

Bettis OM1 - SCE300

Modulating Input/Output Module



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NOTICE

Before installation, these instructions must be fully read and understood.

Section 1: Optional Module 1: Modulating I/O Module

1.1 OM1 Module Functionality

The OM1 Modulating I/O module is supplied as an option on Bettis SCE300 actuators. It is possible to receive the actuator already equipped with the OM1, ordering it with the basic feature.

Alternatively, it is possible to order the OM1 as a separate kit and install it in the basic actuator in the factory or in the field.

The OM1 is an optional module suitable to accomplish the following SCE300 actuator additional functionalities:

- Positioner with analog position input 4 to 20 mA or 0 to 10 V DC optocoupled
- Analog output position transmitter 4 to 20 mA or 0 to 10 V DC optocoupled
- Monitor relay remote indication for:
 - loss of power
 - stop by torque out of limit
 - direction failure
 - over-temperature
 - position sensor alarm
 - valve jammed
 - hardware malfunction
 - alarm on local control panel (if present)
 - stroke failure
- Blinker/Local selector relay remote indication
- 4 additional SPST output contacts to be set independently at 12.5% intervals along the stroke. Contacts are configurable (make or break).

NOTICE

For decommissioning instructions, please refer to the relevant section in the SCE300 manual reference VCIOM-13933-EN.

⚠ WARNING

SCE300 actuators must be electrically isolated before any disassembling or reassembling operations. Before any disassembling or reassembling operations, please follow in detail the relevant paragraph of the basic installation and operating manual (latest revision available).

⚠ WARNING

The electronic parts of the SCE300 actuators and all option modules can be damaged by a discharge of static electricity. Before you start, touch a grounded metal surface to discharge any static electricity.

⚠ WARNING

It is assumed that the installation, configuration, commissioning, maintenance and repair works are carried out by qualified personnel and checked by responsible specialists.

⚠ WARNING

Repair work, other than operations outlined in this manual, is strictly reserved to qualified Bettis personnel or to personnel authorized by the company itself.

1.2 Manufacturer

Manufacturer with respect to Machinery Directive 98/37, as specified on the motor label.

Section 2: Installation

To assemble the OM1 into the SCE300 actuator, proceed as follows:

- Ensure that all the parts received with the OM1 are available as described in Section 5.
- Using Section 5, select only mechanical parts (screws and spacers) depending on actuator models.
- Gather the right tools for the assembly and for setting the actuator controls.
- With an Allen wrench of 5 mm, unscrew the cover screws as shown in Figure 1.
- Remove the actuator cover as shown in Figure 2.

Figure 1.



Figure 2.



Follow one of the following assembling procedures depending on actuator model.

2.1 Assembling Procedure for Models 63-125 N•m Old Version (US or Non-US Market)

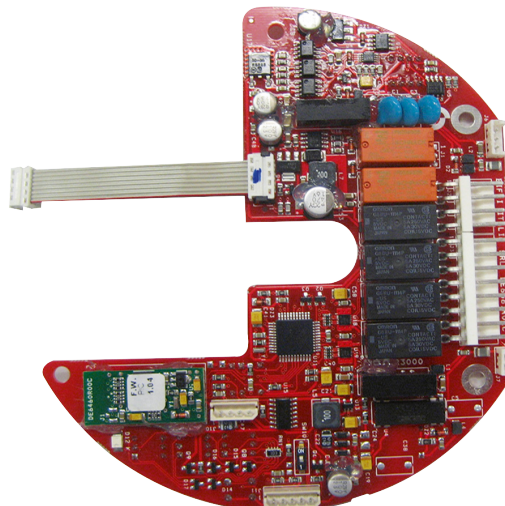
- Detect the 4 black cables required for the OM1 which are already included in the basic actuator as shown in Figure 3.

Figure 3.

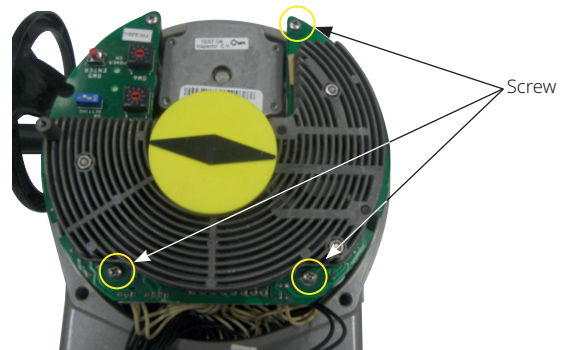


- Connect the flat cable furnished into the kit to connector J9 on OM1 as shown in Figure 4.

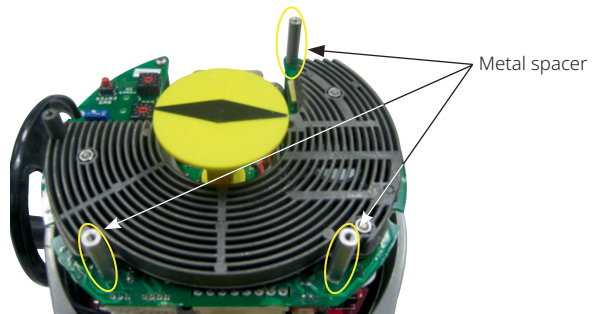
Figure 4.



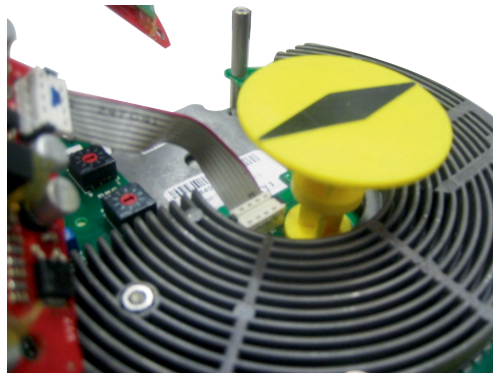
- Unscrew the 3 screws as shown in Figure 5:
 - 3 pieces of M3x10

Figure 5.

Tighten the 3 metal spacers as shown in Figure 6.

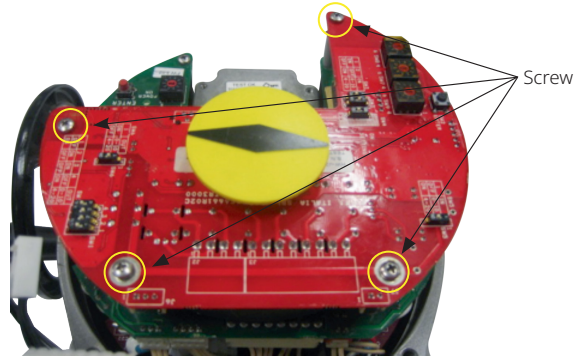
Figure 6.

- In Figure 7, connect OM1 flat cable to connector J8 on the logic board.

Figure 7.

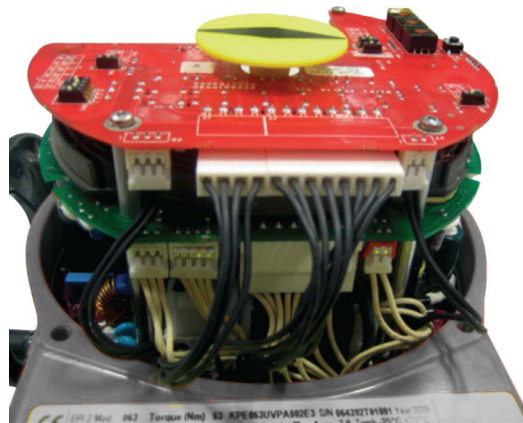
- In Figure 8, place the OM1 card onto the spacer and tighten the 4 screws.

Figure 8.



- Connect the following connector as shown in Figure 9:
 - the 8-pin connector to connector J3 on OM1
 - the 4-pin connector to connector J2 on OM1
 - the 3-pin connector to connector J6 on OM1
 - the 2-pin connector to connector J7 on OM1

Figure 9.



2.2 Assembling Procedure for Models 250-500-1000-2000 N•m Old Version (US or Non-US Market)

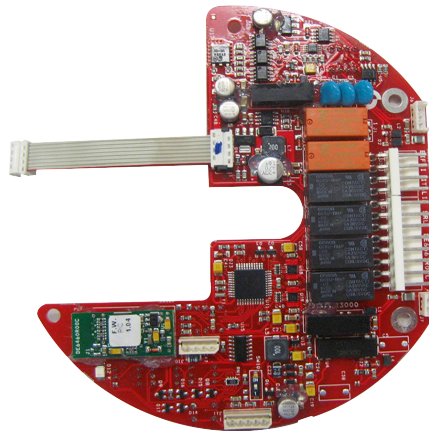
- Detect the 4 black cables required for the OM1 which are already included in the basic actuator; disassemble local mechanical indicator as shown in Figure 10.

Figure 10.



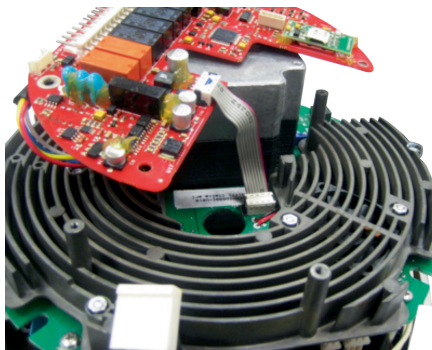
- In Figure 11, connect the flat cable furnished into the kit to connector J9 on OM1.

Figure 11.



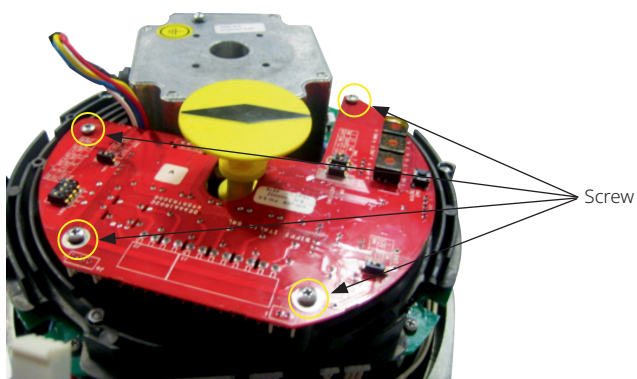
- In Figure 12, connect the OM1 flat cable to the connector on the logic board.

Figure 12.

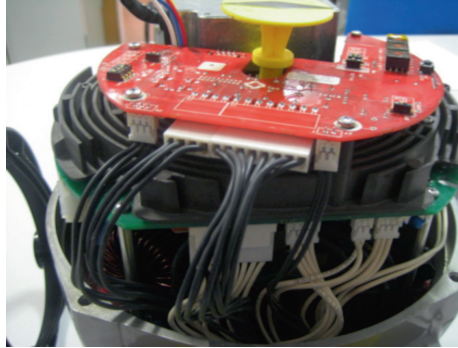


- Place the OM1 card onto the heat sink spacers and tighten the 4 screws; assemble local mechanical indicator shown in Figure 13.

Figure 13.



- Connect the following connector as shown in Figure 14:
 - the 8-pin connector to connector J3 on OM1
 - the 4-pin connector to connector J2 on OM1
 - the 3-pin connector to connector J6 on OM1
 - the 2-pin connector to connector J7 on OM1

Figure 14.

2.3 Assembling Procedure for Models 63-125 N•m New Version (US or Non-US Market)

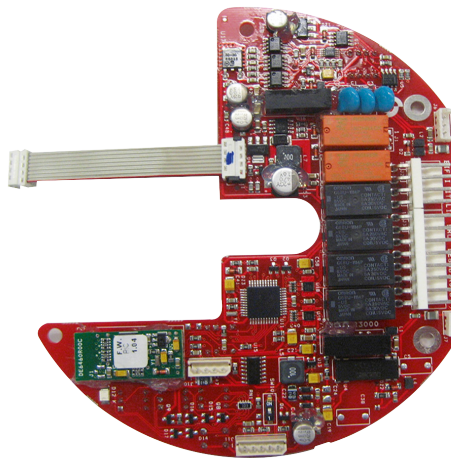
- Detect the 3 black cables required for the OM1 which are already included in the basic actuator as shown in Figure 15.

Figure 15.



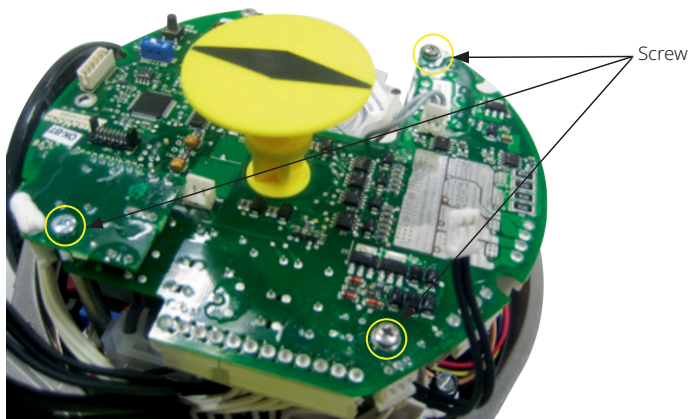
- Connect the flat cable furnished into the kit to connector J9 on OM1 as shown in Figure 16.

Figure 16.



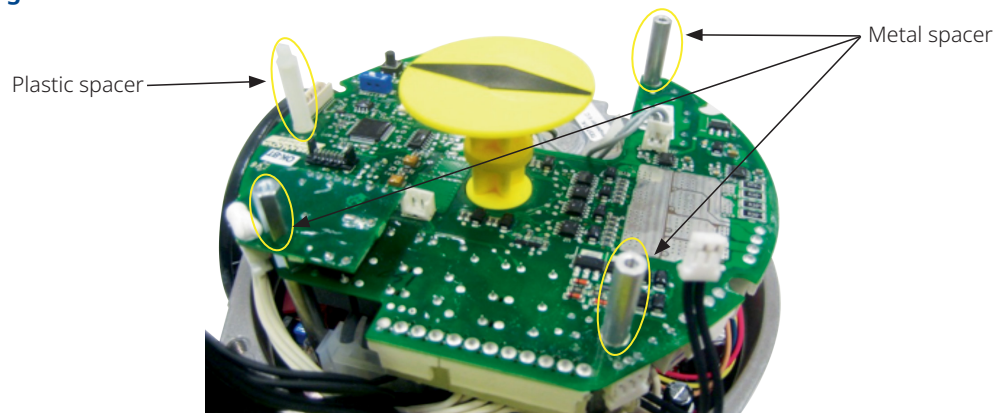
- Unscrew the 3 screws as shown in Figure 17.

Figure 17.



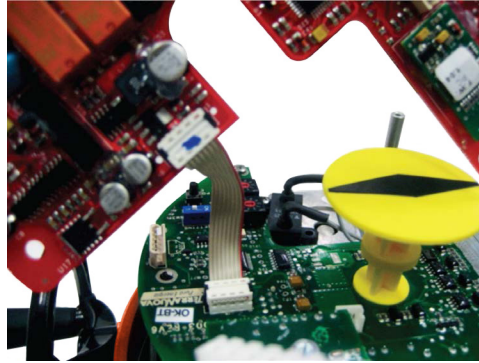
- Tighten the 3 metal spacers and the plastic metal spacer as shown in Figure 18.

Figure 18.



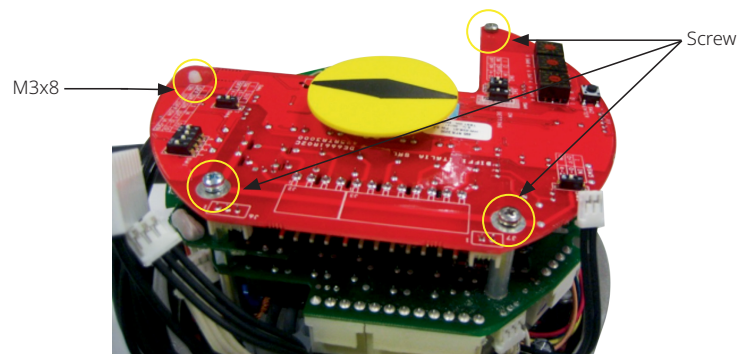
- Connect OM1 flat cable to connector J8 on the logic board as shown in Figure 19.

Figure 19.



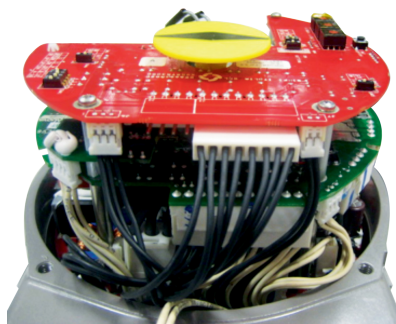
- Place the OM1 card onto the spares and tighten the 3 screws as shown in Figure 20.

Figure 20.



- Connect the following connectors as shown in Figure 21:
 - the 8-pin connector to connector J3 on OM1
 - the 3-pin connector to connector J6 on OM1
 - the 2-pin connector to connector J7 on OM1

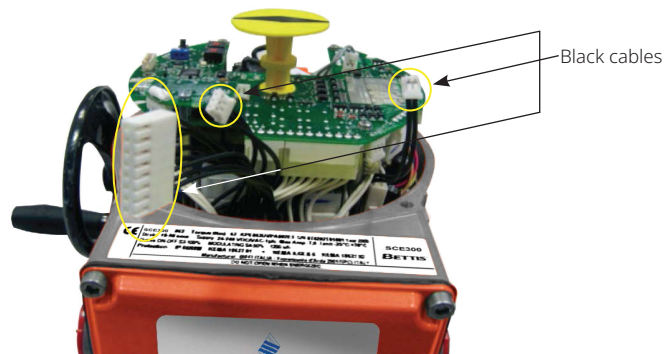
Figure 21.



2.4 Assembling Procedure for Models 250-500-1000-2000 N•m New Version (US or Non-US Market)

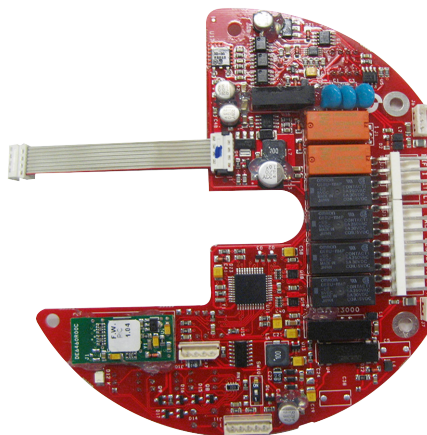
- Detect the 3 black cables required for the OM1 which are already included in the basic actuator as shown in Figure 22.

Figure 22.



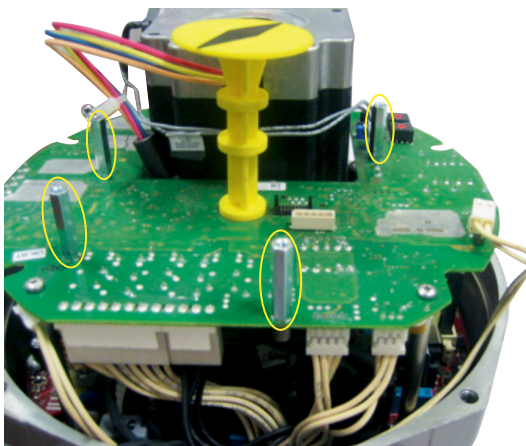
- Connect the flat cable furnished into the kit to connector J9 on OM1 as shown in Figure 23.

Figure 23.



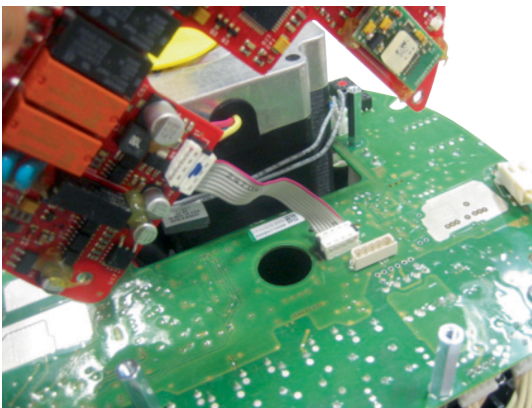
- Add N° 3 spacers and unscrew the screw (A) that fix the motor cable as shown in Figure 24.

Figure 24.



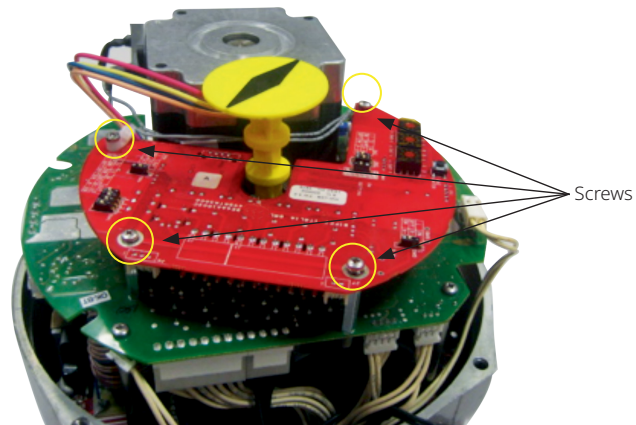
- Disassemble local mechanical indicator and connect OM1 flat cable to connector on the logic board as shown in Figure 25.

Figure 25.



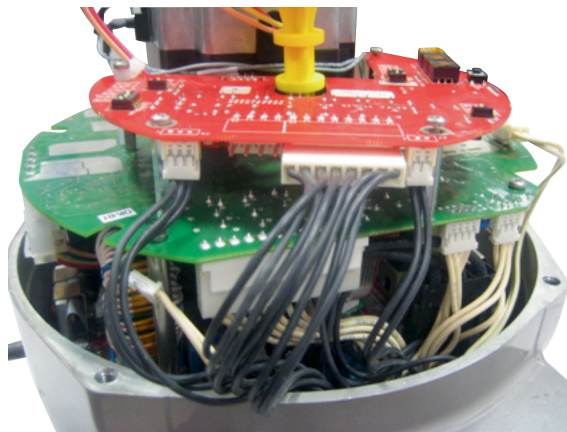
- Place the OM1 card onto the spacers and tighten the 4 screws; assemble local mechanical indicator as shown in Figure 26.

Figure 26.



- Connect the following connectors as shown in Figure 27:
 - the 8-pin connector to connector J3 on OM1
 - the 3-pin connector to connector J6 on OM1
 - the 2-pin connector to connector J7 on OM1

Figure 27.



NOTICE

Please note that all the connectors provided with the base actuator and all optional cards are different from each other (in terms of design and number of pins). In no way is it possible to make a wrong connection.

- The OM1 card is now connected.
- Replace the actuator cover and fix it properly.

Section 3: OM1 Module Setting and Configuration

For the SCE300 basic actuator settings, please refer to the Installation, Operation and Maintenance Manual (VCIOM-13933-EN).

The OM1 can be set once the basic SCE300 has been completely set.

The OM1 configuration can be carried out through the control panel on the optional card itself. In order to get access to the panel, remove the actuator cover and when the setting is complete replace the cover properly.

3.1 Local Setting of the OM1

3.1.1 OM1 Module Default General Setting

Please refer to the last column of Table 1.

3.1.2 OM1 Module Setting

If the application requires a different actuator setting than by default, please proceed as described in this section.

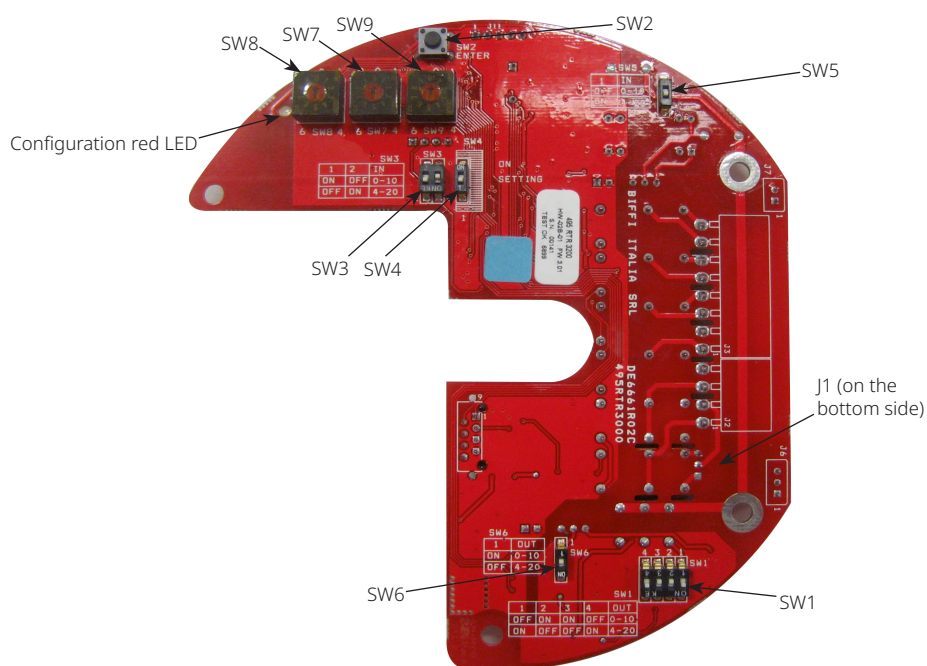
The setting of the actuator parameters is made through the following tools:

- Three selector switches SW7, SW8, and SW9 for functionalities settings
 - Input and output voltage/current selection (through switches SW1, SW3, SW5, and SW6)
 - Monitor relay contact type (through the welding pin J1)
 - ENTER push button SW2 (confirmation push button)
 - Dip switch SW4 (enable configuration mode)
 - Red LED for ENTER action confirmation (switches on when setting is confirmed)
1. Set the requested parameter and functionality accordingly to the following table.
 2. Enter setup configuration: move SW4 switch to position ON (configuration mode).
 3. Confirm each setting by pushing ENTER push button SW2.
 4. When pushing SW2, the red LED switches ON for confirmation.
 5. Exit configuration mode (move SW4 switch to position 1).
 6. Repeat this setting for each parameter.

WARNING

Do not electrically operate the SCE300 when the electrical enclosures are removed. Operating the unit with the electrical enclosures removed could cause personal injury.

Figure 28.



NOTICE

Please note that the OM1 module setting does not require to be done in succession as indicated in the following pages. Each parameter can be set independently.

Table 1. Setup Optional Card 4 to 20 mA (OM1)

Setup	Rotary Switch Settings			DIP Switch	Confirm Button	Default
	SW9	SW8	SW7	SW4	SW2	
Position relay LS3 (AUXC1)	every position	0	0 to 9	ON	PUSHED	0%
Position relay LS4 (AUXC2)	every position	1	0 to 9	ON	PUSHED	25%
Position relay LS5 (AUXC3)	every position	2	0 to 9	ON	PUSHED	75%
Position relay LS6 (AUXC4)	every position	3	0 to 9	ON	PUSHED	100%
Set 0% input 4 to 20 mA	every position	4	0	ON	PUSHED	4 mA
Set 100% input 4 to 20 mA	every position	4	1	ON	PUSHED	20 mA
Fail-Safe	every position	5	0 (off)	ON	PUSHED	off
	every position	5	1 (fully open)	ON	PUSHED	
	every position	5	2 (fully closed)	ON	PUSHED	
Dead band	every position	6	0 to 9	ON	PUSHED	2.0%
Relays LS3-LS5	every position	7	0: break	ON	PUSHED	make
	every position	7	1: make	ON	PUSHED	
Relays LS4-LS6	every position	8	0: break	ON	PUSHED	make
	every position	8	1: make	ON	PUSHED	
Blinker/Local selector	0	9	0: off	ON	PUSHED	off
	0	9	1: Blinker	ON	PUSHED	
	0	9	2: Local selector	ON	PUSHED	
Retransmission direct/reverse	1	9	0: direct	ON	PUSHED	direct
	1	9	1: reverse	ON	PUSHED	
Retransmission volt/mA	1	9	2: mA	ON	PUSHED	mA
	1	9	3: volt	ON	PUSHED	
Set direct/reverse	2	9	0: direct	ON	PUSHED	direct
	2	9	1: reverse	ON	PUSHED	
Position request	3	9	0: off	ON	PUSHED	off
	3	9	1: on	ON	PUSHED	
Set 4 to 20 mA	4	9	0: off	ON	PUSHED	on
	4	9	1: on	ON	PUSHED	
Set 0 to 10 V	5	9	0: off	ON	PUSHED	off
	5	9	1: on	ON	PUSHED	
Offset open for retransmission	6	9	0: increase	ON	PUSHED	n.d.
	6	9	1: decrease	ON	PUSHED	
Offset closed for retransmission	7	9	0: increase	ON	PUSHED	n.d.
	7	9	1: decrease	ON	PUSHED	

3.1.3 4 to 20 mA / 0 to 10 V DC Input Setting

The setting of the input signal 4 to 20 mA or 0 to 10 V DC is done on the hardware of the OM1 card.

By moving switches SW3 and SW5 shown below, it is possible to select 4 to 20 mA or 0 to 10 V DC. Input setting is 4 to 20 mA by default.

WARNING

This configuration is an hardware setting; so it is mandatory to do it with system off (no power supply).

Input 4 to 20 mA

In order to set input as a 4 to 20 mA signal, please proceed as follows:

SW3_1 = OFF; SW3_2 = ON

SW5 = ON

Impedance = 385 Ohm

Input 0 to 10 V DC

In order to set input as a 0 to 10 V DC signal, please proceed as follows:

SW3_1 = ON; SW3_2 = OFF

SW5 = OFF

Impedance = 200 kOhm

3.1.4 4 to 20 mA / 0 to 10 V DC Output Setting

The setting of the output signal 4 to 20 mA or 0 to 10 V DC is done on the hardware of the OM1 card.

By moving switches SW1 and SW6 shown below, it is possible to select 4 to 20 mA or 0 to 10 V DC.

Output setting is 4 to 20 mA by default.

WARNING

This configuration is an hardware setting; so it is mandatory to do it with system off (no power supply).

Output 4 to 20 mA

 In order to set output as a 4 to 20 mA signal, please proceed as follows:

 SW1_1 = ON; SW1_2 = OFF; SW1_3 = OFF;

 SW1_4 = ON

 SW6 = OFF

 Impedance = 250 Ohm

Output 0 to 10 V DC

In order to set output as a 0 to 10 V DC signal, please proceed as follows:

SW1_1 = OFF; SW1_2 = ON; SW1_3 = ON;

SW1_4 = OFF

SW6 = ON

3.1.5 Relays AUXC1, AUXC2, AUXC3 and AUXC4 Settings

The tables below shows reporting the settings of each relays AUXC1, 2, 3 and 4.

Table 2. AUXC1 (LS3)

SW8	SW7	Description
0	0	inactive
0	1	2%
0	2	12.5%
0	3	25%
0	4	37.5%
0	5	50%
0	6	62.5%
0	7	75%
0	8	87.5%
0	9	99%

Table 3. AUXC2 (LS4)

SW8	SW7	Description
1	0	inactive
1	1	2%
1	2	12.5%
1	3	25%
1	4	37.5%
1	5	50%
1	6	62.5%
1	7	75%
1	8	87.5%
1	9	99%

Table 4. AUXC3 (LS5)

SW8	SW7	Description
2	0	inactive
2	1	2%
2	2	12.5%
2	3	25%
2	4	37.5%
2	5	50%
2	6	62.5%
2	7	75%
2	8	87.5%
2	9	99%

Table 5. AUXC4 (LS6)

SW8	SW7	Description
3	0	inactive
3	1	2%
3	2	12.5%
3	3	25%
3	4	37.5%
3	5	50%
3	6	62.5%
3	7	75%
3	8	87.5%
3	9	99%

Figure 29.

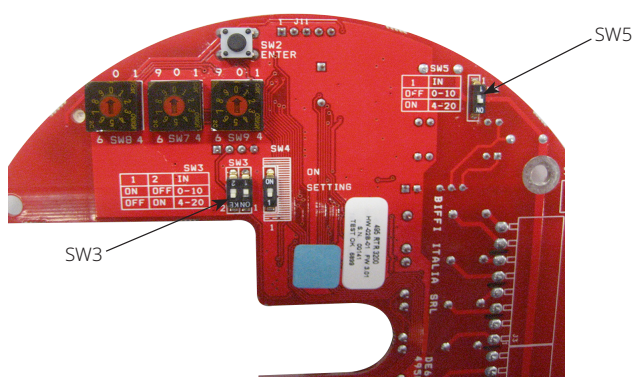


Figure 30.

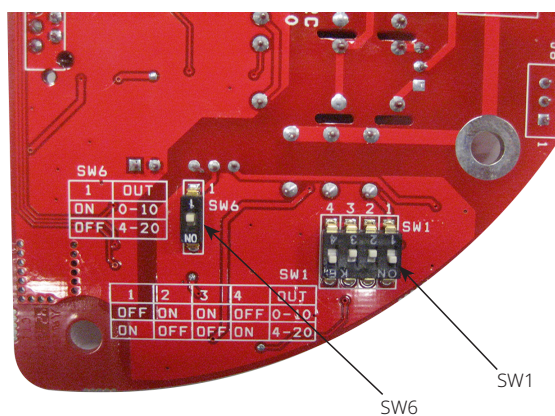
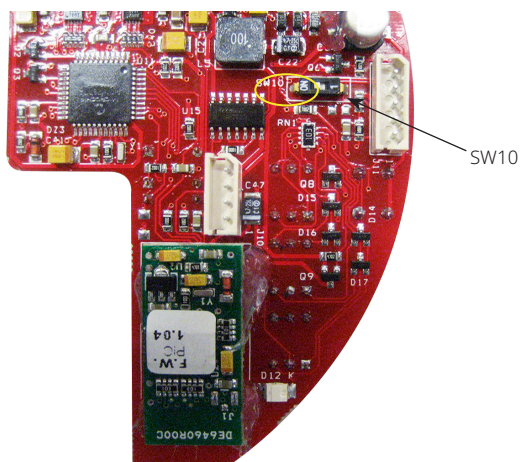


Figure 31.



3.1.6 Dead Band Settings

Table 6 shows the setting of the Dead Band.

Table 6. Dead Band

SW8	SW7	Description*	Description**
6	0	0.3%	1.0%
6	1	0.4%	1.5%
6	2	0.5%	2.0%
6	3	0.6%	2.5%
6	4	0.7%	3.0%
6	5	0.8%	3.5%
6	6	0.9%	4.0%
6	7	1.0%	4.5%
6	8	1.5%	5.0%
6	9	2.0%	5.5%

NOTES:

* Firmware revision minor or equal 2.14

** Firmware revision major or equal 2.15

3.1.7 Position Request

To use the positioner feature (with analog position input 4 to 20 mA or 0 to 10 V DC), it is mandatory to set the position request parameter to 1:on. The position request parameter is set to 0:off as default. See the setup table on Table 1.

Section 4: Monitor Relay Functionality and Setting

The Monitor Relay indicates the following failures:

Table 7.

Monitor Relay Functionality	
1	Missing input 4 to 20 mA
2	Stop by torque out of the limits
3	Direction failure
4	Temperature too high
5	Position sensor failure
6	Local control panel with selector in local position
7	Valve jammed
8	Hardware malfunction
9	Alarm on the local control panel (if present)
10	Stroke failure

The Monitor relay contacts can be set as closed or open by changing the welding of pin J1. As a default setting, pins 2 and 3 are welded together, and the Monitor Relay contact operates as follows:

Contact closed in normal condition with relay energized, and open in case of malfunction (relay is de-energized).

- In case of request, if contact must be open in normal condition and closed in case of malfunction, the contacts of pin J1 must be modified by welding pins 1 and 2 together.

WARNING

This configuration is an hardware setting; so it is mandatory to do it with system off (no power supply).

Section 5: OM1 Kits

The OM1 kit consists of the following parts shown in Figure 32:

- OM1 modulating input/output module
- 3 pieces metal spacers
- 1 piece metal hexagonal spacer 15 mm
- 3 pieces metal hexagonal spacers 25 mm
- 1 plastic spacer
- 1 flat cable with connectors
- 3 screws M3x8
- 4 screws M3x10

This kit allows to assemble optional module OM1 over all different SCE300 models. Depending on models, only some spacers and screws has to be used.

Refer to next tables and Figure 33 to choose the correct mechanical parts.

Figure 32.

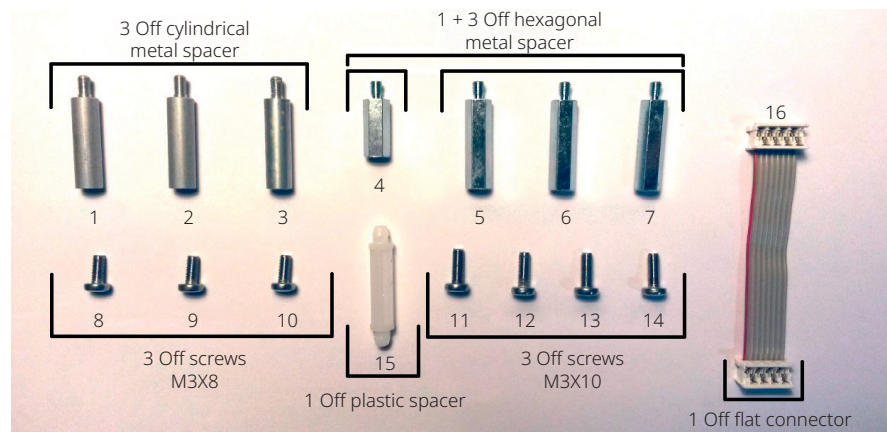


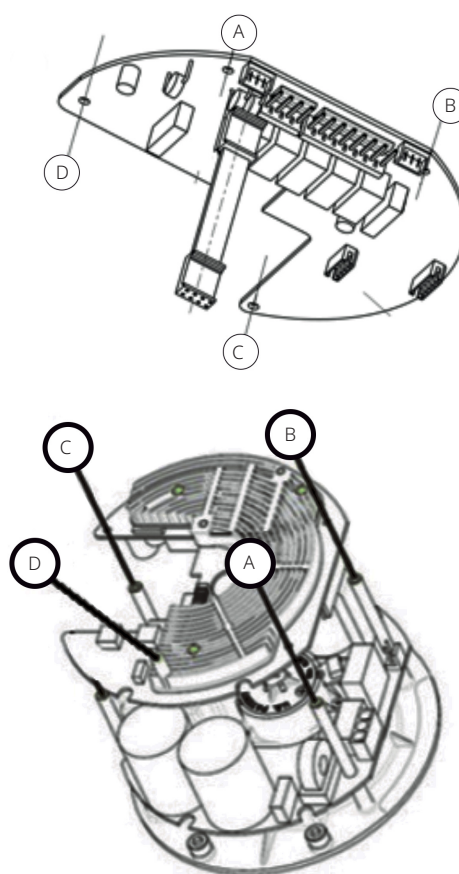
Table 8.

SCE300 Cross Reference Table (Non-US Market)				
Actuator model	Old 63-125	Old 250-2K	New 63-125	New 250-2K
Product coding chart digit X ₇ X ₈ 1-phase	UV - VU	UV - VU	LV - HV	LV - HV
Product coding chart digit X ₇ X ₈ 3-phase	31, 32, 33	31, 32, 33	3A, 3B, 3C	3A, 3B, 3C
A	1, 11	11	4, 8	5, 8
B	2, 12	12	1, 11	6, 9
C	3, 13	13	2, 12	7, 10
D	14	14	15	-

Table 9.

SCE300 Cross Reference Table (US Market)				
Actuator model	Old E006-E013	Old E025-E171	New E006-E013	New E025-E171
Product coding chart digit 6 1-phase	0 - 4	0 - 4	L - H	L - H
Product coding chart digit 6 3-phase	1, 2, 3	1, 2, 3	A, B, C	A, B, C
A	1, 11	11	4, 8	5, 8
B	2, 12	12	1, 11	6, 9
C	3, 13	13	2, 12	7, 10
D	14	14	15	-

Figure 33. Points A, B, C and D to Fix the Board on Standard Group



Figures 34 to 37 allow to distinguish old version of SCE300 from the new version (on the labels, the digits of Product Number are boxed); furthermore, the logic boards with heat sink identifies old version models, while logic boards without heat sink identifies new version models.

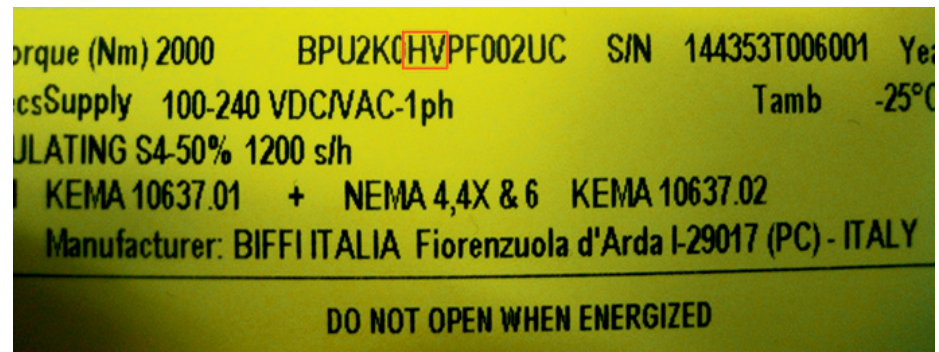
Figure 34. Label for Non-US Market - Digits X₇X₈ on Product Coding Chart

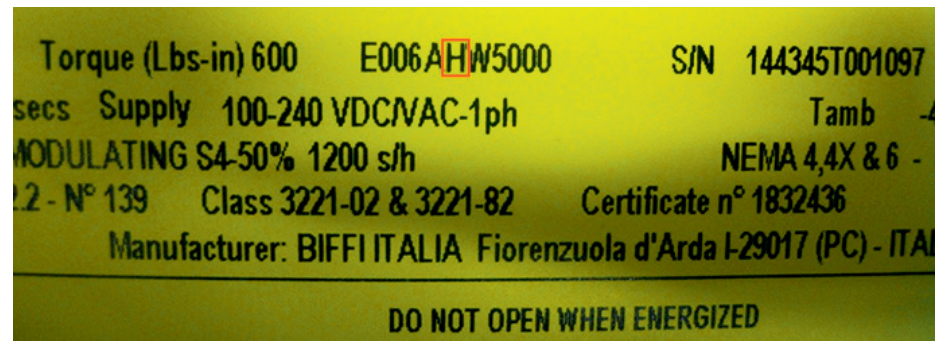
Figure 35. Label for US Market - Digit 6 on Product Coding Chart

Figure 36. Example of SCE300 Old Version (Heat Sink Present)

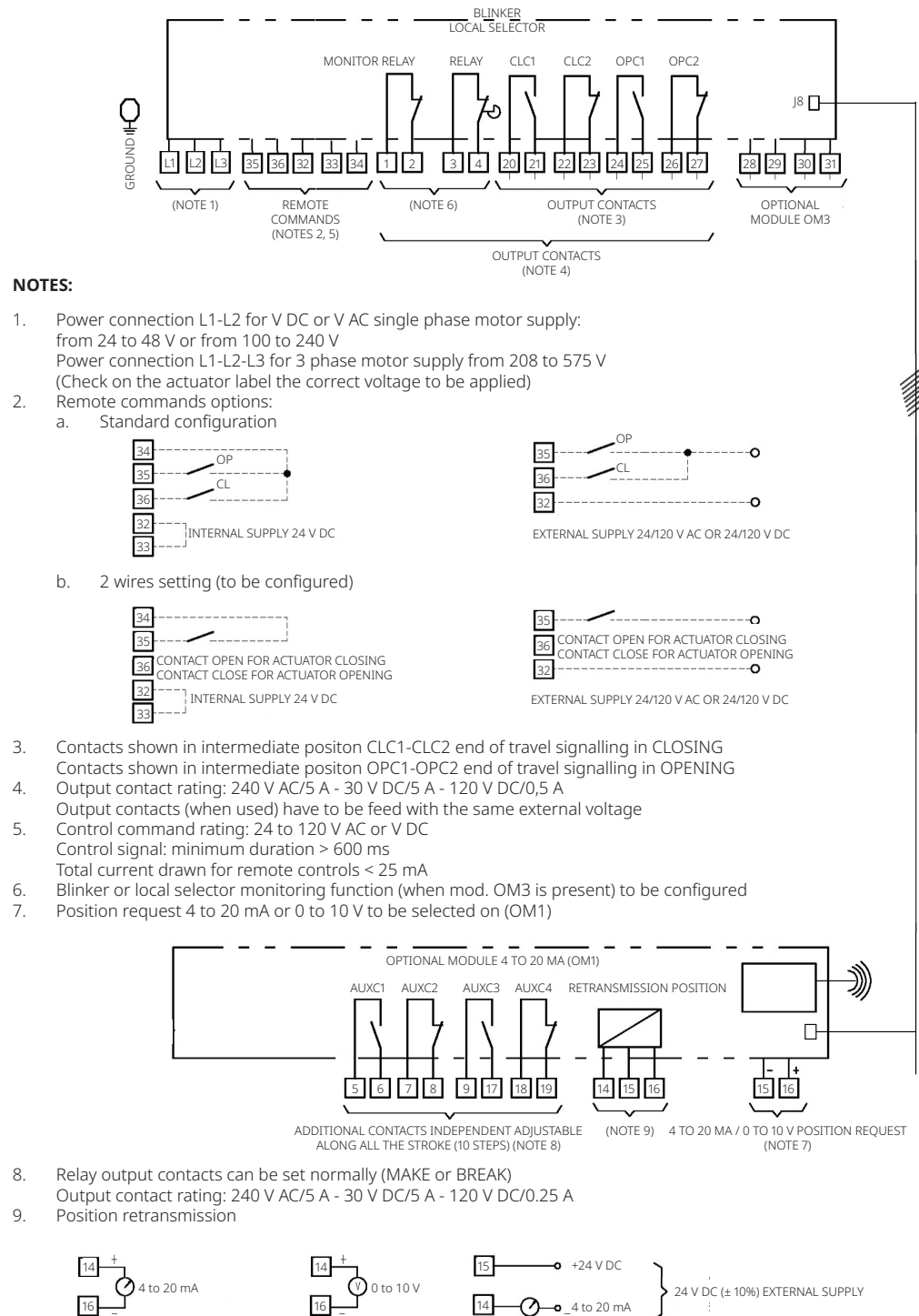


Figure 37. Example of SCE300 New Version (Heat Sink Not Present)



Section 6: OM1 Wiring Diagram

Figure 38.



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