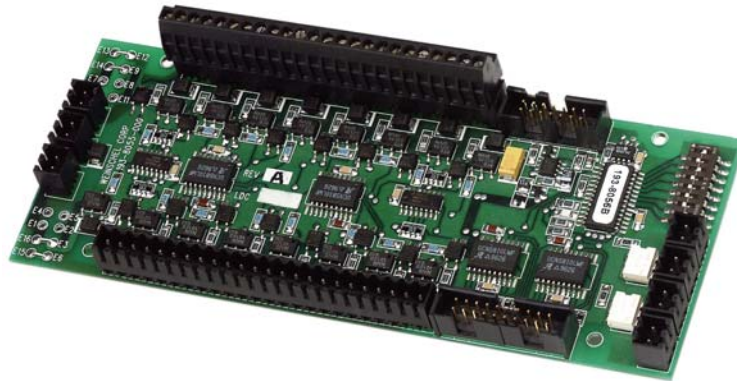# Operation & Installation Manual

Switch Driver Card
(P/N 193-8055-000)

This documentation may not be reproduced in any form, for any purpose unless authorized in writing by API / Weinschel, Inc..

api
technologies corp.
›WEINSCHEL

© API / Weinschel, Inc.
Frederick, Maryland
1998, 2001, 2003

TABLE OF CONTENTS

GENERAL

Description

The Weinschel Switch Driver card (PN 193-8055-00x) is designed for controlling electromechanical switches. When used in conjunction with the 8210A SmartStep controller, the Switch Driver allows for computer control of a variety of devices.

The Switch Driver (Figure 1) provides 16 independent optically isolated outputs and inputs. Up to 16 cards may be attached to the 8210A SmartStep controller, for control of up to a total of 256 individual switch sections.
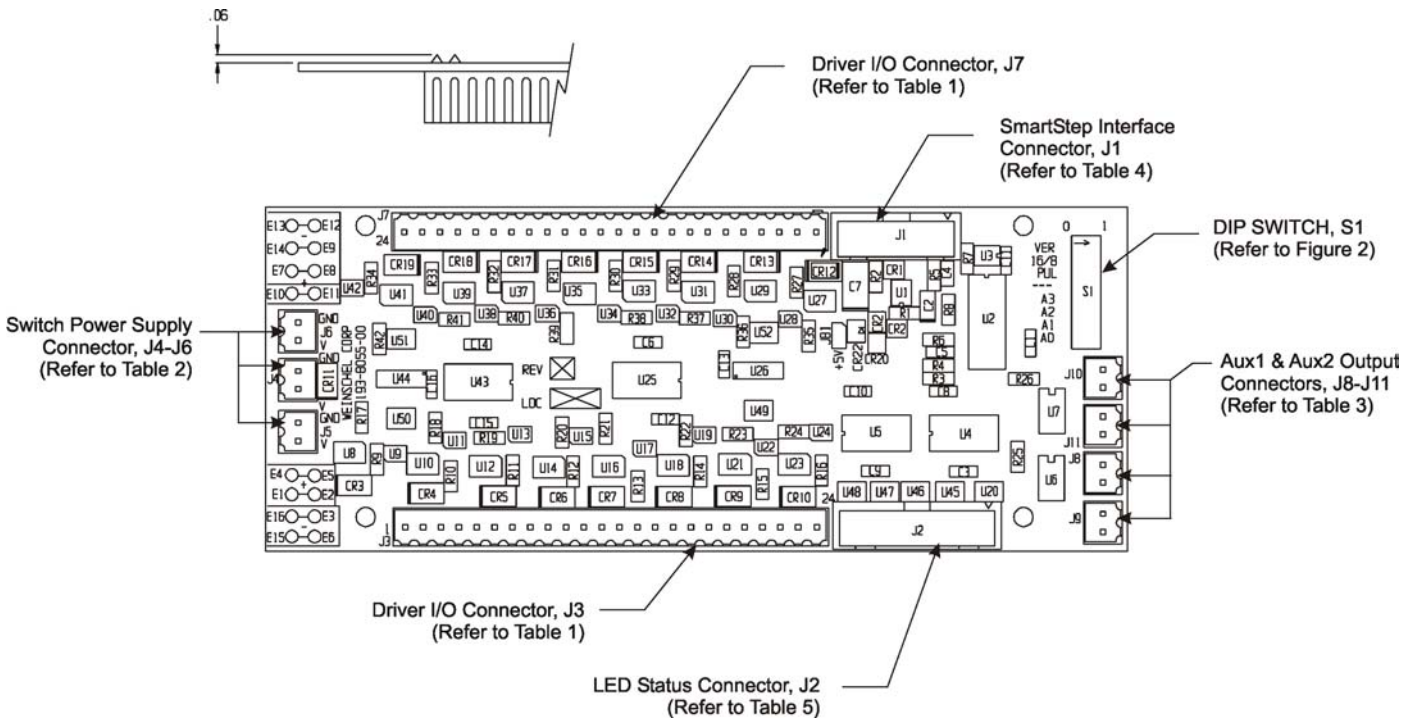

Figure 1. Switch & Connector Location

The outputs are configurable for steady state or pulsed operation, with programmable pulse widths that can be adjusted in order to optimize switching speed. The output drivers are optically isolated power MOSFETs that can deliver 350mA, 32VDC in steady-state operation or up to 1A when operating in pulsed mode. The outputs are protected with transient suppressors to help reduce the switching transients generated when driving inductive loads. Connections are provided on the card for the external power supply required by the switches to help simplify switch wiring.

The Switch Driver card can be configured for 16-channel or 8-channel mode. In 16-channel mode, each driver is independently controlled. In 8-channel mode two bits are used per channel, with one bit being the inverse of the other bit. This mode can be used to drive two coil switches, one for set and one for reset.

In order to accommodate a variety of switch types, the card is available in two different output configurations: Common Voltage (-001 assy) or Common Ground (-002 assy). In the Common Ground configuration, the output drivers provide voltage when turn on, sourcing current to the external device. In the Common Voltage configuration, the output drivers provide a path to ground when they are on, sinking current from the external connection. In either configuration, when the output is deactivated the driver is off, not allowing current to flow.

The Switch Driver optically isolated inputs can be used to verify switching operation when used with switches that can sense switch position. The card allows for a programmable delay period for the switch sense lines to settle, allowing the sensing delay to be adjusted to conform to the switch characteristics. The delay time is independent of pulse/steady-state output operation, and may also be used to provide a "recovery" or idle time between output changes, as required by some types of switches.

Pulse widths and sensing delay can be set from 1 to 255 ms per switching operation in 1 ms increments. The pulse width default setting is 25ms. The sensing delay default is 10ms.

The Switch Driver provides two additional auxiliary switches that are independent of the main outputs. These two switches provide there own separate inputs, and can be used to switch higher current loads, such as DC power supplies. The Aux1 switch is configured for AC/DC operation, and will handle 1A (+/-60VDC or AC peak), while the Aux2 switch is configured for DC operation, and will handle up to 2A at 60VDC. The two Auxiliary switches are not transient protected.

The card contains a separate status output connector that can be used to drive LED indicators to provide a visual indication of the switch settings. The LED output port contains current-limiting resistors that provide approx. 5mA of current per LED.

Setting Card ID and Configuration

The Switch Driver card ID and default configuration is set via an eight position DIP switch (S1) located in the upper corner of the card. The individual sections have a value of 0 when they are in the OFF position, and a value of 1 when they are in the ON position as indicated by the arrow located at the top of the switch.
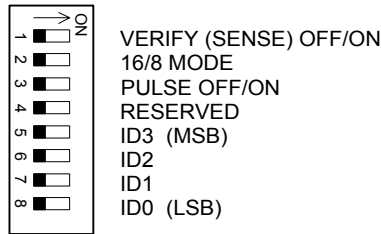
```
          →ON
    1  ■▭    VERIFY (SENSE) OFF/ON
    2  ■▭    16/8 MODE
    3  ■▭    PULSE OFF/ON
    4  ■▭    RESERVED
    5  ■▭    ID3  (MSB)
    6  ■▭    ID2
    7  ■▭    ID1
    8  ■▭    ID0  (LSB)
```

Figure 2 – DIP Switch layout (shown with all switches in the OFF position)

Each Switch Driver must have a unique card ID, which is determined by the settings of the DIP switch sections S1-5 through S1-8, labeled ID3-ID0. These four switches provide for a total of 16 ID's, from 0 (0000_2) to 15 (1111_2). The ID value is set in an 8-4-2-1 binary fashion, with ID3 (msb) having the value of 8, and ID0 (lsb) having a value of 1.

ID3	ID2	D1	D0	ARD ID
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	10
1	0	1	1	11
1	1	0	0	12
1	1	0	1	13
1	1	1	0	14
1	1	1	1	15

Verify Mode operation (Position Sensing) is controlled via switch S1-1. When the Verify Mode is OFF (switch S1-1 OFF), queries as to the current switch position are simply reported as the last programmed state. When sensing is enabled (switch S1-1 ON), queries will read back the position in which they are currently sensed. Verify mode requires switches that have a means of indicating the current position, typically with a separate set of mechanical or electrical contacts.

16/8 channel operation is selected via switch S1-2. In 16 channel mode (switch S1-2 OFF), each of the 16 I/O circuits operate independently. In 8 channel mode (switch S1-2 ON), two bits are paired together and one bit is the inverse of the other. The channel pairs formed are OUT1 SET/OUT1 RESET, OUT2 SET/OUT2 RESET, etc. This mode can be used to drive two coil switches, one for SET and one for RESET.

Pulse/steady-state output selection is controlled via switch S1-3. In steady-state operation (switch S1-3 OFF), the outputs are driven continuously when they are turned on. In pulse mode operation (switch S1-3 ON), the output drivers are turned on for the programmed pulse width time, after which they are disabled. Pulse mode operation is typically used with latching-style switches.

Switch S1-4 is reserved for special operating modes, and should always be in the OFF position for normal operation.
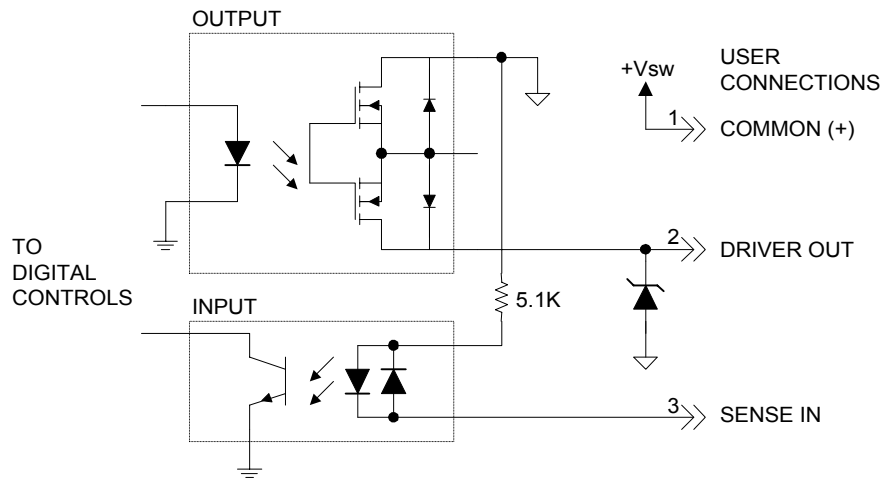
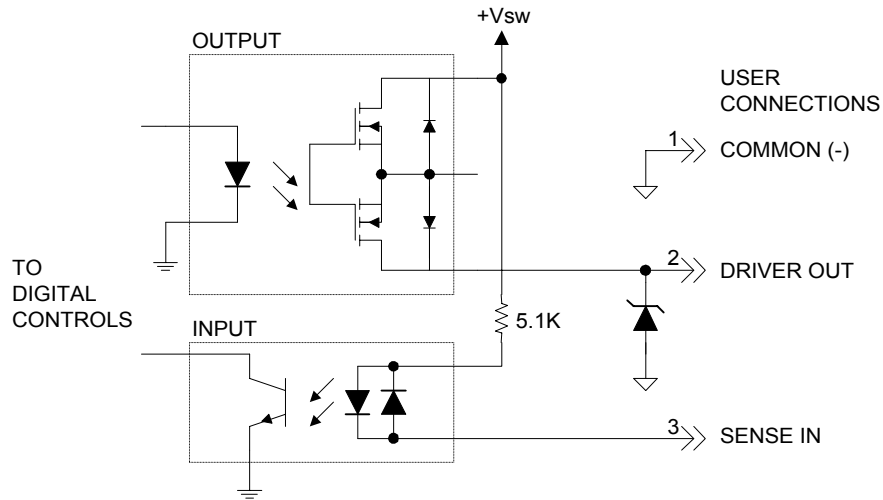*Figure 3 - Common Voltage I/O Configuration (-001 Assy) 1 of 16*

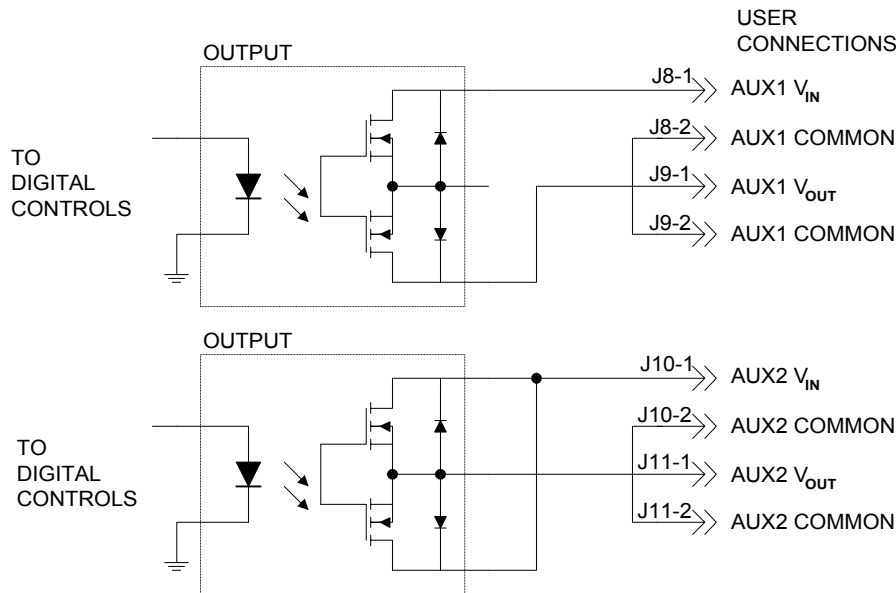*Figure 4 - Common Ground I/O Configuration (-002 Assy) 1 of 16*

Figure 5 – Aux1 and Aux2 Output Configuration

Table 1 – Driver I/O Connections (J3, J7)

24-pin 3.50mm Terminal Block, mates with Weidmuller P/N 163900

CONNECTOR	DESCRIPTION 16 Ch (16/8 OFF)	DESCRIPTION 8 Ch (16/8 ON)	CONNECTOR	DESCRIPTION 16 Ch (16/8 OFF)	DESCRIPTION 8 Ch (16/8 ON)
J3-1	Com	Com	J7-1	Com	Com
J3-2	Out1	Out1 Set	J7-2	Out9	Out5 Set
J3-3	In1	In1 Set	J7-3	In9	In5 Set
J3-4	Com	Com	J7-4	Com	Com
J3-5	Out2	Out1 Reset	J7-5	Out10	Out5 Reset
J3-6	In2	In1 Reset	J7-6	In10	In5 Reset
J3-7	Com	Com	J7-7	Com	Com
J3-8	Out3	Out2 Set	J7-8	Out11	Out6 Set
J3-9	In3	In2 Set	J7-9	In11	In6 Set
J3-10	Com	Com	J7-10	Com	Com
J3-11	Out4	Out2 Reset	J7-11	Out12	Out6 Reset
J3-12	In4	In2 Reset	J7-12	In12	In6 Reset
J3-13	Com	Com	J7-13	Com	Com
J3-14	Out5	Out3 Set	J7-14	Out13	Out7 Set
J3-15	In5	In3 Set	J7-15	In13	In7 Set
J3-16	Com	Com	J7-16	Com	Com
J3-17	Out6	Out3 Reset	J7-17	Out14	Out7 Reset
J3-18	In6	In3 Reset	J7-18	In14	In7 Reset
J3-19	Com	Com	J7-19	Com	Com
J3-20	Out7	Out4 Set	J7-20	Out15	Out8 Set
J3-21	In7	In4 Set	J7-21	In15	In8 Set
J3-22	Com	Com	J7-22	Com	Com
J3-23	Out8	Out4 Reset	J7-23	Out16	Out8 Reset
J3-24	In8	In4 Reset	J7-24	In16	In8 Reset

Note : For the –001 Assy (Common Voltage), Com is connected to Vsw (+) power supply input.
        For the –002 Assy (Common Ground), Com is connected to Vsw RET (-) supply return.

Table 2 – Switch Power Supply Connections (J4, J5, J6)

2-pin 3.50mm Terminal Block, mates with Weidmuller P/N 163878

CONNECTOR	DESCRIPTION
J4-1	Vsw RET (-)
J4-2	Vsw (+)
J5-1	Vsw RET (-)
J5-2	Vsw (+)
J6-1	Vsw RET (-)
J6-2	Vsw (+)

Table 3 – Aux1 and Aux2 Output Connections (J8, J9, J10, J11)

2-pin 3.50mm Terminal Block, mates with Weidmuller P/N 163878

CONNECTOR	DESCRIPTION
J8-1	Aux1 Vin
J8-2	Aux1 Com
J9-1	Aux1 Vout
J9-2	Aux1 Com
J10-1	Aux2 Vin
J10-2	Aux2 Com
J11-1	Aux2 Vout
J11-2	Aux2 Com

Table 4 – SmartStep Interface Conenctions (J1)

14-pin 0.025" square post header, 0.1" center. Mates with AMP 746285-2, or equivalent

CONNECTOR	DESCRIPTION
J1-1	+15V
J1-2	+15V
J1-3	+15V RET
J1-4	+15V RET
J1-7	SDA
J1-8	SCL
J1-14	/RST

Table 5 – Led Status Connector (J2)

20-pin 0.025" square post header, 0.1" center. Mates with AMP 746285-4, or equivalent

CONNECTOR	DESCRIPTION
J2-1	Out1 Status
J2-2	Out2 Status
J2-3	Out3 Status
J2-4	Out4 Status
J2-5	Out5 Status
J2-6	Out6 Status
J2-7	Out7 Status
J2-8	Out8 Status
J2-9	Out9 Status
J2-10	Out10 Status

CONNECTOR	DESCRIPTION
J2-11	Out11 Status
J2-12	Out12 Status
J2-13	Out13 Status
J2-14	Out14 Status
J2-15	Out15 Status
J2-16	Out16 Status
J2-17	Aux1 Status
J2-18	Aux2 Status
J2-19	+V
J2-20	GND