**DC/DC Medical Converter**

**THM 30 Series, 30 Watt**

- Wide 2:1 input voltage 30 W DC/DC converter in a 2 x 1" plastic case
- I/O isolation 5000 VAC rated for 250 VAC working voltage
- Certification according to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP
- Risk management process according to ISO 14971 incl. risk management file
- Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3
- Low leakage current <2.5 µA
- Operating temperature –40°C to 80°C
- EMC compliance to IEC 60601-1-2 4th edition and EN55032 class A
- Operating up to 5000m altitude
- 5-year product warranty

The THM 30 series is a range of medical 30 Watt DC/DC converters in 2.0" x 1.0" plastic package and with wide 2:1 input voltage range. They provide a reinforced isolation system for 5000 VAC isolation and a very low leakage current of less than 2.5 µA. The units are approved to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP and come along with an ISO 14971 risk management file. Design and production conform to the quality management system ISO 13485. With a high efficiency of up to 90% and highest grade components the converters can reliably operate in an ambient temperature range of –40°C up to +80°C. They constitute a reliable solution not only for medical equipment but also for demanding ranges of application such as transportation, control & measurement or IGBT drivers.

### Models

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Input Voltage Range</th>
<th>Output 1</th>
<th>Output 2</th>
<th>Efficiency typ.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vnom</td>
<td>Imax</td>
<td>Vnom</td>
<td>Imax</td>
</tr>
<tr>
<td>THM 30-1211</td>
<td>5 VDC</td>
<td>6'000 mA</td>
<td>-5 VDC</td>
<td>3'000 mA</td>
</tr>
<tr>
<td>THM 30-1212</td>
<td>12 VDC</td>
<td>2'500 mA</td>
<td>-12 VDC</td>
<td>1'250 mA</td>
</tr>
<tr>
<td>THM 30-1213</td>
<td>15 VDC</td>
<td>2'000 mA</td>
<td>-12 VDC</td>
<td>1'250 mA</td>
</tr>
<tr>
<td>THM 30-1215</td>
<td>24 VDC</td>
<td>1'250 mA</td>
<td>-15 VDC</td>
<td>1'000 mA</td>
</tr>
<tr>
<td>THM 30-1221</td>
<td>+5 VDC</td>
<td>3'000 mA</td>
<td>-5 VDC</td>
<td>3'000 mA</td>
</tr>
<tr>
<td>THM 30-1222</td>
<td>+12 VDC</td>
<td>1'250 mA</td>
<td>-12 VDC</td>
<td>1'250 mA</td>
</tr>
<tr>
<td>THM 30-1223</td>
<td>+15 VDC</td>
<td>1'000 mA</td>
<td>-15 VDC</td>
<td>1'000 mA</td>
</tr>
<tr>
<td>THM 30-2411</td>
<td>5 VDC</td>
<td>6'000 mA</td>
<td>-5 VDC</td>
<td>3'000 mA</td>
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<tr>
<td>THM 30-2412</td>
<td>12 VDC</td>
<td>2'500 mA</td>
<td>-12 VDC</td>
<td>1'250 mA</td>
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<tr>
<td>THM 30-2413</td>
<td>15 VDC</td>
<td>2'000 mA</td>
<td>-12 VDC</td>
<td>1'250 mA</td>
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<tr>
<td>THM 30-2415</td>
<td>24 VDC</td>
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<td>-15 VDC</td>
<td>1'000 mA</td>
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<tr>
<td>THM 30-2421</td>
<td>+5 VDC</td>
<td>3'000 mA</td>
<td>-5 VDC</td>
<td>3'000 mA</td>
</tr>
<tr>
<td>THM 30-2422</td>
<td>+12 VDC</td>
<td>1'250 mA</td>
<td>-12 VDC</td>
<td>1'250 mA</td>
</tr>
<tr>
<td>THM 30-2423</td>
<td>+15 VDC</td>
<td>1'000 mA</td>
<td>-15 VDC</td>
<td>1'000 mA</td>
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<tr>
<td>THM 30-4811</td>
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<td>6'000 mA</td>
<td>-5 VDC</td>
<td>3'000 mA</td>
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<tr>
<td>THM 30-4812</td>
<td>12 VDC</td>
<td>2'500 mA</td>
<td>-12 VDC</td>
<td>1'250 mA</td>
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<tr>
<td>THM 30-4813</td>
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<td>THM 30-4815</td>
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<tr>
<td>THM 30-4821</td>
<td>+5 VDC</td>
<td>3'000 mA</td>
<td>-5 VDC</td>
<td>3'000 mA</td>
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<tr>
<td>THM 30-4822</td>
<td>+12 VDC</td>
<td>1'250 mA</td>
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</tr>
<tr>
<td>THM 30-4823</td>
<td>+15 VDC</td>
<td>1'000 mA</td>
<td>-15 VDC</td>
<td>1'000 mA</td>
</tr>
</tbody>
</table>

### Options

<table>
<thead>
<tr>
<th>on demand</th>
<th>- Optional models with Remote On/Off function</th>
</tr>
</thead>
<tbody>
<tr>
<td>(backorder with MOQ non stocking item)</td>
<td>- Optional models with inverse Remote On/Off function (passive = off)</td>
</tr>
</tbody>
</table>

www.tracopower.com  September 20, 2023  Page 1 / 5
## Input Specifications

<table>
<thead>
<tr>
<th>Input Current</th>
<th>- At no load</th>
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<tbody>
<tr>
<td>12 Vin models</td>
<td>11 mA typ.</td>
</tr>
<tr>
<td>24 Vin models</td>
<td>9 mA typ.</td>
</tr>
<tr>
<td>48 Vin models</td>
<td>9 mA typ.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Surge Voltage</th>
<th>12 Vin models</th>
<th>25 VDC max. (3 s max)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Vin models</td>
<td>50 VDC max. (3 s max)</td>
<td></td>
</tr>
<tr>
<td>48 Vin models</td>
<td>100 VDC max. (3 s max)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Under Voltage Lockout</th>
<th>12 Vin models</th>
<th>7.8 VDC min. / 8 VDC typ. / 8.6 VDC max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Vin models</td>
<td>15.8 VDC min. / 16 VDC typ. / 17.4 VDC max.</td>
<td></td>
</tr>
<tr>
<td>48 Vin models</td>
<td>32 VDC min. / 33 VDC typ. / 34 VDC max.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommended Input Fuse</th>
<th>12 Vin models: 6'300 mA (slow blow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Vin models: 3'150 mA (slow blow)</td>
<td></td>
</tr>
<tr>
<td>48 Vin models: 1'600 mA (slow blow)</td>
<td></td>
</tr>
</tbody>
</table>

(The need of an external fuse has to be assessed in the final application.)

| Input Filter | Internal Pi-Type |

## Output Specifications

### Output Voltage Adjustment

-10% to +20% (15 & 24 Vout models) ±10% (other models)

±10% (single output models only)

(By external trim resistor)

See application note: [www.tracopower.com/overview/thm30](http://www.tracopower.com/overview/thm30)

Output power must not exceed rated power!

### Voltage Set Accuracy

- Input Variation (Vmin - Vmax)
  - single output models: 0.2% max.
  - dual output models: 0.5% max.

- Load Variation (0 - 100%)
  - single output models: 0.2% max.
  - dual output models: 1% max. (Output 1)
  - dual output models: 1% max. (Output 2)

- Cross Regulation (25% / 100% asym. load)
  - single output models: 5% max.

### Ripple and Noise (20 MHz Bandwidth)

- single output
  - 5 Vout models: 50 mVp-p typ. (w/ 10 µF X7R)
  - 12 Vout models: 75 mVp-p typ. (w/ 10 µF X7R)
  - 15 Vout models: 100 mVp-p typ. (w/ 10 µF X7R)
  - 24 Vout models: 100 mVp-p typ. (w/ 4.7 µF X7R)

- dual output
  - 5 / -5 Vout models: 50 / 50 mVp-p typ. (w/ 10 µF X7R)
  - 12 / -12 Vout models: 75 / 75 mVp-p typ. (w/ 10 µF X7R)
  - 15 / -15 Vout models: 75 / 75 mVp-p typ. (w/ 10 µF X7R)

### Capacitive Load

- single output
  - 5 Vout models: 7'200 µF max.
  - 12 Vout models: 1'200 µF max.
  - 15 Vout models: 1'000 µF max.
  - 24 Vout models: 375 µF max.

- dual output
  - 5 / -5 Vout models: 3'600 / 3'600 µF max.
  - 12 / -12 Vout models: 750 / 750 µF max.
  - 15 / -15 Vout models: 500 / 500 µF max.

### Minimum Load

Not required

### Temperature Coefficient

±0.02 %/K max.

### Start-up Time

30 ms typ. / 60 ms max.

### Short Circuit Protection

Continuous, Automatic recovery

### Output Current Limitation

185% max. of Iout max.

150% typ. of Iout max.

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All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
Overvoltage Protection

125% typ. of Vout nom. (depending on model)

- 6.2 VDC typ. (5 VDC model)
- 15 VDC typ. (12 VDC model)
- 20 VDC typ. (15 VDC model)
- 30 VDC typ. (24 VDC model)

Transistor

Continuous: +105°C

Transient Response

- Response Time: 250 µs typ. (25% Load Step)

Safety Specifications

Safety Standards

- IT / Multimedia Equipment: EN 62368-1, IEC 62368-1, UL 62368-1
- Medical Equipment: EN 60601-1, IEC 60601-1, ANSI/AAMI ES 60601-1
- Certification Documents: 2 x MOPP (Means Of Patient Protection)

Pollution Degree: PD 2

Over Voltage Category: OVC II

EMC Specifications

EMI Emissions

- Conducted Emissions: EN 60601-1-2 edition 4 (Medical Devices)
  - Class A (internal filter): EN 55011
  - Class B (with external filter): EN 55032
- Radiated Emissions: FCC Part 18
  - Class A (internal filter): FCC Part 18 Class A (internal filter)
  - Class B (with external filter): FCC Part 18 Class B (with external filter)

External filter proposal: www.tracopower.com/overview/thm30

EMS Immunity

- Electrostatic Discharge
  - Air: EN 61000-4-2, ±15 kV, perf. criteria A
  - Contact: EN 61000-4-2, ±8 kV, perf. criteria A
- RF Electromagnetic Field
  - Ext. input component: 12 Vin models: 2 x KY 220 µF || TVS SMDJ36A
  - Continuous: EN 61000-4-6, 10 Vrms, perf. criteria A
- EFT (Burst) / Surge
  - Ext. input component: 48 Vin models: 2 x KY 220 µF || TVS SMDJ120A

General Specifications

Relative Humidity

95% max. (non condensing)

Temperature Ranges

- Operating Temperature: -40°C to +80°C
- Case Temperature: +105°C max.
- Storage Temperature: -55°C to +125°C

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
### Power Derating
- High Temperature
- Depending on model
  See application note: [www.tracopower.com/overview/thm30](http://www.tracopower.com/overview/thm30)

### Over Temperature Protection Switch Off
- Protection Mode
- Measurement Point
- Case
- 115°C typ. (Automatic recovery)

### Cooling System
- Natural convection (20 LFM)

### Remote Control
- Voltage Controlled Remote
  - Off Idle Input Current
  - Remote Pin Input Current
    - On: 3.5 to 12 VDC or open circuit
    - Off: 0 to 1.2 VDC or short circuit
    - Refers to 'Remote' and '-Vin' Pin
    - 2.5 mA typ.
    - -0.5 to 1.0 mA (Optional models with inverse Remote On/Off function (passive = off))

### Over Temperature Protection Switch Off
- 115°C typ.
- Measurement Point
- Case
- 115°C typ. (Automatic recovery)

### Altitude During Operation
- 5'000 m max.

### Switching Frequency
- 225 - 285 kHz (PWM)
- 250 kHz typ. (PWM)

### Insulation System
- Reinforced Insulation

### Working Voltage (rated)
- 250 VAC

### Isolation Test Voltage
- Input to Output: 60 s
- 5'000 VAC

### Creepage
- Input to Output
- 8 mm min.

### Clearance
- Input to Output
- 8 mm min.

### Isolation Capacitance
- Input to Output: 100 kHz, 1 V
- 20 pF typ.

### Leakage Current
- - Touch Current
- 2.5 µA max. (240 VAC, 60 Hz)

### Reliability
- Calculated MTBF
- 1'140'000 h (MIL-HDBK-217F, ground benign)

### Washing Process
- According to Cleaning Guideline
  [www.tracopower.com/info/cleaning.pdf](http://www.tracopower.com/info/cleaning.pdf)

### Environment
- Vibration
- Thermal Shock
  - MIL-STD-810F
  - MIL-STD-810F

### Housing Material
- Non-conductive Plastic (UL 94 V-0 rated)

### Base Material
- Non-conductive Plastic (UL 94 V-0 rated)

### Potting Material
- Silicone (UL 94 V-0 rated)

### Pin Material
- Copper

### Pin Foundation Plating
- Nickel (2 - 3 µm)

### Pin Surface Plating
- Tin (3 - 5 µm), matte

### Housing Type
- Plastic Case

### Mounting Type
- PCB Mount

### Connection Type
- THD (Through-Hole Device)

### Footprint Type
- 2" x 1"

### Soldering Profile
- Lead-Free Wave Soldering
  - 265°C / 10 s max.

### Weight
- 32 g

### Thermal Impedance
- Case to Ambient
- 12.9 K/W typ.

### Environmental Compliance
- REACH Declaration
  - www.tracopower.com/info/reach-declaration.pdf
  - REACH SVHC list compliant
  - REACH Annex XVII compliant
  - www.tracopower.com/info/reach-declaration.pdf

- RoHS Declaration
  - www.tracopower.com/info/rohs-declaration.pdf
  - Exemptions: 7a, 7c-4
    (ROHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule))
  - www.tracopower.com/info/rohs-declaration.pdf

- SCIP Reference Number
  - 06ca88e7-a740-4f31-a81d-c4af720b99d6

### Supporting Documents

**Overview Link** (for additional Documents)

[www.tracopower.com/overview/thm30](http://www.tracopower.com/overview/thm30)

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All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
Outline Dimensions

Dimensions in mm (inch)
Tolerances ±0.5 (±0.02)
Pin Ø 1 ±0.1 (0.039 ±0.004)
Pin pitch tolerances ±0.25 (±0.01)

Pinout

<table>
<thead>
<tr>
<th>Pin</th>
<th>Single Output</th>
<th>Dual Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Vin (Vcc)</td>
<td>+Vin (Vcc)</td>
</tr>
<tr>
<td>2</td>
<td>–Vin (GND)</td>
<td>–Vin (GND)</td>
</tr>
<tr>
<td>3</td>
<td>+Vout</td>
<td>+Vout</td>
</tr>
<tr>
<td>4</td>
<td>–Vout</td>
<td>Common</td>
</tr>
<tr>
<td>5</td>
<td>Trim</td>
<td>–Vout</td>
</tr>
<tr>
<td>6</td>
<td>No pin*/Remote</td>
<td>No pin*/Remote</td>
</tr>
</tbody>
</table>

*If remote is not selected there will be no pin.