Installation, Operation and Maintenance Manual
VCIOM-01494-EN Rev. 0
June 2022

Keystone OM1 - EPI2

Modulating Input/Output Module

EMERSON

This page intentionally left blank

Table of Contents

This page intentionally left blank

NOTE:
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 Keystone EPI2 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 EPI2 actuator additional functionalities:

- Positioner with analog position input 4 - 20 mA or 0 - 10 V DC optocoupled
- Analog output position transmitter 4 - 20 mA or 0 - 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)
- Optional Bluetooth connection feature

NOTE:
For decommissioning instructions, please refer to the relevant section in the EPI2 manual ref. VCIOM-15516-EN.

⚠ WARNING

EPI2 actuator 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 EPI2 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 Keystone 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 EPI2 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 Nm 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.
- Connect the flat cable furnished into the kit to connector J9 on OM1 as shown in Figure 4.

Figure 3

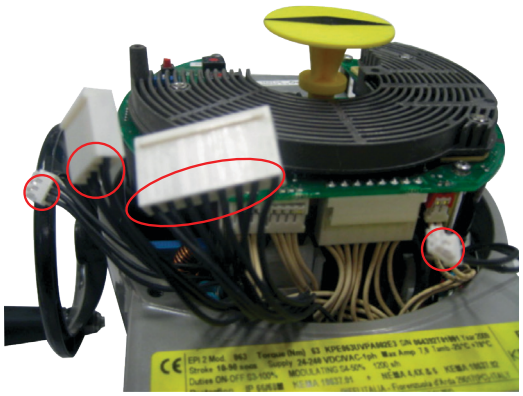
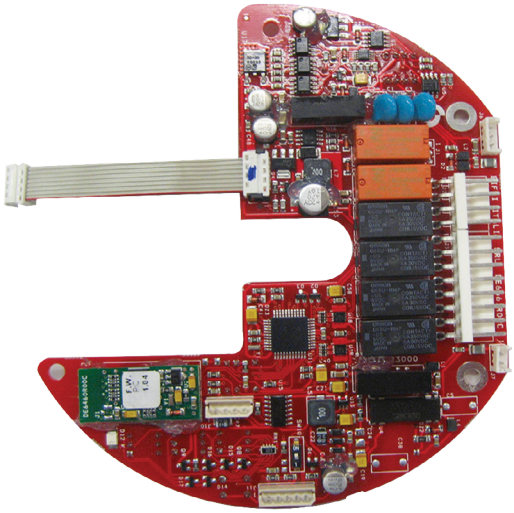


Figure 4



- Unscrew the 3 screws as shown in Figure 5:
  - 3 pcs M3x10
- Tighten the 3 metal spacers as shown in Figure 6.

Figure 5

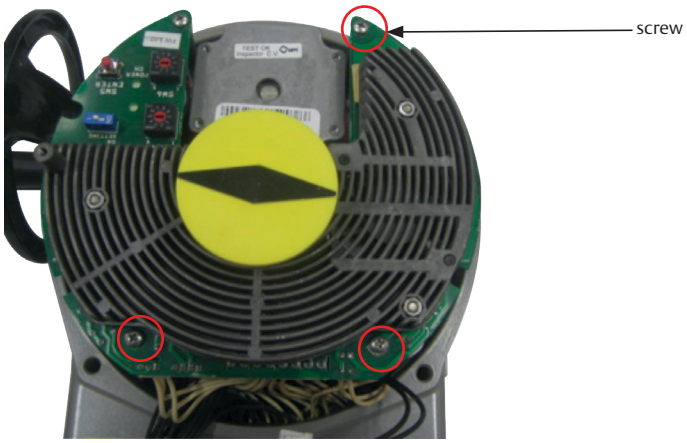
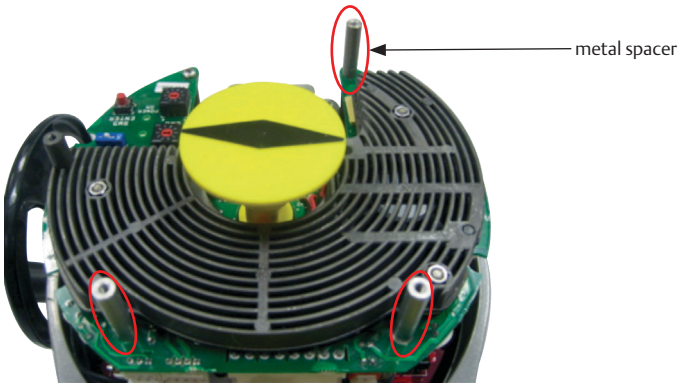


Figure 6



- In Figure 7, connect OM1 flat cable to connector J8 on the logic board.
- In Figure 8, place the OM1 card onto the spacer and tighten the 4 screws.

Figure 7

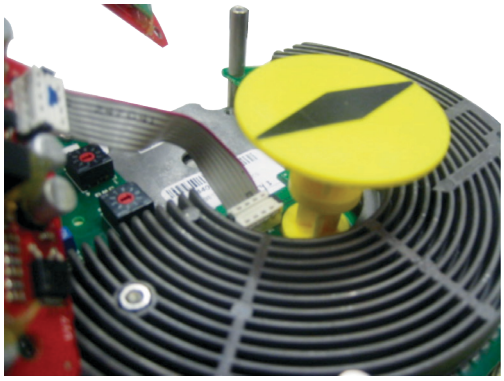
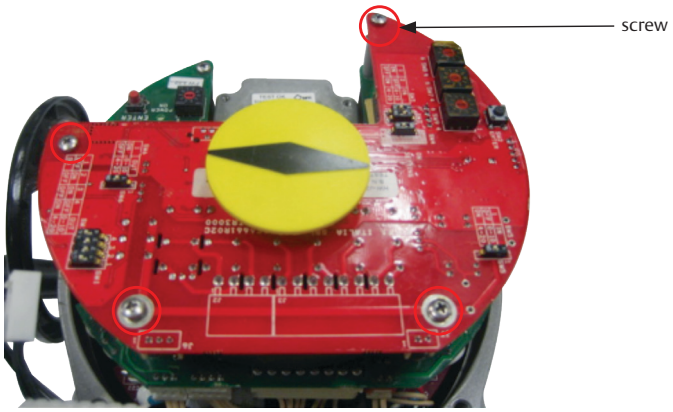
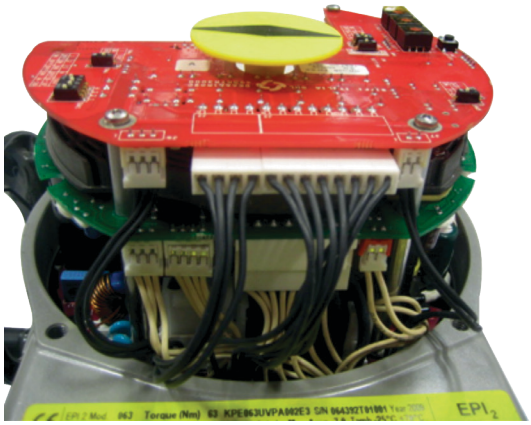


Figure 8



- 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

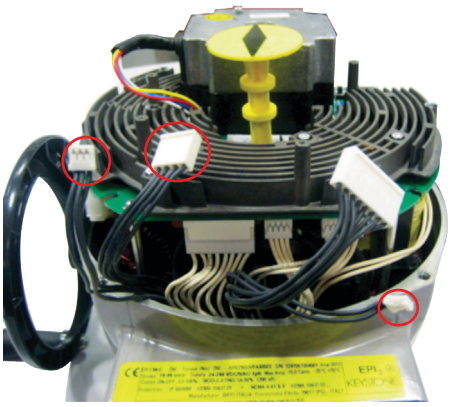
Figure 9



2.2 Assembling Procedure for Models 250-500-1000-2000 Nm 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.
- In Figure 12, connect the OM1 flat cable to the connector on the logic board.

Figure 11

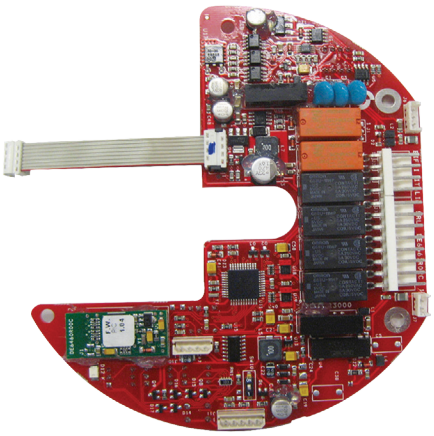
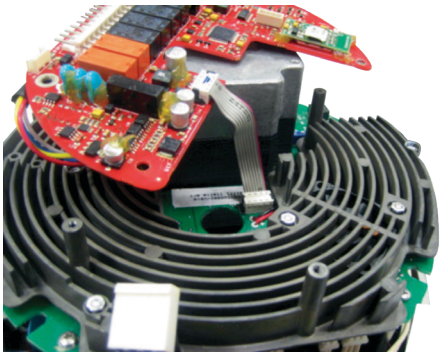


Figure 12



- Place the OM1 card onto the heatsink spacers and tighten the 4 screws; assemble local mechanical indicator shown in 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 13

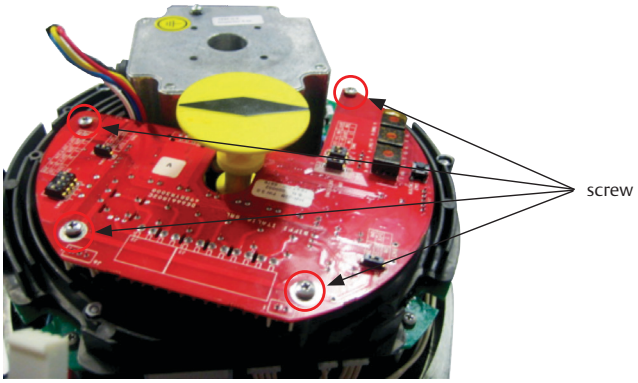
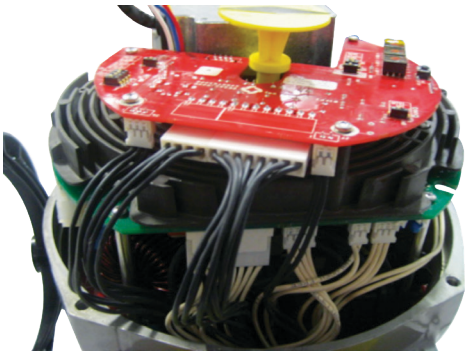


Figure 14

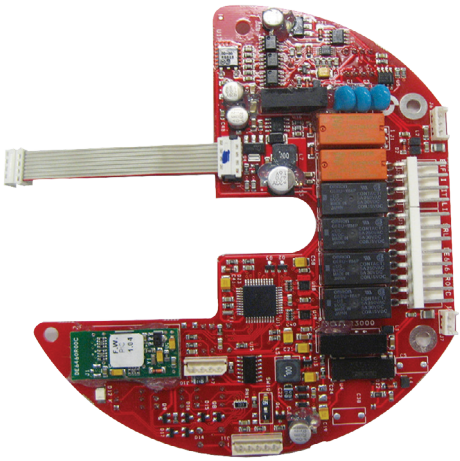


2.3 Assembling Procedure for Models 63-125 Nm New Version (US or Non-US Market)

- Detect the 3 black cables required for the OM1 which are already included in the basic actuator as shown in Figure 15.
- Connect the flat cable furnished into the kit to connector J9 on OM1 as shown in Figure 16.

Figure 15

Figure 16



- Unscrew the 3 screws as shown in Figure 17.
- Tighten the 3 metal spacers and the plastic metal spacer as shown in Figure 18.

Figure 17

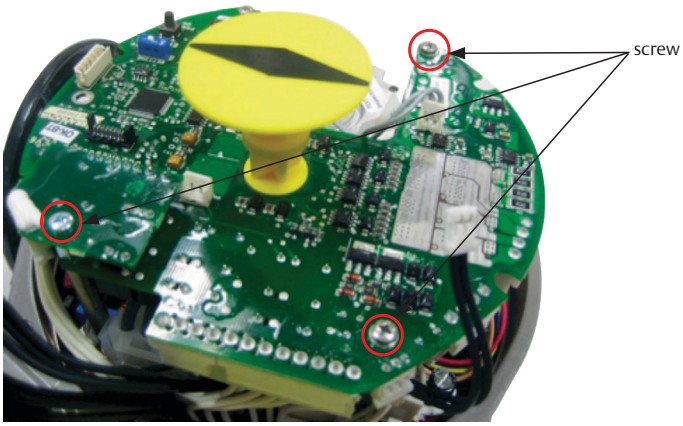
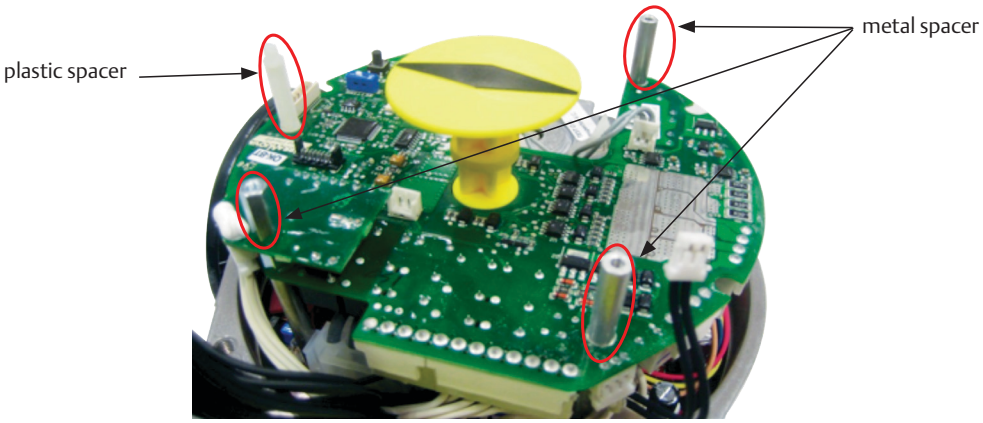


Figure 18



- Connect OM1 flat cable to connector J8 on the logic board as shown in Figure 19.
- Place the OM1 card onto the spares and tighten the 3 screws as shown in Figure 20.

Figure 19

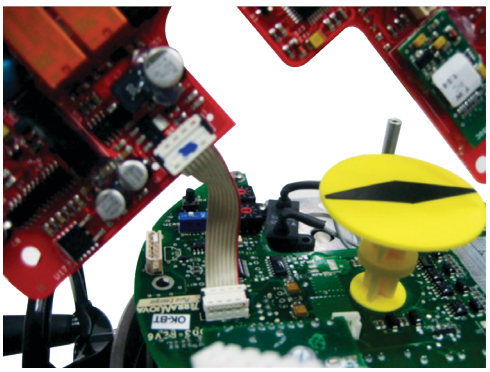
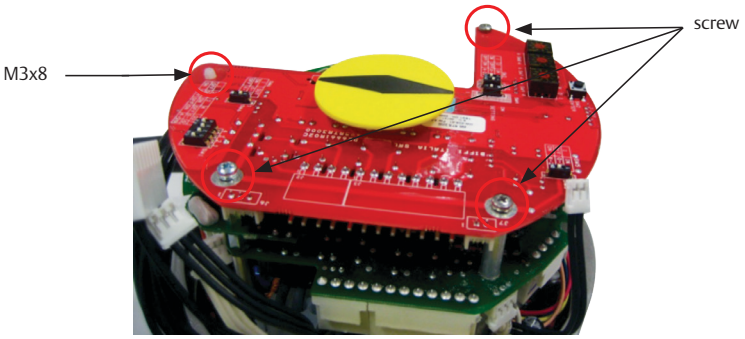
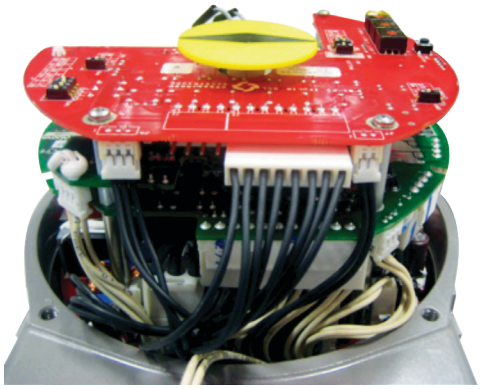


Figure 20



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

Figure 22

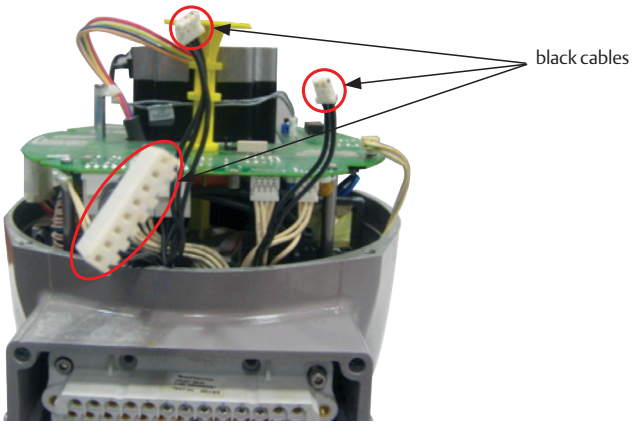
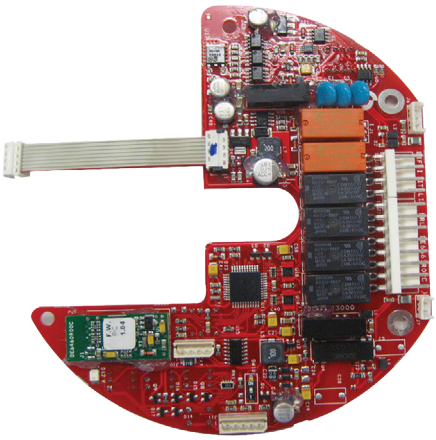


Figure 23



- Add N° 3 spacers and unscrew the screw (A) that fix the motor cable as shown in Figure 24.
- Disassemble local mechanical indicator and connect OM1 flat cable to connector on the logic board as shown in Figure 25.

Figure 24

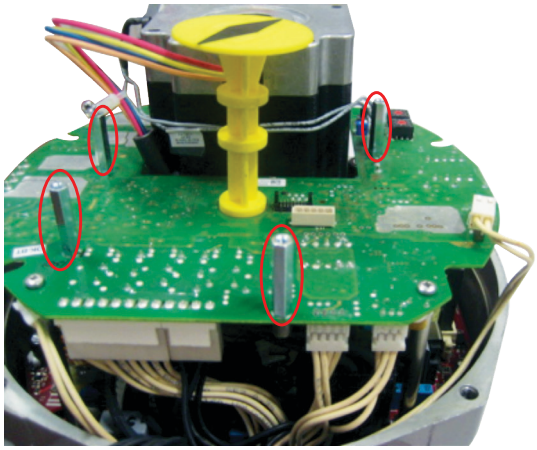
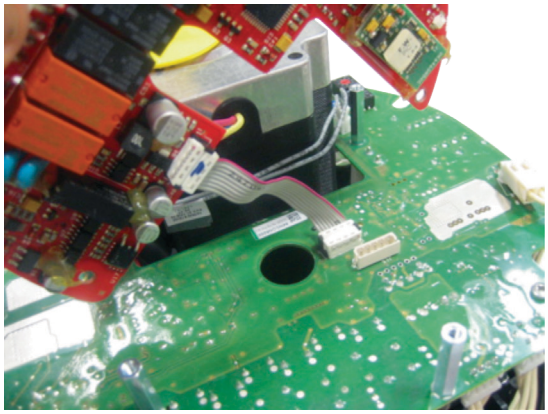


Figure 25



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

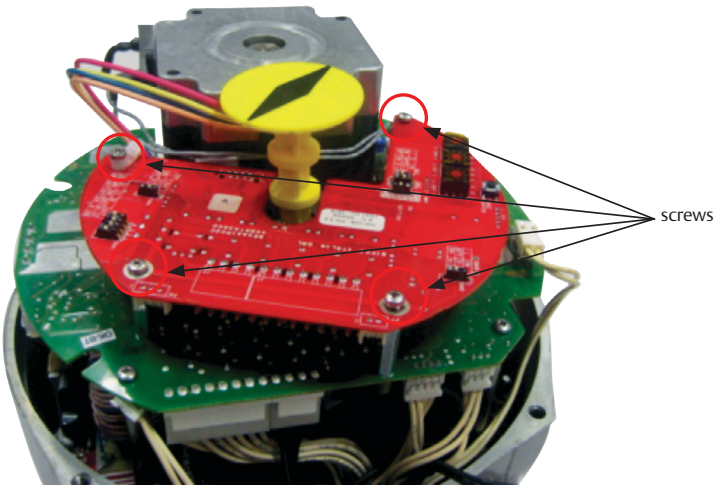
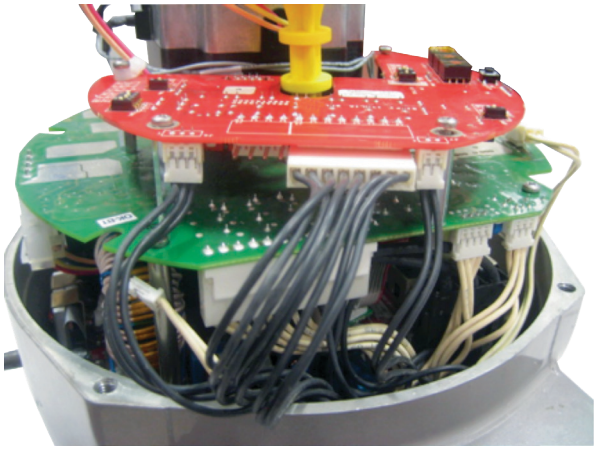


Figure 27



NOTE:
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 EPI2 basic actuator settings, please refer to the Installation, Operation and Maintenance Manual.

The OM1 can be set once the basic EPI2 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:

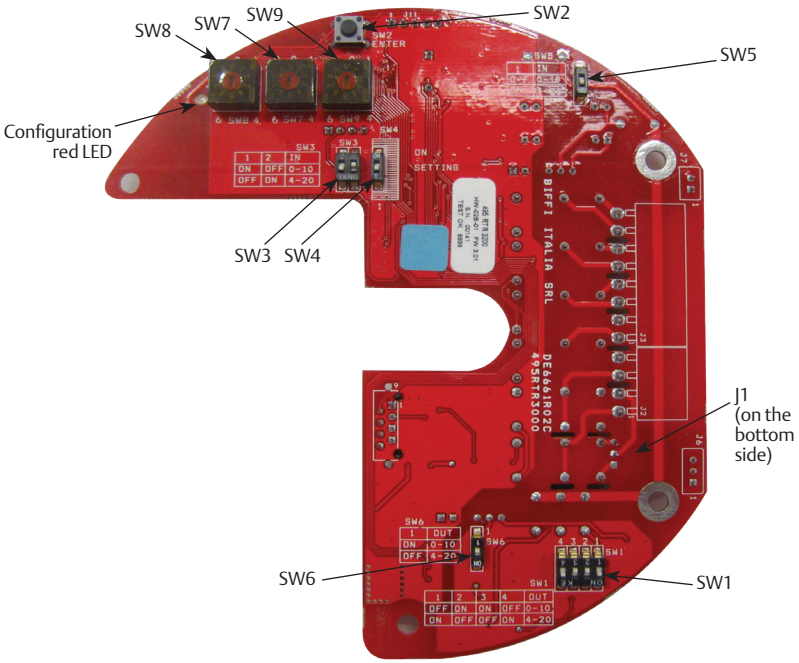
- Three selector switches SW7, SW8, and SW9 for functionalities settings
- Input and output voltage/current selection (through switches SW1, SW3, SW5, and SW6)
- Monitor relay contact type (through the welding pin J1)
- ENTER pushbutton SW2 (confirmation pushbutton)
- Dip switch SW4 (enable configuration mode)
- Red LED for EN TER 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 pushbutton 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 EPI2 when the electrical enclosures are removed. Operating the unit with the electrical enclosures removed could cause personal injury.

Figure 28



NOTE:

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 - 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 - 20 mA	every position	4	0	ON	PUSHED	4 mA
Set 100% input 4 - 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 - 20 mA	4	9	0: off	ON	PUSHED	on
	4	9	1: on	ON	PUSHED	
Set 0 - 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 - 20 mA/0 - 10 V DC Input Setting

The setting of the input signal 4 - 20 mA or 0 - 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 - 20 mA or 0 - 10 V DC. Input setting is 4 - 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 - 20 mA

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

SW3_1 = OFF; SW3_2 = ON

SW5 = ON

Impedance = 385 Ohm

Input 0 - 10 V DC

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

SW3_1 = ON; SW3_2 = OFF

SW5 = OFF

Impedance = 200 kOhm

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

The setting of the output signal 4 - 20 mA or 0 - 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 - 20 mA or 0 - 10 V DC.

Output setting is 4 - 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 - 20 mA

In order to set output as a 4 - 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 - 10 V DC

In order to set output as a 0 - 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

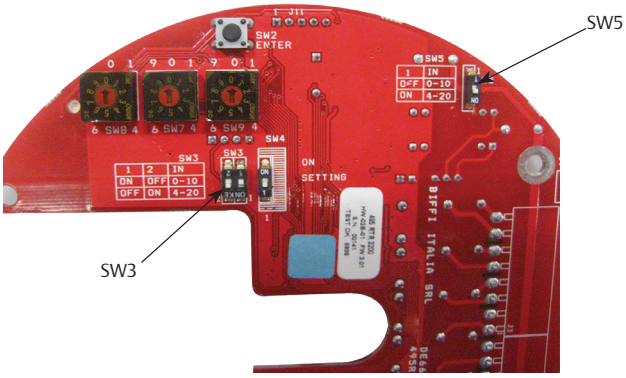


Figure 30

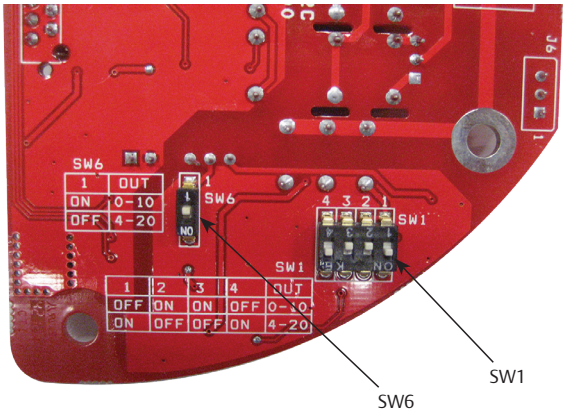
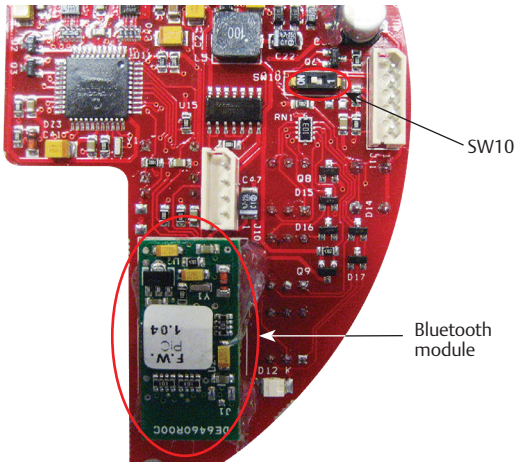


Figure 31



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 - 20 mA or 0 - 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.

3.2 Additional Bluetooth Optional Card

It's possible to receive the OM1 module with integrated Bluetooth module as shown in Figure 31. To use Bluetooth option, dip switch SW10 is to be 'on'.

On https://biffi.it/en-us, please download AManager program and its related documentation. By this software and Bluetooth connection, it is possible to configure/setting the entire actuator without using local settings area.

Please refer to 'Installation and User Manual' document for details.

Section 4: Monitor Relay Functionality and Setting

The Monitor relay indicates the following failures:

Table 7.

Monitor Relay Functionality	
1	Missing input 4 - 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
11	Bluetooth failure (if present)

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 pcs metal spacers
- 1 pc metal hexagonal spacer 15 mm
- 3 pcs 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 EPI2 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

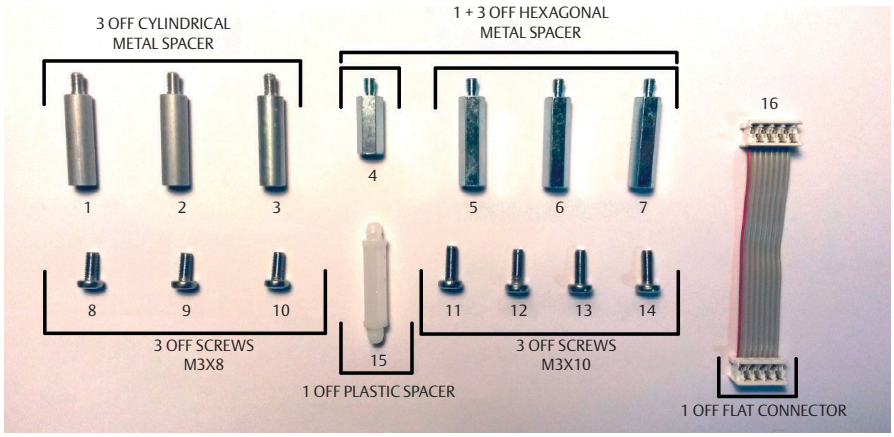


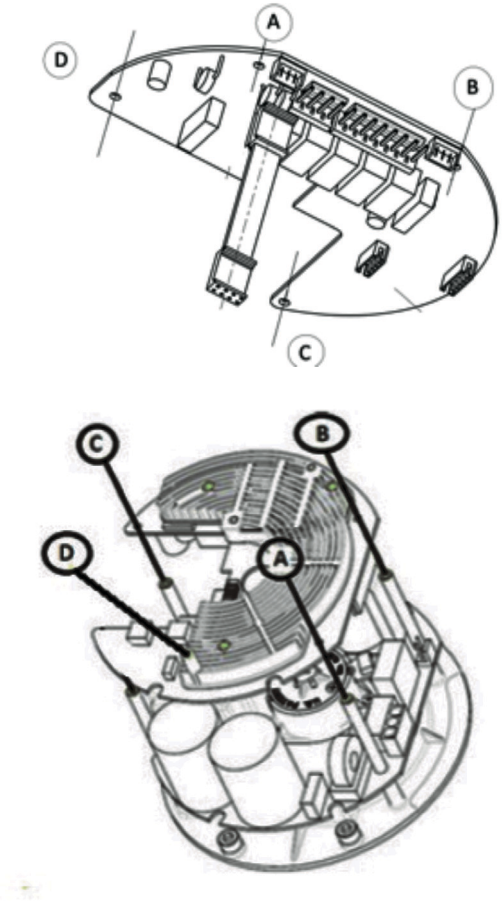
Table 8.

EPI2 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_7X_8 1-phase	UV - VU	UV - VU	LV - HV	LV - HV
Product coding chart digit X_7X_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.

EPI2 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



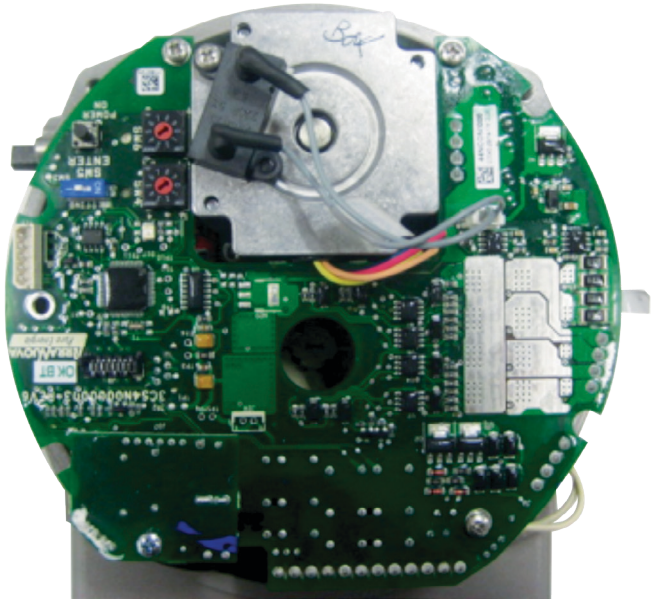
Figures 34 to 37 allow to distinguish old version of EPI2 from the new version (on the labels, the digits of Product Number are boxed); furthermore, the logic boards with heatsink identifies old version models, while logic boards without heatsink identifies new version models.

Figure 34 Label for Non-US Market - Digits X_7X_8 on Product Coding Chart

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

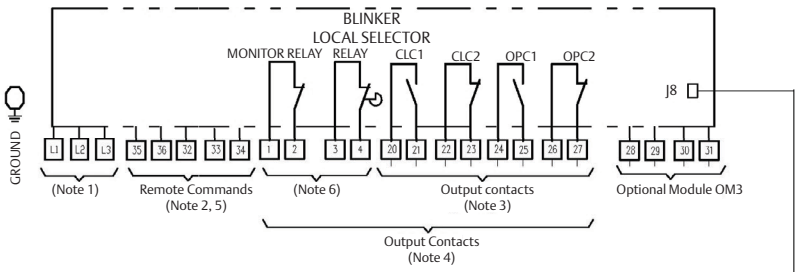
Figure 36 Example of EPI2 Old Version (Heatsink Present)

Figure 37 Example of EPI2 New Version (Heatsink Not Present)



Section 6: OM1 Wiring Diagram

Figure 38

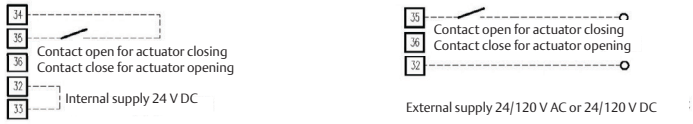


NOTES:

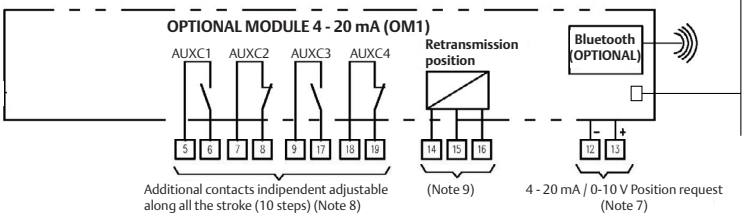
1) Power connection L1-L2 for V DC or V AC single phase motor supply: from 24 V to 48 V or from 100 V to 240 V
   Power connection L1-L2-L3 for 3 phase motor supply from 208 V to 575 V (Check on the actuator label the correct voltage to be applied)

2a) Remote commands options: standard configuration

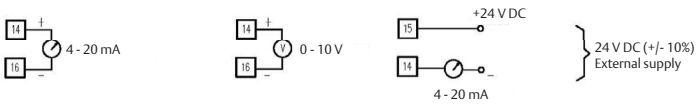
2b) Remote commands options: 2 wires setting (to be configured)



3) Contacts shown in intermediate positon CLC1-CLC2 end of travel signalling in CLOSING
   Contacts shown in intermediate positon OPC1-OPC2 end of travel signalling in OPENING
4) Output contact rating: 240 V AC/5 A - 30 V DC/5 A - 120 V DC/0,5 A
   Output contacts (when used) have to be feed with the same external voltage
5) Control command rating: 24 to 120 V AC or V DC
   Control signal: minimum duration > 600 ms
   Total current drawn for remote controls < 25 mA
6) Blinker or local selector monitoring function (when mod. OM3 is present) to be configured



7) Position request 4 - 20 mA or 0 - 10 V to be selected on (OM1)
8) Relay output contacts can be set normally (MAKE or BREAK)
   Output contact rating: 240 V AC / 5 A - 30 V DC / 5 A - 120 V DC / 0.25 A
9) Position retransmission



World Area Configuration Centers (WACC) offer sales support, service, inventory and commissioning to our global customers.
Choose the WACC or sales office nearest you:

NORTH & SOUTH AMERICA

19200 Northwest Freeway
Houston TX 77065
USA
T +1 281 477 4100

Av. Hollingsworth
325 Iporanga Sorocaba
SP 18087-105
Brazil
T +55 15 3413 8888

ASIA PACIFIC

No. 9 Gul Road
#01-02 Singapore 629361
T +65 6777 8211

No. 1 Lai Yuan Road
Wuqing Development Area
Tianjin 301700
P. R. China
T +86 22 8212 3300

MIDDLE EAST & AFRICA

P. O. Box 17033
Jebel Ali Free Zone
Dubai
T +971 4 811 8100

P. O. Box 10305
Jubail 31961
Saudi Arabia
T +966 3 340 8650

24 Angus Crescent
Longmeadow Business Estate East
P.O. Box 6908 Greenstone
1616 Modderfontein Extension 5
South Africa
T +27 11 451 3700

EUROPE

Holland Fasor 6
Székesfehérvár 8000
Hungary
T +36 22 53 09 50

Strada Biffi 165
29017 Fiorenzuola d'Arda (PC)
Italy
T +39 0523 944 411

For complete list of sales and manufacturing sites, please visit
www.emerson.com/actuationtechnologieslocations or contact us at
info.actuationtechnologies@emerson.com

www.emerson.com

EMERSON™