

KNOPP PRECISION MULTIRANGE CURRENT TRANSFORMERS

TYPE P-5000 AND P-5000-4

DESCRIPTION AND INSTRUCTIONS

INTRODUCTION

This Type P-5000 transformer is primarily a laboratory standard. Its excellent accuracy and the Knopp One-to-One calibrating feature make it well-suited as a standard for precision calibrating work. This transformer makes possible very accurate determination of the ratio and phase angle characteristics of current instrument transformers having ratings from 5 to 5,000 amperes. This transformer also makes it possible to accurately extend the range of a 5 ampere ammeter or wattmeter to cover all current values up to 5,000 amperes.

Several versions of the P-5000 transformer exist. These versions are differentiated by affixing a suffix to the Type designation (e.g. P-5000-4). The differences among the versions generally lie in the number and value of the intermediate voltage ranges and the number of through-turns required to obtain a particular ratio. As an example, the P-5000-4 transformer only requires one through-turn to obtain most of its ranges but it includes fewer ranges than the Type P-5000 transformer. Except where otherwise noted in this document, the term "P-5000" refers to all versions of the Type P-5000 transformer.

PRIMARY RANGES

- P-5000: The P-5000 provides eight self-contained primary ranges from 5 to 100 amperes. These ranges are brought out to binding posts on the top of the transformer. A 240 turn secondary is provided for use with these primary taps; other secondary taps are provided for other ranges as described below. Ranges above 100 amperes are obtained by passing a primary conductor through the transformer window. Various primary ranges are obtainable by varying the number of through-turns and choosing from among the available secondary taps. Table 1 at the end of this document lists all of the ranges typically available on the P-5000. This information is also engraved on the transformer case.
- P-5000-4: The P-5000-4 provides ten self-contained primary ranges from 5 to 200 amperes. These ranges are brought out to binding posts on the top of the transformer. A 240 turn secondary is provided for use with these primary taps; other secondary taps are provided for other ranges as described below. Ranges above 200 amperes are obtained by passing a primary conductor through the transformer window. The

P-5000-4 requires only one through-turn to obtain all of its primary ranges. Table 2 at the end of this document lists all of the ranges typically available on the P-5000-4. This information is also engraved on the transformer case.

BURDEN AND ACCURACY

The Type P-5000 Transformer, like other Knopp Precision Multirange Transformers, has excellent ratio and phase angle characteristics with respect to both inter-range accuracy and overall accuracy. This is made possible through a properly engineered design and through exclusive, highly perfected compensating and winding methods.

The transformer is furnished compensated for the highest possible accuracy at the burden specified by the purchaser, but it may be used with excellent results with other burdens up to 25 volt-amperes. When used with the burden for which compensated, the ratio of this transformer standard is well within .02% and the phase angle is well within 2 minutes on all ranges.

CALIBRATION

The transformer is an absolute standard as it can be calibrated against itself without a standard of comparison by means of the Knopp One-to-One method (see below).

A Report of Calibration, traceable to the National Institute of Standards and Technology (NIST) is included with the transformer.

We recommend that the accuracy of the transformer be checked by a certified laboratory every three (3) to five (5) years. Additionally, the One-to-One accuracy of the transformer can be checked when desired by comparing the 5 ampere primary tap to the 5 ampere (240 turn) secondary. Any reliable error-measuring instrument can be used for this purpose. One-to-One data was included with this transformer when it was shipped.

SECONDARY SHORTING LINK

The transformer is protected against magnetization by a shorting link on the secondary. This link should be shorted (closed) at all times except when instruments are connected to the secondary terminals.

RATING AND INSULATION

All windings are rated at 100% continuous current. Current up to 200% can be applied on a 25% duty-cycle basis in which the "ON" period does not exceed 30 minutes.

The transformer housing insulates the inserted primary from the secondary and primary windings for up to 2500 volts. The wound primary is for use on circuits not exceeding 250 volts.

WEIGHT AND DIMENSIONS

The net weight of the Type P-5000 is approximately 32.5 pounds (14.7 kg) and the shipping weight is approximately 50 pounds (22.7 kg).

The approximate overall dimensions of the Type P-5000 are: 11.5 in. (29.2 cm) wide, 4.5 in. (11.4 cm) deep, and 13.875 in. (35.2 cm) high.

The Type P-5000-4 transformer is slightly larger than the standard P-5000. Weight and dimensions for the P-5000-4 are available upon request.

CONNECTION AND USE

Test leads should be sized so as to minimize burden throughout the test circuit. The overall burden placed on the transformer-under-test (TUT) and the precision transformer is a combination of the burden imposed by the measuring instrument and the burden imposed by the leads. Knopp recommends #8 AWG wire not exceeding a total length of 25 ft. (7.62 m) for use in the secondary of the Type P-5000 transformer.

IMPORTANT NOTE: Test current should be applied, and removed, gradually by use of a variac or other variable current source.

WARRANTY

The Knopp Type P-5000 Precision Current Transformer is warranted against defective materials and workmanship for a period of ONE YEAR from the date of purchase.

If the P-5000 does not perform in accordance with operating specifications during the warranty period, necessary parts and assistance will be supplied under warranty to restore the equipment to service.

Normal service is accomplished through telephone consultation with the Knopp Engineering Department.

Parts are shipped by overnight carrier.

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Attachments:

Table No. 1 (P-5000)

Table No. 2 (P-5000-4)

Report of Calibration and One-to-One Data

August 2002

TABLE 1
Primary Ranges
Type P-5000 Precision Current Transformer

Primary Amperes	Primary Turns	Secondary Turns	Ampere Turns
5 ¹	240	240	1200
10 ¹	120	240	1200
15 ¹	80	240	1200
20 ¹	60	240	1200
25 ¹	48	240	1200
50 ¹	24	240	1200
75 ¹	16	240	1200
100 ¹	12	240	1200
125	12	300	1500
150	8	240	1200
200	6	240	1200
240	5	240	1200
250	6	300	1500
300	4	240	1200
375	4	300	1500
400	3	240	1200
500	3	300	1500
600	2	240	1200
625	4	500	2500
750	2	300	1500
800 ²	5	800	4000
1000 ³	2	400	2000
1200	1	240	1200
1250	2	500	2500
1500	1	300	1500
2000	1	400	2000
2500	1	500	2500
3000	1	600	3000
4000	1	800	4000
5000	1	1000	5000
Other Ranges	See Below		

Note(s)

- 1 These ranges are self-contained ranges and do not require that primary turns be passed through the transformer. The values shown for "Primary Turns" reflect the turns which are

built into the transformer. These ranges are accessed through the built-in primary taps on the top of the transformer.

- 2 This range can also be obtained using only two primary turns by connecting a jumper between the 300 turn secondary terminal and the 20 ampere primary terminal. Use the \pm secondary and 15 ampere primary terminals as the secondary of the transformer.
- 3 This range can also be obtained using only one primary turn by connecting a jumper between the 240 turn secondary terminal and the 10 ampere primary terminal. Use the \pm secondary and 15 ampere primary terminals as the secondary of the transformer.

A 1600 ampere range can be obtained using only one primary turn by connecting a jumper between the 300 turn secondary terminal and the 20 ampere primary terminal. Use the \pm secondary and 15 ampere primary terminals as the secondary of the transformer.

A 2400 ampere range can be obtained using only one primary turn by connecting a jumper between the 400 turn secondary terminal and the \pm primary terminal. Use the \pm secondary and 15 ampere primary terminals as the secondary of the transformer.

A 3200 ampere range can be obtained using only one primary turn by connecting a jumper between the 600 turn secondary terminal and the 15 ampere primary terminal. Use the \pm secondary and 10 ampere primary terminals as the secondary of the transformer.

TABLE 2
Primary Ranges
Type P-5000-4 Precision Current Transformer

Primary Amperes	Primary Turns	Secondary Turns	Ampere Turns
5 ¹	240	240	1200
10 ¹	120	240	1200
15 ¹	80	240	1200
20 ¹	60	240	1200
25 ¹	48	240	1200
50 ¹	24	240	1200
75 ¹	16	240	1200
100 ¹	12	240	1200
150 ¹	8	240	1200
200 ¹	6	240	1200
400	1	80	400
500	1	100	500
600	1	120	600
750	1	150	750
800	1	160	800
1000	1	200	1000
1200	1	240	1200
1500	1	300	1500
2000	1	400	2000
2500	1	500	2500
3000	1	600	3000
4000	1	800	4000
5000	1	1000	5000

Note(s)

- 1 These ranges are self-contained ranges and do not require that primary turns be passed through the transformer. The values shown for "Primary Turns" reflect the turns which are built into the transformer. These ranges are accessed through the built-in primary taps on the top of the transformer.