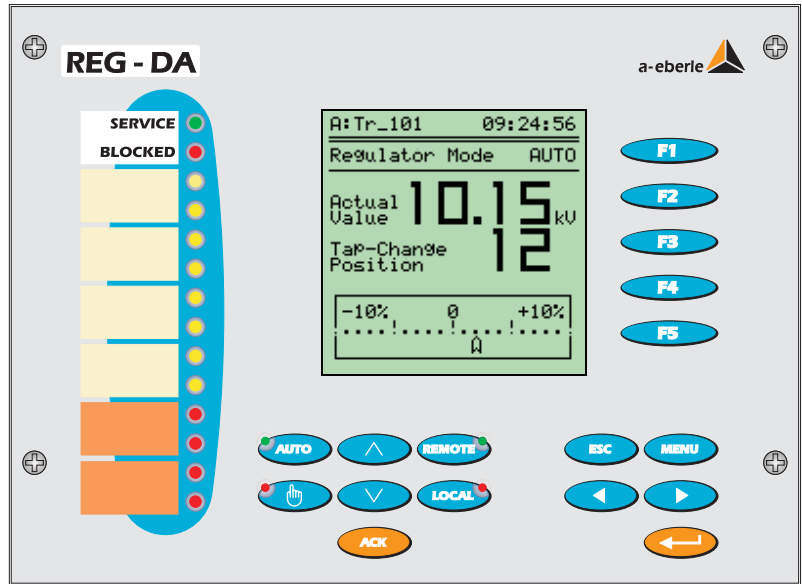
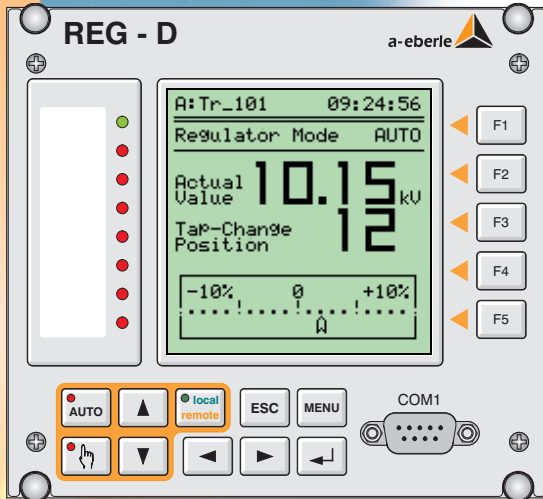


QUICK GUIDE



Voltage Regulator REG-DTM/DA

Short-Form Operating Manual

Issue 09.11.2004

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1 General Information

This Quick-Guide will help you to become familiar with the REG-D/DA voltage regulator as quickly as possible.

Whilst the parameterisation can be implemented using the WinREG parameterisation program, this Quick-Guide only deals with parameterisation using the device keypad.

The parameters that are particularly important for voltage regulation will be briefly mentioned in nine steps and the parameterisation explained.

Further settings that are required in special cases can be found in standard operating manual.

After applying the operating voltage, the REG-D/DA will indicate that it is in regulator mode.

Other modes, such as transducer mode, recorder mode, statistics mode and paragrammer mode, can be selected at any time. Therefore it is important to realise that all modes run parallel to each other in the background. If one selects the recorder mode (for example), the regulating tasks and all the other parameterised task settings will also naturally be processed.

Press MENU and then use the keys F2 ... F5 to select the desired mode..

The individual operating modes are briefly described below.

In total, six SETUPS are designed for the parameterisation.

You can scroll through the individual SETUPS in the following manner:

Starting at the main menu (regulator, transducer, recorder, statistics or paragramer), press MENU to enter SETUP 1.

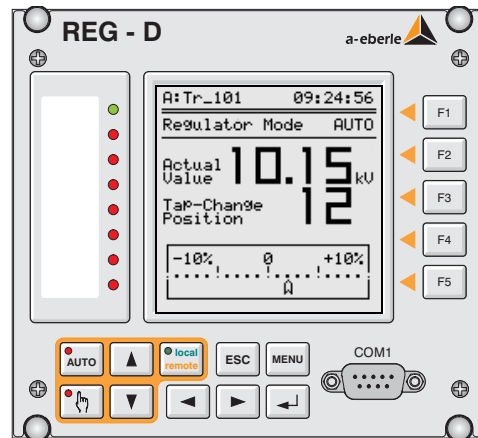
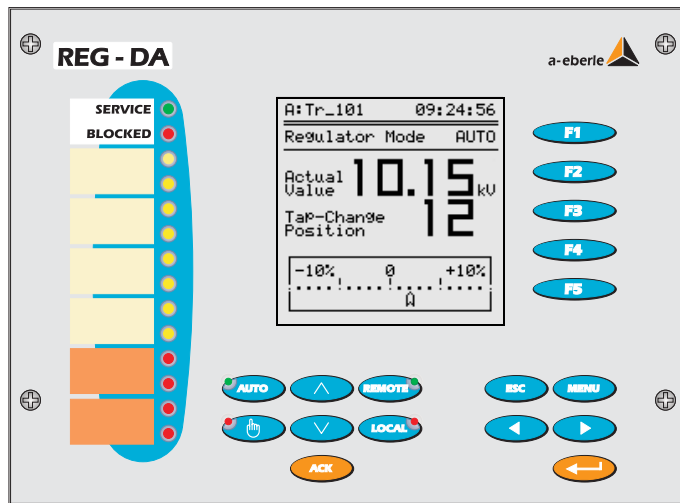
Repeatedly pressing the MENU key selects SETUP 2 to SETUP 6.

If you are already in one of the SETUPS, you can reach all the other menus by pressing the ← and → keys..

Caution!

Please observe the “Warnings and Notes” in the standard operating manual without fail!





2 Regulator Mode

After the auxiliary voltage is applied, the regulator indicates that it is in regulator mode.

The important parameters for assessing a regulation situation are shown in this display mode.

The tap-changer position and the actual regulative deviation are shown in addition to the actual voltage value. The actual regulative deviation is shown in quasi-analogue form.

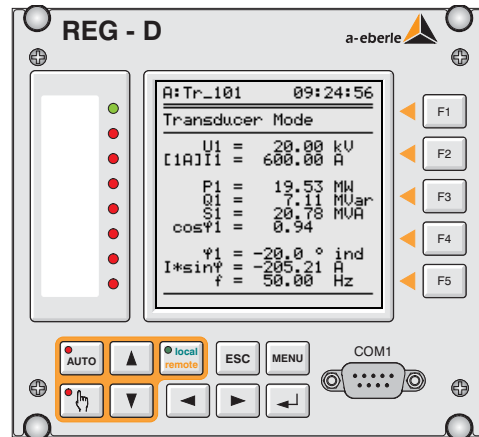
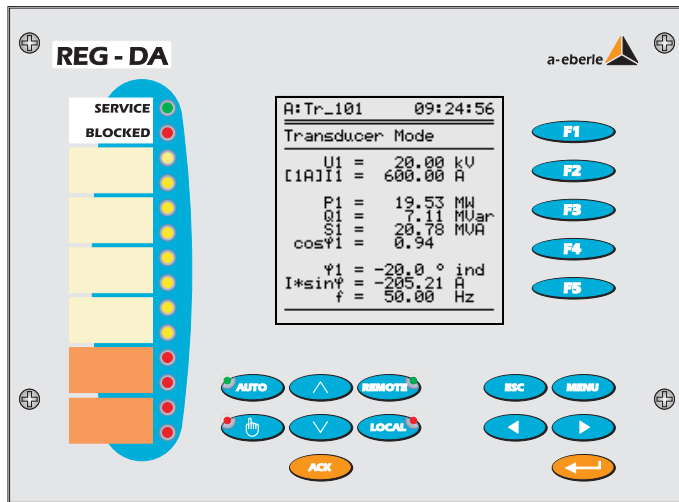
If the pointer is at “0” the actual value is the same as the setpoint value. If the regulative deviation is within the tolerance range the pointer is transparent. If the regulative deviation is outside the permissible regulative deviation the pointer changes to black.

In this way one can judge the present condition of the controlled system at a glance.

An alternative display with additional information – the compact display – can be selected using the F1 key.

In addition to the actual value and the tap-changer position, the setpoint value in V (kV) and % as well as the permissible regulative deviation in % are shown in this display.

If you prefer the large display, simply press the F1 key again.



3 Transducer Mode

Press MENU and then select the transducer mode using the F2 key.

Various important measurement quantities are shown in this mode.

The voltage, current and frequency are independent of the connection of the measurement quantities, whereas the outputs can only be displayed correctly when the measurement sources are correctly entered.

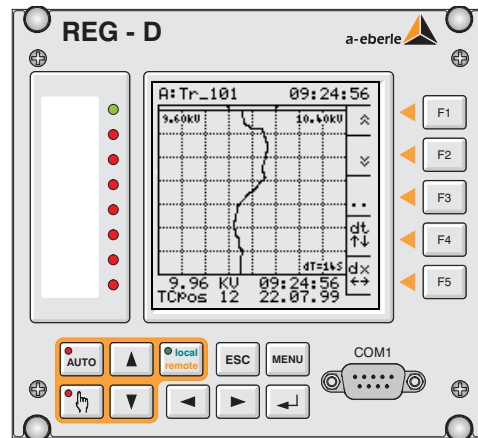
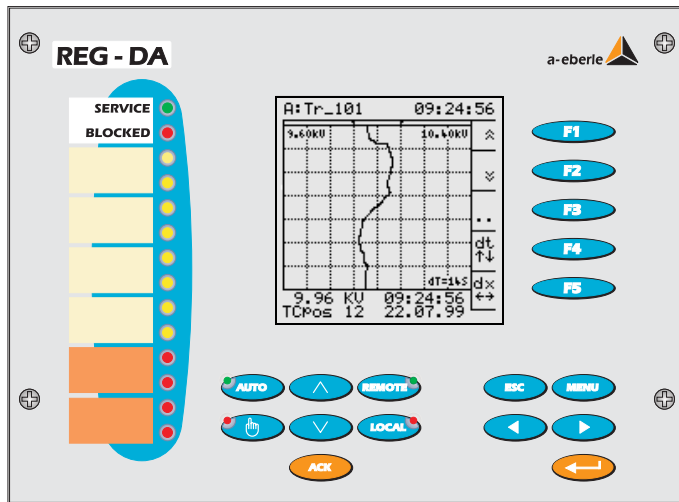
The regulator with feature M1 only gives exact measurement values in equally loaded 3-phase networks. In this case, the transducer emanates from a symmetrical loading of all lines, and measures only one current and one voltage.

For this reason, the regulator must know the source of the voltages (L1L2, L2L3, L3L1) and currents (L1, L2, L3) in order to be able to take the angle between the input quantities into consideration.

If measurements are to be taken in an unbalanced 3-phase network, the regulator must be equipped with feature M2.

Note

The $I \cdot \sin \varphi$ current is particularly important for parallel-running transformers.



4 Recorder Mode

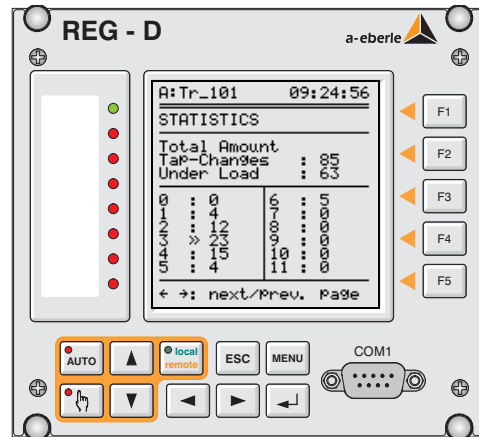
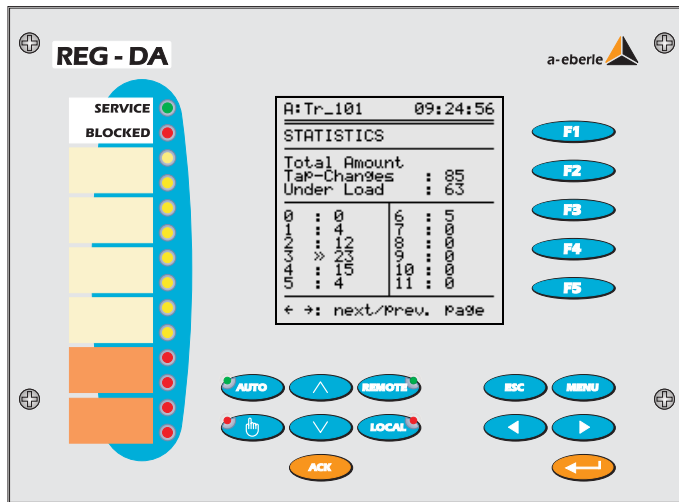
The measured line voltage and the tap-changing position are recorded in Recorder mode.

Each second a measurement value that is the arithmetic average of 10 100ms measurements is stored in the memory for the voltage.

The memory capacity is more than 18.7 days, although this time is only valid when each value measured per second differs from the value recorded the previous second.

In practice the memory usage is such that at least a month of data can be saved.

The saved values can either be recalled using the keypad, or transferred to a PC and analysed there using the WinREG parameterisation program (e.g. with Excel).



5 Statistics Mode

In statistics mode, tap-changes under load and tap-changes when idling are differentiated and recorded separately.

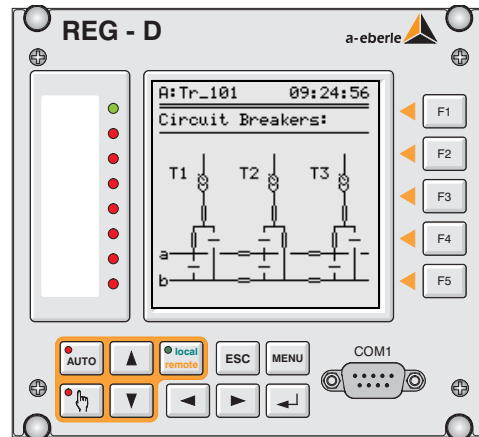
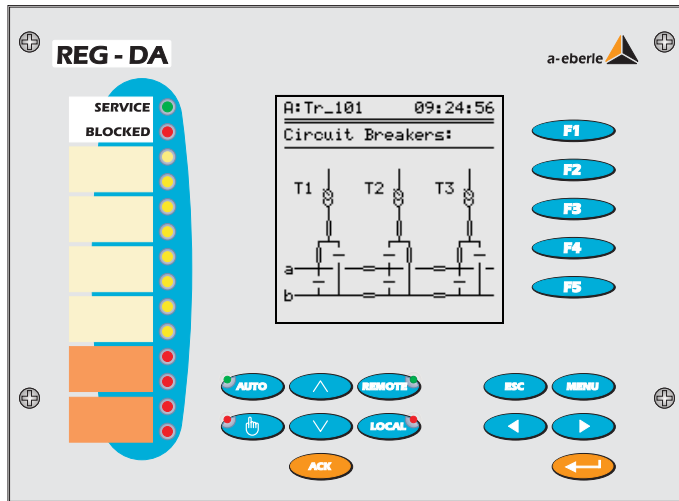
The load condition is fulfilled if a current is measured that is 5% larger than the entered nominal value.

(Example: for $I_n = 1 \text{ A} \rightarrow 50 \text{ mA}$; for $I_n = 5 \text{ A} \rightarrow 250 \text{ mA}$).

Under load conditions every tap-change is recorded and displayed.

A double arrow before a particular change indicates that the transformer is running under load and is on the displayed level.

A single arrow signals that the transformer is idling.



6 Paragrammer Mode

The PARAGRAMMER is a tool used for automatically preparing parallel connections and for one-line visualisation of the switching statuses.

The artificial word PARAGRAMMER is derived from the terms parallel and one-line diagram.

The PARAGRAMMER displays the switching status of the individual transformers in one-line graphics and can be loaded by pressing the F5 key in the main menu.

The function is activated by feeding a complete busbar replica (positions of the circuit breakers, disconnectors, bus ties and bus couplings) into each regulator by means of binary inputs.

On the basis of the switching statuses, the system can independently recognise which transformer should work in parallel operation with which other transformer(s) on a busbar.

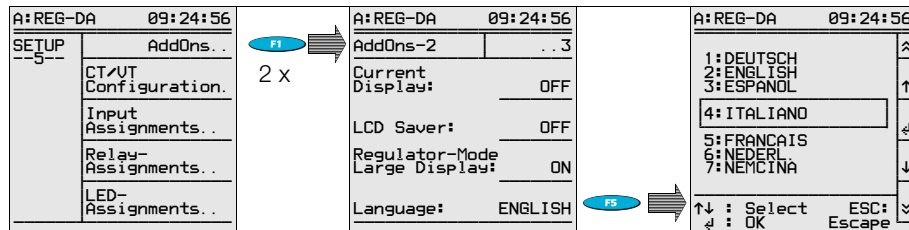
The system treats busbars connected via bus couplings as one single busbar.

As shown in the graphic, both transformers T1 and T3 are working on busbar “a”, whereas transformer T2 is feeding into busbar “b”.

7 Choosing the language

Please select SETUP 5, F1, F1

Press F5 to view all of the selectable languages.



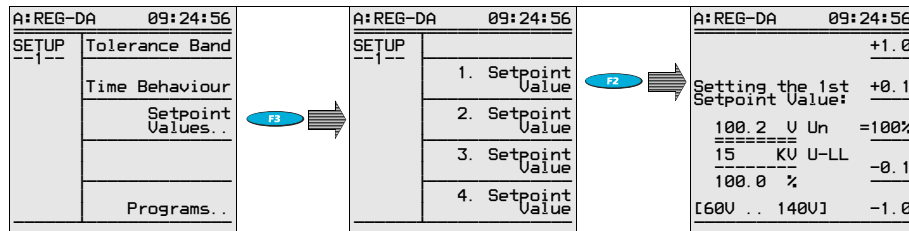
Select the desired language with F2 or F4 and confirm the selection using F3.

8 Setpoint value

The REG-D/DA voltage regulator can manage up to four setpoint values.

However, in general only one fixed value is used.

Please select SETUP 1, F3, F2.



The setpoint value can be increased using F1 and F2 and decreased using F4 and F5.

Press the F3 key if the setpoint value entered should be interpreted as a 100% value.

Press Enter to store the settings.

Note

If the transformer mounting ratio (Knu) of the voltage transformer is specified in a procedure carried out later, then the primary voltage appears in kV in the second row of the setpoint menu.

9 Permissible regulative deviation X_{wz}

There are two limits for setting the regulative deviation.

One limit is determined from the acceptable voltage tolerance specified by the consumer, the other is defined by the tap-change increment of the transformer.



The minimum voltage range can be calculated using the following equation:

$$X_{wz}[\%] \geq 0.6 \cdot \text{tap-change increment}[\%]$$

X_{wz} : Permissible regulative deviation

If a regulative deviation X_{wz} that is smaller than the tap-change increment of the transformer is selected, the controlled system can never reach a stable condition; the regulator will continue hunting the setpoint.

Please choose SETUP 1, F1.

A:REG-DA 09:24:56		 	A:REG-DA 09:24:56	
SETUP	Tolerance Band			+1.0

	Time Behaviour		Setting the Bandwidth	+0.1
	Setpoint Values..		0.1 %	
			=====	
			[0.1% .. 10%]	-0.1
	Programs..			-1.0

The permissible regulative deviation can be increased using F1 and F2 and decreased using F4 and F5.

The parameter is confirmed by pressing Enter.

10 Time behaviour

The golden rule for multiple feeding points is: a calm network.

As a consequence, the regulator should be set up in such a manner that as few switching operations as possible are carried out.

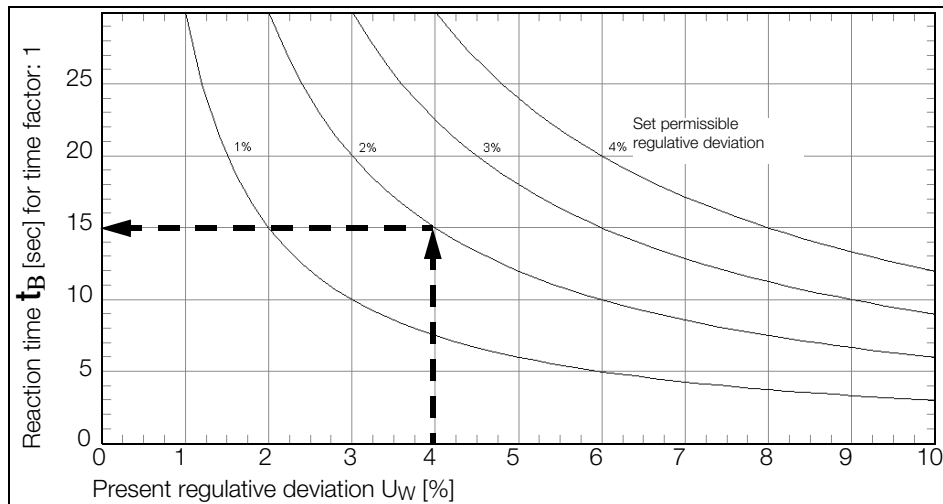
The regulator can be calmed by increasing either the permissible regulative deviation (X_{wz}) or the time factor. However, this course of action has its limits when the interests of the recipients are violated in an impermissible manner (voltage deviations are too large or last too long). The standard defined reaction time t_B must be changed when using the time factor option to influence the number of regulation events.

The default algorithm **$dU \cdot t = \text{const.}$** ensures that small regulative deviations may be present for a long time, before a tap-change is triggered, whereas large deviations are rectified more quickly.

The time factor has been included as an option to influence the reaction time t_B of the regulator. The time factor is set to 1 as factory default. The time t_B is multiplied with the time factor and the result is the reaction time t_v of the regulator.

$$t_v = t_B \cdot \text{time factor}$$

The value of the time factor must be multiplied with the reaction time taken from the diagram.



Example:

Present regulative deviation

$X_w = 4\%$;

Permissible regulative deviation

$X_{wz} = 2\%$

$t_v = t_B \cdot \text{time factor}$

(range of the time factor: 0.1 ... 30
see SETUP 1, F2, F3)

→ with **time factor: 1**: 15 sec;

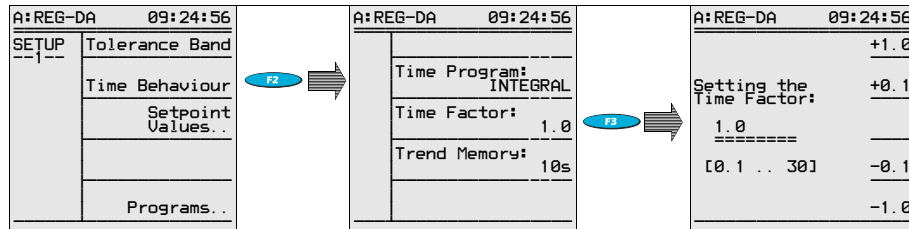
→ with **time factor: 2**: 30 sec.

Note

In practice, a time factor between 2 and 3 is used.

However, a general recommendation cannot be given, since the correct time factor is dependent on both the network and the customer configuration.

Please select SETUP 1, F2, F3 and enter the time factor using F1, F2 and F4, F5..



Confirm your choice by pressing Enter.

The REG-D voltage regulator offers several time programs.

In addition to the default-selected $dU \cdot t = \text{const.}$ integral method, the voltage regulator offers a fast integral method, a linear method and a further method working with a fixed times that can be found under the name **CONST**.

If **CONST** is selected, all regulative deviations that lie outside the tolerance band and that are smaller than the selected permissible deviation are rectified within time T1. For larger regulative deviations, however, the time will be T2.

Example:

The selected permissible regulative deviation is $\pm 1\%$.

Reaction time T1 is valid in the range from 1% to 2%. The voltage regulator carries out tap-changes according to the time selected for T2 if the regulative deviation is larger than 2% (calculated from the setpoint value!).

11 Backward high-speed switching

While the regulator is operating according to the algorithm $dU \cdot t = \text{const.}$, events will always be regulated such that the next tap-change will be triggered after a short time for large deviations and after a long time for small deviations.

Example:

Permissible regulative deviation X_{wz} :	1%
Present regulative deviation X_w :	+6%
Time factor:	1
Tap-change increment of the transformer:	1.5%

The curve below gives a time of 42 s, the time within which the fault will be rectified. High-speed switching can be used to reduce this time. If, in the above example, the high-speed switching limit were set to 6%, the voltage regulator would switch the voltage back to the permissible range of the voltage tolerance band as soon as this limit is reached and the selected time delay for high-speed mode has passed.

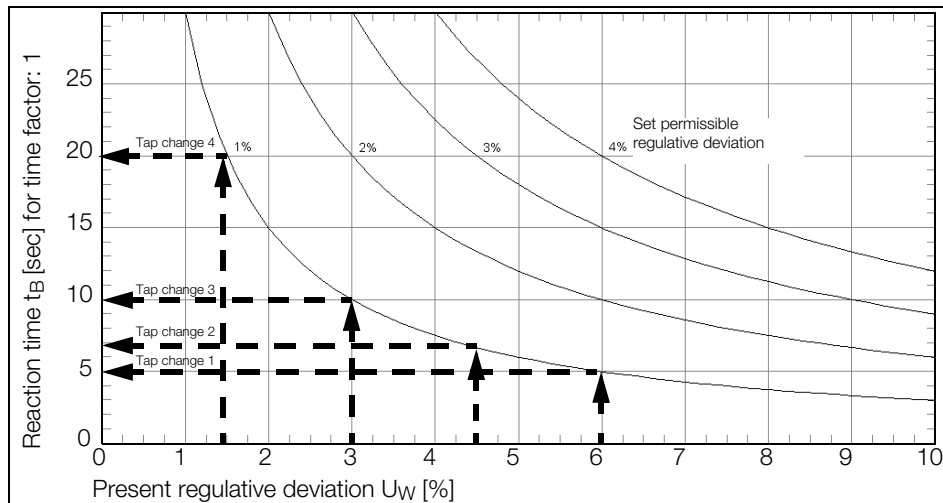


Diagram:

Present regulative deviation

$X_W = 6\%$;

Permissible regulative deviation

$X_{Wz} = 1\%$

$t_v = t_B \cdot \text{time factor}$

→ with **time factor: 1:**

1st tap-change after 5 s



2nd tap-change after 7 s

3rd tap-change after 10 s

4th tap-change after 20 s



Total time = 42 s

Please select SETUP 3, F4 and select backward high-speed switching using F3. Then enter the desired limit as a % of the setpoint value.

A:REG-DA 09:24:56		 	A:REG-DA 09:24:56	
SETUP				+1.0
--3--				
	Inhibit High		Setting the Bwd High-speed switching at	+0.1
	High-speed Switching		6.0 %	Fwd/Bwd
	Inhibit Low		=====	
			[0% .. +35%]	-0.1
				-1.0

Confirm your choice by pressing Enter.

The time delay can be set in SETUP 4, F4 after backward high-speed switching has been activated.

A:REG-DA 09:24:56		 	A:REG-DA 09:24:56	
SETUP	<U, >U			+10
--4--			Setting the	
Time	<I, >I		Time Delay	
until..	Inhibit High		Bwd Highspeed	+1
	High-speed Switching		Switching:	
	Inhibit Low		10 s	Fwd ✓
			=====	Bwd
			[0 .. 999]	-1
				-10

Confirm your choice by pressing Enter.

12 Tap-changer in-operation time



If the high-speed switching limit is reached, then the running time of the tap-changer determines the time required for the voltage to return to being within the tolerance band.

If the running time of the tap-changer is specified, other control signals can be prevented from being output when the tap-changer is running.

Old tap-changing devices in particular may occasionally respond with an EMERGENCY STOP signal, if a further control signal is input at the same moment that the tap-changer is changing to a new position.

The tap-changer in-operation time can be entered in menu AddOns-1.

Please select SETUP 5, F1.

A:REG-DA 09:24:56		 	A:REG-DA 09:24:56	
SETUP --5--	AddOns..		AddOns-1	..2
	CT/UT Configuration.		Maximum Time TC in Operation:	3s
	Input Assignments..		Hand/Automatic:	E5: PULS
	Relay- Assignments..		Tap-changer:	ON
	LED- Assignments..		Self-conduct:	WITH

If the regulator is operating in high-speed switching mode, two seconds will be added to the entered running time. The regulator will not issue a new control command until this entire running time has elapsed.

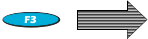
Note

This function will be carried out by the (PAN-D) voltage monitoring unit if the unit is present in the regulating system.



Extension:

Two further settings in SETUP 5 enable the running time of the tap-changer to be monitored.

The tap-change in operation lamp (TC) signal can be connected to one of the freely programmable inputs (E3 in this case). (SETUP 5, F3).

A:REG-DA 09:24:56			A:REG-DA 09:24:56	
SETUP --5--	AddOns..		Input Assignment ...	
	CT/VT Configuration.		[] E-1 : Inh. Low	
	Input Assignments..		[] E-2 : Quick	
	Relay-Assignments..		[] E-3 : TC.i. Op	
	LED-Assignments..		[] E-4 : OFF	

A freely programmable relay (in this case relay 5) can be used for fault reporting (TC-Err).

A:REG-DA 09:24:56		 	A:REG-DA 09:24:56	
SETUP --5--	AddOns..		Relay Assignment	...
	CT/UT Configuration.		[x] Rel 3:	OFF
	Input Assignments..		[] Rel 4:	PROG
	Relay- Assignments..		[] Rel 5:	TC-Err
	LED- Assignments..			

TC-Err+ → transmits a wiping signal in the event of a fault

TC-Err → transmits a permanent signal in the event of a fault

This signal can be used to stop the regulator or turn off the motor drive.

13 Knx transformer mounting ratios and transformer connection

This point can be skipped if only the secondary transformer voltage is required for regulation and the transducer functions of the regulator are not required.

In all other cases, the transformer mounting ratios and the “sources” of both the current and the voltage must be named.

If it is specified via the REG-D/DA menu that the current transformer is connected to external connector L3 and that the voltage to be measured is between L1 and L2, the regulator corrects the 90° angle by itself and delivers the correct values for all the outputs and for the reactive current $I \cdot \sin \varphi$.

Please select SETUP 5, F2, F1

Select the source of the voltage that is to be regulated using F2 or F4 and confirm the selection by using F3 or Enter.

A:REG-DA 09:24:56			A:REG-DA 09:24:56			A:REG-DA 09:24:56	
SETUP	AddOns..		Transformer	L1L2	F1	2:L3L1	^
--5--			Mounting			3:L1N	
	CT/VT	F2	VOLTAGE	Knu		4:L2N	↑
	Configuration.					5:L3N	
	Input		Transformer	L1		6:ARON	↓
	Assignments..		Mounting				
	Relay-		CURRENT				
	Assignments..		Nominal Val.:	1A			↓
	LED-						
	Assignments..			Kni			↵
						↑↓ : Select	ESC:
						↵ : OK	Escape

Knu is the quotient of the input voltage and the output voltage of the voltage transformer and ensures that the primary voltage is displayed (e.g. 20 kV and not 100V).

Select the transformer mounting ratio Knu using F2 or F4 and confirm the selection with the ENTER key.

Select SETUP 5, F2, F2

A:REG-DA 09:24:56			A:REG-DA 09:24:56			A:REG-DA 09:24:56	
SETUP	AddOns..		Transformer	L1L2		Setting the	+10
--5--			Mounting			Transformer	
	CT/VT	F2	VOLTAGE	Knu	F2	Mounting Ratio	+1
	Configuration.					Voltage Knu	Scale
	Input		Transformer	L1		1	↑
	Assignments..		Mounting			=====	↓
	Relay-		CURRENT			[0.01 .. 4000]	-1
	Assignments..		Nominal Val.:	1A			-10
	LED-			Kni			
	Assignments..						

Example:

Primary voltage: 20 kV

Secondary voltage: 100 V

$$K_{nu} = 20 \text{ kV} / 0.1 \text{ kV}$$

$$K_{nu} = 200$$

The voltage is measured by the voltage transformer between L2 and L3, and the current transformer is connected to phase L3.

⇒ Select SETUP 5, F2

⇒ Select the voltage L2L3 using F1 and confirm the selection using F3

⇒ Select the transformer mounting ratio K_{nu} using F2 and confirm the selection with the ENTER key

⇒ Select the current transformer mounting location L3 using F3 and confirm the selection with F3



14 Setting the nominal current

In general it is not necessary to supply the regulator with a current to perform voltage regulation.

If, however, a current-dependent setpoint adjustment is required or the output data should be displayed, a power supply must be provided.

The regulator can operate with 1 A and 5 A input signals.

Please select SETUP 5, F2, F4.

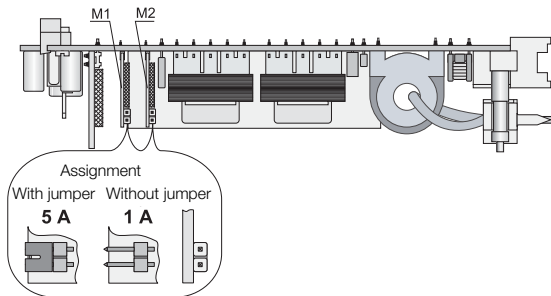
A:REG-DA 09:24:56			A:REG-DA 09:24:56			A:REG-DA 09:24:56	
SETUP	AddOns..		Transformer	L1L2		Transformer	L2L3
--5--			Mounting			Mounting	
	CT/UT		VOLTAGE			VOLTAGE	
	Configuration.			Knu			Knu
	Input		Transformer	L1		Transformer	L2
	Assignments..		Mounting			Mounting	
	Relay-		CURRENT			CURRENT	
	Assignments..		Nominal Val.:	1A		Nominal Val.:	5A
	LED-						
	Assignments..			Kni			Kni

Confirm the selection with the ENTER key.

Caution!



Please note: in addition to the software setting, a jumper must also be placed in the correct position on the REG-NTZ2 terminal block for the REG-D voltage regulator.



In the case of the REG-D voltage regulator, the number of current transformers to be connected is determined by the hardware feature selected.

In normal applications, only subprint M1 is equipped. In cases such as, for example, when three-phase current networks loaded according to the requirements of the user or triple-wound applications are to be operated, subprint M2 is equipped as well and must be set to the nominal current transformer value in the same way.

Note

For the REG-DA voltage regulator, the hardware conversion from 1 A to 5 A is not required.

Kni is the quotient of the input current and the output current of the current transformer.

Example:



Primary current: 600 A

Secondary current: 5 A

$$K_{ni} = 600 \text{ A} / 5 \text{ A}$$

$$K_{ni} = 120$$

Please select SETUP 5, F2, F5

A:REG-DA 09:24:56			A:REG-DA 09:24:56			A:REG-DA 09:24:56	
SETUP	AddOns..		Transformer	L1L2		Setting the	+10
--5--	CT/VT Configuration.		Mounting			Transformer	
	Input Assignments..		VOLTAGE	Knu		Mounting Ratio	+1
	Relay-Assignments..		Transformer	L1		Current Kni	Scale
	LED-Assignments..		CURRENT			1000	↑ ↓
			Nominal Val.:	1A		=====	
				Kni		[0.01 .. 10000]	-1
							-10

Confirm the selection with the ENTER key.

15 Inhibit low limit

Scenario:

The regulator operates with a 110 kV / 20 kV transformer.

Problems on the high voltage side cause the voltage to break down slowly.

The regulator rectifies this and increases the tap-changes of the transformer, to stabilise the voltage on the secondary side at 20 kV.

As soon as a fault on the primary side is eliminated, the primary voltage jumps back to the original voltage value.



However, since tap changes in the direction of a higher voltage were carried out as a result of the voltage breakdown (amongst other things), the secondary voltage is so high that problems on the secondary side can no longer be precluded (protective relay triggered, etc.).

Requirement:

If the voltage that is to be regulated falls beneath a particular limit due to a fault on the primary or secondary side, the regulator shouldn't undertake further attempts to raise the voltage.

This requirement can only be achieved using the inhibit low limit.

Please select SETUP 3, F5.

A:REG-DA 09:24:56				A:REG-DA 09:24:56	
SETUP --3--		 			+1.0
	Inhibit High			Setting the Inhibit Low	+0.1
	High-speed Switching			-25.0 %	
	Inhibit Low			=====	
				[+10% .. -75%]	-0.1
					-1.0

F1, F2 and F4, F5 can be used to enter a percentage value beneath which the regulator does not try to rectify a voltage breakdown.

As soon as the voltage increases above the entered value again, the regulator automatically restarts the regulation by itself.

In order to prevent short-term voltage breakdowns triggering the inhibit low of the regulator, a time delay after which the inhibit low will be activated can be entered in SETUP 4, F5 using F1, F2, F4 or F5.

Please select SETUP 4, F5.

A:REG-DA 09:24:56		A:REG-DA 09:24:56	
SETUP	<U, >U		+10
--4--			
Time	<I, >I	Setting the	+1
until..		Time Delay	
	Inhibit High	Inhibit Low:	
		19 s	
	High-speed Switching	=====	
	Inhibit Low	[0 .. 999]	-1
			-10



Example:

Setpoint value 100 V

If a voltage of < 90 V occurs for a period longer than 10 seconds, the regulator should change to inhibit low.

Input of inhibit low limit:

SETUP 3, F5 Input: -10%

Time delay input:

SETUP 4, F5 Input: 10 seconds

16 Triggering



The trigger limit describes the entered voltage as an absolute value, above which the regulator suppresses all control commands. The regulator automatically starts regulation by itself if the voltage falls beneath this value.

Please select SETUP 3, F3

A:REG-DA 09:24:56			A:REG-DA 09:24:56
SETUP			+1.0
---3---			
			Setting the
			Inhibit High
			+0.1
			115.0 V
			=====
			115.0 V
			-0.1
			[100V .. 135V]
			-1.0

Select the trigger value using the F1, F2 and F4, F5 keys and confirm the selection using the ENTER key.

Please select SETUP 4, F3

A:REG-DA 09:24:56		 	A:REG-DA 09:24:56	
SETUP	<U, >U			+10
--4--				
Time	<I, >I		Setting the	
until..	Inhibit High		Time Delay	+1
	High-speed Switching		Inhibit High:	
	Inhibit Low		10 s	
			=====	
			[0 .. 999]	-1
				-10

Choose the time delay for the triggering using the F1, F2 and F4, F5 keys and confirm the selection using the ENTER key.

The limit signals can also be connected to the relay outputs / binary outputs.

In addition, the “Trigger” signal can also be indicated by the programmable LEDs).

Note

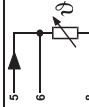
The pin assignments and installation instructions are valid only for the REG-DA.
























Since the REG-D plug-in module is available in many different types of housing (19" module rack, wall or panel mount housing), terminal assignments will vary in each case.

Please follow the terminal diagrams which are always included with your delivery.

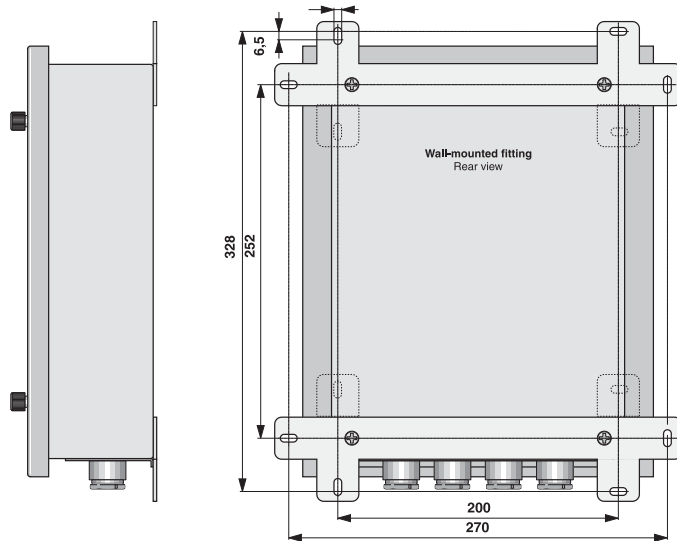
Terminal assignment

* The assignments of the terminals 23 to 32 changes depending on the features D0/D1 and D2/D3.

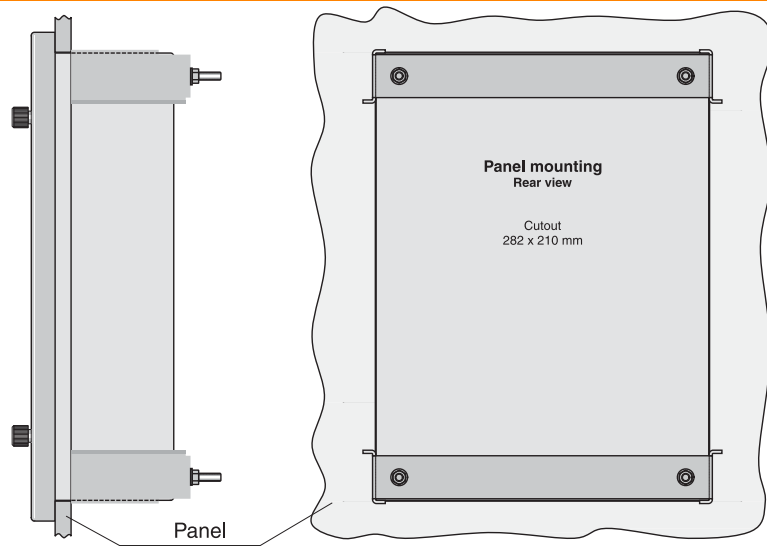
Ebene I			Ebene III			Ebene I		
Nr.								
2	Input voltage	U ₁	63	mA input +	A1	* Option:	D0, D1	D2, D3
5	Input voltage		64	mA input -	A1		Input 1	Tap changer in progress
8	Input voltage	U ₂	61	mA input or output +	A2	Input 2	Freely programmable	
10	Input voltage		62	mA input or output -	A2	Input 3	Freely programmable	
1	Current input I ₁		65	mA input or output +	A3	Input 4	Freely programmable	
3	Current input I ₂		66	mA input or output -	A3	Input 1 ... 4	GND	
4	Current input I ₂		67	mA input or output +	A4	Input 5	AUTO	
6	Current input I ₂		68	mA input or output -	A4	Input 6	MANUAL	
7	Current input I ₃					Input 7	Freely programmable	
9	Current input I ₃					Input 8	Freely programmable	
21	L / (+)	U _H = Auxiliary voltage				Input 5 ... 8	GND	
22	L / (-)					Input 9	BCD 1	
						Input 10	BCD 2	
						Input 11	BCD 4	
						Input 12	BCD 8	
						Input 9 ... 12	GND	
			Input 13	BCD 10				
			Input 14	BCD 20				
			Input 15	BCD sgn.				
			Input 16	Freely programm.				
			Input 13 ... 16	GND				

Level I		Level III	
Nr.			
33		Freely programmable	R ₅
34		Freely programmable	R ₄
35		Freely programmable	R ₃
36		Freely programmable	R ₂
37		lower	
38		higher	
39			
40			
41			
42			
43			
44			
45			
46			
47		> I	R ₁₁
48		> U	R ₁₀
49		< U	R ₉
50		Local	R ₈
51		Remote	R ₇
52		TC error	R ₆
53		GND	R ₆ ... R ₁₁
54		Life-contact (status)	R ₁₃
55		MANUAL	
56		AUTO	
57			R ₁₂
58			
59			
60			
61			
62			
63			
64			
65			
66			
67			
68			
69		E -	
70		E +	
71		EA -	
72		EA +	
73		E -	
74		E +	
75		EA -	
76		EA +	
77		Tx +	
78		Tx -	
79		Rx +	
80		Rx -	
81			
82			
83			
84			
85			
86			

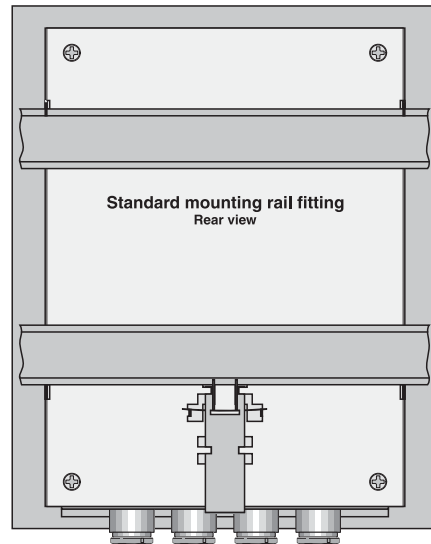
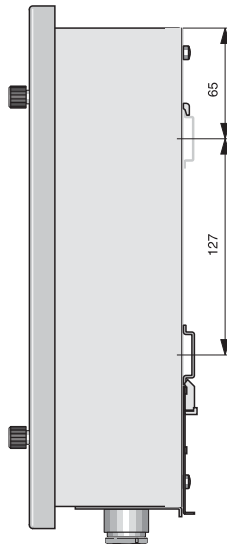
Wall-mounted fitting



Panel mounting



Standard mounting rail fitting



SERVICE	BLOCKED												



SERVICE	BLOCKED												



Wiring Scheme

