

XA88 Installation Handbook

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Box Contents

- 1 x XA88
- 1 x 'Installation Handbook'






This symbol is used to alert the user to important operating or maintenance instructions.



The Lightning bolt triangle is used to alert the user to the risk of electric shock.

SAFETY

1. It is important to read these instructions, and to follow them.
2. Keep this instruction manual in an accessible place.
3. Clean only with a dry cloth. Cleaning fluids may affect the equipment.
4.  The rear heatsink must overhang any flat surface onto which the equipment is mounted. Install in accordance with the manufacturer's instructions.
5. Do not install this equipment near any heat sources such as radiators, heating vents or other apparatus that produces heat.
6.  **WARNING - THIS APPARATUS MUST BE EARTHED / GROUNDED USING CHASSIS STUD.**
7. Refer all servicing to qualified personnel. Servicing is required when the apparatus has been damaged in any way, such as liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to any rain or moisture, does not operate normally or has been dropped.
8. The unit contains no power switch. Isolate power supply externally before removing connections.
9.  **WARNING – To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture. The apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus.**



CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

TO PREVENT ELECTRIC SHOCK DO NOT REMOVE THE COVER. THERE ARE NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.

INTRODUCTION

The XA88 has been designed as a high quality stand-alone induction loop driver for use in a rail environment. The unit is also suited to other transport and industrial applications.

The XA88 has two inputs that each allow two levels to be accommodated. Both are accessed on CON1. Selection of input level is performed by wiring to the appropriate terminal in the connector. Input one is 100V line or 1V. Input 2 is 30V or 1V.

Each input is externally enabled by applying signals to CON 2. If this function is not required the unit can be permanently enabled by following the instructions on page 12. CON2 also contains access to relay contacts which are open during fault conditions.

The unit is supplied fitted with a control cover to prevent tampering and to provide ingress protection. This must be removed during set-up and replaced after.

Power input can be from 110V, 72V or 24Vdc*.

Connections are made using MIL-C-5015 circular connectors.

*depending on model selected

Variants available:

Unit name	Input voltage
XA88-110DC	110Vdc
XA88-72DC	72Vdc
XA88-24DC	24Vdc

Other variants may be available.

QUICK START

For those who have a good appreciation of audio induction loop systems, the following is a very quick guide to setting up the amplifier:

All you need is a DC power source, a signal source and a loop. See 'Designing Induction Loops' handbook (supplied) or contact Ampetronic for advice.

Installation

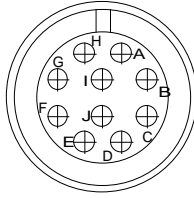
1. Remove control cover
2. Turn all controls fully anti-clockwise.
3. Connect loop cable of appropriate length and gauge.
4. Connect signal input(s).
5. Connect power. See points 6 and 8 in **SAFETY** section.

Operation

6. Check green POWER LED illuminates.
7. Enable appropriate input. (if externally enabled)
8. Apply input signal and increase the input control until the green AGC LED is illuminated on the peaks of the signal.
9. Adjust the CURRENT control until the CURRENT LED illuminates to achieve the desired peak current.
10. Repeat step 6 & 7 for any other inputs used.
11. Listen to the magnetic field produced inside the loop area using a receiving device (e.g. Ampetronic ILR3), or examine the performance in more detail with a field strength meter.
12. Adjust MLC control to achieve a flat frequency response.
13. Re-fit the control cover.

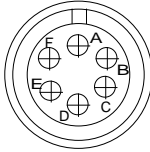
Connections

CON 1



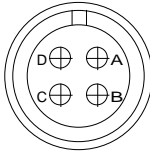
PIN	CONNECTION
A	INPUT 1 100V
B	INPUT 1 3V
C	INPUT 1 0V
D	INPUT 1 SCREEN
E	INPUT 2 30V
F	INPUT 2 3V
G	INPUT 2 0V
H	INPUT 1 SCREEN
I	NO CONNECTION
J	NO CONNECTION

CON 2



PIN	CONNECTION
A	INPUT 1 ENABLE +VE
B	INPUT 2 ENABLE +VE
C	ENABLE COMMON
D	NO CONNECTION
E	ISOLATED STATUS RELAY CONTACTS
F	RELAY CONTACTS

CON 3



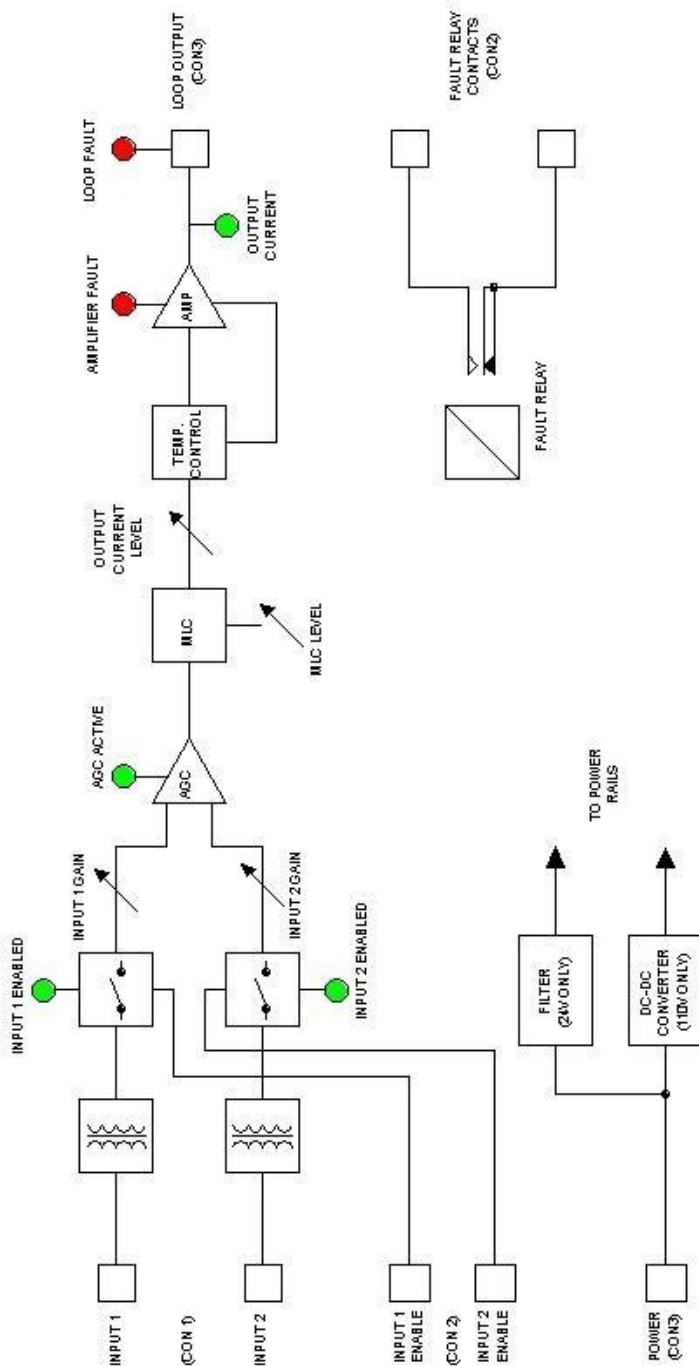
PIN	CONNECTION
A	POWER INPUT +VE
B	POWER INPUT 0V
C	LOOP -VE
D	LOOP +VE

VIEWED FROM FRONT OF UNIT

CONNECTOR NUMBER	MATING PART	CABLE RESTRAINT
CON1	MS3106A-18-1S	97-3057-1010-1
CON2	MS3106A-14S6S	97-3057-1007-1
CON3	MS3106A-14S2S	97-3057-1007-1

TYPICAL AMPHENOL MATING PART NO.S

Block Diagram



INSTALLATION

Location

The unit is designed to be mounted horizontally onto a flat surface or structure using the 6 qty M4 inserts on the underside. Alternatively the unit can be mounted using a separately available rack tray.



The location must provide adequate ventilation for the unit.

The heatsink on the rear of the unit must overhang any flat surface (or rack tray) on to which it is mounted. Failure to comply with this may result in the unit overheating and shutting down prematurely.

Contact Ampetronic for advice on cooling requirements for your installation.

Tools and Equipment

For wiring connectors, small hand tools including wire strippers, cutters and a soldering iron will be required.

For mounting the unit suitable fasteners and screwdrivers will be necessary

An ILR3 loop receiver or a magnetic field strength meter (e.g. Ampetronic FSM) is vital to check that the loop system is providing the desired level of performance.

System Requirements

The induction loop cable itself should be already installed according to specific design instructions provided by Ampetronic. As a result, a target current should be known, based on achieving acceptable field strength across the area to be covered.

It is important that the total resistance of loop and feed must not be more than 1Ω (at DC). If this is not achieved, the LOOP fault LED may become illuminated, resulting in a fault signal on the status contacts. See **Troubleshooting** section for details on how correct this, and get your system working.

The correct design and positioning of the actual loop is vital for satisfactory system performance. If in doubt consult Ampetronic for advice.

See next page for connection and set-up.

Connection and Set-up

It is advised that the loop system is initially set up using a local audio source such as a CD player, which is not connected into any other system. This avoids the complication of ground loops and feedback etc, whilst the unit is set up.

The following procedure describes the installation of a stand alone XA88, and does not incorporate connection of other ancillary units such as microphone pre-amps, mixing desks, or signal processing units.

1. Remove the control cover and turn all controls fully anti-clockwise.
2. Connect the loop feed cables & power supply cables into the 4 way circular connector (CON 3) as shown in the connections drawing.

Note: The feed cable should be tightly twisted to avoid unwanted stray magnetic fields.

3. Connect to input 1 and input 2 (selecting the appropriate position for the source

used) using the 10 way circular connector (CON 1) wired as per **Connections** drawing.

You may use either or both inputs.

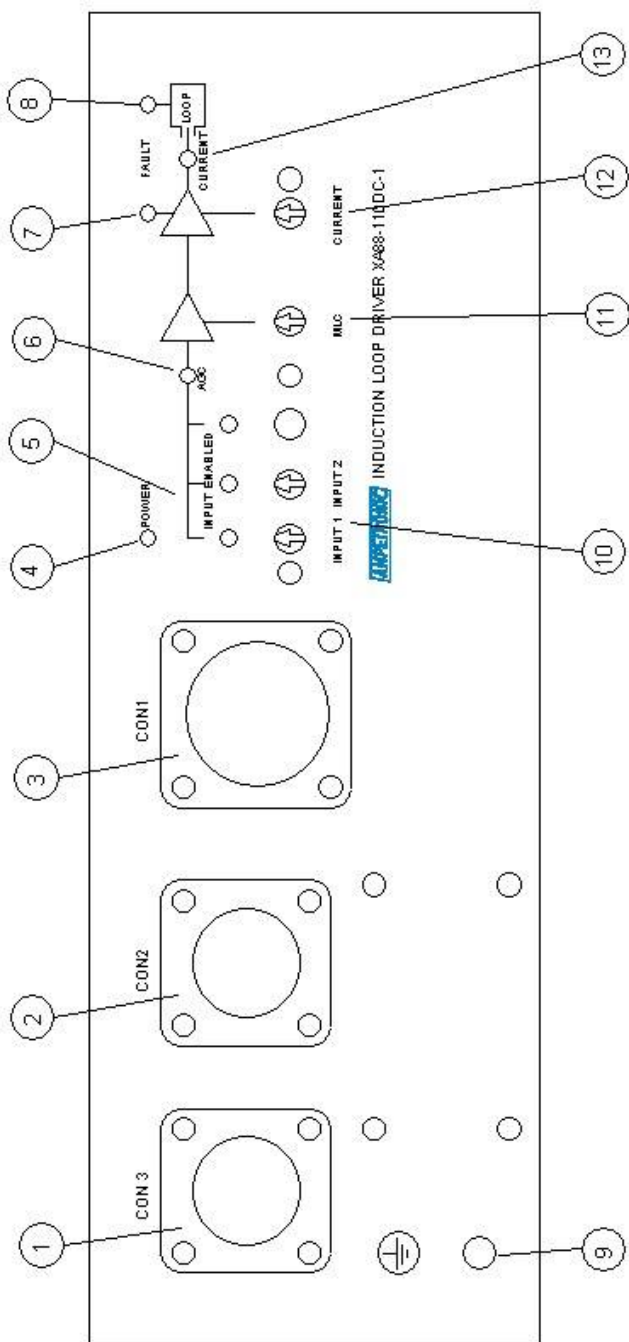


Do not run input and output cables close together

4. Connect the control inputs and fault detection into the 6 way circular connector (CON 2) as shown in the connections drawing.
If the unit is to be changed from external to internal enable or vice versa, please refer to instructions on page 12.
 5. Connect DC power to the XA88. See points 6 and 7 in **Safety** section.
 6. The POWER, AGC & AMPLIFIER FAULT LEDs will illuminate initially. After a few seconds the AMPLIFIER FAULT LED will go out (a fault condition will be present on the status contacts during this time). The AGC LED will then go out after about 30 seconds.
 7. Select one input and apply a suitable audio signal. Turn the associated input control clockwise until the AGC LED is illuminated on the peaks of the signal.
 8. Turn the CURRENT control clockwise until current is achieved – as indicated by the CURRENT LED. If high frequency oscillation or low frequency hum is experienced, consult the **Troubleshooting** section.
 9. The loop system should now be providing a magnetic field inside the area of the loop – use the ILR3 or field strength meter to examine its performance with respect to:
 - a. Magnetic field strength. This may vary across the coverage due to layout, metal loss and loop current.
 - b. Frequency response. Metal losses tend to increase with frequency, and may require the adjustment of the MLC control.
- As a result of this analysis, adjust the CURRENT and set the MLC to achieve the best sound quality. This should result in adequate magnetic field strength and a level frequency response in order to satisfy IEC60118-4.
- Once the CURRENT and MLC controls have been adjusted to the correct level they should **NOT** need re-adjusting.
10. If not already done so, steps can now be taken to integrate the XA88 into the host system following standard audio techniques. If any unusual effects are experienced refer to the **Troubleshooting** section.
- Note: Ideally, each input signal level should be set up to just trigger the AGC with the quietest level of input likely to be used. This will maximize the dynamic range of the system and ensure satisfactory performance.
11. Repeat the above procedure for each input used. When adjusting each input, make sure the signals are removed from the other inputs. This ensures that all signals are set to equivalent loudness and drive the compressor properly.
 12. Re-fit the control cover.

OVERVIEW

1. **CON 3:** 4 way connector for DC input and loop output
2. **CON 2:** 6 way connector for input enables and fault relay contacts
3. **CON 1:** 10 way connector for audio inputs. Level selected by appropriate configuration (see connections drawing)
4. **POWER LED:** Indicates power is being supplied
5. **INPUT ENABLED LEDs:** Indicates which inputs are enabled
6. **AGC LED:** Indicates that the AGC threshold has been reached
7. **AMPLIFIER FAULT LED:** Indicates that a thermal fault has occurred or a DC level is present on the loop (a thermal fault also results in the loop output being muted).
8. **LOOP FAULT LED:** Indicates that the loop output voltage has been clipping for some time (e.g. because the loop is open circuit)
9. **EARTH STUD:** The unit **MUST** be connected to the system earth at this point.
10. **INPUT 1, INPUT 2:** Screwdriver adjustable input gain controls.
11. **MLC:** Screwdriver adjustable metal loss control. Compensates for the frequency dependent effects of metal
12. **CURRENT:** Screwdriver adjustable control which sets the level of output current
13. **CURRENT LED:** Indicates the level of current in the loop.



TROUBLESHOOTING

POWER LED not illuminated

- Check that the power is being supplied on the correct pins of CON1 and in the correct polarity. If reverse polarity has been applied internal damage may have been caused in which case the unit should be returned for repair.

AGC LED not illuminating

- Check there is an input signal.
- Check input connections.
- Ensure that the appropriate front panel control (INPUT1, INPUT2) is turned up. Check there is sufficient signal level for the required input.

CURRENT LED not illuminating

There are many possible causes for this:

- Check the COMPRESSION LED is illuminating.
- Check that the CURRENT control is turned up sufficiently.
- Check the LOOP FAULT, or AMPLIFIER FAULT LEDs are not illuminated.
- Ensure the POWER LED is illuminated.
- Check that the loop cable is connected, terminated correctly and connected to the correct pins of CON3.
- Check the loop is not open circuit, short circuit, or connected to earth (see instability or high frequency noise section of **Troubleshooting**)

LOOP FAULT LED illuminated

Indicates that the output voltage is clipping or that loop is open circuit.

- Turn down the CURRENT control to avoid running too much current or causing the output voltage to clip.
- Check the loop is not open circuit or connected to earth (see instability or high frequency noise section of **Troubleshooting**)

AMPLIFIER FAULT LED illuminated

Indicates that the heatsink is too hot (accompanied by a loss of signal as the unit protects itself) or a fault with the unit.

- Ensure that the unit is installed in a location with sufficient ventilation
- Check the loop is not open circuit, short circuit, or connected to earth (see instability or high frequency noise section of **Troubleshooting**)

Low magnetic field strength

- Due to insufficient CURRENT or excessive metal loss.

May require a special loop design to achieve acceptable performance, contact Ampetronic for advice.

Instability or high frequency noise

1. It is possible for the loop cable to be grounded under fault conditions, resulting in instability which may sound like high frequency noise, buzz or whistling. The results of this type of fault are unpredictable and may appear as any combination of the front panel indication errors.

This fault is easy to determine. Simply unplug the loop cable from the amplifier and test with a resistance meter between either of the loop wires and a good earth point. There should be an infinitely high reading i.e. no connection at all. Any reading indicates a failure of the loop cable insulation and you will need to either repair or replace the loop cable.

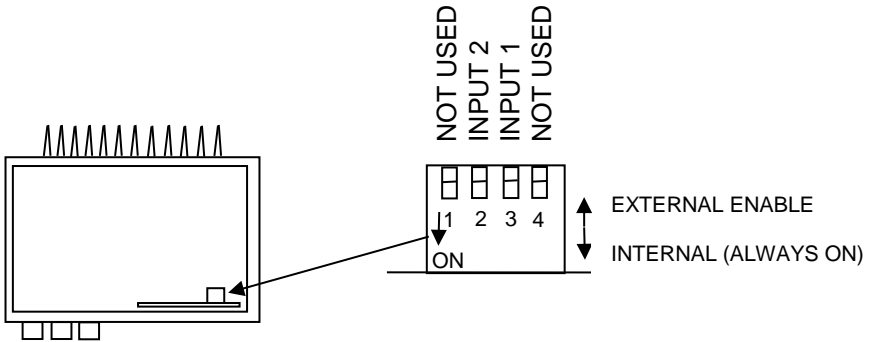
2. Instability can be caused by using poor quality signal cables, long unbalanced signal runs to the inputs, or by running input cables in close proximity with the loop wire over an appreciable distance. Loop amplifiers are capable of delivering high currents at audio frequencies. If the loop cable is run close to sensitive signal cables it may be possible to induce a signal back into the input of the amplifier causing feedback. Cable runs and loop wires should be kept well apart from each other. To avoid interference maintain a separation of at least 300mm.
3. Instability can cause the amplifier to run hot and may result in the AMPLIFIER FAULT LED illuminating.

Interference

1. Background magnetic field signals or interference may be present in any location and may not be anything to do with the loop system. Monitor this with a loop receiver (such as an ILR3). If the interference is still present with the loop system switched off, then you need to locate and eliminate the source of the interference before switching the loop system back on
2. Magnetic fields can induce currents into any low impedance electrical path or loop. Audio or video systems with multiple earths may experience pick up of the loop signal. Check entire sound system for evidence of loop signal, and trace source of pick up.
3. Under certain circumstances, the loop signal may appear as jagged lines or hum bars on a CCTV picture. This could be due to running CCTV (low impedance unbalanced circuit) cables in close proximity to the loop cable. Separate the loop cables from video cables to reduce the effect.
4. Remote (and apparently unconnected) audio systems can sometimes pick up loop signals. This is usually because the loop cable becomes damaged (see point 1 of **Instability**) or induces signals into the remote system through long unbalanced cables. Always run long audio signal cables as balanced circuits and keep away from loop cables.

Changing Enable method

1. Disconnect power supply
2. Remove lid screws (A TX10 torx driver will be required)
3. Remove lid. Take care not to damage PSU connector wiring (110V / 72V version). It may be easier to unplug the PSU connector.
4. Make appropriate adjustments to switches on front panel PCB see below.
5. Reconnect PSU if necessary and refit lid and tighten screws.



ACCESSORIES

Details of products and services provided by Ampetronic can be found at www.ampetronic.co

TECHNICAL SPECIFICATIONS

INPUTS

Input figures quoted at maximum front panel gain control setting.	Low level		High level
INPUT 1 (CON 1); Isolated, balanced. Sensitivity Overload	130mVrms 7.3Vrms	4.2Vrms 236Vrms	
INPUT 2 (CON 1); Isolated, balanced. Sensitivity Overload	130mVrms 7.3Vrms	1.3Vrms 73Vrms	
CONTROL (CON 2); Sensitivity (per input) Maximum	5V (3.4mA) dc 24V (20mA) dc		
DC POWER (CON 3);			
Supply voltage	110 Vdc	72 Vdc	24 Vdc
Power	150W max 90W Average		
Fuse	5A in DC-DC converter (non-replaceable)		8A (T)

COMPRESSION (AGC)

Compression of signal shown on front panel LED Input range Output range Min. input level for AGC Attack time Decay time	>36dB ±1dB across input range Depends on input used (see sensitivity) 7ms >1s
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OUTPUTS

LOOP OUTPUT (CON 3); supplied via auto-transformer. Voltage Current into a single turn loop. Absolute max short term peak current. THD +N Frequency response (loop current) Metal Loss correction Current indicated via front panel LED. Note: Supplied with 1.67:1 transformer ratio as standard. Loop output parameters shown at this setting. Different transformer ratios can be supplied.	11V peak (7.1V _{RMS}) 15.5A peak (11A _{RMS}) >21A <0.2% @1kHz 100Hz to 5kHz ±1.5dB at low level Adjustable 0 to 3dB per octave (gain @ 1kHz remains constant)
Status contacts (CON 2); A pair of isolated contacts. Amplifier or load fault Amplifier and load OK Contact rating Dielectric strength (coil – contact)	Open Closed DC 1.25A @24Vdc AC 0.4A, 125Vac 1000Vac 50/60Hz

PROTECTION FEATURES

Clipping; If clipping persists (>8s of continuous clipping) LOOP FAULT LED will illuminate. Threshold	97% of peak output voltage (time delays applied to prevent nuisance tripping)
Output DC offset; If DC offset is detected AMPLIFIER FAULT LED will illuminate. threshold	±0.7V DC
Overheat; (heatsink) Output level reduction Output mute (illuminates AMPLIFIER FAULT)	90 to 125°C (3dB max) 125°C
Any of the above faults also cause the status relay contacts to open.	
Current limit; Threshold	Approx. 21A pk
Cooling; Amplifier thermal emissions	120W

PHYSICAL

Weight;	4.5kg
Dimensions; Width Height Depth	251mm 89mm 320mm
Connectors	All connections except chassis ground are MIL-C-5015 with pin contacts – for pin assignments and typical mating parts see Connections section. Chassis ground is via front panel M6 stud.
Environmental; Ingress Protection Operating temperature range Relative humidity	IP 43 -40 to +70°C 95%

WARRANTY

This product carries a parts and labour warranty which could be invalidated if these instructions are not followed correctly, or if the unit is misused in any way.

The warranty is dated from the time the equipment leaves Ampetronic and NOT when it is installed, unless otherwise agreed in writing before dispatch.

DECLARATION OF CONFORMITY

Manufacturer: Ampetronic Ltd.,

Unit 2, Trentside Business Village
Farndon Road
Newark
NG24 4XB

Declares that the product:

Description: Induction Loop Driver

Type name: XA88 – All versions

Conforms to the following Directive(s) and Norm(s):

Directive 2014/30/EU EMC Directive

Directive 2014/35/EU Low Voltage Directive

Directive 2011/65/EU RoHS

With the application of the following standards:

Safety: EN60065: 2014

Rail applications: EN50155:2017

EMC: EN50121-3-2:2016

EN50498:2010

Environmental EN61373:2010

For details of applied criteria, limits and levels during testing - contact Ampetronic.

Date: May 2017

Julian Pieters

Managing Director,

Ampetronic Ltd.