

V[6] . **V>**	[Protection Para / Set 1…4 / V-Prot / V[6]]	
• *Set 1:* 1.13 Vn • *Set 2:* 1.13 Vn • *Set 3:* 1.13 Vn • *Set 4:* 1.13 Vn	*If the pickup value is exceeded, the module is started. The definition of Vn is dependent on both the Field Parameter »VT con« and the Setting Group Parameter »Measuring Mode«:* *If the measuring inputs of the voltage measuring card are fed with phase-to-ground voltages (»VT con« = "Phase to Ground") then »Measuring Mode« = "Phase to Ground" means that Vn = VT sec / $\sqrt{3}$, and »Measuring Mode« = "Phase to Phase" means that Vn = VT sec.* *However, if the measuring inputs of the voltage measuring card are fed with phase-to-phase voltages (»VT con« = "Phase to Phase") then the setting of* "*Measuring Mode*" *is ignored and internally set to "Phase to Phase" instead, so that Vn = VT sec.* Set to the required threshold by default, but can be modified by qualified users. For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

V[6] . **t**	[Protection Para / Set 1…4 / V-Prot / V[6]]	
• *Set 1:* 0.5 s • *Set 2:* 0.5 s • *Set 3:* 0.5 s • *Set 4:* 0.5 s	*Tripping delay*: Set to the required value by default, but can be modified by qualified users. For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

2.2 G99-Specific Frequency Protection Settings

The MRA4 features six instances of the frequency protection module.

- »f[1]« is configured and fixed as under-frequency stage 1.

- »f[2]« is configured and fixed as under-frequency stage 2.

- »f[3]« is configured and fixed as over-frequency stage 1.

- »f[4]«, »f[5]«, »f[6]« are not enabled by default, but may be enabled and adapted to the application if necessary. (See the Reference Manual of the generic MRA4 variant for available settings.)

2.2.1 f[1]: Underfrequency Protection Settings

f[1] . **Mode**	[Device planning]	
f<	*Frequency protection instance number 1: Configured as underfrequency protection.* This setting is fixed according to the G99 requirements and cannot be modified.	Fixed setting!

f[1] . **f<**	[Protection Para / Set 1…4 / f-Prot / f[1]]	
• *Set 1:* 47.50 Hz • *Set 2:* 47.50 Hz • *Set 3:* 47.50 Hz • *Set 4:* 47.50 Hz	*Pickup value for underfrequency.* This setting is fixed according to the G99 requirements and cannot be modified.	Fixed value!

f[1] . **t**	[Protection Para / Set 1…4 / f-Prot / f[1]]	
• *Set 1:* 20.00 s • *Set 2:* 20.00 s • *Set 3:* 20.00 s • *Set 4:* 20.00 s	*Tripping delay* This setting is fixed according to the G99 requirements and cannot be modified.	Fixed value!

2.2.2　f[2]: Underfrequency Protection Settings

f[2] . **Mode**	[Device planning]	
f<	*Frequency protection instance number 2: Configured as underfrequency protection.* This setting is fixed according to the G99 requirements and cannot be modified.	Fixed setting!

f[2] . **f<**	[Protection Para / Set 1...4 / f-Prot / f[2]]	
• *Set 1:*　47.00 Hz • *Set 2:*　47.00 Hz • *Set 3:*　47.00 Hz • *Set 4:*　47.00 Hz	*Pickup value for underfrequency.* This setting is fixed according to the G99 requirements and cannot be modified.	Fixed value!

f[2] . **t**	[Protection Para / Set 1...4 / f-Prot / f[2]]	
• *Set 1:*　0.50 s • *Set 2:*　0.50 s • *Set 3:*　0.50 s • *Set 4:*　0.50 s	*Tripping delay* This setting is fixed according to the G99 requirements and cannot be modified.	Fixed value!

2.2.3   f[3]: Overfrequency Protection Settings

f[3] . **Mode**	[Device planning]	
f>	*Frequency protection instance number 3: Configured as overfrequency protection.* This setting is fixed according to the G99 requirements and cannot be modified.	Fixed setting!

f[3] . **f<**	[Protection Para / Set 1...4 / f-Prot / f[3]]	
• *Set 1:* 52.00 Hz • *Set 2:* 52.00 Hz • *Set 3:* 52.00 Hz • *Set 4:* 52.00 Hz	*Pickup value for underfrequency.* This setting is fixed according to the G99 requirements and cannot be modified.	Fixed value!

f[3] . **t**	[Protection Para / Set 1...4 / f-Prot / f[3]]	
• *Set 1:* 0.50 s • *Set 2:* 0.50 s • *Set 3:* 0.50 s • *Set 4:* 0.50 s	*Tripping delay* This setting is fixed according to the G99 requirements and cannot be modified.	Fixed value!

2.3 G99-Specific LoM Protection Settings

For Loss of Mains (ROCOF, Intertripping), the G99-type-tested variant of the MRA4 features the following settings:

- Intertripping is enabled by default, as it is expected for the Type D, but can be disabled.

- »df/dt« (ROCOF) is enabled by default in the [Device planning] menu, as it is expected for the Types A, B and C, but can be disabled.

  The threshold and delay times are fixed according to the EREC G99-1-6 requirements.

2.3.1 Intertripping

Intertripping . **Mode**	[Device planning]	
use	*Intertripping Module, general operation mode:* This is enabled by default, but can be disabled. For the password-protection (of access level "S.3"), see the "Security" chapter in the generic MRA4 User Manual.	S.3

Intertripping . **Function**	[Protection Para / Set 1…4 / Intercon-Prot / Mains Decouplg / Intertripping]	
• *Set 1:* inactive • *Set 2:* inactive • *Set 3:* inactive • *Set 4:* inactive	*Permanent activation or deactivation of Intertripping:* This module is inactive by default, because the factory-preset enables the Types A, B and C HV protection, and Intertripping is expected only for Type D. For a Type D application, set this to active. For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

2.3.2   df/dt: ROCOF (Rate-of-Change-of-Frequency) Protection Settings

df/dt . **Mode**	[Device planning]	
use	*ROCOF Protection Module, general operation mode.* This setting is fixed according to the G99 requirements and cannot be modified.	Fixed setting!

df/dt . **Function**	[Protection Para / Set 1...4 / Intercon-Prot / Mains Decouplg / df/dt]	
• *Set 1:* active • *Set 2:* active • *Set 3:* active • *Set 4:* active	*Permanent activation or deactivation of the module.* This setting is fixed according to the G99 requirements and cannot be modified.	Fixed setting!

df/dt . **df/dt**	[Protection Para / Set 1...4 / Intercon-Prot / Mains Decouplg / df/dt]	
• *Set 1:* 1.00 Hz/s • *Set 2:* 1.00 Hz/s • *Set 3:* 1.00 Hz/s • *Set 4:* 1.00 Hz/s	*Measured value (calculated): Rate-of-frequency-change.* This setting is fixed according to the G99 requirements and cannot be modified.	Fixed setting!

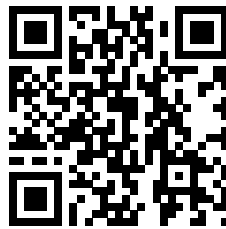| df/dt . **t-df/dt**	[Protection Para / Set 1...4 / Intercon-Prot / Mains Decouplg / df/dt]	
• *Set 1:* 0.50 s • *Set 2:* 0.50 s • *Set 3:* 0.50 s • *Set 4:* 0.50 s	*Trip delay df/dt.* This setting is fixed according to the G99 requirements and cannot be modified.	Fixed setting!

3   G99-Specific Switchgear / Control Settings

For all protection functions that are required by the EREC G99-1-6, the respective trip commands have already been assigned to the circuit breaker »SG[1]«.

SG[1] . **Off Cmdx**	[Control / SG / SG[1] / Trip Manager]	
• SG[1] . *Off Cmd1* = V[1] . TripCmd • SG[1] . *Off Cmd2* = V[2] . TripCmd • SG[1] . *Off Cmd3* = V[3] . TripCmd • SG[1] . *Off Cmd4* = V[4] . TripCmd • SG[1] . *Off Cmd5* = V[5] . TripCmd • SG[1] . *Off Cmd6* = V[6] . TripCmd • SG[1] . *Off Cmd7* = f[1] . TripCmd • SG[1] . *Off Cmd8* = f[2] . TripCmd • SG[1] . *Off Cmd9* = f[3] . TripCmd • SG[1] . *Off Cmd10* = df/dt . TripCmd • SG[1] . *Off Cmd11* = Intertripping . TripCmd	*Off Command to the Circuit Breaker if the state of the assigned signal becomes true.* For the password-protection (of access level "P.2"), see the "Security" chapter in the generic MRA4 User Manual.	P.2

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