



# Differential relays





# Toroids for differential relays



Model	Del						
	TDGA2	TDGB2	TDGH2	TDGC2	TDGD2	TDGE2	TDGF2
Ordering codes see page:	07	07	07	07	07	07	07
Close-core toroids Ø	28mm	35mm	60mm	80mm	110mm	140mm	210mm
Lowest current I $\Delta$ n	0,03A	0,03A	0,03A	0,03A	0,1A	0,3A	0,3A
Technical note	NT641						
Price							



Model	Del A		Del A	Del
	TDAA2	TDAB2	TDAC2	TDS5...
Ordering codes see page:	08	08	08	08
Open-core toroids Ø	110mm	150mm	300mm	-
Lowest current I $\Delta$ n	0,5A	0,5A	1A	-
Technical note	NT641	NT641	NT641	NT642
Price				

In the event that problems with cable or bar sizes for the line to be protected do not allow to use above mentioned toroids (Ø hole max. 300mm), it is possible to use measuring current transformers with 5A (class 0.5 or 1) secondary winding together with a summation toroid **TD55** manufactured according to the used C.T. ratios. For connection with toroids with ratio higher than 400/5A, the I $\Delta$ n intervention current values which can be selected on the earth leakage relay are multiplied by 10.



Model	Delta TCS	
	ARD003	ARD00H
Ordering codes see page:	07	07
Controlled circuits	1 - 2 selectable	
Controlled circuits voltage	20...440Va.c./d.c.	
Output relay	2 SPDT contacts	
Test	manual	
Reset	automatic	
A.C. auxiliary supply	230V	48V
D.C. auxiliary supply	-	20...150V
Dimensions	4 module DIN	
Technical note	NT817	
Price		

Reliability of differential protection depends also on the switch opening circuit. **Delta TCS** monitors the release circuit working order for one or two switches with current launching coil. It reports the opening circuit breakdown by displaying the alarm (front LED's) and intervention of output relay.



Model	Delta D2-L	Delta D2-s	Delta D4-s	Delta D4-I
Codes	RD1A...	RD3A...	RD1B....	RD2B....
Ordering codes see page:	06	06	06	06
Waveform IΔn	type AC-A according to IEC/EN 60947-2 (annex B and M) ed. VIII (2007)			
1 alarm	•	•		
2 or 1 alarm + 1 pre-alarm 50%			•	
2 alarms				•
19 ranges 0,03...30A	•	•	•	•
Intervention time (t) 0/0,15/0,25/0,5/1/2,5/5s	•	•	•	•
Intervention time R2(t) R1 + 0,4s				•
Electrical block t=0 a 30mA	•	•	•	•
Display IΔn on LED bar		•	•	•
Filter for harmonics	•	•	•	•
Enhanced filter for industrial uses			•	•
1 relay SPDT output	•	•		
2 relay SPDT output			•	•
Relay status	field-selectable positive/negative	field-selectable positive/negative	field-selectable positive/negative	field-selectable positive/negative (R2 always negative)
Test	manual/automatic permanent	manual/automatic permanent	manual/automatic permanent	manual/automatic permanent
Reset	manual or automatic (3 restart, 1 every 60s)	manual or automatic (3 restart, 1 every 60s)	manual	manual or automatic (3 restart, 1 every 60s)
A.C. auxiliary supply	24-48-115-230-240-400V	24-48-115-230-240-400V	24-48-115-230-240-400V	230V
D.C. auxiliary supply	20...150V	20...150V	20...150 - 10...36V	
2 wire Del - DelA connections	•	•	•	•
Dimensions	2 module DIN	2 module DIN	4 module DIN	4 module DIN
Technical note	NT544	NT597	NT647	NT748
Price				
Extra price d.c. auxiliary supply and 48Va.c.	•	•	•	
Extra price auxiliary supply 24Va.c.	•	•	•	



Model	Delta 48-s		Delta 72-s	
Codes	RD1DF...	RD1D2...	RD1EP....	RD1E2....
Ordering codes see page:	06	06	07	07
Waveform IΔn	type AC-A according to IEC/EN 60947-2 (annex B and M) ed. VIII (2007)			
1 alarm	•	•		
1 alarm + 1 pre-alarm 50%			•	
2 or 1 alarm + 1 pre-alarm 50%				•
19 ranges 0,03...30A	•	•	•	•
18 ranges 0,05...30A	•	•	•	•
Intervention time (t) 0/0,15/0,25/0,5/1/2,5/5s	•	•	•	•
Electrical block t=0 a 30mA	•	•	•	•
Display IΔn on LED bar			•	•
Display IΔn on LED display				•
Filter for harmonics	•	•	•	•
1 relay SPDT output	•			
2 relay SPDT + SPST output		•		
2 relay SPDT output			•	•
Relay status	field-selectable positive / negative		field-selectable positive / negative	
Test	manual / automatic permanent		manual / automatic permanent	
Reset	manual or automatic (3 restart, 1 every 60s)		manual or automatic (3 restart, 1 every 60s)	manual
A.C. auxiliary supply	24-48-115-230-240-400V	48-115-230-240-400V	24-48-115-230-240-400V	
D.C. auxiliary supply	20...150V		20...150	
2 wire Del - DelA connections	•	•	•	•
Dimensions	48x48x102mm		72x72x75mm	
Technical note	NT556	NT711	NT552	NT692
Price				
Extra price d.c. auxiliary supply and 48Va.c.	•	•	•	•
Extra price auxiliary supply 24Va.c.	•		•	•



Model	Delta 72-h	Delta 72-F	Delta 96-s	Delta 96-F
Codes	RD3E...	RD2E...	RD1G....	RD2G....
Ordering codes see page:	06	07	07	07
Waveform IΔn	type AC-A according to IEC/EN 60947-2 (annex B and M) ed. VIII (2007)			
1 alarm				
1 alarm + 1 pre-alarm 50%				
2 or 1 alarm + 1 pre-alarm 50%	•	•	•	•
19 ranges 0,03...30A	•		•	
18 ranges 0,05...30A		•		•
Intervention time (t) 0/0,15/0,25/0,5/1/2,5/5s	•	•	•	•
Electrical block t=0 a 30mA	•		•	
Display IΔn on LED bar		•	•	•
Display IΔn on LED display	•			
Filter for harmonics		•		•
1 relay SPDT output				
2 relay SPDT + SPST output	•			
2 relay SPDT output		•	•	•
Relay status	field-selectable positive / negative	field-selectable positive / negative	field-selectable positive / negative	field-selectable positive / negative
Test	manual / automatic permanent	manual / automatic permanent	manual / automatic permanent	manual / automatic permanent
Reset	manual	manual	manual	manual
A.C. auxiliary supply	24-48-115-230-240-400V	24-48-115-230-240-400V	24-48-115-230-240-400V	24-48-115-230-240-400V
D.C. auxiliary supply	20...150V	20...150	20...150	20...150
2 wire Del - DelA connections	•	•	•	•
Dimensions	72x72x75mm	72x72x75mm	96x96x92mm	96x96x92mm
Technical note	NT649	NT745	NT691	NT746
Price				
Extra price d.c. auxiliary supply and 48Va.c.	•	•	•	•
Extra price auxiliary supply 24Va.c.	•	•	•	•

**Delta D2-L****1 threshold differential relay****2 module**

Ordering code	Auxiliary supply	Relay	Reset	Stock
RD1AF11B	24Va.c.	1 alarm	manual or automatic	
RD1AF12B	115Va.c.	1 alarm	manual or automatic	•
RD1AF13B	230Va.c.	1 alarm	manual or automatic	•
RD1AF14B	240Va.c.	1 alarm	manual or automatic	
RD1AF15B	400Va.c.	1 alarm	manual or automatic	
RD1AF1HB	20...150Vd.c. + 48Va.c.	1 alarm	manual or automatic	•

**Delta D2-s****1 threshold differential relay****2 module**

Ordering code	Auxiliary supply	Relay	Reset	Stock
RD3AF11B	24Va.c.	1 alarm	manual or automatic	
RD3AF12B	115Va.c.	1 alarm	manual or automatic	
RD3AF13B	230Va.c.	1 alarm	manual or automatic	•
RD3AF14B	240Va.c.	1 alarm	manual or automatic	
RD3AF15B	400Va.c.	1 alarm	manual or automatic	
RD3AF1HB	20...150Vd.c. + 48Va.c.	1 alarm	manual or automatic	

**Delta D4-s****2 threshold differential relay****4 module**

Ordering code	Auxiliary supply	Relay	Reset	Stock
RD1B211B	24Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD1B212B	115Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD1B213B	230Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	•
RD1B214B	240Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD1B215B	400Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD1B21DB	10...36Vd.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD1B21HB	20...150Vd.c. + 48Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	

**Delta D4-I****1 threshold differential relay****4 module**

Ordering code	Auxiliary supply	Relay	Reset	Stock
RD2B213B	230Va.c.	2 alarms	manual or automatic	•

**Delta 48-s****1 threshold differential relay****48x48mm**

Ordering code	Auxiliary supply	Relay	Reset	Stock
RD1DF11B	24Va.c.	1 alarm	manual or automatic	
RD1DF12B	115Va.c.	1 alarm	manual or automatic	•
RD1DF13B	230Va.c.	1 alarm	manual or automatic	•
RD1DF14B	240Va.c.	1 alarm	manual or automatic	
RD1DF15B	400Va.c.	1 alarm	manual or automatic	
RD1DF1HB	20...150Vd.c. + 48Va.c.	1 alarm	manual or automatic	•

**Delta 48-s****1 threshold differential relay****48x48mm**

Ordering code	Auxiliary supply	Relay	Reset	Stock
RD1D212B	115Va.c.	2 alarms	manual or automatic	
RD1D213B	230Va.c.	2 alarms	manual or automatic	
RD1D214B	240Va.c.	2 alarms	manual or automatic	
RD1D215B	400Va.c.	2 alarms	manual or automatic	
RD1D21HB	20...150Vd.c. + 48Va.c.	2 alarms	manual or automatic	

**Delta 72-h****2 threshold differential relay****72x72mm**

Ordering code	Auxiliary supply	Relay	Reset	Stock
RD3E211B	24Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD3E212B	115Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	•
RD3E217B	230 - 240Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	•
RD3E218B	400 - 415Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD3E21HB	20...150Vd.c. + 48Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	•

**Delta 72-s****2 threshold differential relay**

72x72mm

Ordering code	Auxiliary supply	Relay	Reset	Stock
RD1EP11B	24Va.c.	1 alarm + 1 pre-alarm	manual and automatic	
RD1EP12B	115Va.c.	1 alarm + 1 pre-alarm	manual and automatic	•
RD1EP13B	230Va.c.	1 alarm + 1 pre-alarm	manual and automatic	•
RD1EP14B	240Va.c.	1 alarm + 1 pre-alarm	manual and automatic	
RD1EP15B	400Va.c.	1 alarm + 1 pre-alarm	manual and automatic	
RD1EP1HB	20...150Vd.c. + 48Va.c.	1 alarm + 1 pre-alarm	manual and automatic	•
RD1E211B	24Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD1E212B	115Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	•
RD1E213B	230Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	•
RD1E214B	240Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD1E215B	400Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD1E21HB	20...150Vd.c. + 48Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	•

**Delta 72-F****2 threshold differential relay**

72x72mm

Ordering code	Auxiliary supply	Relay	Reset	Stock
RD2E211B	24Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD2E212B	115Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD2E213B	230Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD2E214B	240Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD2E215B	400Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD2E21HB	20...150Vd.c. + 48Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	

**Delta 96-s****2 threshold differential relay**

96x96mm

Ordering code	Auxiliary supply	Relay	Reset	Stock
RD1G211B	24Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD1G212B	115Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	•
RD1G213B	230Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	•
RD1G214B	240Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD1G215B	400Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD1G21HB	20...150Vd.c. + 48Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	•

**Delta 96-F****2 threshold differential relay**

96x96mm

Ordering code	Auxiliary supply	Relay	Reset	Stock
RD2G211B	24Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD2G212B	115Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD2G213B	230Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD2G214B	240Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD2G215B	400Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	
RD2G21HB	20...150Vd.c. + 48Va.c.	1 alarm + 1 pre-alarm or 2 alarms	manual	

**Delta TCS****Relay to check the switch opening circuit**

4 module

Ordering code	Auxiliary supply	Relay	Reset	Stock
ARD003	230Va.c.	2 alarms	automatic	
ARD00H	20...150Vd.c. + 48Va.c.	2 alarms	automatic	

**Del****Closed-core toroid for differential relay**

Ordering code	Inside diameter	Stock
TDGA2	28mm	•
TDGB2	35mm	•
TDGH2	60mm	•
TDGC2	80mm	•
TDGD2	110mm	•
TDGE2	140mm	•
TDGF2	210mm	•

**Del A****Open-core toroid for differential relay**

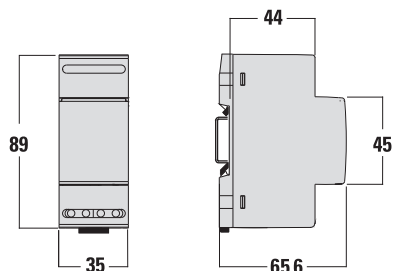
Ordering code	Inside diameter	Stock
T D A A 2	110mm	•
T D A B 2	150mm	•
T D A C 2	300mm	•

**Del****Summation toroid for differential protection with measuring current transformer**

Ordering code	Description	Stock
T D S 5 C 1 0 0	Measuring current transformer 100/5A	
T D S 5 C 1 5 0	Measuring current transformer 150/5A	
T D S 5 C 2 5 0	Measuring current transformer 250/5A	
T D S 5 C 4 0 0	Measuring current transformer 400/5A	
T D S 5 C 5 0 0	Measuring current transformer 500/5A	
T D S 5 C 6 0 0	Measuring current transformer 600/5A	
T D S 5 C 8 0 0	Measuring current transformer 800/5A	
T D S 5 D 1 0 0	Measuring current transformer 1000/5A	
T D S 5 D 1 2 0	Measuring current transformer 1200/5A	
T D S 5 D 1 2 5	Measuring current transformer 1250/5A	
T D S 5 D 1 5 0	Measuring current transformer 1500/5A	
T D S 5 D 1 6 0	Measuring current transformer 1600/5A	
T D S 5 D 2 0 0	Measuring current transformer 2000/5A	
T D S 5 D 2 5 0	Measuring current transformer 2500/5A	
T D S 5 D 3 0 0	Measuring current transformer 3000/5A	
T D S 5 D 3 2 0	Measuring current transformer 3200/5A	
T D S 5 D 4 0 0	Measuring current transformer 4000/5A	
T D S 5 D 5 0 0	Measuring current transformer 5000/5A	

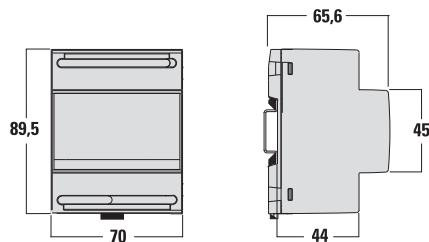


**RD1A... / RD3A...**



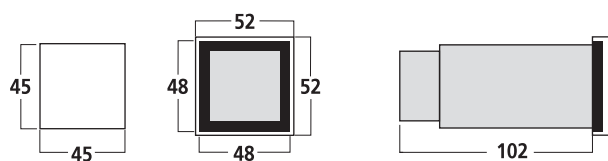
2 Module

**RD1B... / RD2B... / ARD...**



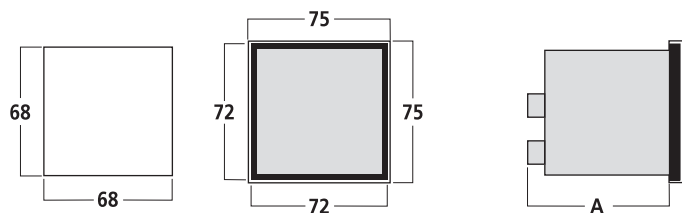
4 Module

**RD1D...**



48x48 flush mounting

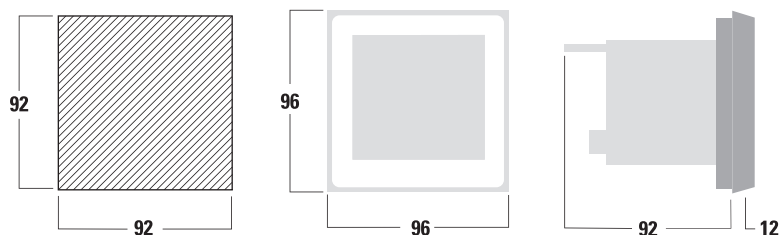
**RD1E... / RD2E... / RD3E...**



72x72 flush mounting

A = 75 RD1E... / RD2E...  
A = 78,2 RD3E...

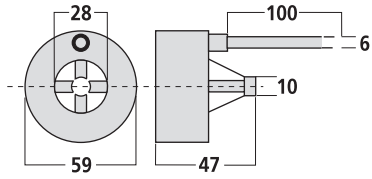
**RD1G... / RD2G...**



96x96 flush mounting

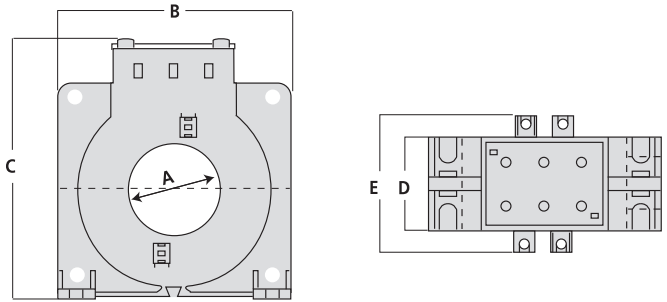
**Del**

**TDGA2**



Weight 200g

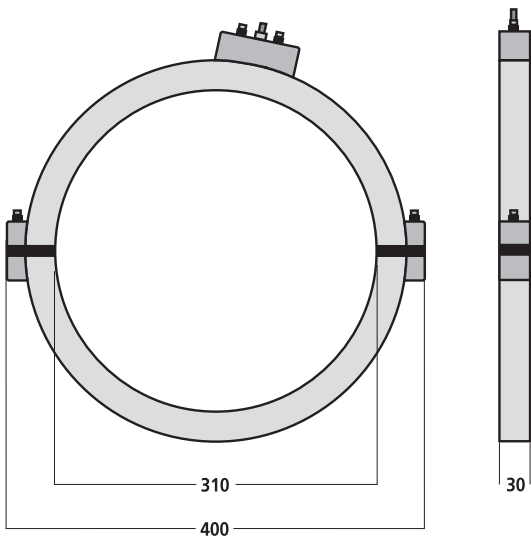
**TDG.2 / TDS5...**



Model	A	B	C	D	E	Weight
TDGB2	35	92	113	36	56	250g
TDGH2	60	105	138	36	56	300g
TDGC2	80	125	160	36	56	350g
TDGD2	110	165	198	36	56	500g
TDGE2	140	200	234	36	56	700g
TDGF2	210	290	323	44	64	1200g
TDS5...	80	125	160	36	56	400g

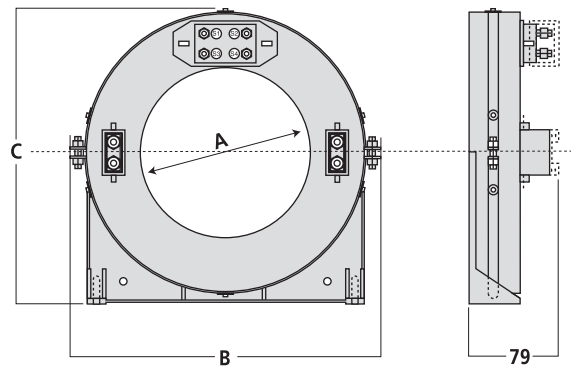
**Del A**

**TDAC2**



Weight 3,8kg

**TDAA2 / TDAB2**



Model	A	B	C	Weight
TDAA2	110	235	219	2,35Kg
TDAB2	150	275	259	2,5Kg