

E.2 Series

High efficiency circulator

Installation and operating instructions

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READ CAREFULLY BEFORE INSTALLING & OPERATING THE CIRCULATOR

INSTALLER: PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE

You are about to install an E.2 series circulator – a high-efficiency pump from Armstrong. E.2 series circulators are designed for heating and cooling in hydronic, geothermal or solar systems and circulating water, ethylene or propylene glycol/water solutions. For pumping domestic (potable) water, Armstrong recommends the use of circulators with bronze body construction.

The E.2 series circulators are extremely efficient and quiet. They utilize a state of the art permanently lubricated bearing system designed for many years of trouble-free operation. They feature a permanent-split capacitor motor with thermal protection.

1.0 OPERATING LIMITS

Maximum ambient temperature: 30°C

Maximum operating pressure: 10 bar

Maximum operating temperature: All standard models 110°C

Minimum operating temperature: All standard models 4°C

Electrical rating:

For models with ¼ hp motors (100W): 220-240V, 50Hz

For models with ⅜ hp motors (300W): 220-240V, 50Hz

When unpacking the circulator, inspect for any damage that may have occurred during transit. Check for loose, missing or damaged parts.

THIS PUMP IS FOR INDOOR USE ONLY

Before installing the circulator, proper installation practice recommends a thorough flush of the hydronic system, ensuring removal of all foreign materials.

This pump should be installed in a well lit location with good access.

Installation personnel must be qualified for the task.

All personnel performing installation must wear appropriate personal protective equipment

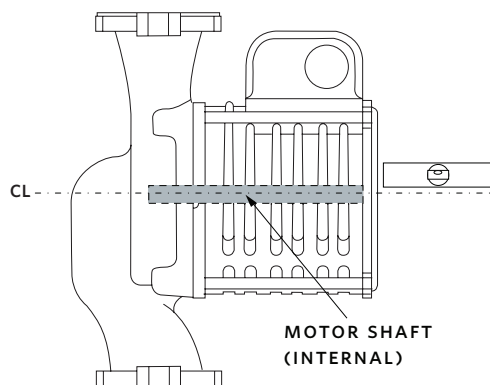
WARNING



Mount with motor shaft horizontal and terminal box above centerline (CL) only!

The circulator is supplied for up-discharge.

DIAGRAM 1: Installation Orientation



For alternate discharge orientation:

- 1 Loosen the four motor mounting bolts
- 2 Rotate the volute to match piping orientation
- 3 Observe flow direction arrow on volute
- 4 Ensure volute gasket is properly seated
- 5 Retighten mounting bolts evenly to 6.7 N/m
- 6 Ensure the impeller spins freely

2.0 ELECTRICAL WIRING

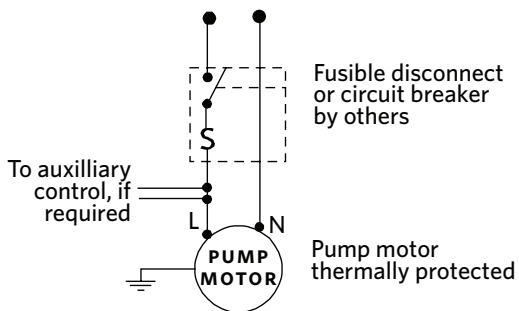


The electrical wiring must be installed in strict accordance with BS 7671 (Europe) as well as local codes and regulations.

- 1 Electrical installation should be conducted by a qualified electrician. Installers should be equipped with proper personal protective equipment.
- 2 The motors of E.2 series circulators are designed for 1 phase, 220-240 50 Hz service only. (Please refer to the rating label on the circulator's terminal box to determine the correct voltage.)
- 3 Always make sure the electric power is disconnected and locked out before wiring the circulator.
- 4 To wire, loosen the screw from the terminal box cover and remove the screw and cover.
- 5 Install the appropriate size conduit end to one of the holes on either side of the terminal box.
- 6 **For models:** Referring to **DIAGRAM 2** below, connect the black (L1) and blue (L2) leads of the supply wire to the black and white motor leads respectively inside the terminal box. Connect the ground wire to any one of the four green ground screws inside of the terminal box (use a minimum 18 AWG wire size).

NOTE: For any voltage the brown and yellow wires are hard wired in and should **not** be touched they are for the capacitor only and can stop the motor from running.

DIAGRAM 2 240 v 50Hz installations

Typical wiring diagram for
single phase, 240 v, 50 HZ power source

7 Replace the terminal box cover.

The motor is thermally protected for your safety so thermal overload protection is not necessary. All that is required is a fused plug or circuit breaker in the power line for short circuit protection.

Electrical information can be found on the nameplate of the motor.

3.0 START UP

- 1 Before starting up the circulator, proper installation practice recommends a thorough flush and draining of the hydronic system, ensuring removal of all foreign materials. Fill the system with clean water or glycol solution before starting.
- 2 Air must be completely vented from the system before starting up the circulator. **If the system is not completely vented of air and the circulator is allowed to run dry, the mechanical seal will be damaged.**
- 3 When the system has been completely filled and vented, only then can the pump be started.

4.0 PREVENTIVE MAINTENANCE – INSPECTION

E.2 series circulators are fitted with permanently lubricated ball bearings and **do not** require lubrication.

Although Armstrong long-life circulators are designed to provide years of worry-free service, it is good maintenance practice to inspect the entire hydronic system periodically – including the E.2 series circulator – for potential problems. If there is any evidence of leakage or damage, repair or replace the pump.

Disconnect and lockout the power before servicing.

5.0 PUMP REPLACEMENT IN AN EXISTING INSTALLATION

5.1 COMPLETE PUMP

- 1 Ensure that electric power is disconnected and locked out. Loosen the screw from the terminal box cover and remove the cover. Disconnect the supply wires from the circulator only, leaving the capacitor wires connected.



All servicing personnel should be equipped with proper personal protective equipment.

- 2 If valves have been installed, on the suction and discharge sides of the pump, close them before attempting to remove the circulator from the volute. If no valves have been installed it may be necessary to drain the system.



Allow water to cool to 40°C before draining the system. It is best to leave the drain valve open while working on the system.

- 3 To relieve any residual pressure which may be present in the pump body, loosen the flange bolts and gently move the pump body back and forth to allow the pressurized water to escape.

NOTE: Place a pan under the pump to collect the drain water.

- 4 If the entire volute is needed to be removed, then remove the flange bolts and nuts. The entire circulator can then be removed from the piping system.
- 5 Install the E.2 series circulator where there will be sufficient room for inspection and service. It is recommended that isolation valves be installed on both the suction and discharge sides of the circulator for future servicing. This eliminates the need for draining the system when working on the circulator (for example, when replacing the mechanical seal).
- 6 Install suction and discharge flanges on the pipe ends. The use of Teflon tape sealer or a high quality thread sealant is recommended.
- 7 Pipe strain can be minimized by the use of pipe hangers near the pump, positioned to support the suction and discharge piping.

To wire the E.2 series circulator, follow steps C through G in the Electrical Wiring section above, noting that electrical supply and grounding wires must be rated for at least 90°C.


5.2 MOTOR END ONLY

- 1 Turn off the pump leaving it installed in the line.
- 2 Ensure electrical power is disconnected and locked out.
- 3 Close the water supply at the points closest to the pump's inlet and outlet.
- 4 For safety, allow water to cool to 40°C before draining the system. It is best to leave the drain valve open while working on the system.

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- 5 Bleed the water pressure from the pump.
- 6 Place a pan under the pump to collect the drain water.
- 7 While holding the motor body, loosen the four bolts that attach the motor to the pump casing (volute). Start with the two bottom bolts first and remove them, then slowly loosen the top two bolts. Allow the water to drain from the bottom of the pump. When the water has finished draining, remove the two top bolts. Remove the motor straight out from the volute being careful of its attached impeller. The motor is heavy, do not drop it.
- 8 Install new casing gasket .
- 9 Install new motor end (with impeller and seal kit).
- 10 Tighten four motor end bolts in a crisscross pattern and tighten evenly to 6.8 Nm.
- 11 Open isolation flanges or fill the system with water before starting circulator.
- 12 To wire the E.2 series circulator, follow steps C through G in the Electrical Wiring section above, noting that electrical supply and grounding wires must be rated for at least 90°C.

6.0 MECHANICAL SEAL REPLACEMENT

- 1 Follow steps 1 through 4 in section **Existing pump removal from system piping**.
 - 2 While holding the motor body, remove the bottom two bolts that attach the motor to the pump casing (volute), then slowly loosen the top two bolts. Allow the water to drain from the bottom of the pump. When the water has finished draining, remove the two top bolts. Remove the motor straight out from the volute being careful of the attached impeller.
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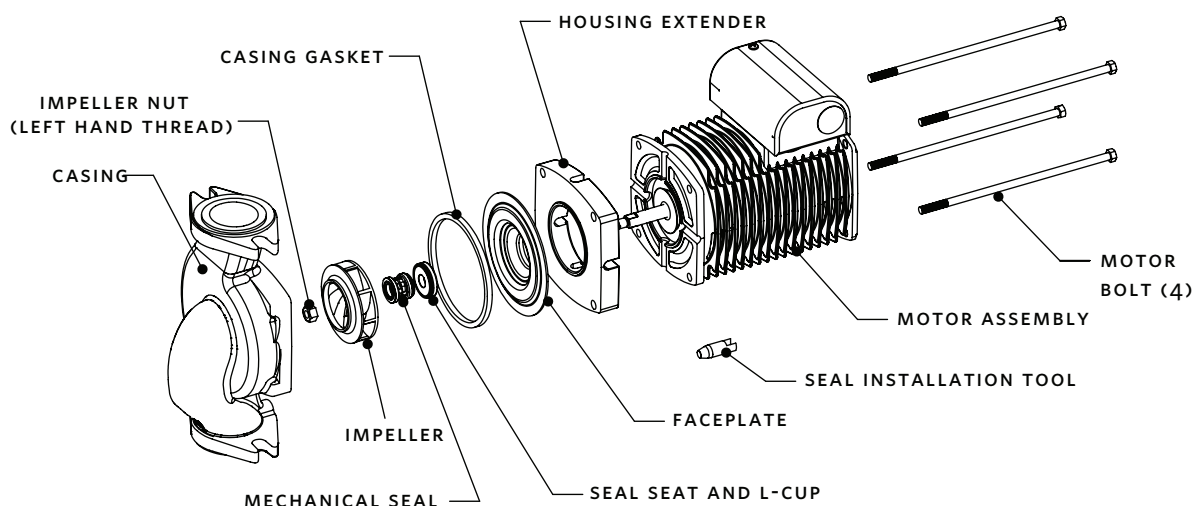
Handle with care
The motor is heavy, and possibly hot, **DO NOT** drop it!
- 3 While holding the rotor very tightly by hand or a gloved hand only, unscrew the impeller nut off the motor shaft by turning it clockwise (i.e. opposite to most bolts and nuts). Place the motor on its back, with the shaft up.
 - 4 Remove the rotary part of the mechanical seal by gently pulling it off the shaft. If it is too tight use two small flat bladed screwdrivers to gently pry it off the shaft by placing the flat side of the blades onto opposite sides of the mechanical seal.
 - 5 Remove the face plate from the motor by gently prying it off of the motor housing extension, and carefully pulling it straight up, avoiding any shaft contact.
 - 6 Remove the stationary part of the seal by gently prying it off the steel faceplate.

- 7 Remove any corrosion present on the stainless steel motor shaft and face plate (especially the seal seat area) with a non-metallic brush or scrub pad. Do not use a wire brush or steel wool.
- 8 Remove any dust created during step #7 above and put a few drops of non-petroleum lubricant around the face plate where the stationary seat is to be installed.
- 9 Install the new stationary seal seat into the faceplate by firmly pressing it down until it bottoms. The disk should be clean. If needed, wipe it with alcohol and a soft lint free cloth.
- 10 Replace the faceplate on the motor housing extension, being careful to avoid shaft contact. This may need to be gently tapped down until tight to the housing. Be sure to check that the stainless steel plate is flush to the extender plate face.
- 11 Install the special **installation tool** (P/N #180212-095) on the top of the shaft making sure it is tight to the flat base of the impeller to protect the seal from sharp edges during seal installation.
- 12 Apply a liberal amount of non-petroleum based lubricant on the outside of the special plastic **installation tool**.
- 13 Wipe any excess lubricant off of the stationary silicon carbide seal face with a lint free cloth and alcohol to ensure the surface is clean.
- 14 Install the new rotating seal element and spring assembly by gently pushing it (graphite ring first) over the **installation tool** and onto the shaft until the graphite ring presses tightly against the stationary seal seat. The seal spring may be compressed slightly.
- 15 Remove the **installation tool** from the shaft.
- 16 Install the impeller keeping the inlet end up. Make sure to align the flats to the shaft flats and push the impeller down tightly to the seal.
- 17 Place 2-3 drops of medium strength thread locker liquid on the nut threads.
- 18 Install the special left hand thread nut on the motor shaft. While holding the motor rotor in place as in step 3, thread the impeller nut on to the shaft in a counter-clockwise direction and tighten the nut to approximately 8.1Nm.
- 19 If the impeller will not spin freely contact Armstrong Technical Support at +33 (0) 420 102 625 or email france@armstrongfluidtechnology.com.
- 20 Ensure the gasket is properly seated in the pump casing (volute) gasket groove. Holding the motor body, insert the impeller straight into the volute. Verify the gasket was not dislodged during insertion, and is still seated properly. Hold the motor body steady while fastening the four bolts that attach the motor to the pump casing

(volute). Tighten evenly and diagonally. There should be a small, even gap of about 0.5 mm between the motor flange and the pump casing (volute).

21 Follow the **START UP** instructions (File no. 10.84) and check for leaks.

DIAGRAM 3 Internal Assembly (Exploded view)



7.0 PRODUCT FAMILY SPECIFICATION

Hydraulic data E.2 series models for European market only

E.2 SERIES MODELS	E9.2	E14.2 / E14.2B	E22.2 / E22.2B	E33.2
Flow @ 50 Hz (range) [m ³ /h]	1.0 / 6.5	1.0 / 6.5	2.5 / 15.0	13.0 / 25.0
Head @ 50 Hz (range) [m]	1.0 / 6.8	0.7 / 12.4	1.0 / 6.8	1.0 / 4.2
Circled numbers @ 50 Hz	(01)	(02) + (03)	(04) + (05)	(06)
Flow @ 60 Hz (range) [m ³ /h]	1.0 / 8.5	1.0 / 8.0	3.0 / 18.0	15.5 / 30.0
Head @ 60 Hz (range) [m]	1.0 / 9.8	10.0 / 17.8	1.0 / 9.8	1.0 / 6.0
Circled numbers @ 60 Hz	(07)	(08) + (09)	(10) + (11)	(12)
Min. / Max. fluid temperature	+4/+110°C (all models)			
Max. working pressure	10 bar g.(all models)			
Max. ambient temperature	30°C (all models)			

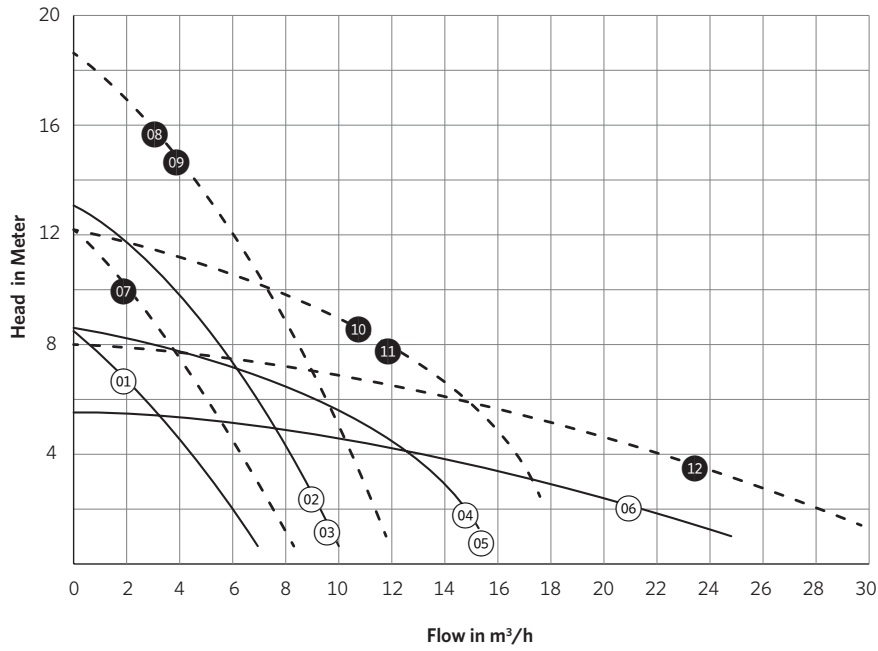
Cast iron casing for (01) (02) (04) (06) (07) (08) (10) (12) compatible with ethylene or propylene glycol/water solutions.

Bronze casing for (03) (05) (09) (11) compatible with potable water only

Electric data E.2 series models for European market only

E.2 SERIES MODELS	E9.2	E14.2 / E14.2B	E22.2 / E22.2B	E33.2
Motor type	125 Watt ODP	300 Watt ODP	300 Watt ODP	300 Watt ODP
Electrical supply	240V AC / 1Ph / 50-60Hz (all models)			
Max. speed @ 60 Hz [rpm]	3,250	3,300	3,350	3,300
Full load current [A]	1.0	2.4	3.0	3.1

Performance Curve



Circled numbers denote E.2 series model number (performance guaranteed only at operating point indicated).

- | | |
|-------------|-------------|
| ① E9 50Hz | ⑦ E9 60Hz |
| ② E14 50Hz | ⑧ E14 60Hz |
| ③ E14B 50Hz | ⑨ E14B 60Hz |
| ④ E22 50Hz | ⑩ E22 60Hz |
| ⑤ E22B 50Hz | ⑪ E22B 60Hz |
| ⑥ E33 50Hz | ⑫ E33 60Hz |

	PRODUCT	E-3326 Rev. 2
	Centrifugal Pump Units (Water Circulators)	Date: 2017-03-24



EU DECLARATION OF CONFORMITY

16

Model: E.2/E.2B-Series Pump Units (Water Circulators,) 250 W Class

We, Armstrong Pumps Inc, declare under our sole responsibility that the products are in conformity with the relevant Union harmonisation legislation:

Directive 2006/42/EC (Machinery) of the European Parliament and of The Council

Directive 2014/35/EU (Low Voltage) of the European Parliament and of The Council

Directive 2014/30/EU (EMC) of the European Parliament and of The Council

Directive 2011/65/EU (on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) of the European Parliament and of The Council

The following harmonised standards and technical specifications have been applied:

BS EN ISO 12100:2010	Safety of Machinery. Basic concepts, general principles for design.
BS EN 809:2011-01	Pumps and Pump units for liquids – Common safety requirements.
BS EN 14121-1:2007	Safety of Machinery Risk Assessment – Principles.
BS EN 14121-2:2007	Safety of Machinery Risk Assessment – Practical guidance & examples.
BS EN 50581:2012	Technical documentation for the assessment of electrical & electronic products with respect to the restriction of hazardous substances.

- Description:** E.2/E.2B Pump Units (Water Circulators,) 250W Class
Manufacturer: Armstrong Pumps Inc.
Model Nos. E12.2/E12.2B, E14.2/E14.2B, E15.2/E15.2B, E17.2/E17.2B, E19.2/E19.2B, E21.2/E21.2B, E22.2/E22.2B, E23.2/E23.2B, E24.2/E24.2B, E28.2/E28.2B, E29.2/E29.2B, E30.2/E30.2B, E32.2/E32.2B, E33.2/E33.2B (both 2" and 3" line sizes)

Nom. Volts/hz./ FLA (max) 240V, 50 hz, 3.1 A, (Specific ratings per model on nameplate.)
Fluid/Amb. Temp Limits: 110C fluid/50C ambient
Mo/Year of Manufacture: 02/2016 -current
Serial Number/Date Code: 0216-current
- The pump unit uses electricity, has electrical assemblies & components, moving parts, areas of high temperature and fluids under pressure.
- The pump unit produces heat, sound, and vibration and it is necessary to take suitable precautionary measures when moving, installing and operating the pump to reduce risk associated with the characteristics stated above.
- The pump unit must be installed in accordance with local laws and regulations. The pump must only be used in accordance with the scope of supply and the intended applications.


Technical Author: Signed: 
 Jeffrey L. Martin, PE, RE
 Compliance Engineer

Date: 2017-03-24

Armstrong Pumps Inc. 93 East Avenue, North Tonawanda, New York, USA 14120-6594	Tel: 716-693-8813 Fax: 716-693-8970
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- The technical documentation is available in the EC from :

Armstrong Integrated Ltd. 1 Wolverton St, Manchester M11 2ET England	Tel: 0844 414 5145 Fax: 0844 414 5146
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Responsible Person: Signed: 
 Kathryn Poke, B.Eng (Hons)
 Director, Engineering –UK

Date: 26-4-2017

Revision History : Rev 1, dated 2016-04-20 : Holden Brook changed to AIL, added Andrew Harrop. Released.
 Rev 2, dated 2017-03-24 : Added EMC directive, updated LV directive revision, added K.Poke & EN 50581.

	PRODUCT	E-3325 Rev. 2
	Centrifugal Pump Units (Water Circulators)	Date: 2017-03-24



EU DECLARATION OF CONFORMITY

16

Model: E.2/E.2B-Series Pump Units (Water Circulators,) 100 W Class

We, Armstrong Pumps Inc, declare under our sole responsibility that the products are in conformity with the relevant Union harmonisation legislation:

Directive 2006/42/EC (Machinery) of the European Parliament and of The Council

Directive 2014/35/EU (Low Voltage) of the European Parliament and of The Council

Directive 2014/30/EU (EMC) of the European Parliament and of The Council

Directive 2011/65/EU (on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) of the European Parliament and of The Council

The following harmonised standards and technical specifications have been applied:

BS EN ISO 12100:2010	Safety of Machinery. Basic concepts, general principles for design.
BS EN 809:2011-01	Pumps and Pump units for liquids – Common safety requirements.
BS EN 14121-1:2007	Safety of Machinery Risk Assessment – Principles.
BS EN 14121-2:2007	Safety of Machinery Risk Assessment – Practical guidance & examples.
BS EN 50581:2012	Technical documentation for the assessment of electrical & electronic products with respect to the restriction of hazardous substances.

- Description:** E.2/E.2B Pump Units (Water Circulators,) 100W Class
Manufacturer: Armstrong Pumps Inc.
Model Nos. E001.2/E001.2B, E7.2/E7.2B, E8.2/E8.2B, E9.2/E9.2B, E10.2/E10.2B/E11.2/E11.2B, E13.2/E13.2B, E16.2/E16.2B
Nom. Volts/hz./ FLA (max) 240V, 50 hz, 1.0 A , (Specific ratings per model on nameplate.)
Fluid/Amb. Temp Limits: 110C fluid/50C ambient
Mo/Year of Manufacture: 02/2016 -current
Serial Number/Date Code: 0216-current
- The pump unit uses electricity, has electrical assemblies & components, moving parts, areas of high temperature and fluids under pressure.
- The pump unit produces heat, sound, and vibration and it is necessary to take suitable precautionary measures when moving, installing and operating the pump to reduce risk associated with the characteristics stated above.
- The pump unit must be installed in accordance with local laws and regulations. The pump must only be used in accordance with the scope of supply and the intended applications.

Technical Author: Signed:  Date: 2017-03-24

Jeffrey L. Martin, PE, RE
Compliance Engineer

TORONTO
+1 416 755 2291

Armstrong Pumps Inc. 93 East Avenue, North Tonawanda, New York, USA 14120-6594	Tel: 716-693-8813 Fax: 716-693-8970
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BUFFALO
+1 716 693 8813

5. The technical documentation is available in the EC from :	Tel: 0844 414 5145 Fax: 0844 414 5146
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BIRMINGHAM
+44 (0) 8444 145 145

Responsible Person: Signed:  Date: 24-4-2017

Kathryn Poke, B.Eng (Hons)
Director, Engineering –UK

MANCHESTER
+44 (0) 8444 145 145

Revision History : Rev 1, dated 2016-04-20 : Holden Brook changed to ALL, added Andrew Harrop. Released.
Rev 2, dated 2017-03-24 : Added EMC directive, updated LV directive revision, added K.Poke & EN 50581.

BANGALORE
+91 (0) 80 4906 3555

SHANGHAI
+86 21 3756 6696

SÃO PAULO
+55 11 4781 5500

LYON
+33 (0) 2010 2625