



230 V AC

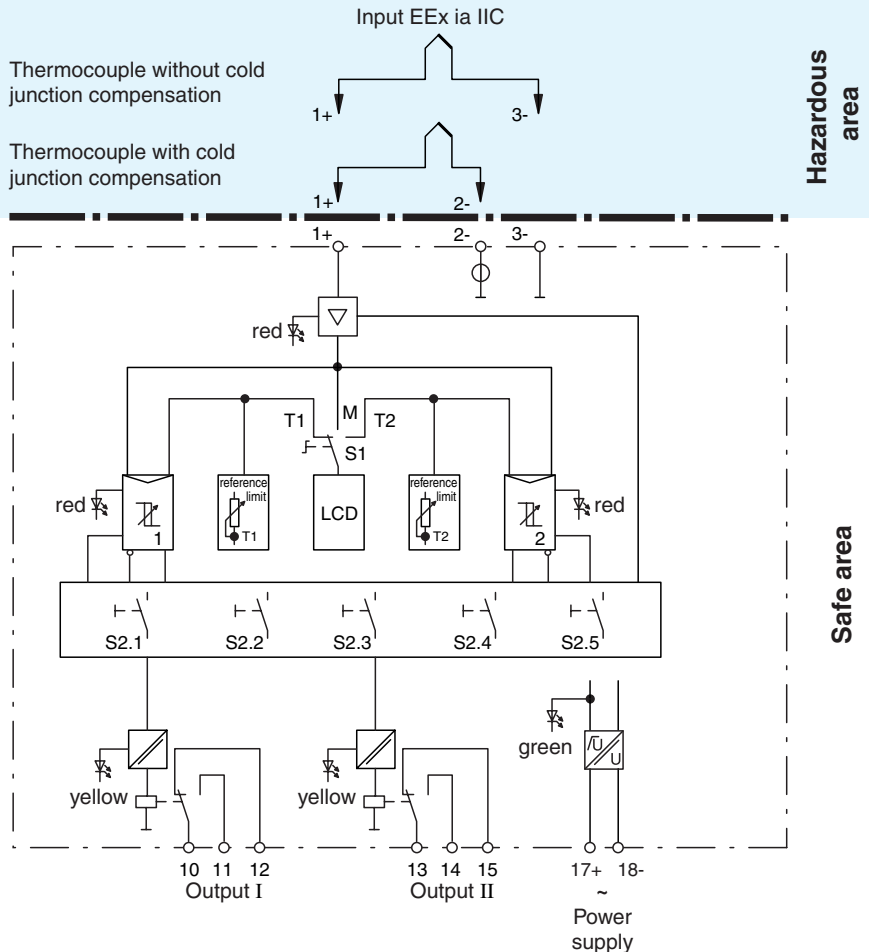
- 1-channel
- Input EEx ia IIC
- Cold junction compensation
- 2 switching points operate on 2 output relays
- High/low alarm can be selected for each switching point
- Mode of operation of the relay selectable separately
- Lead breakage monitoring (can be deactivated)
- LC-display for switching point and actual value
- Hysteresis, adjustable for each switching point in the range of 1 % ... 10 %
- All indicator and operating elements on the front side laid out

Discontinued type

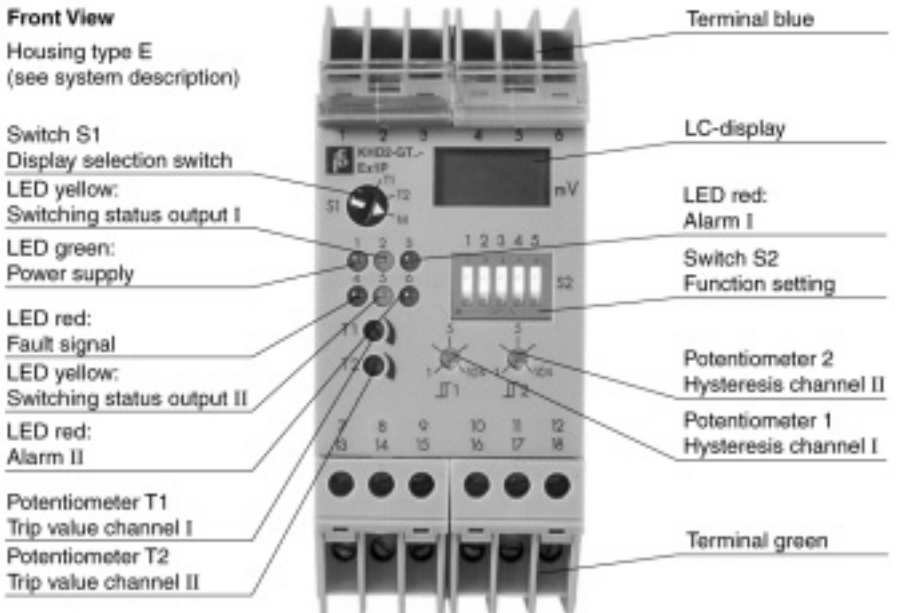
Function

The trip amplifier converts the thermocouple voltage into a proportional internal voltage. The thermocouple must be connected to terminals 1 and 2 when cold junction compensation is required. Otherwise, the thermocouple is connected to terminals 1 and 3. A comparator checks the internal voltage against the two set reference values. The hysteresis, the mode of operation and the type of alarm (high/low) is optional for each switch point.

High alarm means that the alarm is tripped when a limit is exceeded and is reset when it falls below another specified limit. The hysteresis, which is the difference between these limits, is adjustable. Low alarm is tripped when the value falls below a specified limit. The output relays transfer the switch state potentially isolated across output terminals 10, 11, 12 and 13, 14, 15. The built in LC-display shows the thermocouple voltage in mV. The corresponding temperature can be determined through the thermocouple value table (see last page). When lead breakage occurs in the input circuit, the output relays are open.



Composition



| | |
|---|---|
| Supply | |
| Connection | terminals 17, 18 |
| Rated voltage | 85 ... 253 V AC , 45 ... 65 Hz |
| Ripple | - |
| Power consumption | approx. 2 W |
| Input | |
| Connection | terminals 1+, 2-, 3- Input with cold junction compensation: terminals 1+, 2- Input without cold junction compensation: terminals 1+, 3- |
| Loop resistance | ≤ 650 Ohm |
| Output | |
| Measurement range | see note |
| Output I | limit value 1: terminals 10, 11, 12 |
| Output II | limit value 2: terminals 13, 14, 15 |
| Contact loading | 253 V AC, 2 A, cos φ > 0.6 |
| Mechanical life | 2 x 10 ⁷ switching cycles |
| Transfer characteristics | |
| Deviation | LC-display, 0.5 % of measuring value + 1 digit |
| Temperature | <u>clamping point measuring error at 273 K:</u> ± 1.5 K <u>switching point:</u> 0.03 % of measuring range <u>display:</u> 0.01 % / K of measuring range |
| Influence of supply voltage | not measurable |
| Repeat accuracy | 0,2 % |
| Input delay | 300 ms (rise time and energising delay of relay) |
| Electrical isolation | |
| Input/Output | safe electrical isolation acc. to EN 50020 |
| Input/Power supply | safe electrical isolation acc. to EN 50020 |
| Output/Power supply | available |
| Standard conformity | |
| Coordination of insulation | acc. to DIN EN 50178 |
| Electrical isolation | acc. to DIN EN 50178 |
| Electromagnetic compatibility | acc. to EN 50081-2 / EN 50082-2 |
| Climatic conditions | acc. to DIN IEC 721 |
| Directive conformity | |
| Electromagnetic compatibility | standards |
| Directive 89/336/EG | on request |
| Ambient conditions | |
| Ambient temperature | -25 ... 65 °C (248 ... 338 K) |
| Mechanical specifications | |
| Protection degree | IP20 |
| Mass | approx. 250 g |
| Data for application in conjunction with hazardous areas | |
| EC-Type Examination Certificate | PTB No. Ex-93.C.2073 ; for additional certificates refer to the approval list |
| Voltage U ₀ | 22 V DC |
| Current I ₀ | 7,8 mA |
| Power P ₀ | 30 mW |
| Type of protection [Ex ia] | |
| Explosion group | IIB IIC |
| External capacitance | 0,43 μF 0,069 μF |
| External inductance | 25 mH 5 mH |
| Type of protection [Ex ib] | |
| Explosion group | IIB IIC |
| External capacitance | 0,776 μF 0,126 μF |
| External inductance | 1000 mH 540 mH |
| Supply | |
| Safety maximum voltage U _m | 253 V AC |
| Electrical isolation | |
| Input/Output | safe electrical isolation acc. to EN 50020 |
| Input/Power supply | safe electrical isolation acc. to EN 50020 |
| Directive conformity | |
| Directive 94/9 EU | standards on request |
| Safety parameter | |
| CSA control drawing | LR 36087-8 |

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Notes

Monitoring of limit values during temperature measurement with type J, K, R, S and T thermocouples.

Additional measurement ranges:

- **GTA** -12 mV ... +2 mV for thermocouple
- **GTB** -2 mV ... +12 mV for thermocouple type K, T
- **GTC** -2 mV ... +25 mV for thermocouple type K, T
- **GTD** -12 mV ... +70 mV for thermocouple type K, T
- **GTE** -20 mV ... +70 mV for thermocouple type K, T
- **GTF** -12 mV ... +2 mV for thermocouple type J
- **GTG** -2 mV ... +12 mV for thermocouple type J
- **GTH** -2 mV ... +25 mV for thermocouple type J
- **GTI** -12 mV ... +70 mV for thermocouple type J
- **GTJ** -20 mV ... +70 mV for thermocouple type J
- **GTK** -2 mV ... +12 mV for thermocouple type R, S
- **GTL** -2 mV ... +25 mV for thermocouple type R, S
- **GTM** -5 mV ... +20 mV for thermocouple type R, S

LC-display

Reference values are displayed in mV.

LC-display selector switch

With switch S1 it is possible to select, which value (actual or reference value) is indicated on the LC-display.

S1 in pos. T1: switch point 1 (reference value or limit value 1)

S1 in pos. T2: switch point 2 (reference value or limit value 2)

S1 in pos. M: actual value

Potentiometer T1, T2

By means of the potentiometers T1 or T2 the switch points or limit values are set.

T1: Adjustment of switch point 1 (reference value or limit value 1)

T2: Adjustment of switch point 2 (reference value or limit value 2)

Potentiometer Π 1 and Π 2

The potentiometer Π 1 and Π 2 serve for the hysteresis adjustment of the individual switch points in a range of 1 % ... 10 % referred to the measurement value.

Π 1 Hysteresis switch point 1 (reference value or limit value 1)

Π 2 Hysteresis switch point 2 (reference value or limit value 2)

DIP switch S2

| Switch | Position | Function |
|--------|----------|------------------------------|
| S2.1 | OPEN | High alarm output I |
| | - | Low alarm output I |
| S2.2 | OPEN | Relays closed on alarm state |
| | - | Relays open in alarm state |
| S2.3 | OPEN | Lead breakage monitoring off |
| | - | Lead breakage monitoring on |
| S2.4 | OPEN | High alarm output II |
| | - | Low alarm output II |
| S2.5 | OPEN | Relays closed on alarm state |
| | - | Relays open in alarm state |

Basic values of the thermoelectric voltage of thermocouples for temperatures from 10 to 10 degrees in mV; reference temperature: 0 °C

1. Thermocouple type J Fe-CuNi IEC 584

| °C | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| -200 | -7.890 | -8.096 | - | - | - | - | - | - | - | - |
| -100 | -4.632 | -5.036 | -5.426 | -5.801 | -6.159 | -6.499 | -6.821 | -7.122 | -7.402 | -7.659 |
| 0 | 0.000 | -0.501 | -0.995 | -1.481 | -1.960 | -2.431 | -2.892 | -3.344 | -3.785 | -4.215 |
| °C | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
| 0 | 0.000 | 0.507 | 1.019 | 1.536 | 2.058 | 2.585 | 3.115 | 3.649 | 4.186 | 4.725 |
| 100 | 5.268 | 5.812 | 6.359 | 6.907 | 7.457 | 8.008 | 8.560 | 9.113 | 9.667 | 10.222 |
| 200 | 10.777 | 11.332 | 11.887 | 12.442 | 12.998 | 13.553 | 14.108 | 14.663 | 15.217 | 15.771 |
| 300 | 16.325 | 16.879 | 17.432 | 17.984 | 18.537 | 19.089 | 19.640 | 20.192 | 20.743 | 21.295 |
| 400 | 21.846 | 22.397 | 22.949 | 23.501 | 24.054 | 24.607 | 25.161 | 25.716 | 26.272 | 26.829 |
| 500 | 27.388 | 27.949 | 28.511 | 29.075 | 29.642 | 30.210 | 30.782 | 31.356 | 31.933 | 32.513 |
| 600 | 33.096 | 33.683 | 34.273 | 34.867 | 35.464 | 36.066 | 36.671 | 37.280 | 37.893 | 38.510 |
| 700 | 39.130 | 39.754 | 40.382 | 41.013 | 41.647 | 42.283 | 42.922 | 43.563 | 44.207 | 44.852 |
| 800 | 45.498 | 46.144 | 46.790 | 47.434 | 48.076 | 48.716 | 49.354 | 49.989 | 50.621 | 51.249 |
| 900 | 51.875 | 52.496 | 53.115 | 53.729 | 54.341 | 54.948 | 55.553 | 56.155 | 56.753 | 57.349 |
| 1000 | 57.942 | 58.533 | 59.121 | 59.708 | 60.293 | 60.876 | 61.459 | 62.039 | 62.619 | 63.199 |
| 1100 | 63.777 | 64.355 | 64.933 | 65.510 | 66.087 | 66.664 | 67.240 | 67.815 | 68.390 | 68.964 |
| 1200 | 69.536 | - | - | - | - | - | - | - | - | - |

2. Thermocouple type K NiCr-Ni IEC 584

| °C | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| -200 | -5.891 | -6.035 | -6.158 | -6.262 | -6.344 | -6.404 | -6.441 | -6.458 | - | - |
| -100 | -3.553 | -3.852 | -4.138 | -4.410 | -4.669 | -4.912 | -5.141 | -5.354 | -5.550 | -5.730 |
| 0 | 0.000 | -0.392 | -0.777 | -1.156 | -1.527 | -1.889 | -2.243 | -2.586 | -2.920 | -3.242 |
| °C | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
| 0 | 0.000 | 0.397 | 0.798 | 1.203 | 1.611 | 2.022 | 2.436 | 2.850 | 3.266 | 3.681 |
| 100 | 4.095 | 4.508 | 4.919 | 5.327 | 5.733 | 6.137 | 6.539 | 6.939 | 7.338 | 7.737 |
| 200 | 8.137 | 8.537 | 8.938 | 9.341 | 9.745 | 10.151 | 10.560 | 10.969 | 11.381 | 11.793 |
| 300 | 12.207 | 12.623 | 13.039 | 13.456 | 13.874 | 14.292 | 14.712 | 15.132 | 15.552 | 15.974 |
| 400 | 16.395 | 16.818 | 17.241 | 17.664 | 18.088 | 18.513 | 18.938 | 19.363 | 19.788 | 20.214 |
| 500 | 20.640 | 21.066 | 21.493 | 21.919 | 22.346 | 22.772 | 23.198 | 23.624 | 24.050 | 24.476 |
| 600 | 24.902 | 25.327 | 25.751 | 26.176 | 26.599 | 27.022 | 27.445 | 27.867 | 28.288 | 28.709 |
| 700 | 29.128 | 29.547 | 29.965 | 30.383 | 30.799 | 31.214 | 31.622 | 32.042 | 32.455 | 32.866 |
| 800 | 33.277 | 33.686 | 34.095 | 34.502 | 34.909 | 35.314 | 35.718 | 36.121 | 36.524 | 36.925 |
| 900 | 37.325 | 37.724 | 38.122 | 38.519 | 38.915 | 39.310 | 39.703 | 40.096 | 40.488 | 40.879 |
| 1000 | 41.269 | 41.657 | 42.045 | 42.432 | 42.817 | 43.202 | 43.585 | 43.968 | 44.349 | 44.729 |
| 1100 | 45.108 | 45.486 | 45.863 | 46.238 | 46.612 | 46.985 | 47.356 | 47.726 | 48.095 | 48.462 |
| 1200 | 48.828 | 49.192 | 49.555 | 49.916 | 50.276 | 50.633 | 50.990 | 51.344 | 51.697 | 52.049 |
| 1300 | 52.398 | 52.747 | 53.093 | 53.439 | 53.782 | 54.125 | 54.466 | 54.807 | - | - |

3. Thermocouple type R Pt13Rh-Pt IEC 584

| °C | 0 | -10 | -20 | -30 | -40 | -50 | -60 | -70 | -80 | -90 |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.000 | -0.051 | -0.100 | -0.145 | -0.188 | -0.226 | - | - | - | - | - |
| °C | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
| 0 | 0.000 | 0.054 | 0.111 | 0.171 | 0.232 | 0.296 | 0.363 | 0.431 | 0.501 | 0.573 |
| 100 | 0.647 | 0.723 | 0.800 | 0.879 | 0.959 | 1.041 | 1.124 | 1.208 | 1.294 | 1.380 |
| 200 | 1.468 | 1.557 | 1.647 | 1.738 | 1.830 | 1.923 | 2.017 | 2.111 | 2.207 | 2.303 |
| 300 | 2.400 | 2.498 | 2.596 | 2.695 | 2.795 | 2.896 | 2.997 | 3.099 | 3.201 | 3.304 |
| 400 | 3.407 | 3.511 | 3.616 | 3.721 | 3.826 | 3.933 | 4.039 | 4.146 | 4.254 | 4.362 |
| 500 | 4.471 | 4.580 | 4.689 | 4.799 | 4.910 | 5.021 | 5.132 | 5.244 | 5.356 | 5.469 |
| 600 | 5.582 | 5.696 | 5.810 | 5.925 | 6.040 | 6.155 | 6.272 | 6.388 | 6.505 | 6.623 |
| 700 | 6.741 | 6.860 | 6.979 | 7.098 | 7.218 | 7.339 | 7.460 | 7.582 | 7.703 | 7.826 |
| 800 | 7.949 | 8.072 | 8.196 | 8.320 | 8.445 | 8.570 | 8.696 | 8.822 | 8.949 | 9.076 |
| 900 | 9.203 | 9.331 | 9.460 | 9.589 | 9.718 | 9.848 | 9.978 | 10.109 | 10.240 | 10.371 |
| 1000 | 10.503 | 10.636 | 10.768 | 10.902 | 11.035 | 11.170 | 11.304 | 11.439 | 11.574 | 11.710 |
| 1100 | 11.846 | 11.983 | 12.119 | 12.257 | 12.394 | 12.532 | 12.669 | 12.808 | 12.946 | 13.085 |
| 1200 | 13.224 | 13.363 | 13.502 | 13.642 | 13.782 | 13.922 | 14.062 | 14.202 | 14.343 | 14.483 |
| 1300 | 14.624 | 14.765 | 14.906 | 15.047 | 15.188 | 15.329 | 15.470 | 15.611 | 15.752 | 15.893 |
| 1400 | 16.035 | 16.176 | 16.317 | 16.458 | 16.599 | 16.741 | 16.882 | 17.022 | 17.163 | 17.304 |
| 1500 | 17.445 | 17.585 | 17.726 | 17.866 | 18.006 | 18.146 | 18.286 | 18.425 | 18.564 | 18.703 |
| 1600 | 18.842 | 18.981 | 19.119 | 19.257 | 19.395 | 19.533 | 19.670 | 19.807 | 19.944 | 20.080 |
| 1700 | 20.215 | 20.350 | 20.483 | 20.616 | 20.748 | 20.878 | 21.006 | - | - | - |

4. Thermocouple type S Pt10Rh-Pt IEC 584

| °C | 0 | -10 | -20 | -30 | -40 | -50 | -60 | -70 | -80 | -90 |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.000 | -0.053 | -0.103 | -0.150 | -0.194 | -0.236 | - | - | - | - | - |
| °C | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
| 0 | 0.000 | 0.055 | 0.113 | 0.173 | 0.235 | 0.299 | 0.365 | 0.432 | 0.502 | 0.573 |
| 100 | 0.645 | 0.719 | 0.795 | 0.872 | 0.950 | 1.029 | 1.109 | 1.190 | 1.273 | 1.356 |
| 200 | 1.440 | 1.525 | 1.611 | 1.698 | 1.785 | 1.873 | 1.962 | 2.051 | 2.141 | 2.232 |
| 300 | 2.323 | 2.414 | 2.506 | 2.599 | 2.692 | 2.786 | 2.880 | 2.974 | 3.069 | 3.164 |
| 400 | 3.260 | 3.356 | 3.452 | 3.549 | 3.645 | 3.743 | 3.840 | 3.938 | 4.036 | 4.135 |
| 500 | 4.234 | 4.333 | 4.432 | 4.532 | 4.632 | 4.732 | 4.832 | 4.933 | 5.034 | 5.136 |
| 600 | 5.237 | 5.339 | 5.442 | 5.544 | 5.648 | 5.751 | 5.855 | 5.960 | 6.064 | 6.169 |
| 700 | 6.274 | 6.380 | 6.486 | 6.592 | 6.699 | 6.805 | 6.913 | 7.020 | 7.128 | 7.236 |
| 800 | 7.345 | 7.454 | 7.563 | 7.672 | 7.782 | 7.892 | 8.003 | 8.114 | 8.225 | 8.336 |
| 900 | 8.448 | 8.560 | 8.673 | 8.786 | 8.899 | 9.012 | 9.126 | 9.240 | 9.355 | 9.470 |
| 1000 | 9.585 | 9.700 | 9.816 | 9.932 | 10.048 | 10.165 | 10.282 | 10.400 | 10.517 | 10.635 |
| 1100 | 10.754 | 10.872 | 10.991 | 11.110 | 11.229 | 11.348 | 11.467 | 11.587 | 11.707 | 11.827 |
| 1200 | 11.947 | 12.067 | 12.188 | 12.308 | 12.429 | 12.550 | 12.671 | 12.792 | 12.913 | 13.034 |
| 1300 | 13.155 | 13.276 | 13.397 | 13.519 | 13.640 | 13.761 | 13.883 | 14.004 | 14.125 | 14.247 |
| 1400 | 14.368 | 14.489 | 14.610 | 14.731 | 14.852 | 14.973 | 15.094 | 15.215 | 15.336 | 15.456 |
| 1500 | 15.576 | 15.697 | 15.817 | 15.937 | 16.057 | 16.176 | 16.296 | 16.415 | 16.534 | 16.653 |
| 1600 | 16.771 | 16.890 | 17.008 | 17.125 | 17.243 | 17.360 | 17.477 | 17.594 | 17.711 | 17.826 |
| 1700 | 17.942 | 18.056 | 18.170 | 18.282 | 18.394 | 18.504 | 18.612 | - | - | - |

5. Thermocouple type T Cu-CuNi IEC 584

| °C | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| -200 | 5.603 | 5.753 | -5.889 | -6.007 | -6.105 | -6.181 | -6.232 | -6.258 | - | - |
| -100 | 3.378 | 3.656 | -3.949 | -4.177 | -4.419 | -4.648 | -4.865 | -5.069 | -5.261 | -5.439 |
| 0 | 0.000 | -0.383 | -0.757 | -1.121 | -1.475 | -1.819 | -2.152 | -2.475 | -2.788 | -3.089 |
| °C | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
| 0 | 0.000 | 0.391 | 0.789 | 1.196 | 1.611 | 2.035 | 2.467 | 2.908 | 3.357 | 3.813 |
| 100 | 4.277 | 4.749 | 5.227 | 5.712 | 6.204 | 6.702 | 7.207 | 7.718 | 8.235 | 8.757 |
| 200 | 9.286 | 9.820 | 10.360 | 10.905 | 11.456 | 12.011 | 12.572 | 13.137 | 13.707 | 14.281 |
| 300 | 14.860 | 15.443 | 16.030 | 16.621 | 17.217 | 17.816 | 18.420 | 19.027 | 19.638 | 20.252 |
| 400 | 20.869 | - | - | - | - | - | - | - | - | - |