Mounting Instructions:	SEMITRANS®
Revision:	1.1
Issue Date:	2014-02-07
Prepared by:	Norbert Schäfer
Approved by:	Volker Demuth

Keywords: SEMITRANS 2 / 3 / 4

Table of content

1. ESD Protection

SEMITRANS® IGBT modules are electrostatic sensitive devices. All modules SEMITRANS®2, 3 and 4 are supplied with ESD protection via a conductive connection between the gate and emitter terminals. This connection should be kept intact until the driver has been connected.

Module assembly must be carried out by qualified staff wearing conductive grounded bracelets at ESD protected, grounded workstations.

2. Heat sink specifications

Preparation, surface specifications

In order to ensure good thermal contact and to obtain the thermal contact resistance values specified in the datasheets, the contact surface of the heat sink must be clean and free from particles. It is useful to clean the mounting surface of the heat sink with wipes and an alcohol cleaner, e.g. isopropanol, right before the mounting process. The following mechanical specifications have to be met:

- Unevenness of heat sink mounting area must be ≤ 50 µm per 100 mm (DIN EN ISO 1101)
- Roughness “Rz” ≤ 10 µm (DIN EN ISO 4287)
- No steps > 10 µm (DIN EN ISO 4287)

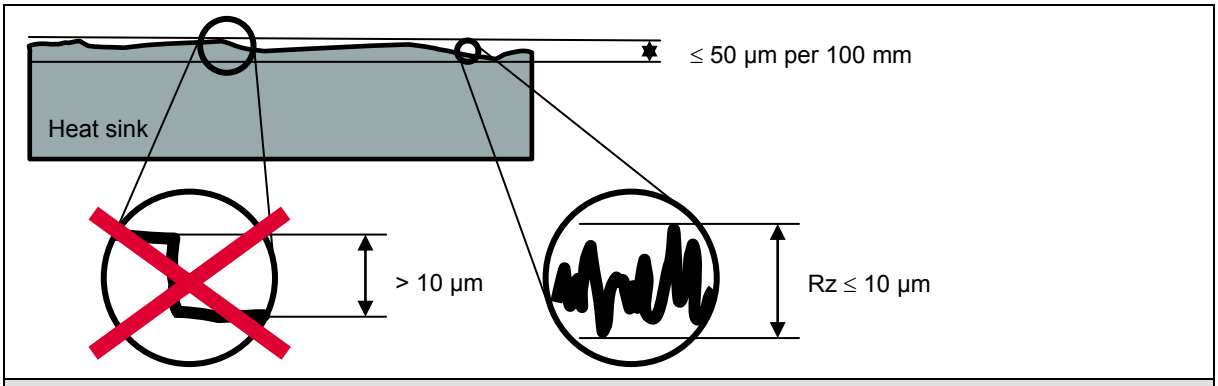
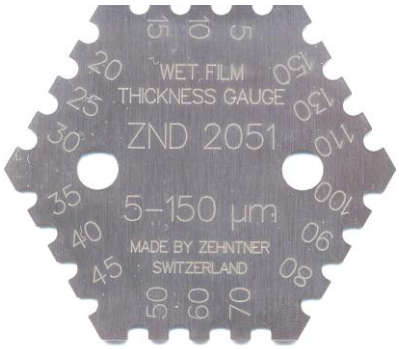


Fig. 1 Heat sink surface specifications

3. Thermal compound

Before assembly onto the heat sink, the module baseplate or the contact surface of the heat sink has to be evenly coated with a thin layer of thermal compound. A layer thickness of 50 µm – 100 µm is recommended for silicone paste P12 from WACKER CHEMIE or silicone-free paste HTC from ELECTROLUBE.

The thickness of the layer can be determined using a measurement gauge as shown in Fig. 2.



Supplier:

ELCOMETER Instruments GmbH
Ulmer Strasse 68
D-73431 Aalen
Germany

phone: +49-7361-52806-0
web: www.elcometer.de

Fig. 2 Wet Film Thickness Gauge 5 – 150 µm

SEMIKRON recommends using screen printing to apply a homogenous layer of thermal paste. In certain cases a hard rubber roller might be suitable for the application of thermal paste.

Weight measurements (spot test) on module before and after thermal compound printing is a good possibility to apply statistical process control to the printing process without performing destrucive testing with the film thickness gauge.

4. Mounting torques

Mounting torques on heat sink M_s

To secure SEMITRANS® IGBT modules, the use of either M6 steel screws (DIN 7045, property class 4.8) in combination with suitable washers and spring lock washers or combination screws is strongly recommended. When doing so, the torque value specified must be observed.

Housing	Screw	Mounting torque M_s [Nm]	
		Min	Max
SEMITRANS®2	M6	3	5
SEMITRANS®3	M6	3	5
SEMITRANS®4	M6	3	5

Table 1: Tightening torque for module mounting

A pre-tightening torque of 0.6 Nm and retightening to the given torque value is recommended.

For the screwing process the speed has to be limited to 300 rpm and soft torque limitation is recommended to avoid torque peaks, which may occur with pneumatic screwdrivers. Calibrated screw drivers (manual screw driver or electrical screw driver) are recommended.

The screws must be tightened in diagonal order with equal torque in several steps until the specified torque value M_s has been reached. An example of the diagonal mounting order is shown is Fig. 3.

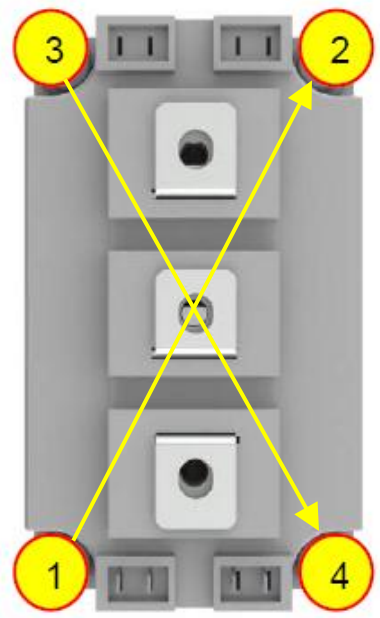


Fig. 3 Example of mounting order

Mounting torque for terminals M_t

For the electrical terminals, suitable screws, washers and spring lock washers or combination screws are to be used. Maximum and minimum thread reaches can be taken from the module drawings (see data sheets) and the permissible tightening torque values M_t must be observed.

Housing	Screw		M_t [Nm]	
	Auxiliary terminal	Power terminal	Min	Max
SEMITRANS®2	-	M5	2,5	5,0
SEMITRANS®3	-	M6	2,5	5,0
SEMITRANS®4	(M4)	M6	(1,1) 2,5	(2,0) 5,0

Table 2: Tightening torque for electrical terminals

5. Power Terminals

Where possible, laminated DC-link bus bars should be used for connections on the DC side of the circuit. In this way, a minimum of stray inductance is achieved, which in turn guarantees a low load with switching surges. In most applications, the use of inductance pulse capacitors (MKP, MKT … 0.22 µF … 1µF) at the DC terminals (collector TOP-IGBT/emitter BOT IGBT) is recommended to prevent parasitic oscillations.

6. Terminal pull forces
SEMITRANS®2

Cable connections of half bridge modules must be mounted in such way that the resulting pull forces per power terminal of the module are limited to 200N and the resulting pull forces per control terminal of the module are limited to 60N.

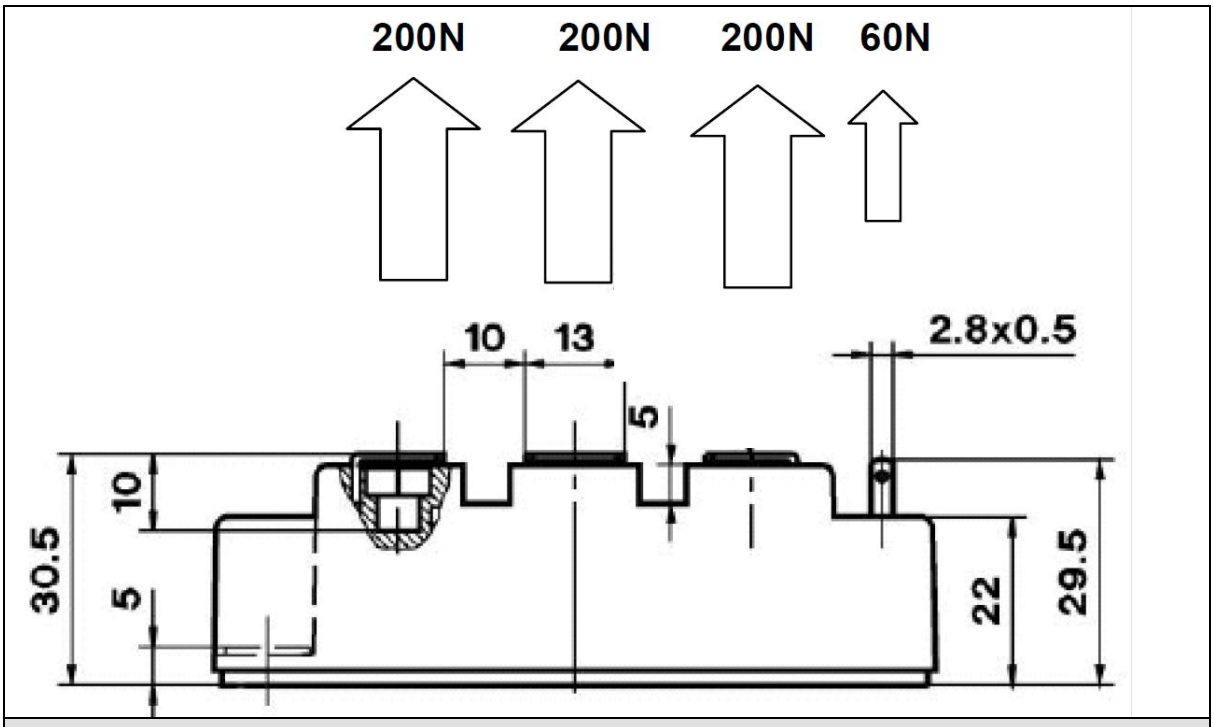


Fig. 4 Half bridge module (SEMITRANS®2)

SEMITRANS®3

Cable connections of half bridge modules must be mounted in such way that the resulting pull forces per power terminal of the module are limited to 250N and the resulting pull forces per control terminal of the module are limited to 60N.

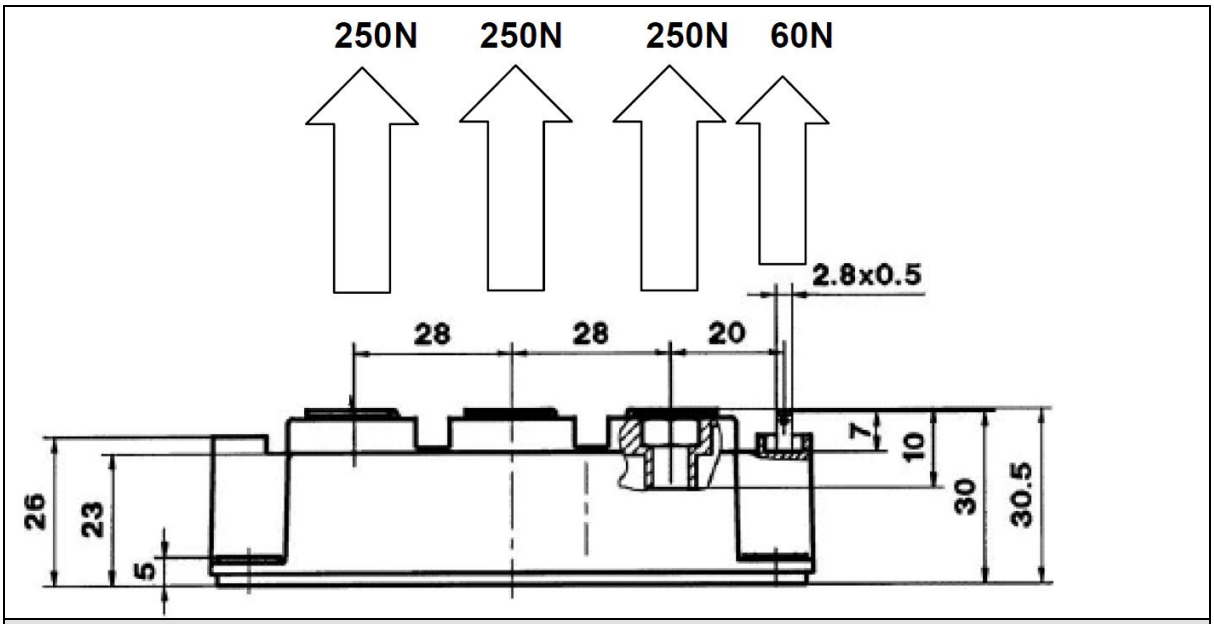


Fig. 5 Half bridge module (SEMITRANS®3)

SEMITRANS®4

Cable connections of ingle switch modules must be mounted in such way that the resulting pull forces per power terminal of the module are limited to 250N and the resulting pull forces per control terminal of the module are limited to 150N.

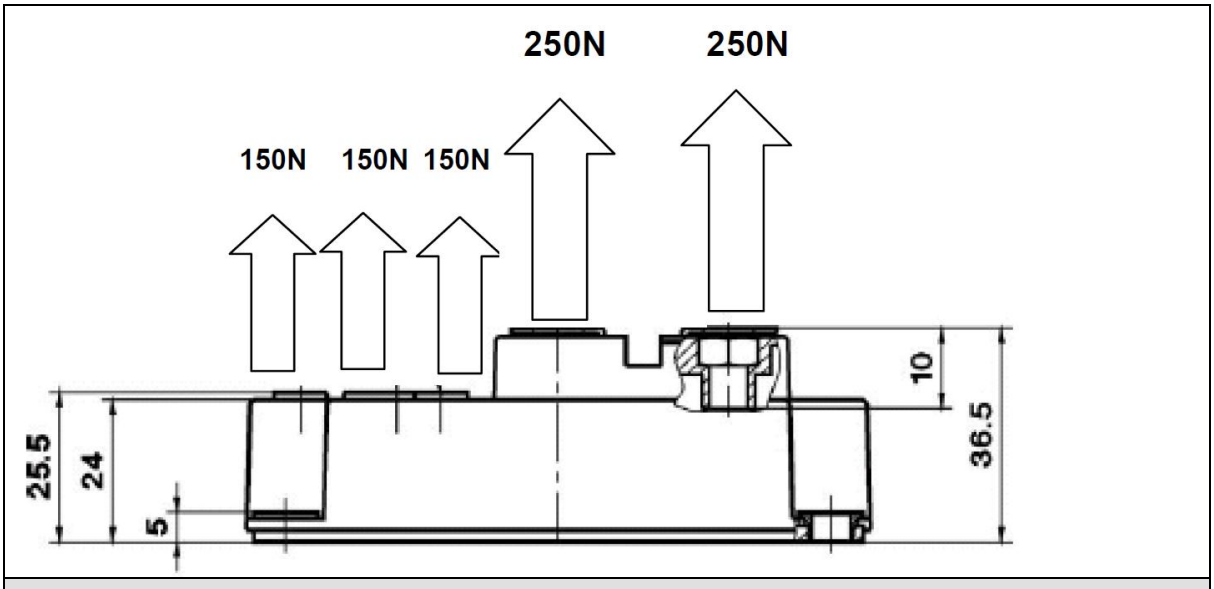


Fig. 6 Single switch module (SEMITRANS®4)

7. Terminal push forces

SEMITRANS®2

Cable connections of half bridge modules must be mounted in such way that the resulting pull forces per power terminal of the module are limited to 250N and the resulting pull forces per control terminal of the module are limited to 60N.

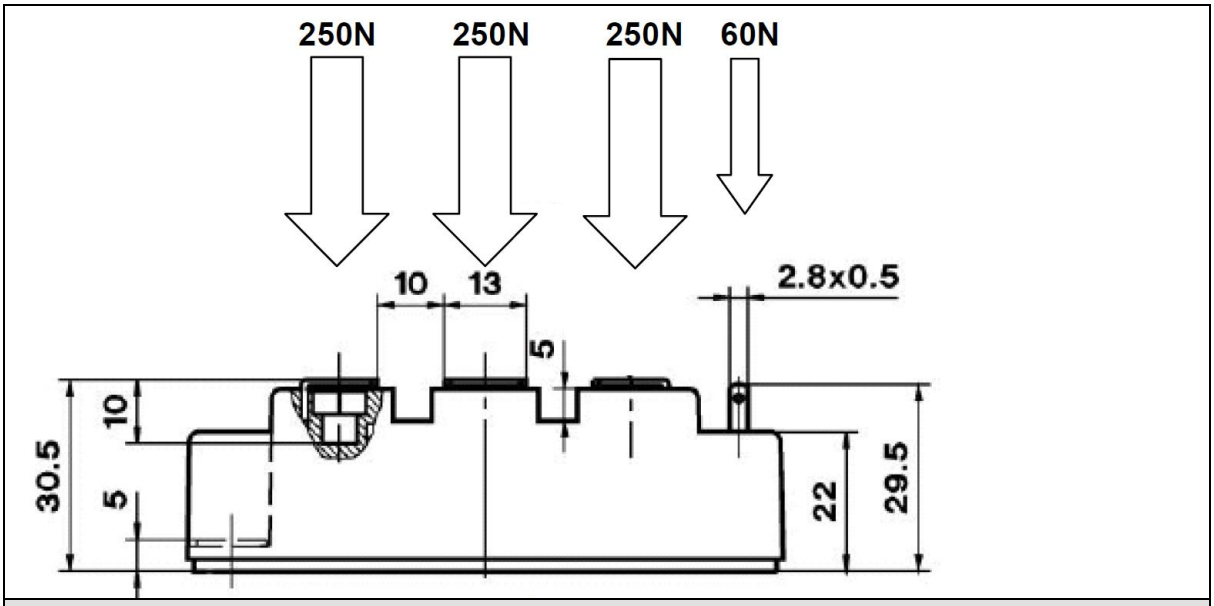


Fig. 7 Half bridge module (SEMITRANS®2)

SEMITRANS®3

Cable connections of **half bridge modules** must be mounted in such way that the resulting pull forces per power terminal of the module are limited to **200N** and the resulting pull forces per control terminal of the module are limited to **60N**.

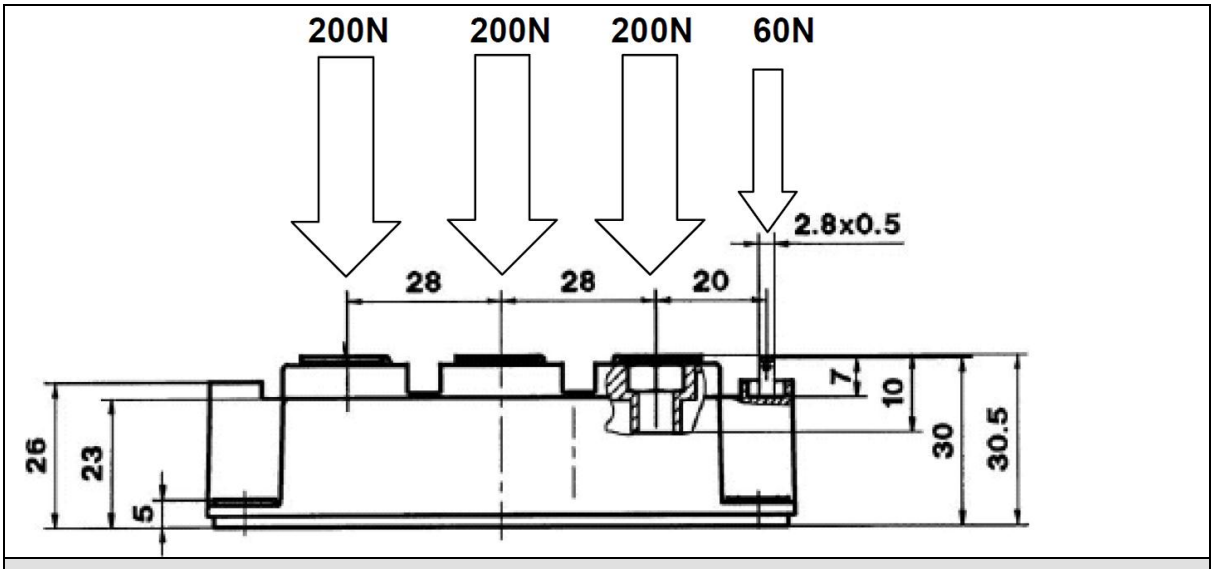


Fig. 8 Half bridge module (SEMITRANS®3)

SEMITRANS®4

Cable connections of ingle switch modules must be mounted in such way that the resulting pull forces per power terminal of the module are limited to 250N and the resulting pull forces per control terminal of the module are limited to 250N.

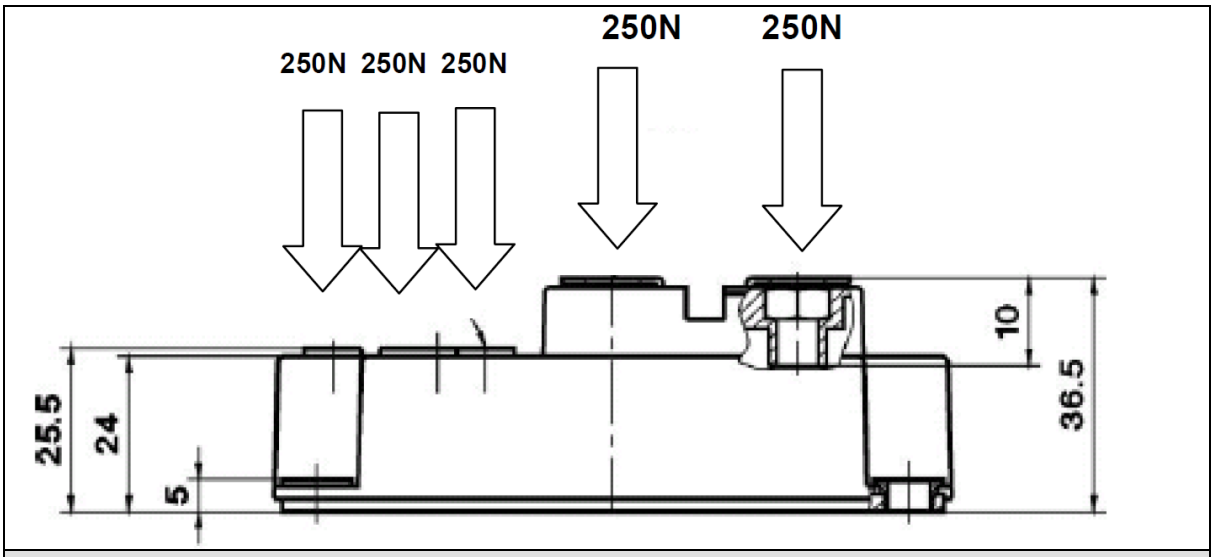


Fig. 9 Single switch module (SEMITRANS®4)

8. Driver connections

All control cables must be twisted conductor cables and kept as short as possible in order to minimize stray inductance and avoid electromagnetic interference and oscillation.

SEMIKRON recommends the use of SEMIKRON drivers (data sheets available on the internet under: http://www.semikron.com)

9. Mounting accessories

SEMIKRON offers a standard accessories kit (ID No. 33321100) for 10 SEMITRANS® 2, 3 and 4 modules each or 4 SEMITRANS® 6, 7 modules each.

Units	Type
30	Cross recessed screws M4x8 Z4-1 DIN 7045-4.8
30	Cross recessed screws M5x12 Z4-1 DIN 7045-4.8
30	Cross recessed screws M6x12 Z4-1 DIN 7045-4.8
40	Cross recessed screws M6x16 Z4-1 DIN 7045-4.8
50	Push-on receptacles A2.8-0.5 (2.8 x 0.5)

Table 3: Content of the accessories kit

10. Disclaimer

SEMIKRON reserves the right to make changes without further notice herein to improve reliability, function or design. Information furnished in this document is believed to be accurate and reliable. However, no representation or warranty is given and no liability is assumed with respect to the accuracy or use of such information, including without limitation, warranties of non-infringement of intellectual property rights of any third party. SEMIKRON does not assume any liability arising out of the application or use of any product or circuit described herein. Furthermore, this technical information may not be considered as an assurance of component characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability. This document supersedes and replaces all information previously supplied and may be superseded by updates without further notice.

SEMIKRON products are not authorized for use in life support appliances and systems without the express written approval by SEMIKRON.

SEMIKRON INTERNATIONAL GmbH
P.O. Box 820251 • 90253 Nuremberg • Germany
Tel: +49 911-65 59-234 • Fax: +49 911-65 59-262
sales.skd@semikron.com • www.semikron.com