



Inženýrsko – výrobní elektrotechnický podnik, a.s.

619 00 Brno, Videnska 117

TEST PROTOCOL No.: 83 – 0101

CTS 12.S, CTS 25 supporting current measuring transformers



(signature)
Ing. Jaromir Mudra, CSc.

Brno, 24 July 1996

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	TEST PROTOCOL No. 83 – 0101 Test subject: Supporting current measuring transformers		Sheet: 2 Number of sheets: 6
Type: CTS 12.6 CTS 25	Test type: partial		
	Tested according to: CSN 35 1360 IEC Publ. 185/1987 Appendix 2 IEC 185-1995-08		
Rated values: Primary rated current 800 and 3200 A Secondary rated current 5A a 1A Highest system voltage 12; 25 kV Accuracy class 0.2; 0.5; 5P Overcurrent number < 5 Testing voltage 35/75 kV 55/125kV Rated frequency 50 Hz Isolation class E	Test customer: Czech Metrology Institute Okružní 31 638 00 Brno		
	Order number: Contract No. 13/Tr. 01/1996		
	Sample registration numbers: 150/96, 152/96		
	Atmospheric conditions: Temperature: - Pressure: - Humidity: -		
Product manufacturer: KPB INRA, s.r.o. Fucikova 860 685 01 Bucovice	Protocol contains: Text sheets: 5 Tables: Oscillograms: Diagrams: Drawings: Photographs:	Table of distribution: Customer 2x IVEP archive 1x IVEP RT 2x Testing st. 1x	
Samples delivered in: May 1996			
Test results: CTS 12.S and CTS 25 supporting current measuring transformers <p style="text-align: center;">comply</p> with repeated tests according to CSN 35 1360, IEC Publ. 185/1987 and appendix 2 IEC 185-1995-08.			
Test date: 2 July 1996	Tested by: (signature) Ing. Vlastimil Rada	Testing station chief: Ing. J. Mudra, CSc. (signature) (stamp)	

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After dynamical and rated heat current test at Bechovice short-circuit testing station on 2 supporting current measuring transformers type CTS 12.S – transfer 3,200//5/1 A, serial number 1200003 and CTS 25 – transfer 400-800//5/5 A (connected at 800A), serial number 2500002, producer KPB INTRA, s.r.o. Bucovice, performed on 27 June 1996, were according to CSN 35 1360 article 116h and IEC Publ. 185/1987 article 12 performed these repeated tests:

- 1 Accuracy test
- 2 AC voltage isolation tests
- 3 Thread isolation test
- 4 Partial discharge measuring

1 Accuracy test

Test was performed by Hartmann Braun AG bridge by compensation method, Keller system, type MEWK, serial number 6406857, test sheet No. LMP/451/93.

Further were used these other instruments:

Current measuring transformer – comparator, producer Tettex company, type 4764, serial No. 135233, test sheet No. CM 114/1/078/95

Current measuring transformer – producer Tettex company, type 4724, serial No. 113033, test sheet No. CM 114/1/128/95

Current load: producer Hartmann & Braun AG, type NBKa, serial No. 3154031, test sheet No. LMP/451/93

Current load: producer IVEP a.s. Brno, part of current load serial No. 3154031, test sheet No. 250 –tr/04/92

Accuracy measuring was performed according to CSN 351360, article 61, 71 and IEC 185 article 27, 37.

Measured fault values of current and angles before and after short-circuit test are stated in table 1 and 2.

CTS 12.S and CST 25 current measuring transformers comply with accuracy test according to CSN 35 1360 and IEC Publ. 185/1987 also after short-circuit test and fault measured values of current and angles did not exceed allowed values for corresponding accuracy classes 0.2; 0.5 and 5 P.

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Table No. 1 – CTS 12.S current measuring transformer, serial No. 1200003
Transfer 3,200//5/1 A, 60 VA – accuracy class 0.2
Transfer 3,200//5/1 A, 60 VA - accuracy class 5P

	I_N	5%	10%	20%	100%	120%	P_N [VA]
Winding 1S1-1S2	ε_I [%]	-0.02	+0.01	+0.03	+0.05	+0.07	15
	δ_I [°]	+8.0	+5.8	+4.0	+2.0	+1.1	
	ε_I [%]	-0.29	-0.21	-0.14	-0.05	-0.02	60
	δ_I [°]	+10.0	+6.5	+3.6	+2.0	0.0	
After short- circuit test	ε_I [%]	-0.03	-0.01	+0.02	+0.04	+0.06	15
	δ_I [°]	+8.9	+6.8	+4.0	+2.1	+1.9	
	ε_I [%]	-0.30	-0.23	-0.15	-0.05	-0.04	60
	δ_I [°]	+10.9	+7.0	+3.9	+1.9	+0.9	
Winding 2S1-2S2	ε_I [%]				+0.24		30
	δ_I [°]				+0.5		
	ε_I [%]				+0.18		60
	δ_I [°]				-0.5		
After short- circuit test	ε_I [%]				+0.22		30
	δ_I [°]				+2.0		
	ε_I [%]				+0.15		60
	δ_I [°]				0.0		

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Table No. 2 – CTS 25 current measuring transformer, serial No. 2500002
Transfer 400-800//5/5 A, 15 VA – accuracy class 0.5
Transfer 400-800//5/5 A, 15 VA – accuracy class 5P

	I_N	5%	10%	20%	100%	120%	P_N [VA]
Winding 1S1-1S2 800//5/5A	ε_I [%]	-0.03	-0.03	-0.04	-0.04	-0.05	3.75
	$\delta_{I[\text{°}]}$	+5.0	+4.5	+3.8	+1.9	+1.5	
	ε_I [%]	-0.22	-0.21	-0.18	-0.12	-0.10	15
	$\delta_{I[\text{°}]}$	+8.5	+7.1	+4.9	+0.8	0.0	
After short- circuit test	ε_I [%]	-0.04	-0.04	-0.04	-0.05	-0.06	3.75
	$\delta_{I[\text{°}]}$	+5.5	+5.0	+4.0	+2.1	+1.3	
	ε_I [%]	-0.20	-0.19	-0.17	-0.12	-0.11	15
	$\delta_{I[\text{°}]}$	+7.9	+6.1	+3.9	+1.1	+0.5	
Winding 2S1-2S2 800//5/5A	ε_I [%]				-0.09		7.5
	$\delta_{I[\text{°}]}$				+2.1		
	ε_I [%]				-0.10		15
	$\delta_{I[\text{°}]}$				+2.1		
After short- circuit test	ε_I [%]				+0.09		7.5
	$\delta_{I[\text{°}]}$				+2.1		
	ε_I [%]				-0.13		15
	$\delta_{I[\text{°}]}$				+2.1		

2 AC voltage isolation tests

a) Test of isolation between primary and secondary winding.

Test was performed according to CSN 35 1360 and IEC Publ. 185 by 31.5 kV AC test voltage for 1 minute (90% of test voltage) at CTS 12.S current measuring transformer and by 49.5 kV AC voltage for 1 minute (90% of test voltage) at CTS 25 current measuring transformer with satisfactory result.

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b) Secondary winding isolation test by AC voltage

Test was performed by testing source registration No. 00770 of 2.7 kV AC voltage for 1 minute (90% of test voltage) within secondary winding and between secondary windings and earthed parts. CTS 12.S and CTS 25 current measuring transformers comply with CSN 35 1360 article 116 and IEC Publ. 185 article 12c.

3 Thread isolation test

At CTS 12.S and CTS 25 measuring transformers was performed this test at 120% of rated current or more precisely $0.9 \times 4.5 \text{ kV}_{\text{max}}$ voltage (winding 2S1-2S2 of transformer 12.S) according to appendix 2 IEC 185-1995-08 by test method A.

Test voltage at open secondary winding was measured by peak voltmeter with SME 2 capacitor divider. CTS 12.S and CTS 25 current measuring transformers comply with requirements of CSN 35 1360 article 116h and IEC Publ. 185 article 12c.

4 Partial discharge measuring

Measuring was performed according to appendix 2 IEC 185-1995-08 for both types of system earthing.

After short-circuit tests at short-circuit test stations IVEP a.s. Brno and Bechovice were measured these values of partial discharges:

CTS 12.S – serial No. 1200003

$1.2 U_m - Q = 40 \text{ pC}$ satisfactory

$1.2 U_m/\sqrt{3} - Q = 0.5 \text{ pC}$ satisfactory

CTS 25 – serial No. 2500002

$1.2 U_m - Q = 1.5 \text{ pC}$ satisfactory

$1.2 U_m/\sqrt{3} - Q = 0.5 \text{ pC}$ satisfactory

CTS 12.S and CTS 25 current measuring transformers comply with requirements of CSN 35 1360 article 116h and IEC Publ. 185 article 12c.