

GB/T 4703—2007

Um 72.5kV

15Hz 100Hz

SAC/TC 222



电机试验台典型案例



WP4000 变频功率分析仪  
WP4000



DP800 数字功率计  
5~400Hz      0.2%

**ICS 29.180**  
**K 41**

**GB/T 4703 2007**  
**GB/T 4703 2001**

**Capacitor voltage transformers**

**IEC 60044-5 2004 Instrument transformers**  
**Part 5 Capacitor voltage transformers MOD**

**2007-12-03**  
**2008-05-01**

$\delta$

$\delta$

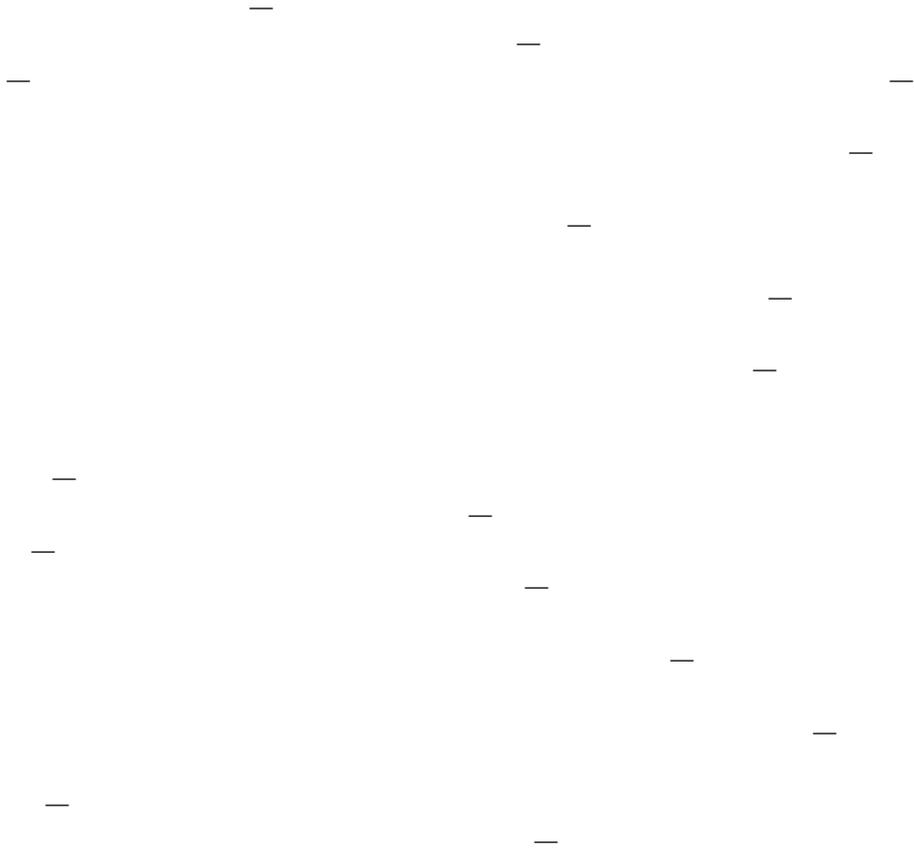






*U*

**2**



**3**

*f*

$U$

$U$

$K$

$\varepsilon$

电压误差  $\varepsilon_U = \frac{K_r U_s - U_p}{U_p} \times 100\%$

$K$ —

$U$ —

$U$ —

$U$

$\phi$

$\phi$   $\phi$   $\phi$   
 $\phi$

$\phi$

$\phi$

*U*

*F*

*U*

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*C*

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*C C C C C C*

*C*

*C*

*U*

*K*

*C*

*C C*

*K C C*

*δ*

*P*

*P*

*δ P P*

*T*

$$T_C = \frac{\frac{\Delta C}{\Delta T}}{C_{20^\circ\text{C}}}, \left(\frac{1}{K}\right)$$

*C—*

*T*



1

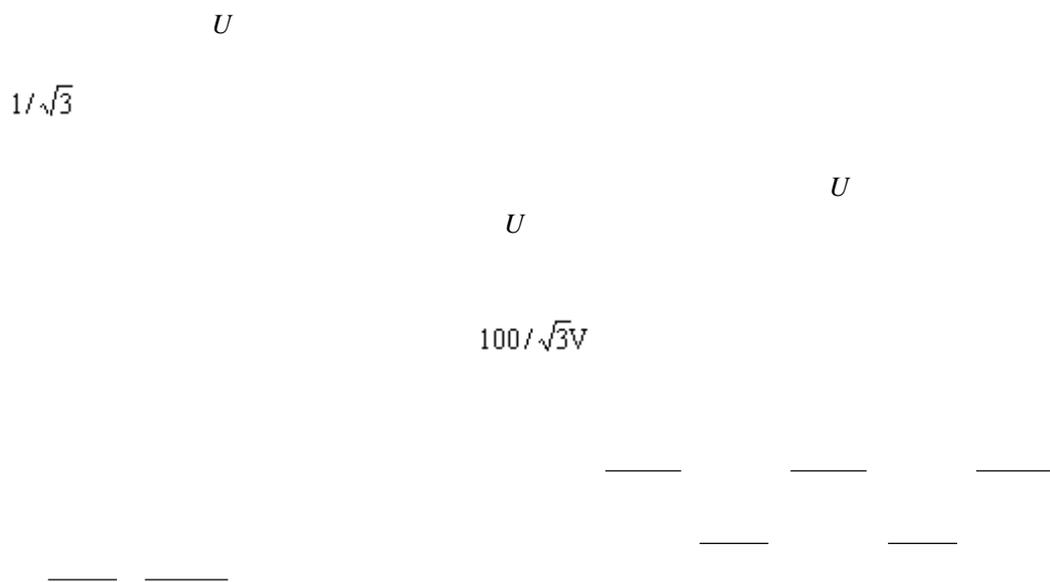

$k$

$$k = \frac{1}{1.1 - h \times 10^{-4}}$$

$h$ ---

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6



2

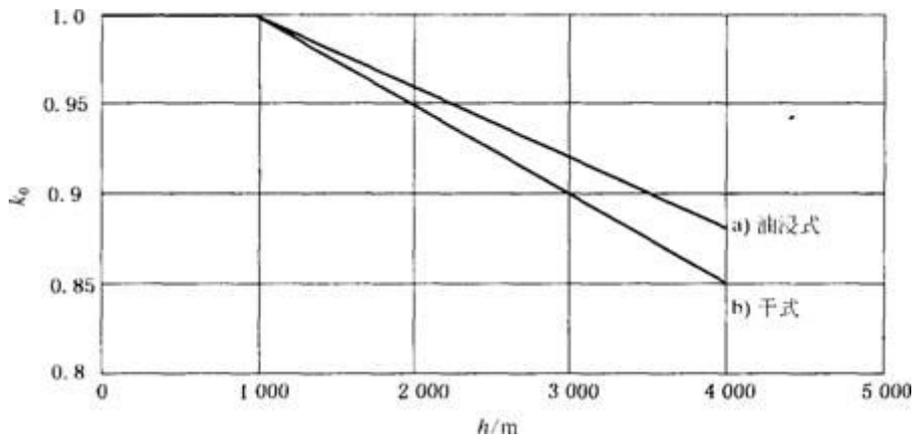
$F$		

$U$		$U \quad \sqrt{3} \quad U$

$T$

$T$

$T$



温升的海拔校正因数  $k_0 = \frac{\Delta T_h}{\Delta T_{h_0}}$

$T$   
 $\Delta T_{h_0}$

$h$

$h$

$T$

1

$T$

3

	$TK$
$T$	
$T$	

$T$	

7

$U$

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$U$

$U$

$U$

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$U$

$U$

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4

		$U$			
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					—
$U$					

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5

	$U$	
	$\frac{1.2U_m}{\sqrt{3}}$	
	$U$	
	$\frac{1.2U_m}{\sqrt{3}}$	



		爬电距离 闪络距离
$U$		

$F \times U$

$$\hat{\varepsilon}_F = \frac{\hat{U}_s - \frac{\sqrt{2}U_p}{K_r}}{\frac{\sqrt{2}U_p}{K_r}} = \frac{K_r \hat{U}_s - \sqrt{2}U_p}{\sqrt{2}U_p}$$

$\hat{\varepsilon}_F$  —

$\hat{U}_s$  —

$U$  —

$U$  —

$K$  —

$T$

$T$  ---

$T$

$\frac{\Lambda}{\epsilon F}$

**7a**

$U$	$T$	$T$	$\frac{\Lambda}{\epsilon F} \%$
$U$			

**7b**

$U$	$T$	$T$	$\frac{\Lambda}{\epsilon F} \%$
$U$			

$U$

$\mu$

$1.1U_m / \sqrt{3}$

**8**

$U$	$1.6 \times \frac{1.2U_m}{\sqrt{3}}$	$1.6 \times \frac{1.2U_m}{\sqrt{3}}$
--- $T$	$\times \pm \mu$	---
--- $T$	$\mu$	---
--- $T$	---	$\times \pm$
--- $T$	---	
$U$		

9

<i>U</i>	<i>F</i>		

8

*C*  $\delta$

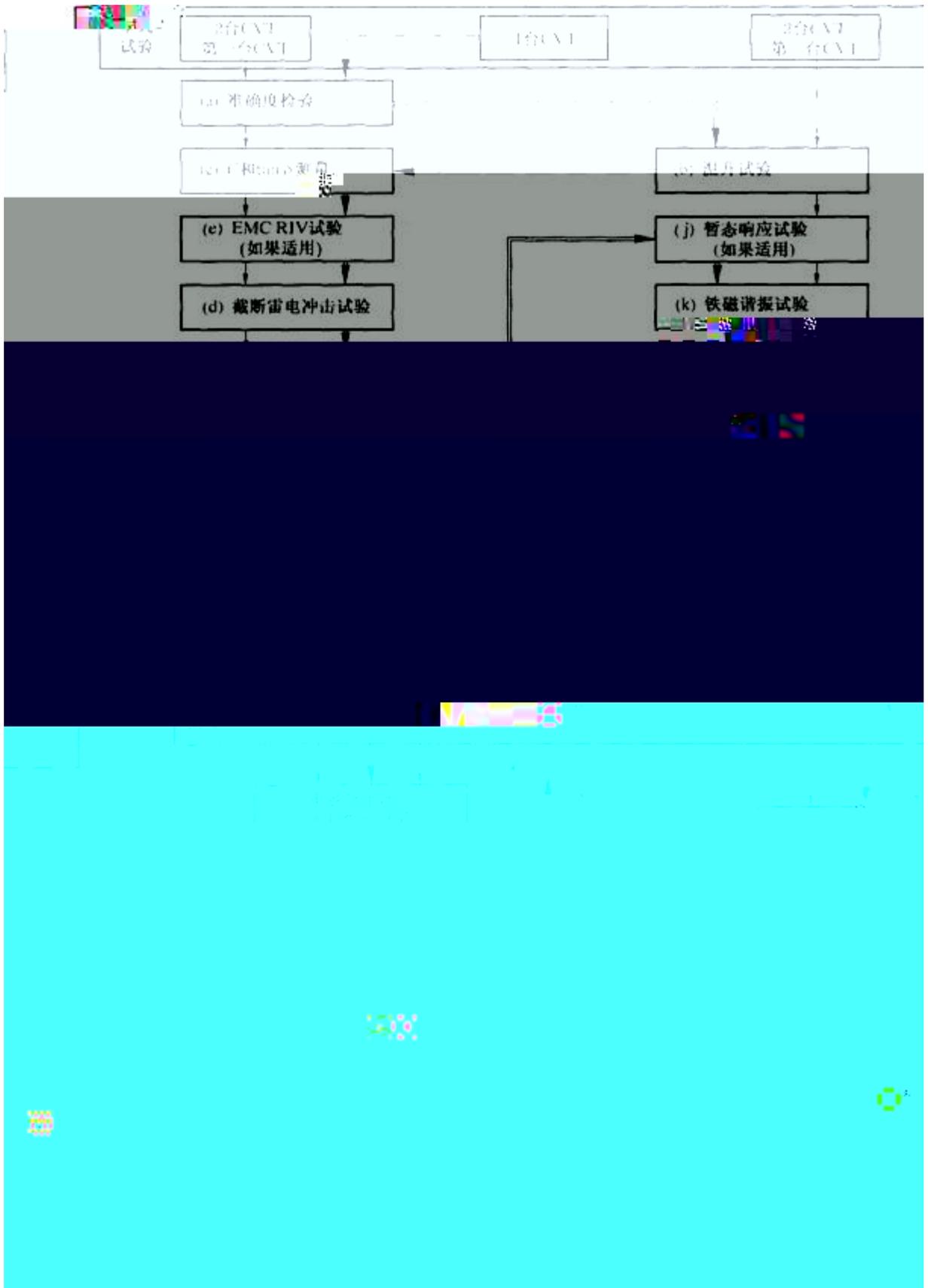
$\delta$

*U*

*U*

*C*

*δ*



2

2a

2b

$U$

$U$

10

	$F$		$F$		$F$		— —	
	$U_s = \frac{1.2U_{pr}}{K_r}$	$U \quad U$	$U_s = \frac{1.2U_{pr}}{K_r}$	$U \quad U$	$U_s = \frac{1.2U_{pr}}{K_r}$	$U \quad U$	$U_C = \frac{U_{pr}}{K_{CR}}$	$U \quad U$
	—	—	$U_s = \frac{F_V \cdot U_{pr}}{K_r}$	$U \quad F \cdot U$	$U_s = \frac{1.9U_{pr}}{K_r}$	$U \quad U$	—	—

$\delta$

$U$

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1]TJ /1919 ñ

54]TJ /1919 ñ

8D]2735 ñ

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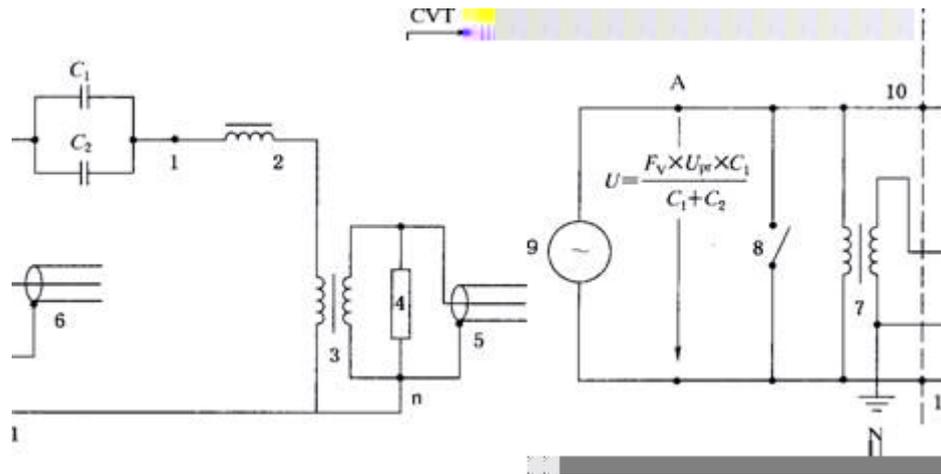
*C C*


$$U \quad U_P \cdot \frac{C_1}{C_1 + C_2}$$

$\pm \quad ^\circ$

$U$        $U$        $F$   
                   $U$        $U$

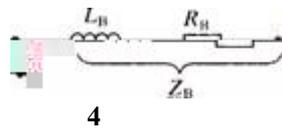
$U$



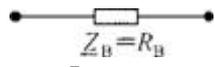
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Z

3



4



5

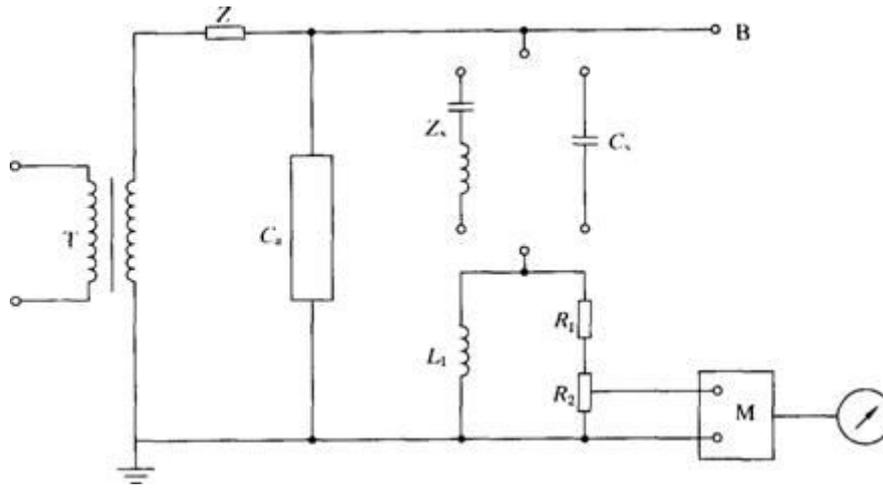
$$|Z_B| = \frac{U_{sr}^2}{S_r}$$

$R_B$	$\omega \cdot L_B$
$0.8  Z_B $	$0.6  Z_B $

S ---  
 U ---  
 |Z<sub>B</sub>| ---

R    ω · L





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 C ---  
 Z ---  
 ---  
 ---  
 Z R R  
 Z C L R R

6

10

$\delta$

C  $\delta$

C  $\delta$

C  $\delta$

U

C

$$1.05 \times \text{叠柱的试验电压} \times \frac{\text{单元的额定电压}}{\text{叠柱的额定电压}}$$

$$1.05 \times \text{完整的CVT的试验电压} \times \frac{\text{叠柱的额定电压}}{\text{完整的CVT的额定电压}}$$

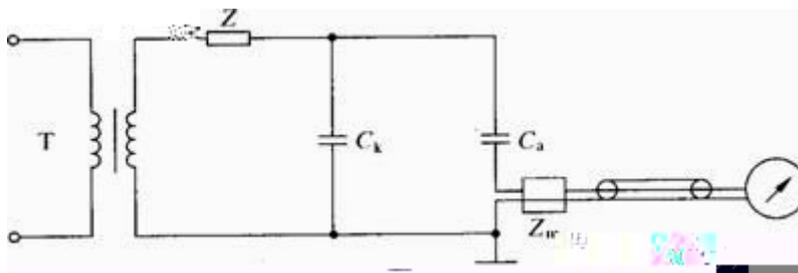
---  $U$   
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12

	—	×	—	
	—	×	—	
		×	×	

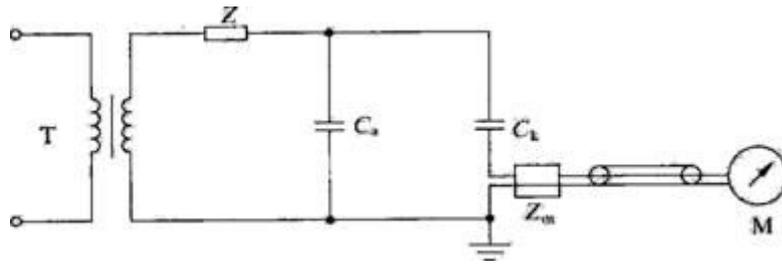
$C$   $\delta$

$q$



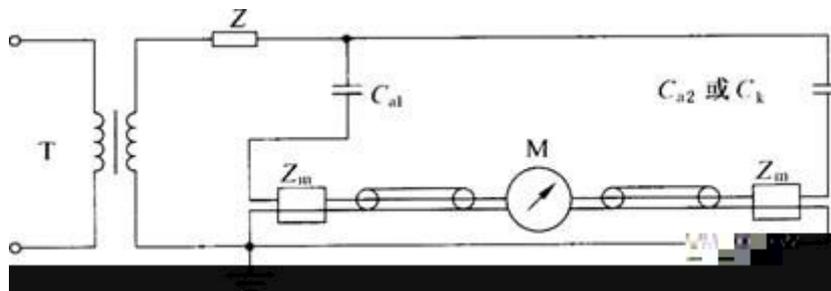
---  
 C---  
 C---  
 ---  
 Z---  
 Z---  
 C

7



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 C---  
 C---  
 ---  
 Z---  
 Z---

8

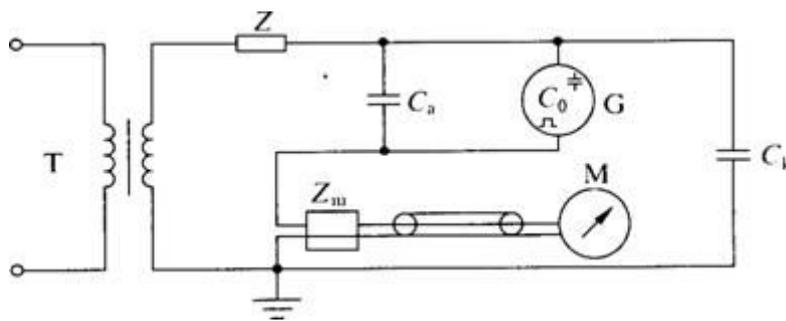


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 C---  
 C---  
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 Z---  
 Z---

C---

C C C C

9



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 C---  
 C---  
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 Z---  
 Z---  
 G---

C

10

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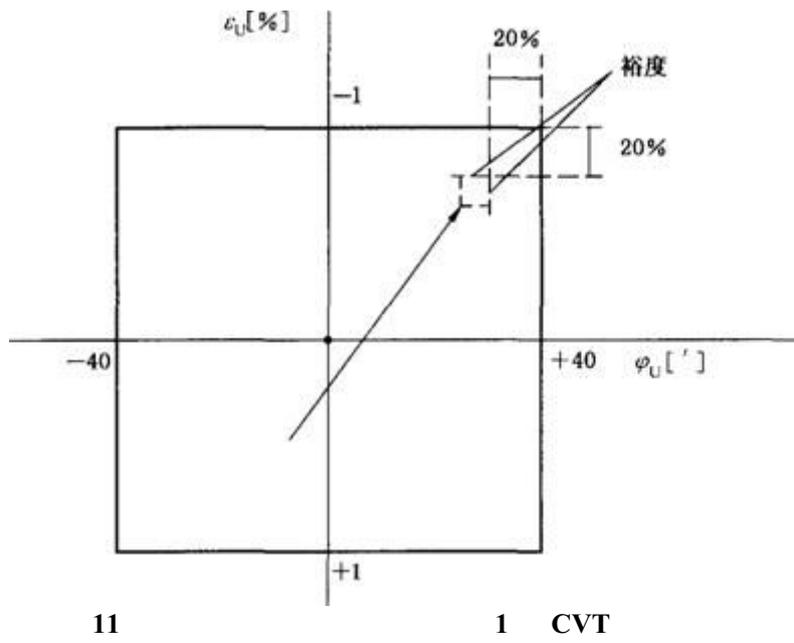
$$\text{CVT的工频试验电压} \times \frac{C_{1r}}{C_{1r} + C_{2r}} \times K \text{ (方均根值)}$$

$K$  --  
 $C$  --  
 $C$  --

$$\text{试验时间} = \frac{\text{两倍的额定频率}}{\text{试验频率}} \cdot 60\text{s}$$

$U$

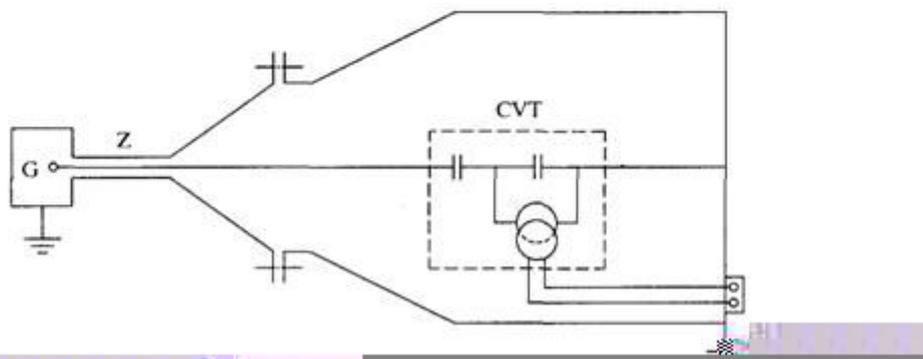
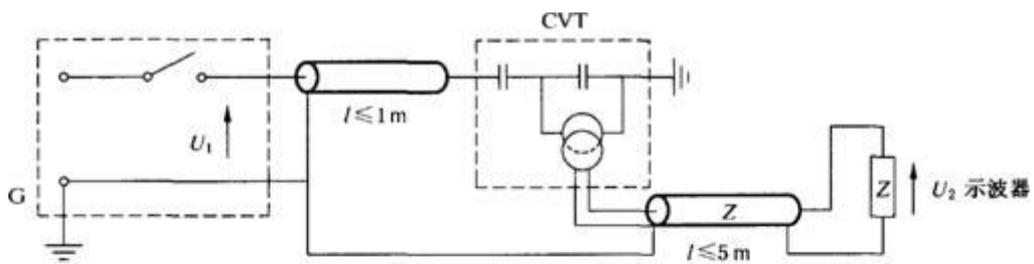


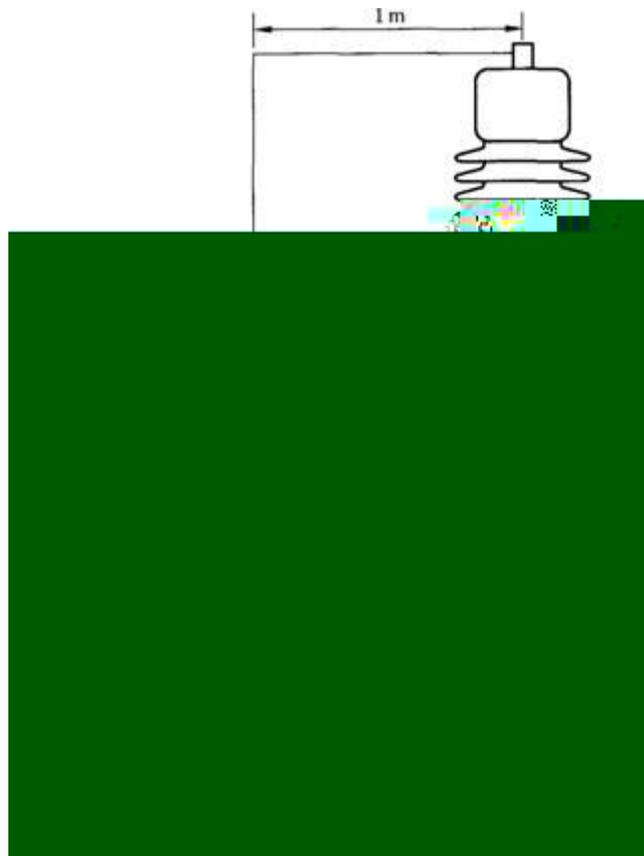


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11

$U$



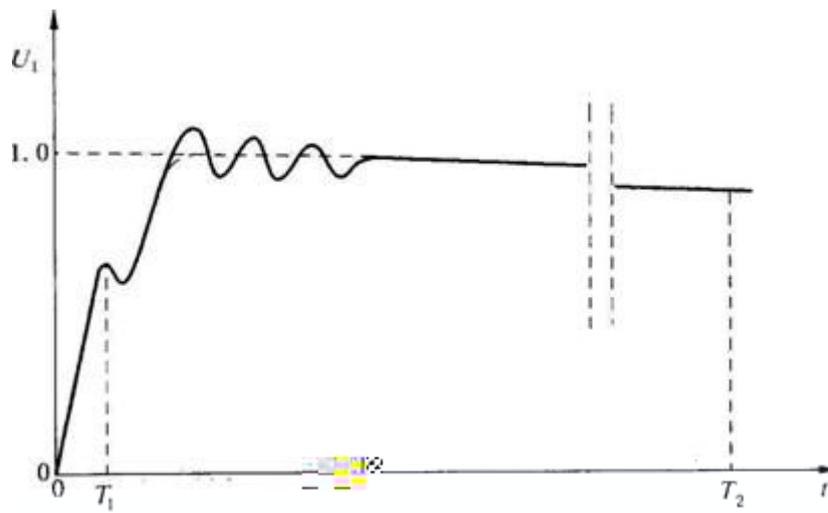
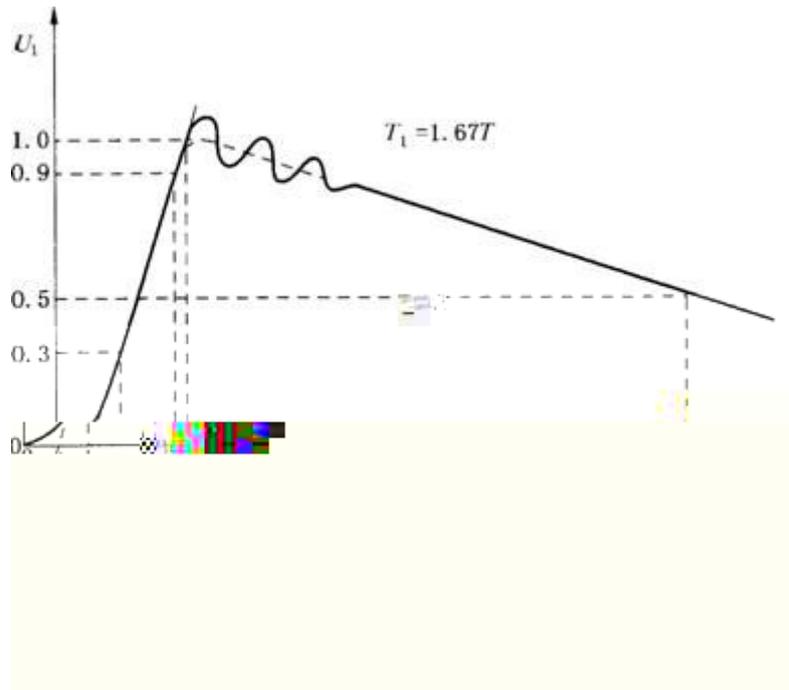


13

 $U$  $U$  $U$ 

$$U_s = \frac{U_2}{U_1} \times U_p$$

 $U$

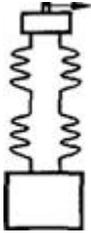
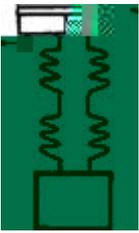
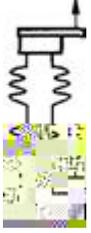
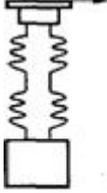
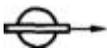
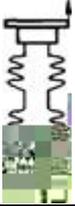
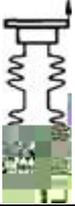


波形 B

$$U_s = \frac{U_2}{U_1} \times U_p \times \frac{C_2}{C_1 + C_2}$$

$U_1$  —

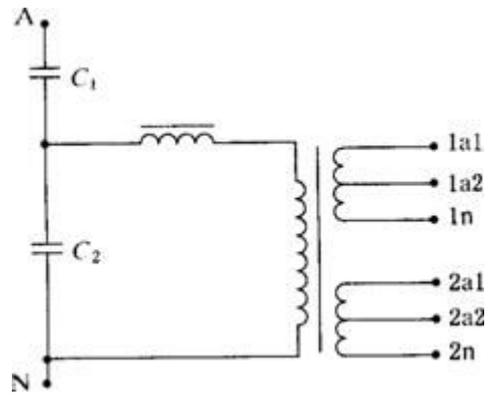
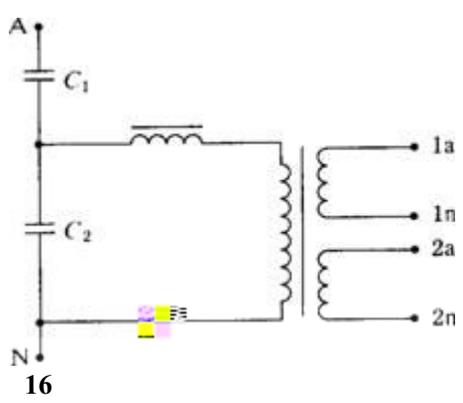
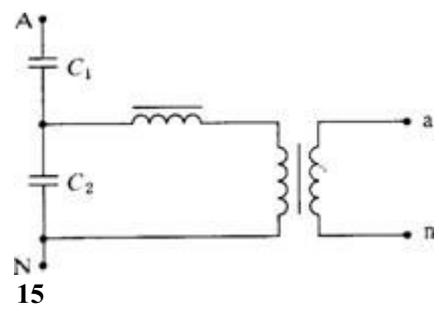
$U$

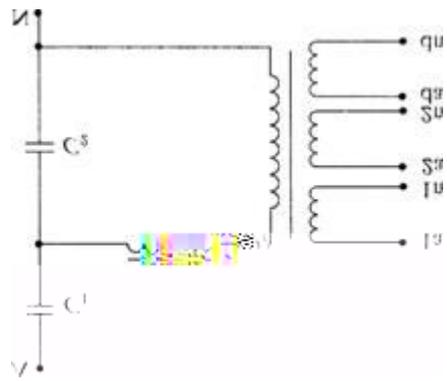
$C$   $T$   
 $C$   $C$   $\delta$

$C$   
 $U$

13



17

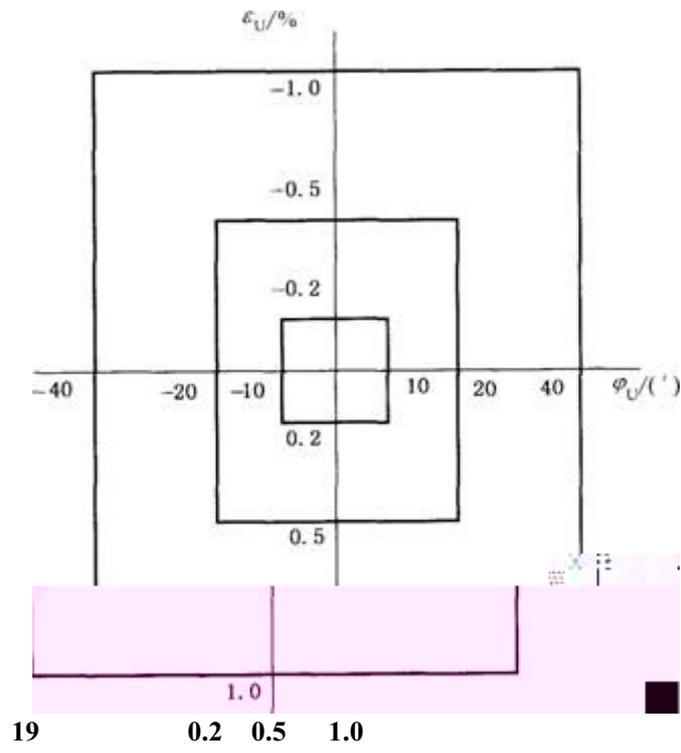


18

14

16

	$\varepsilon$	$\phi$	
		$\pm$	
	$\pm$		



15

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" " " "

17

	$\epsilon$				$\phi$							
	$\pm$				$\pm$							
				$X$				$X$				$X$
$X F \times$												

$T$

$U t$

—

*U t*

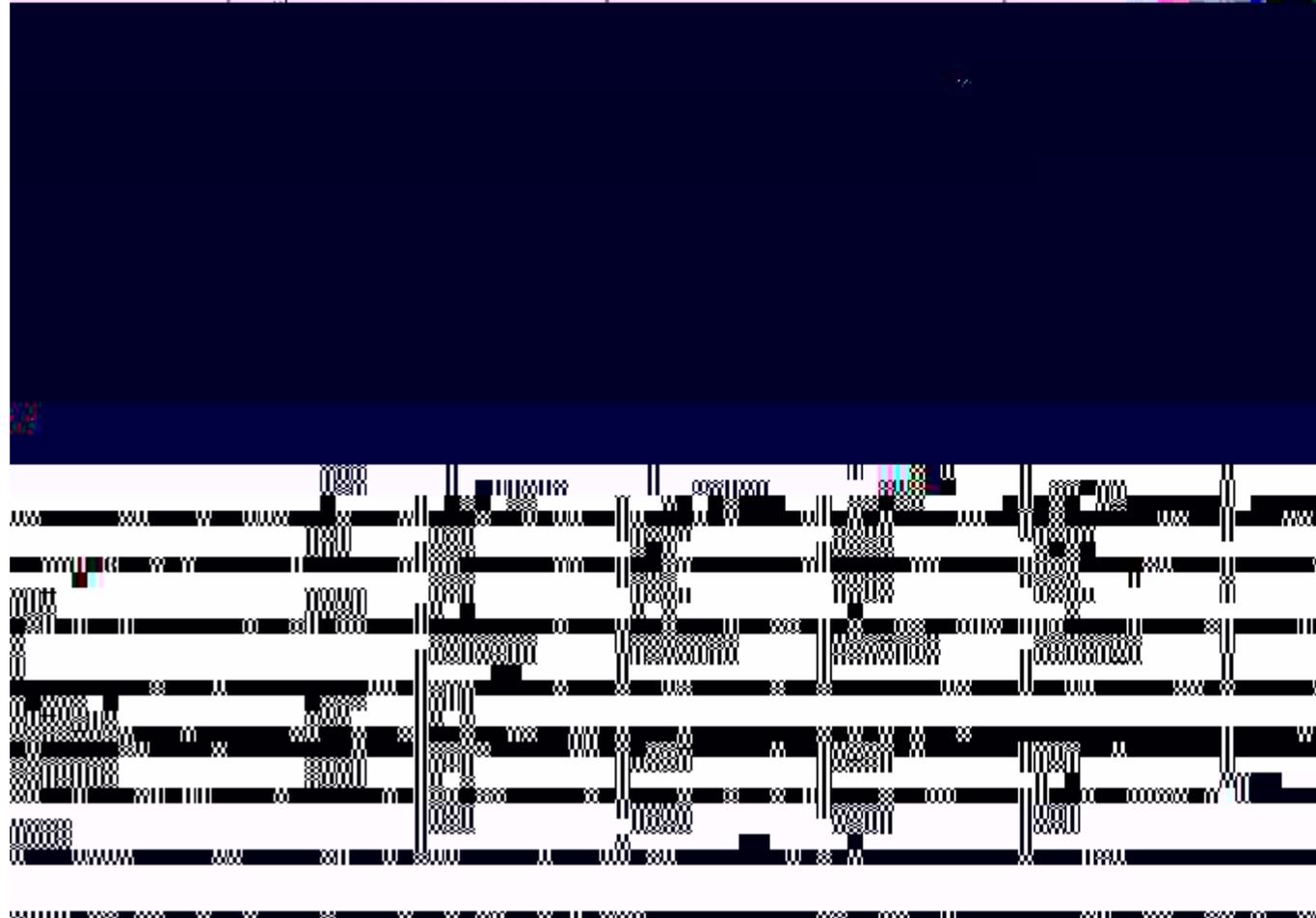




(1)

(2) **电容式电压互感器** 型号

序号	(5)	年份	(4)	质量
$U_m$	(6) kV	$f_r$	(8) Hz	绝缘水平
			(7) AC/SII	



$\mu$

$U$

$U$

$$U_{SP} \geq 10F_V(2\pi f_V)2C_V L_D U_m / \sqrt{3}$$

$L \text{ ---}$

$\mu$

$\mu$

$T$

$T$

$\mu$



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	$100/\sqrt{3}V_0$	
	" ....."	
	$\delta$	
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	" C C " " C " " C "	
	K	
	"	
	$\times \frac{C_1}{C_1 + C_2} \times K$	
	" $U_{PR} \times 3.3 \times \frac{C_1}{C_1 + C_2}$ "	
		" C C "

B.1

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" "

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$\wedge$   
 $\varepsilon F$  "  $T$  "  $\wedge$   
 $U_s$   
"  $T$  "

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"  $C$  " "  $C$  "

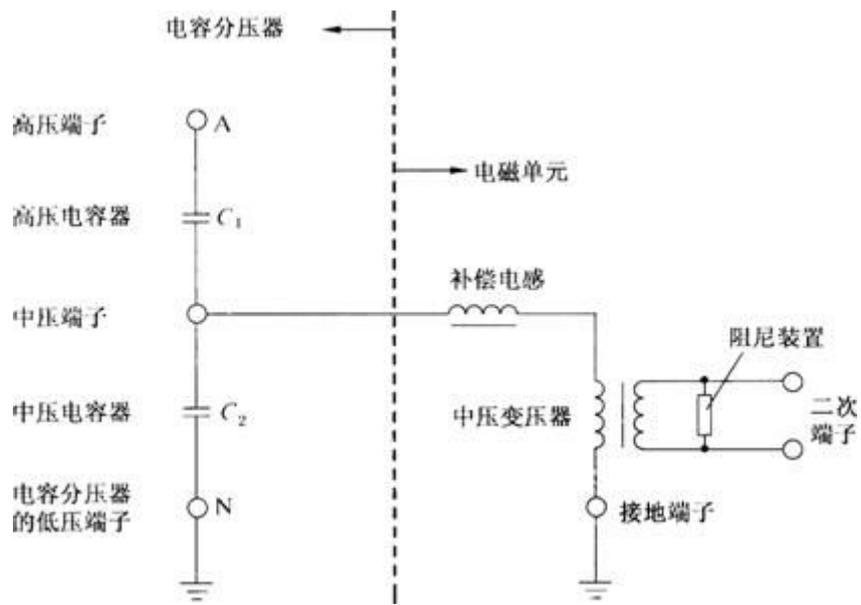
"  $C$   $C$  "

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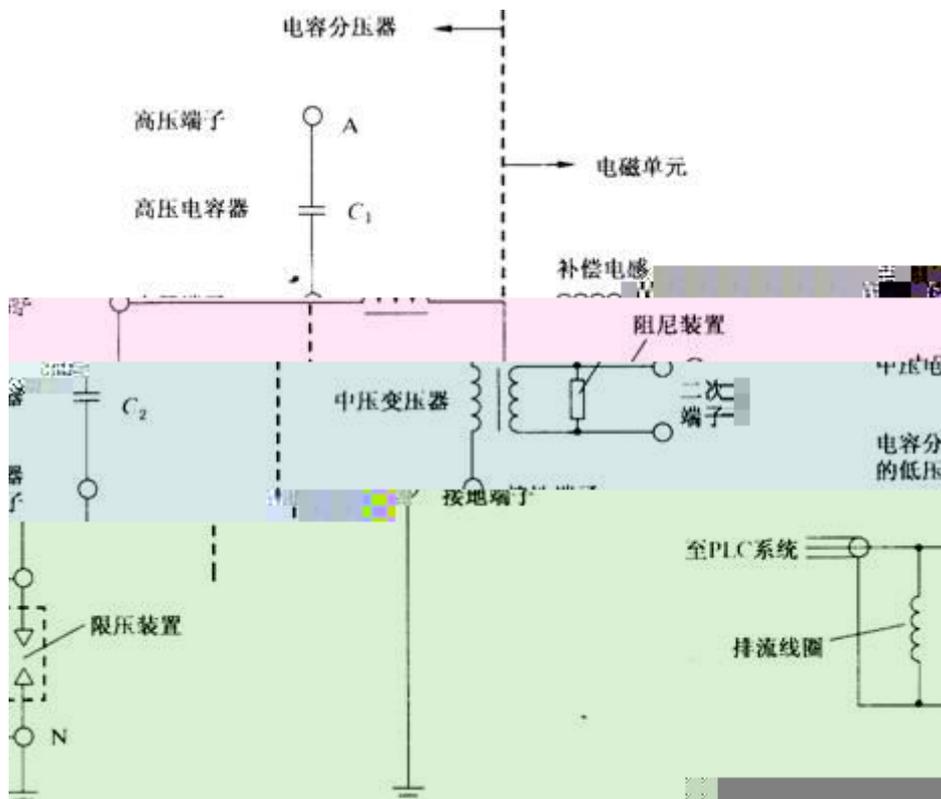
"

"  $K$  "

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	" "	



C.1

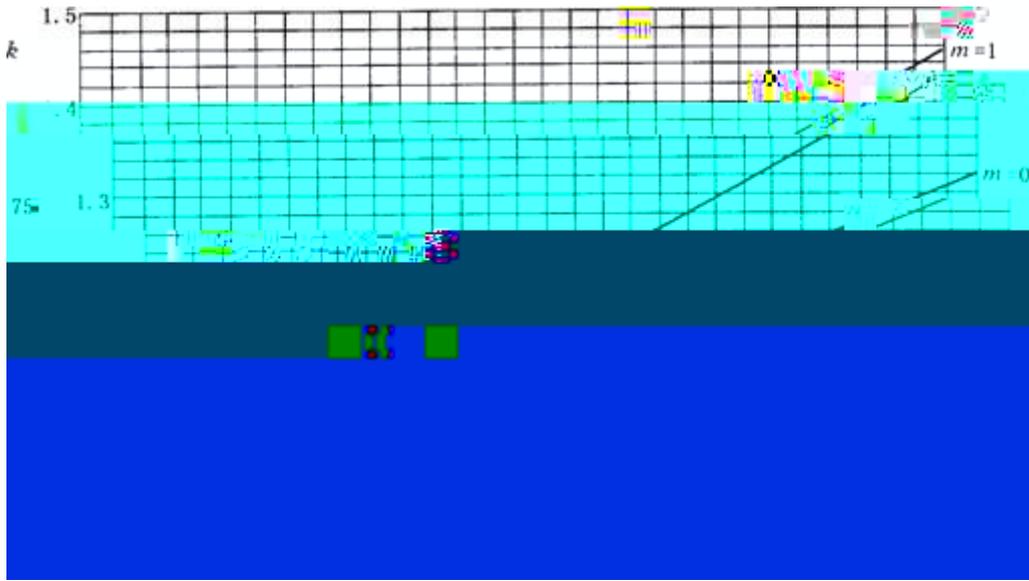


C.2

D

IEC 60044-5 2004

k



**D.1**

$$k e^{m h}$$

$h$  — —  
 $m$  — —  
 $m$  — —

**E**

范围	设备最高电压 $U_m$ (方均根值)/kV	额定操作冲击耐受电压		额定雷电冲击耐受电压		额定短时工频耐受电压 (方均根值)/kV
		(峰值)/kV	(峰值)/kV	(峰值)/kV	(峰值)/kV	
72.5				325		140
100				450		185
123				450		185
				550		

E.1

F

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—  
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G

" "

$$\frac{\sqrt{2} \cdot U_1}{C} \qquad C \qquad q_1 = C_1 \cdot \sqrt{2} \cdot U_1$$

$$U_{C_2}(t) = -q_1 / (C_1 + C_2) = -\sqrt{2} \cdot U_1 C_1 / (C_1 + C_2) \approx -\sqrt{2} \cdot U_1 (C_1 + C_2)$$