DEIF A/S

Protection relays and controllers

Types TRANSAL DC-2TF, ACV-3TF, ACI-3TF, PFC-2TF
TRANSAL DC-2TB, AVC- 3TB, ACI-3TB, PFC-2TB

4921250026C

Transal…TF

Transal…TB

- *Available for the following inputs:*
  - *DC current/voltage*
  - *AC current/voltage*
  - *Phase angle*
- *2 relay outputs*
- *Analog output*
- *Extremely robust construction*

CE

Introduction

"TRANSAL" is a collective name standing for the DEIF transducers combined with 1 or 2 alarm functions or applied as PI-step controllers. The TRANSAL relays are available in two versions:

- Types ...TF: Q96 housing for flush mounting
- Types ...TB: Q96 housing for base mounting

and are CE marked for residential, commercial and light industry plus industrial environment.

Available electrical measurements

Measuring of	Transal type	Lowest measuring range	Highest measuring range	Characteristic data	
DC inputs	DC-2TF DC-2TB	0...1V	0..10V	R_i: approx. 1kΩ/V.	**No** analog output.
		0..1mA	0..20mA	Voltage drop: approx. 1V	
AC voltage	ACV-3TF ACV-3TB	0..25V	0..500V	R_i: approx. 1kΩ/V, standard.	
AC current	ACI-3TF ACI-3TB	-/1A	-/5A	With built-in current transformer.	
Phase angle Cos-φ	PFC-2TF PFC-2TB	0.5 cap....1...0.5 ind. 0.7 cap....1...0.3 ind. 0...(0.707)...1 ind. 0...(0.707)...1 cap.		Auxiliary voltage internally connected to measuring voltage: 57.8...480V AC Measuring current: -/1A or -/5A	

Function of TRANSAL protection relays

Hold-on circuit (H_1-H_2)

If a greater and/or variable "hysteresis" is required, one of the contacts is provided with a hold-on circuit which is released by the other contact. If the hold-on circuit has been incorporated, the relays can be locked in their warning position even if the measured signal returns to normal. The relays can be reset by short-circuiting terminals A-C ("left" contact) and/or terminals B-C ("right" contact).

Surge damping (T_{c1}-T_{c2})

The contact function may be provided with an integrating time delay resulting in an "inversely proportional release characteristic". **Note:** If the TRANSAL is equipped with 2 relay outputs, boths will be provided with this surge damping.

Calculation of operating time

$$T = \frac{x\%}{y\%} \times TC$$

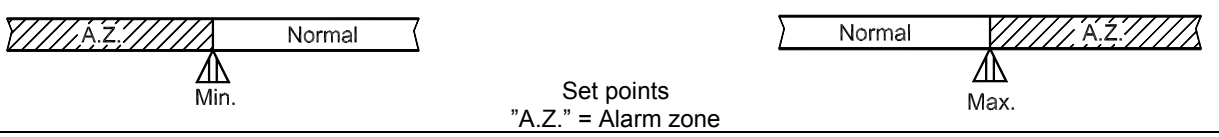
T = operating time
TC = set time (0…20 s)
% = calculated on the basis of full scale value
x = measuring signal before set point (x = 10 for x > 10)
y = difference between measuring signal after set point and set point (%)

Example: The measuring signal suddenly changes from 50% to 70% (max. contact).

Tc = 10 s. Set point = 65%. $T = \frac{10}{5} \times 10 = 20\ s$

Contacts • Protection relays

Aux. supply	Input	Contact type	Relay R1	Relay R2	Contacts	LED
ON	A.Z.	A	1-3	11-13	Closed	ON
			1-2	11-12	Open	
ON	Normal	A	1-3	11-13	Open	OFF
			1-2	11-12	Closed	
OFF	Don't care	A	1-3	11-13	Open	OFF
			1-2	11-12	Closed	
ON	A.Z.	H	1-3	11-13	Open	ON
			1-2	11-12	Closed	
ON	Normal	H	1-3	11-13	Closed	OFF
			1-2	11-12	Open	
OFF	Don't care	H	1-3	11-13	Open	OFF
			1-2	11-12	Closed	



Function of TRANSAL PI-step controllers

The TRANSAL PI-step controllers are applicable to all control purposes where the controlling element can be controlled by a servomotor.

The controller can operate at servomotor "speeds" from 30 s to 10 minutes (~ ∆100%) adapted to the time constant of the control loop.

Proportional band: x_p scale (0...10)

This is the range where the pulse control takes place.

Within this range the pulse ratio, i.e. T_{ON}/T_{OFF} will be determinated by the devaition of the measured signal from the set point.

Outside the proportional band the relevant relay will be continuously ON.

x_p determines the amplification in the control loop and is independent of T_N.

Pulse time: T_N scale (0...10)

This is primarily determined by the T_N adjustment but it is also affected by the adjustment of x_p.

When x_p rises, the $T_{ON} + T_{OFF}$ time is shortened, but this has a favourable effect when stopping continuous fluctuations in the control process.

Differential output

The deviation between input and set point is amplified to a 0...±1V DC load independent signal equivalent to a control deviation of 0...±20% and is connected to terminals B and C.

The signal is suitable for recording, indication, and/or connection of a TRANSAL for warning. It can also be amplified to a standard signal connected to the normal output terminals. (See page 5).

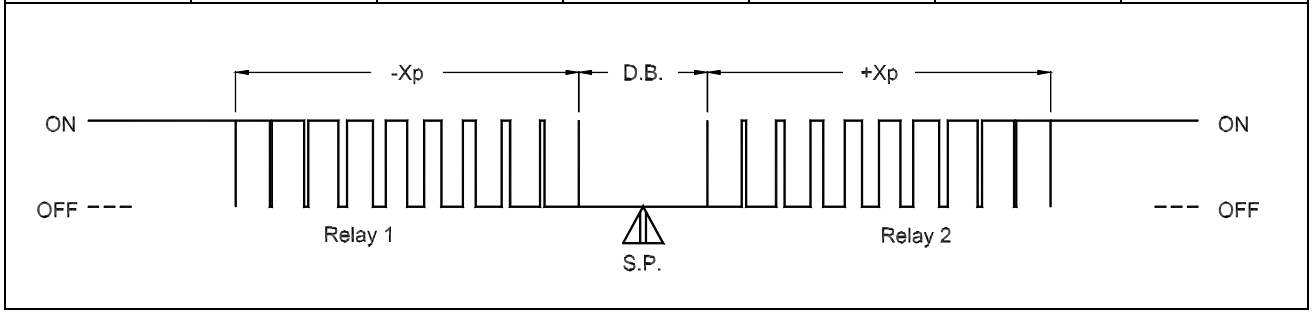
Settings

Possible settings	**T_N (pulse length)**	**DB (dead band)**	**x_p (proportional band)**
	"VERY SLOW"	±1...6% of ∆S (scale length)	0...±10% and 0...±50%
	"SLOW"	±0.5...3% of ∆S (scale length)	0...±10% and 0...±50%
	"FAST"	±0.5...3% of ∆S (scale length)	0...±10% and 0...±50%
On delivery:	"SLOW"	±0.5%	0...±10%

By adjusting T_N and x_p on the scale front the controller can be adapted to most control loops.

Contacts • TRANSAL PI-step controllers

Aux. supply	**Relay**	**Contact type**	**Relay R1**	**Relay R2**	**Contacts**	**LED**
ON	ON	A	1-3	11-13	Closed	ON
			1-2	11-12	Open	
ON	OFF	A	1-3	11-13	Open	OFF
			1-2	11-12	Closed	
OFF	OFF	A	1-3	11-13	Open	OFF
			1-2	11-12	Closed	



Contact types

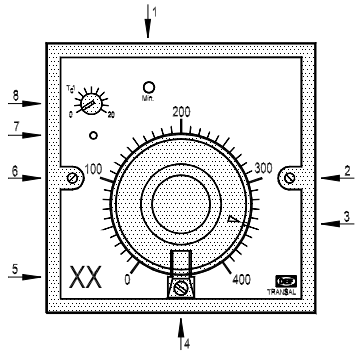
A: Normally de-energised	H: Normally energised

Operations from the front TRANSAL protection relays

Single alarm contact with/without surge damping

Relay 1: contacts 2 - 1 - 3:

1) Relay 1, LED
2) Release screw for plug-in unit
3) Set point, SP1 (relay 1)
4) Locking of SP1
5) Unit of scale
6) Release screw for plug-in unit
7) Locking, T_{c1}
8) Adjustment, T_{c1}

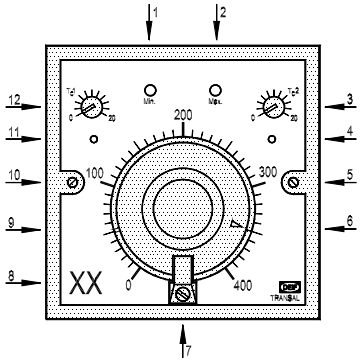


Note:
The 2 parts of the big knob are coupled together mechanically.

Double alarm contact with/without surge damping

Relay 1: contacts 2 - 1 - 3:

1) Relay 1, LED
2) Relay 2, LED
3) Adjustment, T_{c2}
4) Locking, T_{c2}
5) Release screw for plug-in unit
6) Set point, SP2 (relay 2)
7) Locking of SP1 and SP2



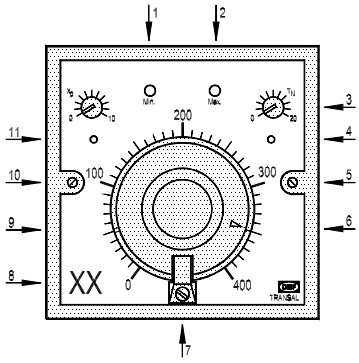
Relay 2: contacts 12 - 11 - 13:

8) Unit of scale
9) Set point, SP1 (relay 1)
10) Release screw for plug-in unit
11) Locking, T_{c1}
12) Adjustment, T_{c1}

Operations from the front TRANSAL PI-step controllers

Relay 1: contacts 2 - 1 - 3:

1) Relay 1, LED
2) Relay 2, LED
3) Adjustment, T_N
4) Locking, T_N
5) Release screw for plug-in unit
6) Set point
7) Locking of set point
8) Unit of scale

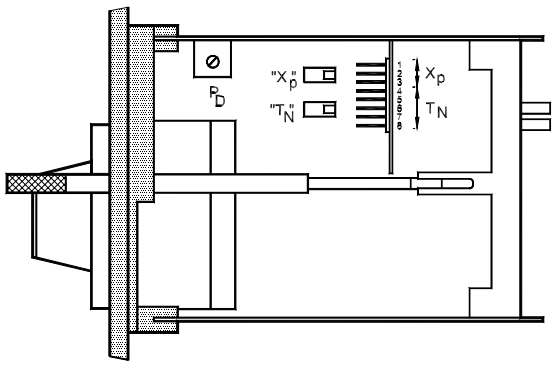


Relay 2: contacts 12 - 11 - 13:

9) Release screw for plug-in unit
10) Locking, x_p
11) Adjustment, x_p

Note:
The 2 parts of the big knob are coupled together mechanically.

Adjustments of TRANSAL PI-step controllers after opening



”Dead band” (P_D): ± 1…±6% (Very slow)
±0.5…±3% (Slow/fast)

Jumper ”x_p”: 1-2 x_p = 10%
2-3 x_p = 50%

Jumper ”T_N”: 4-5 ”Very slow”
6-7 ”Slow”
7-8 ”Fast”

Opening of the TRANSAL

1. Turn the ”screws” Ⓢ approx. 15 rotations counter-clockwise.
2. Pull out the ”screws” (approx. 20 mm)
3. Pull out the plug-in unit by pulling both ”screws” firmly (to facilitate this: keep the TRANSAL mounted in the panel).

Never try using a screwdriver or the like between bezel and housing to ease out the plug-in unit!

Technical specifications

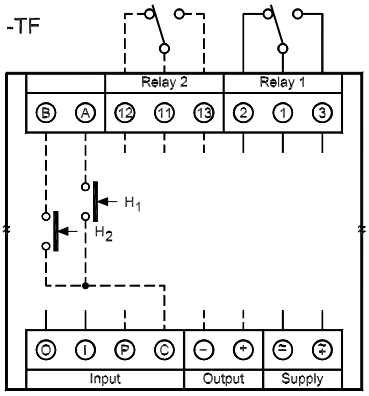
Accuracy		Input to output: class 0.5% (-10..15..30..55°C), to IEC 688 Input to set point: ±0.5% of F.S. and ±2.5% of scale length					
Input		See page 2					
Normal output		**"Mini" output**	**Standard outputs[1]**				
0..100% All models		0..1V	0..10V	0..1mA	0..5mA	0..10mA	0..20mA
	Live zero		2..10V	0.2..1mA	1..5mA	2..10mA	4..20mA
	Load	Min. 200Ω	Min. 500Ω	Max. 15kΩ	Max. 3kΩ	Max. 1.5kΩ	Max. 750Ω
Diff. output 20..0..20% PI-step controllers only		-1..0..1V		-1..0..1mA	-5..0..5mA	-10..0..10mA	-20..0..20mA
	Load			Max. 2.5kΩ	Max. 500Ω	Max. 250Ω	Max. 125Ω
	Elevated zero		0..5..10V	0..0.5..1mA	0..2.5..5mA	0..5..10mA	0..10..20mA
	Load	Min. 1kΩ	Min. 500Ω	Max. 15kΩ	Max. 3kΩ	Max. 1.5kΩ	Max. 750Ω
"Constant voltage"		Short circuit protected, continuously. 0..1V/0..±1V: Max. ±3V at overload. 0..(2)..10V/0..5..10V: Max. 13V at overload.					
"Constant current"		Open circuit protected: max. 22V. Max 3 x I_{FS}, - max. 27mA at overload.					
Ripple		Max. 0.5%pp.					
Response time		0.3 s (models without surge damping only).					
Load dependence		Max. 0.1% at max. load variation.					
Non-linearity		Max. 0.1% of F.S.					
Auxiliary voltage		24-48-57.7-63.5-100-110-115-127-220-230-240-380-400-415-440-480V AC ±20% (40..70Hz) + (300..500Hz).					
Aux. voltage influence		Max. 0.1% for ΔU_N. Consumption: approx. 6VA.					
Relay contacts		1 change-over switch per relay. 250V-2A-400VA (AC). 250V-2A-50W (DC) at resistive load and 2 x 10^6 operations. Mechanical life: 20 x 10^6 operations.					

General technical specifications

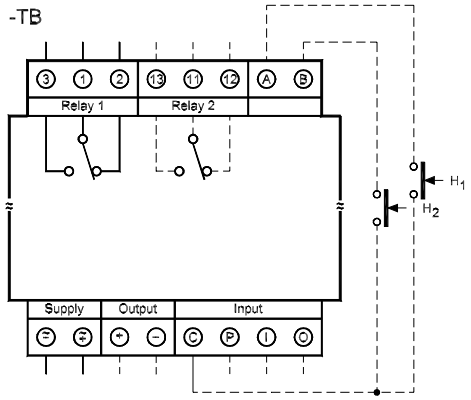
Temperature	-10..55°C (nominal), -25..70°C (operating), -40..70°C (storage)	
Temperature drift	Max. 0.15% of F.S. per 10°C.	
Galvanic separation	Between input(s) and output: ACI-3T, PFC-2T	2,2kV-50Hz-1 min.
	Between input(s) and output: other types (see page 2)	None
	Between input/output and auxiliary voltage	2,2kV-50Hz-1 min.
Climate	Class HSE, to DIN 40040.	
EMC	To EN 50081-1/2, EN 50082-1/2, SS4361503 (PL4) and IEC 255-4 (class 3).	
Materials	All plastic parts are of self-extinguishing materials to UL94 (V0).	
Connections	Max. 4 mm^2 (single-stranded), max. 2.5 mm^2 (multi-stranded).	
Protection	Case: IP40. Terminals: IP20, to IEC 529 and EN 60529.	

1) Only one standard output is possible

Connections/release of hold-on circuit



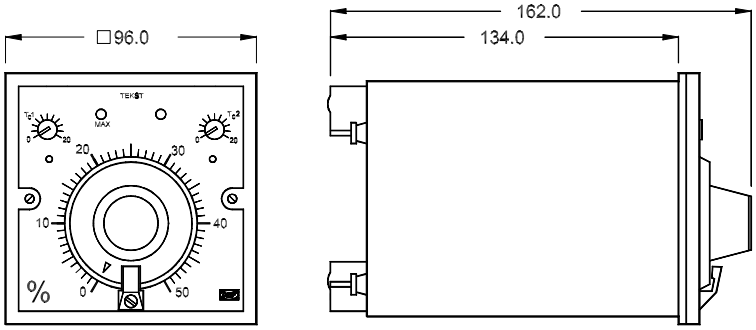
TRANSAL DC-2TF, ACV-3TF, ACI-3TF, PFC-2TF



TRANSAL DC-2TB, ACV-3TB, ACI-3TB, PFC-2TB

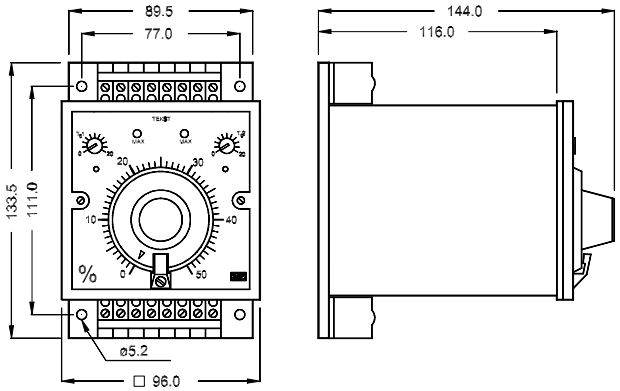
Dimensions

All dimensions in mm



TRANSAL DC-2TF, ACV-3TF, ACI-3TF, PFC-2TF Weight: approx. 1 kg

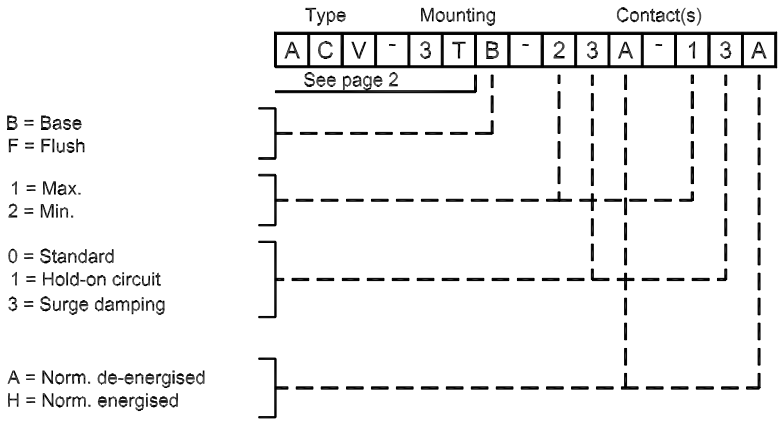
All dimensions in mm



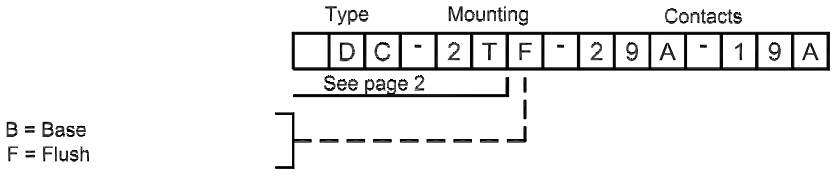
TRANSAL DC-2TB, ACV-3TB, ACI-3TB, PFC-2TB Weight: approx. 1 kg

Order specifications

Protection relays



PI-step controllers



	Type/mounting/contacts	Input	Scale	(Coupling)	(Output)	Aux. voltage
Examples:	**Protection relays**					
	ACV-3TB-23A-13A	60…120V AC	6…12kV		0…1V DC	230V AC
	PFC-2TF-23H-13H	-/5A	0.5…1…0.5 cos-φ	WC3	0…10V DC	400V AC
	PI-step controllers					
	DC-2TF-29A-19A	0-20mA	0-400V			230V AC

Due to our continous development we reserve the right to supply equipment which may vary from the described.

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