SWITCHERGEAR
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Accessory ADP002

Half-bridge adaptor kit
Semikron™ Semiteach™ IGBT

REFERENCE MANUAL

Features

Standard accessory for SwitcherGear

Adaptor for Semikron Semiteach IGBT

interfaces to SwitcherGear Module CON002

LED indicators for power, gate activity and fault active

Test points for gate and fault signals

Integrated cable management

Applications

Using Semikron Semiteach IGBT with SwitcherGear controller

3-phase half-bridge converter

motor drives, grid active front-end, etc.

Half-bridge

PV boost, battery DC-DC, etc.

Full-bridge

isolated DC-DC, etc.

General Description

The ADP002 accessory is a kit of multiple half-bridge adaptors and a set gate-driver power cables. It allows standard 20-way gate-driver ribbon cables to connect to the half-bridges of a Semikron Semiteach IGBT unit.

Ordering Information

Order Code	***Description***
`ADP002/3`	*SwitcherGear accessory, 3-phase adaptor kit for Semikron Semiteach IGBT*
`ADP001`	*SwitcherGear accessory, single adaptor for Semikron Semiteach IGBT*
`CBL002`	*SwitcherGear accessory, gate driver power cable set for Semikron Semiteach IGBT*
`CON002`	*SwitcherGear module, triple half-bridge gate-driver interface, 20-way ribbon cable*
`CBL003`	*SwitcherGear accessory, 20-way ribbon cable*

Quick Start

1. **Attach gate-driver power cables**

   Attach the red and blue cables to the screw terminals of one half-bridge adaptor. Then attach the 4 mm safety connectors of the cables to the Semikron Semiteach IGBT terminals for the gate-driver power.

2. **Attach adaptors to Semiteach IGBT**

   Using the locking bayonet mechanism, attach each half-bridge adaptor to the BNC connectors on the Semiteach IGBT.

3. **Attach ribbon cable**

   Run the ribbon cables from the controller and connect to the half-bridge adaptors, making sure that the ribbon cable that carries signals for HB1 is connected to Semiteach IGBT half-bridge 1, and so on.

Standard Interfaces

Figure 1 shows the interface connectors and features of one half-bridge adaptor.

Semikron Semiteach IGBT

The adaptor kit includes one half-bridge adaptor for each half-bridge gate-driver of the Semikron Semiteach IGBT unit. Each half-bridge adaptor attaches to the vertically aligned BNC connectors of one gate-driver of the Semiteach IGBT unit, which carry the gate and error signals.

The power for the gate-drivers is provided from a 2-way screw terminal on the adaptors, using a set of cables that is included in the adaptor kit.

Ribbon Cable Connector

Each adaptor kit accepts a 20-way ribbon cable that carries the control signals and gate-driver power. The pin-out conforms to a standard that is used for half-bridge gate-drivers.

The other end of the ribbon cable is typically connected to a SwitcherGear CON002 module interface, that processes and routes the control signals to the microcontroller and provides power for the gate driver.

Indicator LEDs

Four LED indicators provide status information about the control signals and power of the adaptor.

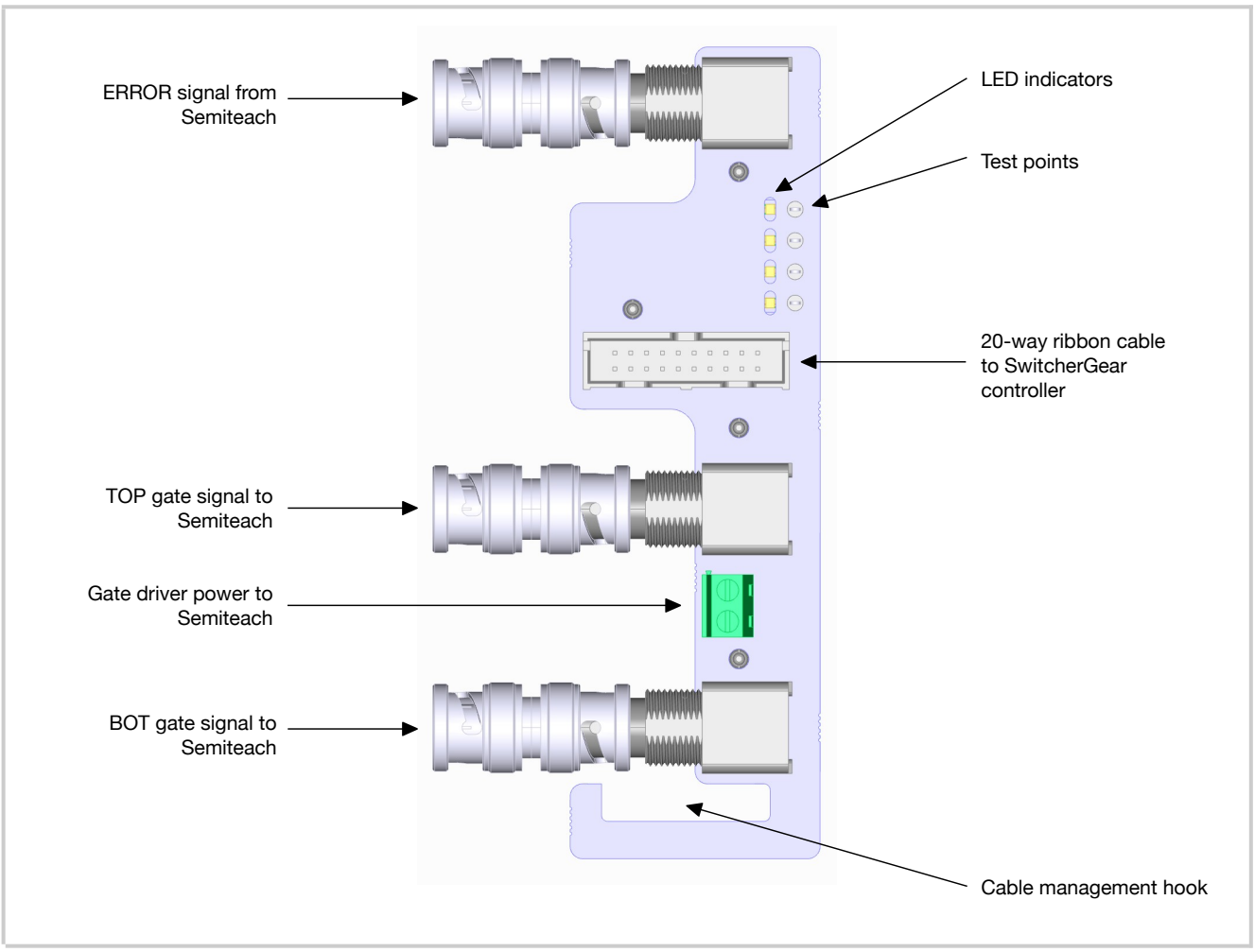

Table 1: LED indicators in order from top to bottom.

Colour	Description
●	ERR signal from either the top or the bottom gate driver is active.
●	TOP gate signal is active.
●	BOT gate signal is active.
●	Gate driver power is present.

Test Points

Test points allow the gate and error signals to be monitored during operation of the controller.

Table 2: Test points in order from top to bottom.

Signal	Description
ERR	Monitor signal for the ERR control signal.
TOP	Monitor signal for the TOP control signal of the top IGBT gate driver.
BOT	Monitor signal for the BOT control signal of the bottom IGBT gate driver.
GND	0V reference for the monitor signals.

Functional Description

The ADP002 adaptor kit has two functions:

- to allow the power and signals in a standard 20-way gate-driver ribbon cable (e.g. from SwitcherGear Module CON002) to be connected to the low-voltage terminals of a Semikron Semiteach IGBT unit.
- to allow the user to check the status of the control signals to the converter.

The adaptor does not provide any voltage translation or buffering of the gate signals or the error signal.

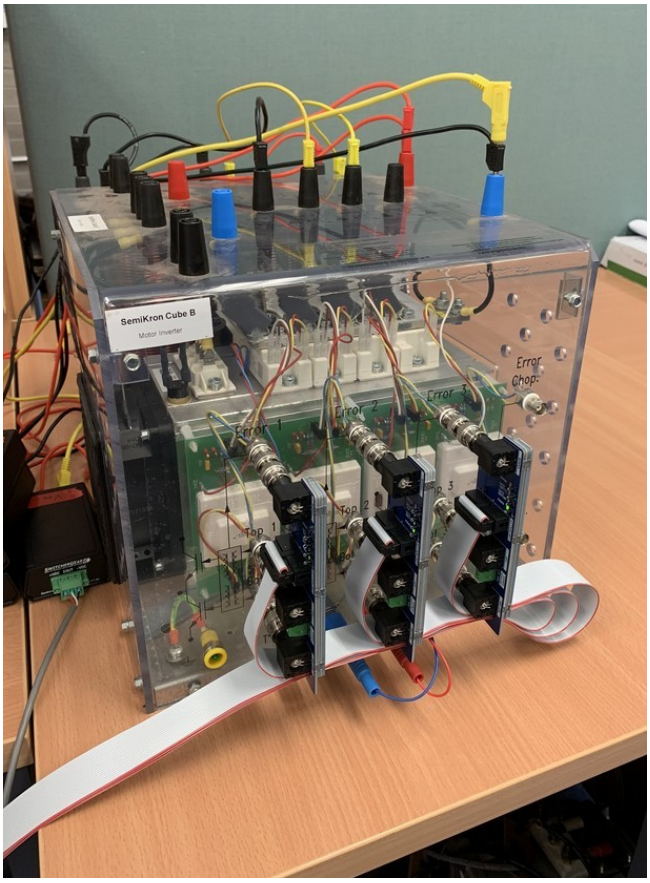

Figure 1: Three-phase adaptor kit ADP002/3 used on Semikron Semiteach IGBT. Note the routing of the ribbon cables through the cable management hooks, and the looping of the cable at the right side to take up slack.

Applications Information

Indicator LEDs

When a gate signal is logic high, the corresponding IGBT in the Semiteach unit is turned on. The corresponding indicator LED on the adaptor is turned on.

When driving the gates with pulse waveforms (e.g. PWM or six-step pulses) the LEDs will flash on and off at a very fast rate. In this situation, the LEDs will not appear to flash, but to be constantly on. The intensity of the LEDs will vary according to the proportion of time that the IGBT is on compared to the period of the pulse train.

When a gate-driver detects a fault condition (de-saturation of the IGBT, or a low gate-driver supply voltage), the error signal is pulled to a logic low level. The ERR indicator LED on the adaptor is turned on.

Test Points

The signals on the test points are protected versions of the control signals, not the actual control signals. Use only test equipment with a high input impedance to monitor the signals on the test points. It is highly recommended that you use test leads with hook-clip probes to attach securely to the test points. Only attach, or remove, the hook-clips to the test points when the system is NOT operating.

The monitor test points are protected against damage by accidental connection to each other. The operation of the actual gate driver control signals is not affected by such accidental connection. The actual ERR control signal may be affected and cause a fault level to occur.

Cable Management

The ribbon cables should be run through the hook at the bottom of each adaptor.

The ribbon cables should be physically separated from the high power wiring of the power converter. This can be achieved by keeping the ribbon cables at the front of the Semiteach IGBT unit and the high power wiring at the back of the unit. See Figure 1 for an example.

Warnings

The length of the ribbon cables that are connected to the half-bridge adaptors must not be longer than 3 m.

The half-bridge adaptors do not provide an interlock mechanism to prevent simultaneous turn-on of the lower and upper IGBTs in a half-bridge.
It is the user's responsibility to ensure that the TOP and BOT gate signals in a half-bridge are complementary and have appropriate dead-time at the switching transitions.

The half-bridge adaptors do not provide any isolation. A gate-driver with suitable isolation must be used to drive power devices in a mains-connected power system.

Revision History

Revision	Date	Changes From Previous Release
1	16 Apr 2014	▪ Original release.
2	8 Mar 2019	▪ Complete update.