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Influence of Holzer sensors' angle difference on power measurement

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Abstract: Angle difference is an important part of transformer accuracy and one of the main factors influencing the power measurement accuracy. But in the power measurement of inverter motors, , inverters and voltage, current sensors, the
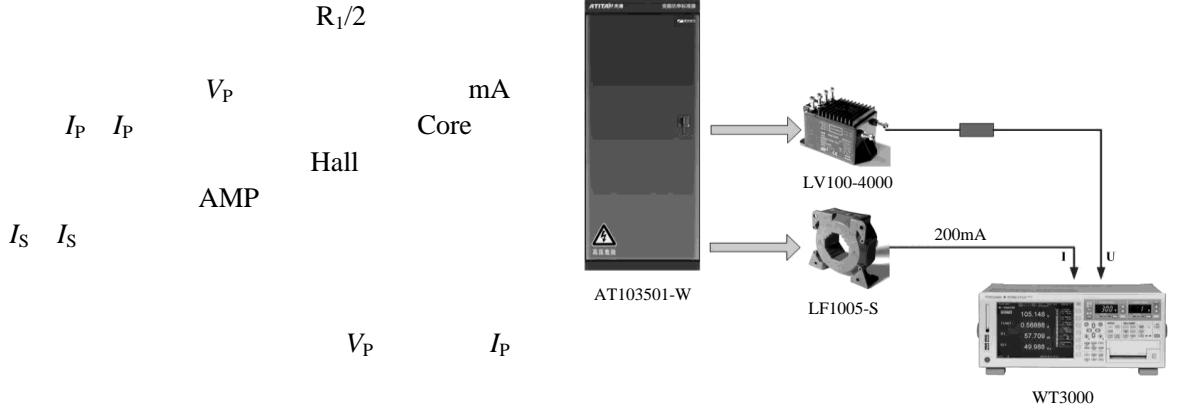
R₁/2

V_P mA

I_P I_P Core

Hall

AMP

I_S I_S

V_P I_P

K

$$I_S = KI_P \tag{1}$$

LV100-4000   50mA   210

10.5V   WT3000

15V R_M

0.05%   15ppm   LF1005-S

200mA   WT3000

200mA

AT103501-W

R_1

V_P ₁I_P 1

$$V_P \quad R_1 I_S/K \tag{2}$$

R_1 K $K_N = R_1/K$

$$V_P = K_N I_S \qquad 3$$

100V~10kV

2.5~500A   5~400Hz

0.05   −1~0

−0

− 1~ −1   −0

15kHz

WT3000   45~66Hz

0.04%   0.01%rd+0.03%fs   200mA

0.08%   0.03%rd+0.05%fs

1

0.1%   0.05%rd+0.05%fs   WT3000

AT103501-W   50Hz

0.2~1

1

LF1005-S

1000A   200mA   ±0.4%

150kHz   500A

1000A

1   50Hz

2

3

表 1 WT3000

2. LV100-4000

LV100-4000   LEM
[3]

V_{PN} 4000V

V_{PM} ±6000V

I_{SN} 50mA

K_N 4000V   50mA

R_M

X_G ±0.9%

$_L$ 0.1%

200uS

3.

AT103501-W   LEM

LV100-4000

LF1005-S   WT3000

2
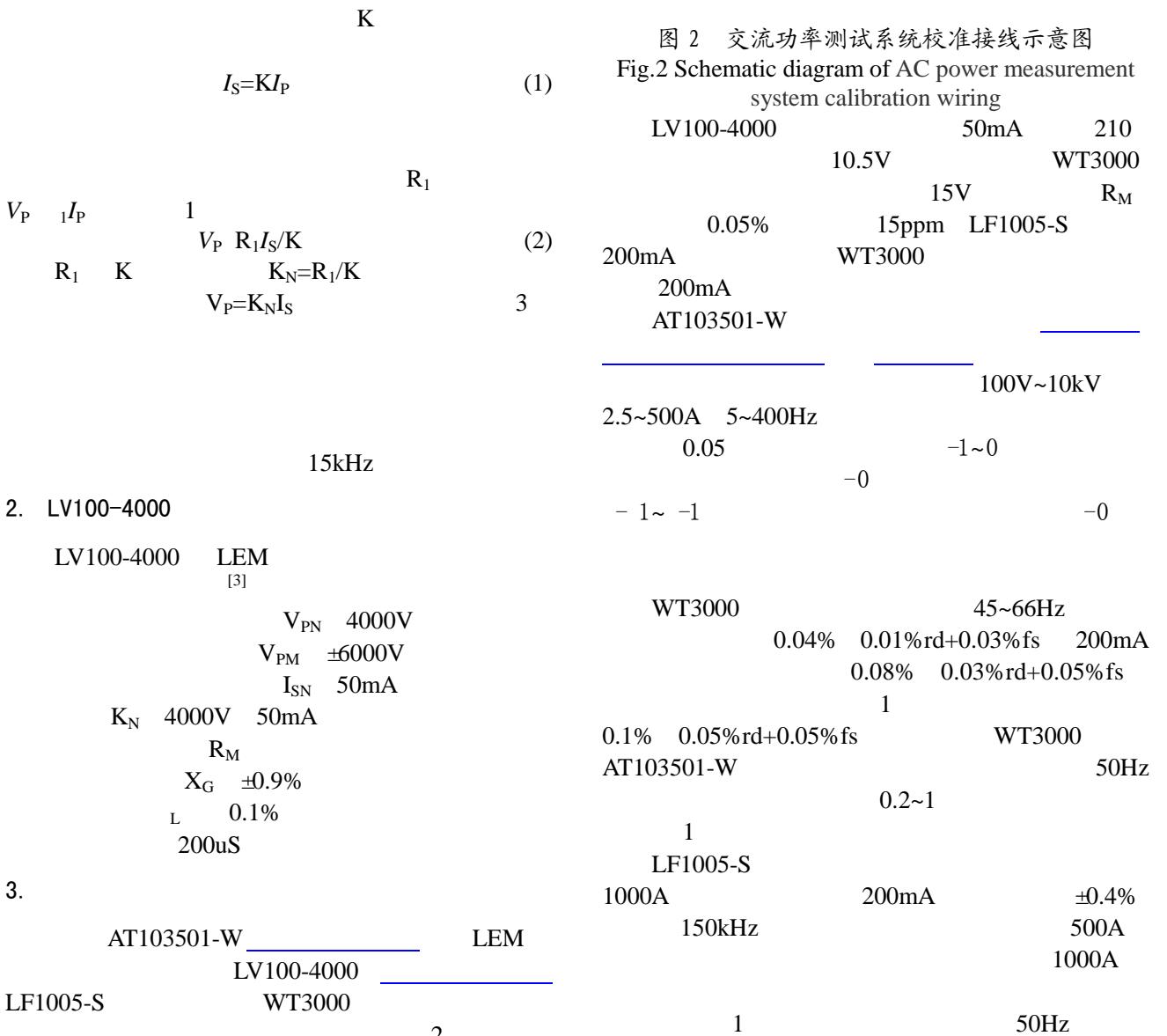
1000	30	1.000	30.000	29.987	-0.05
1000	30	0.501	15.014	15.008	-0.04
1000	30	0.201	6.017	6.012	-0.07

<div align="center">表 2 交流测试系统电压、电流数据记录

Tab.2 AC voltage, current data test system records</div>

U_0/V	I_0/A	U/V	E_U/%	I/A	E_I/%
4000	1000	4021	0.53	998.3	-0.17
2000	500	2011	0.55	498.9	-0.22
1000	250	1006	0.60	249.3	-0.28

<div align="center">表 3 交流测试系统功率数据记录

Tab.3 AC test power system data recording</div>

U_0/V	I_0/A	$cos\varphi$	P_0/kW	P/kW	E_P/%
4000	1000	1.000	4000.0	4012.6	0.31
4000	1000	0.500	2000.1	2063.1	3.15
4000	1000	0.200	800.12	864.63	8.06

0

U_0 I_0 P_0 $cos\varphi$
U I P E_P E_U E_I

WT3000 -0.07% LV100-4000

0.9% 0.05%

LF1005-S 0.4%

1.42%

1

0.5

$P=UI\cos\varphi$
P
U
I
φ

U I φ

WT3000 LV100-4000 R_M

0.2
WT3000
LV100-4000

,

9

50Hz

E   E   6

表 6 根据实际测量获得的角差估算值

Tab.6 According to the actual measured angle error estimates