Current Transformers

Types IK5, IM, IH
Current Transformers

Introduction

Trench is a recognized world leader in the design and manufacture of high voltage equipment for application on electric utility and high energy industrial systems. As part of Trench’s product scope, the Company produces a diversified range of Instrument Transformers which are installed on 69 - 800kV electrical systems. Instrument Transformers include: Voltage (Potential) Transformers (both inductive and capacitive type), Current Transformers and Combined Instrument Transformers (voltage and current transformer in one unit).

Current Transformers must convert high transmission line currents (up to 5000 A) to standardized low and easily measurable values, which will be used for metering, protection and control of the high voltage system. As such, the need for accurate and reliable current transformation is essential.

This brochure will detail the features and characteristics of Types IK5, IM and IH Current Transformers. Please refer to Trench brochure E210 for additional general information concerning high voltage Instrument Transformers.

Fig. 1
Type IH-650, high accuracy current transformer
Features

- meet all ANSI and IEC metering and protection class accuracies (other standards on request)
- rated primary currents up to 3000 A
- applications from 25 kV to 230 kV
- Trench Management System has been certified to ISO 9001, ISO 14001 and OHSAS 18001
- Hi-ACC™, 0.15% accuracy units available
- highly refined and processed oil/paper insulation system
- head type design of low weight and minimum oil volume
- excellent seismic performance as a consequence of optimized design of flanges, porcelain and their interconnection
- excellent control of internal and external insulation stresses
- hermetically sealed construction using nitrile rubber gaskets
- uniformly distributed secondary windings guarantee accurate transformation at both rated and high currents
- essentially unaffected by stray external magnetic fields
- stable accuracy over a long period of time
- corrosion resistant aluminum head polyester powder coated

Fig. 2 Sectioned view of a typical IK5 current Transformer
Trench type IK5, IM and IH Current Transformers are defined as "head type" Current Transformers. These CT’s are designed and constructed with the well proven, highly reliable, oil/paper insulation system. Each porcelain housed, hermetically sealed Current Transformer is equipped with an aluminum head housing which also serves as the expansion chamber, compensating for oil volume changes by means of a dry nitrogen cushion above the oil. All Current Transformers feature a single core with dual ratio, tapped secondary winding.

The Current Transformer type designations are defined as follows:

- **IK5**: 0.3% accuracy, BO.1-1.8, standard short time current rating
- **IM**: 0.3% accuracy, BO.1-1.8, up to 5 times higher short time current rating on selected models
- **IH**: 0.15% accuracy, BO.1-1.8, standard short time current rating

For ratio arrangements, individual customer requirements may specify:

- single ratio
- dual ratio by secondary tap (suffix S)
- dual ratio by series-parallel of primary (suffix P)
- multi-ratio by secondary tap (suffix M)

**Standard Equipment**

- aluminum flat pad primary terminal and ground terminal
- lifting holes on base
- magnetic oil level gauge
- oil filling plug with nitrogen filling valve
- oil drain valve
- secondary terminal box with 3-1.5" (38mm) knockouts
- primary bypass protector
- slide link to visibly short full winding
Catalog Numbering System

Catalog numbers are composed of two parts as shown in the example on the right.

- The TYPE contains the transformer SERIES designation and the BIL (kV) rating. In this example, IK5-650.
- The SUFFIX is listed in two parts PRIMARY AMPERES and RATIO ARRANGEMENTS. In this example, 202S.

Current Transformer Selection

<table>
<thead>
<tr>
<th>Series</th>
<th>BIL Catalog Number (kV) Type + Suffix (No.1 + No.2)</th>
<th>Primary Nominal Amperes</th>
<th>Ratio Arrangements (Suffix No.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No. 1</td>
<td>S Blank M P</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Dual Ratio) (Single Ratio) (Multi Ratio) (Dual Ratio)</td>
</tr>
<tr>
<td>IK5</td>
<td>150 IK5-150- (No.1) (No.2)</td>
<td>50 500</td>
<td>25/50:5 50:5 -</td>
</tr>
<tr>
<td></td>
<td>200 IK5-200- (No.1) (No.2)</td>
<td>100 101</td>
<td>50/100:5 100:5 -</td>
</tr>
<tr>
<td></td>
<td>250 IK5-250- (No.1) (No.2)</td>
<td>150 151</td>
<td>75/150:5 150:5 -</td>
</tr>
<tr>
<td></td>
<td>350 IK5-350- (No.1) (No.2)</td>
<td>200 201</td>
<td>100/200:5 200:5 -</td>
</tr>
<tr>
<td></td>
<td>550 IK5-550- (No.1) (No.2)</td>
<td>300 301</td>
<td>150/300:5 300:5 -</td>
</tr>
<tr>
<td></td>
<td>650 IK5-650- (No.1) (No.2)</td>
<td>400 401</td>
<td>200/400:5 400:5 -</td>
</tr>
<tr>
<td></td>
<td>750 IK5-750- (No.1) (No.2)</td>
<td>600 601</td>
<td>300/600:5 600:5 600:5MR -</td>
</tr>
<tr>
<td></td>
<td>900 IK5-900- (No.1) (No.2)</td>
<td>800 801</td>
<td>400/800:5 800:5 -</td>
</tr>
<tr>
<td></td>
<td>1050 IK5-1050- (No.1) (No.2)</td>
<td>1000 1002</td>
<td>500/1000:5 1000:5 -</td>
</tr>
<tr>
<td>IM</td>
<td>350 IM-350- (No.1) (No.2)</td>
<td>200 201</td>
<td>100/200:5 200:5 -</td>
</tr>
<tr>
<td></td>
<td>550 IM-550- (No.1) (No.2)</td>
<td>300 301</td>
<td>150/300:5 300:5 -</td>
</tr>
<tr>
<td></td>
<td>650 IM-650- (No.1) (No.2)</td>
<td>400 401</td>
<td>200/400:5 400:5 -</td>
</tr>
<tr>
<td></td>
<td>750 IM-750- (No.1) (No.2)</td>
<td>600 601</td>
<td>300/600:5 600:5 600:5MR -</td>
</tr>
<tr>
<td></td>
<td>900 IM-900- (No.1) (No.2)</td>
<td>800 801</td>
<td>400/800:5 800:5 -</td>
</tr>
<tr>
<td></td>
<td>1050 IM-1050- (No.1) (No.2)</td>
<td>1000 1002</td>
<td>500/1000:5 1000:5 -</td>
</tr>
<tr>
<td>IH</td>
<td>150 IH-150- (No.1) (No.2)</td>
<td>200 201</td>
<td>100/200:5 200:5 -</td>
</tr>
<tr>
<td></td>
<td>200 IH-200- (No.1) (No.2)</td>
<td>300 301</td>
<td>150/300:5 300:5 -</td>
</tr>
<tr>
<td></td>
<td>250 IH-250- (No.1) (No.2)</td>
<td>400 401</td>
<td>200/400:5 400:5 -</td>
</tr>
<tr>
<td></td>
<td>350 IH-350- (No.1) (No.2)</td>
<td>600 601</td>
<td>300/600:5 600:5 600:5MR -</td>
</tr>
<tr>
<td></td>
<td>550 IH-550- (No.1) (No.2)</td>
<td>800 801</td>
<td>400/800:5 800:5 -</td>
</tr>
<tr>
<td></td>
<td>650 IH-650- (No.1) (No.2)</td>
<td>1000 1002</td>
<td>500/1000:5 1000:5 -</td>
</tr>
<tr>
<td></td>
<td>750 IH-750- (No.1) (No.2)</td>
<td>1200 122</td>
<td>600/1200:5 1200:5 1200:5MR -</td>
</tr>
<tr>
<td></td>
<td>900 IH-900- (No.1) (No.2)</td>
<td>1500 152</td>
<td>750/1500:5 1500:5 -</td>
</tr>
<tr>
<td></td>
<td>1050 IH-1050- (No.1) (No.2)</td>
<td>1600 162</td>
<td>800/1600:5 1600:5 -</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2000 202</td>
<td>1000/2000:5 2000:5 -</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3000 302</td>
<td>1500/3000:5 3000:5 -</td>
</tr>
</tbody>
</table>

Notes: Other ratios available, please consult factory. For multiple secondary windings, please consult factory.
### Accuracy Selection

<table>
<thead>
<tr>
<th>Series</th>
<th>% of Nameplate Rating</th>
<th>Optional Burden Rating</th>
<th>Relay Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>IK5</td>
<td>0.3%</td>
<td>Not specified</td>
<td>BO.1-1.8</td>
</tr>
<tr>
<td>IM</td>
<td>0.3%</td>
<td>by ANSI</td>
<td>BO.1-1.8</td>
</tr>
<tr>
<td>IH</td>
<td>0.15%</td>
<td>0.15%</td>
<td>BO.1-1.8</td>
</tr>
</tbody>
</table>

1 For additional information on HI-ACC TM transformers consult factory.
2 The 0.15% parallelogram is constructed using the same principles as the 0.3% parallelogram in accordance with ANSI Standard C57.13, except the maximum phase angle and ratio correction factors of the 0.15% parallelogram are half those of the 0.3% parallelogram.
3 Rating is based on highest ratio. Higher relay ratings are available.
4 Available on some ratios listed below (consult factory for details).

### Electrical Characteristics

<table>
<thead>
<tr>
<th>Series</th>
<th>BIL (kV)</th>
<th>Applied Creepage Strike Distance (kV)</th>
<th>Creepage Strike Distance in/mm</th>
<th>Ratio</th>
<th>Thermal Rating Factor at 30°C</th>
<th>Current Rating (kA RMS Max.)</th>
<th>Short-Time Thermal Current Rating (1 sec.) kA RMS</th>
</tr>
</thead>
</table>

For units rated C400 or C800 relay class rating consult factory.

Note: Consult factory for ratios not listed.
### Dimensional Table

<table>
<thead>
<tr>
<th>Type</th>
<th>BIL (kV)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>in (mm)²</th>
<th>lb (kg)²</th>
<th>gal (l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IK5-150 150</td>
<td>50.26</td>
<td>39.19</td>
<td>13.40</td>
<td>10.50</td>
<td>14.00</td>
<td>13.94</td>
<td>17.00</td>
<td>17.00</td>
<td>23.75</td>
<td>17.25</td>
<td>4.50</td>
<td>34</td>
<td>295</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>IK5-200 200</td>
<td>50.26</td>
<td>39.19</td>
<td>13.40</td>
<td>10.50</td>
<td>14.00</td>
<td>13.94</td>
<td>17.00</td>
<td>17.00</td>
<td>23.75</td>
<td>17.25</td>
<td>4.50</td>
<td>34</td>
<td>295</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>IK5-250 250</td>
<td>61.13</td>
<td>50.06</td>
<td>24.21</td>
<td>10.50</td>
<td>14.00</td>
<td>13.94</td>
<td>17.00</td>
<td>17.00</td>
<td>23.75</td>
<td>17.25</td>
<td>4.50</td>
<td>52</td>
<td>335</td>
<td>14</td>
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</tr>
<tr>
<td>IK5-350 350</td>
<td>61.13</td>
<td>50.06</td>
<td>24.21</td>
<td>10.50</td>
<td>14.00</td>
<td>13.94</td>
<td>17.00</td>
<td>17.00</td>
<td>23.75</td>
<td>17.25</td>
<td>4.50</td>
<td>52</td>
<td>335</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>IK5-550 550</td>
<td>80.38</td>
<td>69.12</td>
<td>40.27</td>
<td>11.00</td>
<td>14.00</td>
<td>13.94</td>
<td>17.00</td>
<td>17.00</td>
<td>28.00</td>
<td>22.25</td>
<td>4.50</td>
<td>92</td>
<td>600</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>IK5-650 650</td>
<td>88.45</td>
<td>77.19</td>
<td>48.34</td>
<td>11.00</td>
<td>14.00</td>
<td>13.94</td>
<td>17.00</td>
<td>17.00</td>
<td>28.00</td>
<td>22.25</td>
<td>4.50</td>
<td>112</td>
<td>640</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>IK5-750 750</td>
<td>120.13</td>
<td>100.62</td>
<td>65.28</td>
<td>14.00</td>
<td>21.00</td>
<td>20.58</td>
<td>24.00</td>
<td>24.00</td>
<td>31.75</td>
<td>25.25</td>
<td>4.50</td>
<td>169</td>
<td>1640</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>IK5-900 900</td>
<td>120.13</td>
<td>100.62</td>
<td>65.28</td>
<td>14.00</td>
<td>21.00</td>
<td>20.58</td>
<td>24.00</td>
<td>24.00</td>
<td>31.75</td>
<td>25.25</td>
<td>4.50</td>
<td>169</td>
<td>1640</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>IK5-1050 1050</td>
<td>138.50</td>
<td>119.00</td>
<td>83.65</td>
<td>14.00</td>
<td>21.00</td>
<td>20.97</td>
<td>24.00</td>
<td>24.00</td>
<td>31.75</td>
<td>25.25</td>
<td>4.50</td>
<td>214</td>
<td>1800</td>
<td>87</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3518)</td>
<td>(3023)</td>
<td>(2125)</td>
<td>(356)</td>
<td>(533)</td>
<td>(533)</td>
<td>(610)</td>
<td>(610)</td>
<td>(806)</td>
<td>(565)</td>
<td>(114)</td>
<td>(5436)</td>
<td>(817)</td>
<td>(329)</td>
<td></td>
</tr>
</tbody>
</table>

1 Weights and dimensions are approximations only and are not intended for construction purposes.

Note: Dimensions for Series IH and IM differ from that listed for the IK5. Please contact factory for specific details.
The Trench Group is your partner of choice for electrical power transmission and distribution solutions today; and for the development of your new technology solutions of tomorrow.

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