

## Instruction Manual

- **BMS CARD**
- **AF10, AF10A, AF10B, AF10-XP2, AF10A-XP2, AF10B-XP2**
- **Retrofit to (or supplied with) CWC DIGICHEM<sup>®</sup>, DCON & XP2 Series CONTROLLERS**
- **4-20mA Output**
- **NPN Open Collector Outputs for Power Failure, Alarm & Individual Output Status**



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**Manufacturer:** Convergent Water Controls Pty Ltd, Sydney Australia.

**Note:** On-going product development at Convergent Water Controls may lead to changes in the specifications of this product.

**Warranty:** This product is guaranteed for a period of 12 months from installation date. The warranty applies to manufacturing or component defects which may cause the unit to malfunction under specified conditions. The guarantee does not cover damage due to abuse, tampering or improper installation.

**Disclaimer:** Convergent Water Controls will not be held liable for any consequential damage or loss arising resulting from product malfunction.

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# 1. INTRODUCTION

The AF10 Series BMS cards can be fitted to any CWC DIGICHEM, DCON or XP2-Series controller to remotely monitor the variable being controlled as well as power failure, alarm and output status. The outputs of the card can be connected directly to Building Management Systems (BMS), data loggers or the CWC RSD (Remote SMSlog Diallers). For older controllers, a software upgrade is required. However, for most controllers, the card works immediately after installation when powered up.

## 1.1 Features

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- Easy retrofit to controllers installed in the field.
- Isolated 4-20mA proportional to  $\mu\text{S}/\text{TDS}$ , ORP or pH
- NPN Open Collector Transistors to signal output status
- Failsafe Power Failure alarm signal (NPN)
- Independent Alarm signal (NPN)
- Independent "Output ON" signal (NPN) for DCON-PH2, DCON-RX2, PH-XP2 & ORP-XP2 controllers
- Separate Independent "Output ON" signal (NPN) for Biocide A, Biocide B, Inhibitor C and Solenoid Valve, for DIGICHEM & DIGICHEM-XP2 controllers.
- Ideal Interface between DIGICHEM controller and RSD Remote SMSlog diallers.

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## 2. INSTALLATION & WIRING – DIGICHEM & DIGICHEM-XP2

The DIGICHEM/DIGICHEM-XP2 fitted with the AF10/AF10-XP2 BMS card provides an optically isolated 4-20mA signal for direct interface to a data logger, chart recorder, building management system (BMS) or CWC RSD Remote SMSlog Dialler (with 250 ohm resistor across output to convert to 1-5VDC). It also has various NPN open collector transistor outputs for remotely monitoring controller and output status. The interface card is an ordering option and can be retro-fitted to the DIGICHEM/DIGICHEM-XP2, or can be supplied factory fitted.

The **AF10** optional kit consists of the following:

1. BMS card
2. Interconnecting communications cable (3-way).
3. 2 x 20mm metal spacers (M/F)

The **AF10-XP2** optional kit consists of the following:

1. BMS card
2. Interconnecting communications cable (2-way).
3. 2 x 40mm metal spacers (F/F).
4. 2 x screws & washers

Your controller may also require a software upgrade if it does not recognise the card on power-up. The card is recognised if the LED on the card pulses after power up. If you are unsure, please provide CWC with the serial number of the controller to determine if the software needs upgrading. A software upgrade entails purchasing a new EPROM pre-programmed with the updated software. The ordering codes for the EPROMs are:

<b>Series</b>	<b>Order Code</b>
DIGICHEM Series I	N/A
DIGICHEM Series II	SP-DCII-EPROM
DIGICHEM Series III	SP-DCIII-EPROM
DIGICHEM Series IV	Software upgrade not required
DIGICHEM-XP2	Software upgrade not required

You may skip section 2.1 & 2.2 if the card is factory fitted.

## 2.1 Installing BMS card (AF10) in a DIGICHEM Series II, III or IV Controller

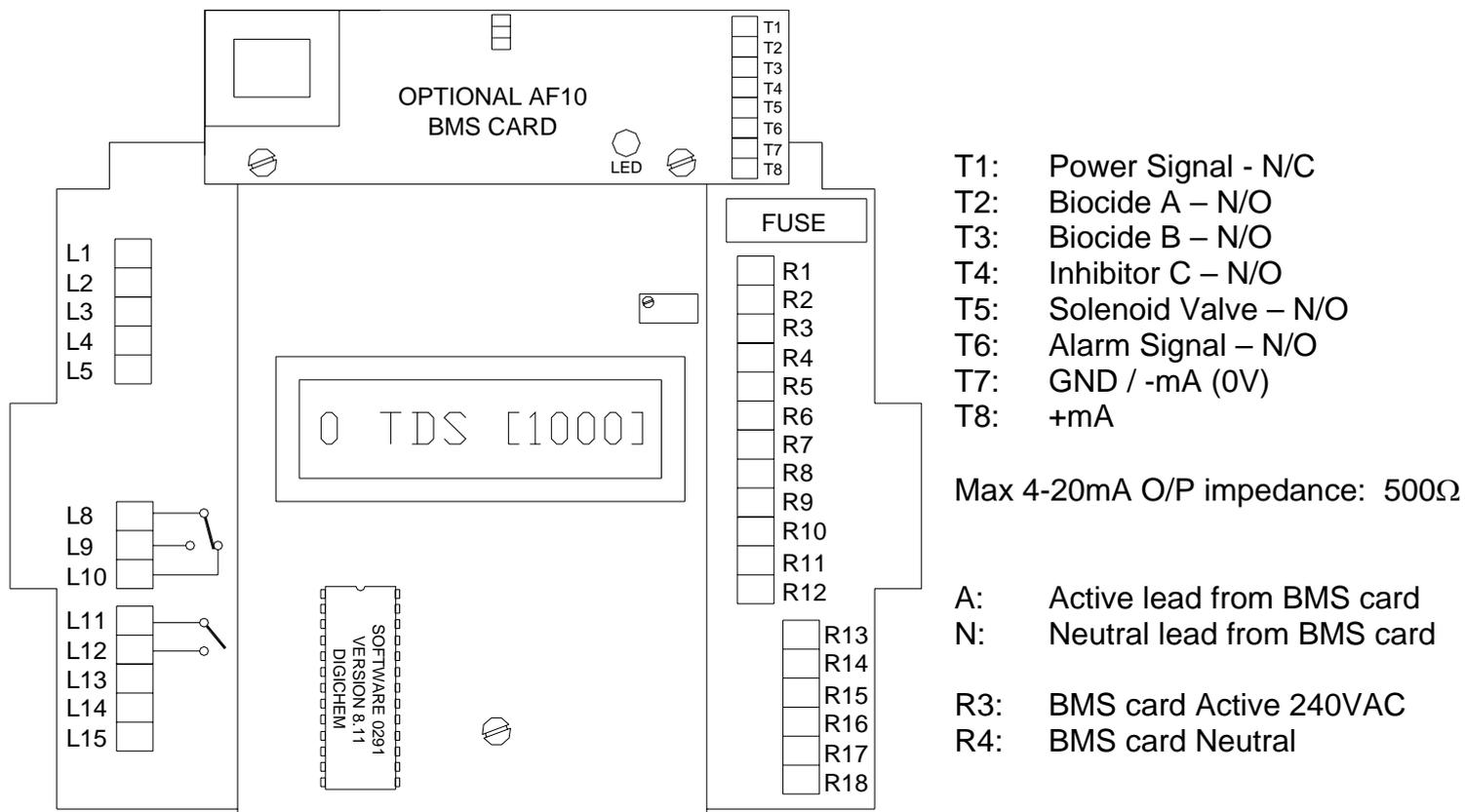
Screws



**CIRCUIT WITHOUT THE BMS CARD**



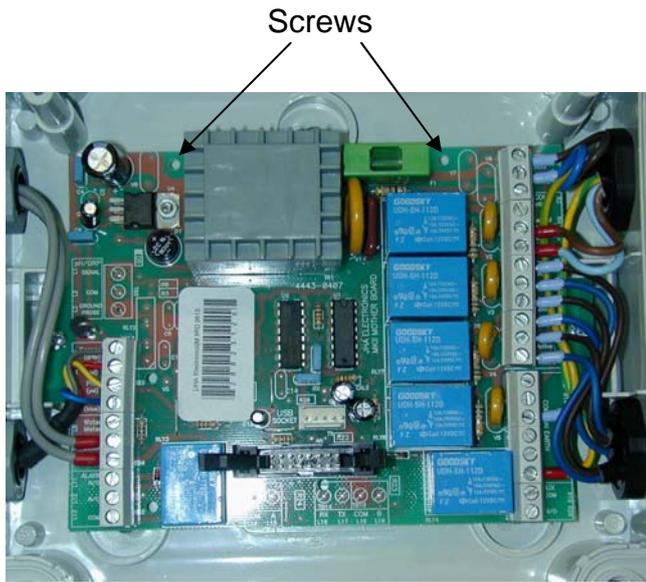
**CIRCUIT WITH THE BMS CARD**



**WIRING DIAGRAM OF DIGICHEM with BMS CARD**

1. Make sure that the power is switched off and the controller is unplugged from mains power.
2. Remove cover of enclosure.
3. Locate the two top screws as indicated in the diagram and photographs above and remove. **Do not discard these screws.**
4. Remove the interconnecting cable supplied with the controller. This is connected between the RTC socket on the motherboard and the USB socket on the processor board.
5. Plug the new interconnecting cable from the BMS card into the RTC and USB sockets.
6. Screw the 2 metal spacers into space where the screws were removed.
7. Locate the two mounting holes on the interface card.
8. Use the screws removed in step 3 and fasten the card to the 2 metal spacers (installed in step 6).
9. Connect the RED wire of the interface card to R3.
10. Connect the BLACK wire of the interface card to terminal R4.
11. Connect terminals 1 to 8 on the BMS card per the electrical diagram in section 2.3.
12. Replace cover of enclosure, ensuring that the seal is in place and no wires are trapped between the lid and the base.
13. Plug into mains and switch on.

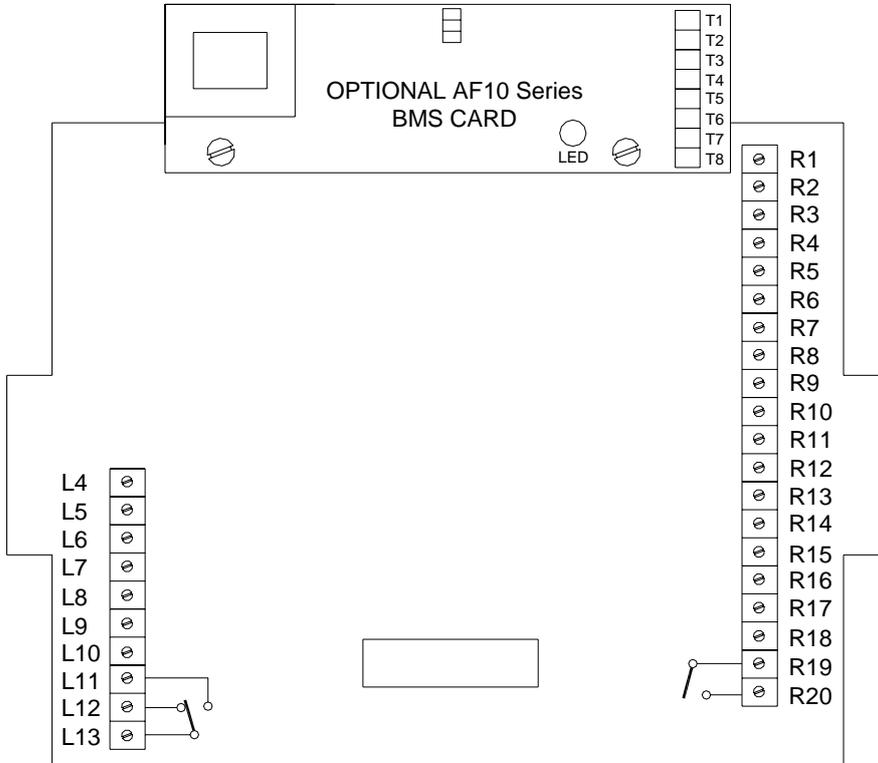
## 2.2 Installing BMS card (AF10-XP2) in a DIGICHEM-XP2 Controller



**CIRCUIT WITHOUT THE BMS CARD**



**CIRCUIT WITH THE BMS CARD**



- T1: Power Signal - N/C
- T2: Biocide A – N/O
- T3: Biocide B – N/O
- T4: Inhibitor C – N/O
- T5: Solenoid Valve – N/O
- T6: Alarm Signal – N/O
- T7: GND / -mA (0V)
- T8: +mA

Max 4-20mA O/P impedance: 500 Ω

- A: Active lead from BMS card
- N: Neutral lead from BMS card

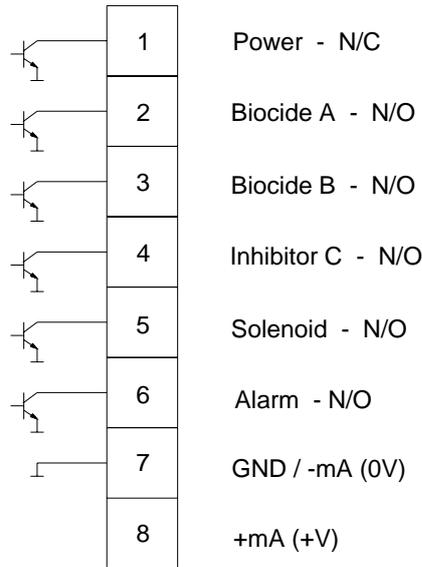
- R3: BMS card Active 240VAC
- R4: BMS card Neutral

**WIRING DIAGRAM OF DIGICHEM-XP2 with BMS CARD**

1. Make sure that the power is switched off and the controller is unplugged from mains power.
2. Remove cover of enclosure.
3. Locate the two screws (male threads) as indicated in the LHS photograph.
4. Plug the new interconnecting cable from the BMS card into the USB socket on the motherboard.
5. Screw the 2 metal spacers onto the 2 male threads on the motherboard.
6. Use the two screws provided and fasten the card to the 2 metal spacers.
7. Connect the RED wire of the interface card to R3.
8. Connect the BLACK wire of the interface card to terminal R4.
9. Connect terminals 1 to 8 on the BMS card per the electrical diagram in section 2.3.
10. Replace cover of enclosure, ensuring that the seal is in place and no wires are trapped between the lid and the base.
11. Plug into mains and switch on.

## 2.3 Wiring Information for a BMS card in a DIGICHEM Controller

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1. Connect the -ve and +ve terminals (ie 7 & 8) of the BMS card to your chart recorder, data logger, building management system or CWC RSD Remote SMSlog dialler (with 250 ohm resistor across output to convert to 1-5VDC). It is important to observe the correct polarity of these connections.
2. Connect all the other outputs to the building management system NPN inputs or potential-free switch inputs. The same applies if connecting to a CWC RSD.
3. The ground for the NPN outputs is the same ground as the analogue 4-20mA (1-5V) output.
4. The LED on the BMS card should pulse if it is working correctly.

**NOTE:** For the DIGICHEM Series II, III or IV, the 4-20mA signal transmitted spans the conductivity range of 0 to twice the  $\mu\text{S}/\text{TDS}$  setpoint. For instance, if the setpoint=1000  $\mu\text{S}/\text{TDS}$ , 4-20mA spans the conductivity range: 0-2000  $\mu\text{S}/\text{TDS}$ .

For the DIGICHEM-XP2, the 4-20mA signal transmitted spans 0-5000  $\mu\text{S}/\text{TDS}$

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### 3. INSTALLATION & WIRING – DCON-PH, DCON-RX, PH-XP2 & ORP-XP2 Controllers

A DCON Series controller (eg. DCON-PH or DCON-RX) or PH/ORP-XP2 controller fitted with an AF10A/AF10B/AF10A-XP2/AF10B-XP2 BMS card provides an optically isolated 4-20mA signal for direct interface to a data logger, chart recorder, building management system (BMS) or CWC RSD Remote SMSlog Dialler (with 250 ohm resistor across output to convert to 1-5VDC). It also has various NPN open collector transistor outputs for remotely monitoring controller and output status. The interface card is an ordering option and can be retro-fitted to the DIGICHEM, or can be supplied factory fitted.

The **AF10A/AF10B** optional kit consists of the following:

1. BMS card
2. Interconnecting communications cable (2-way or 3 way).
3. 2 x 20mm metal spacers (M/F)

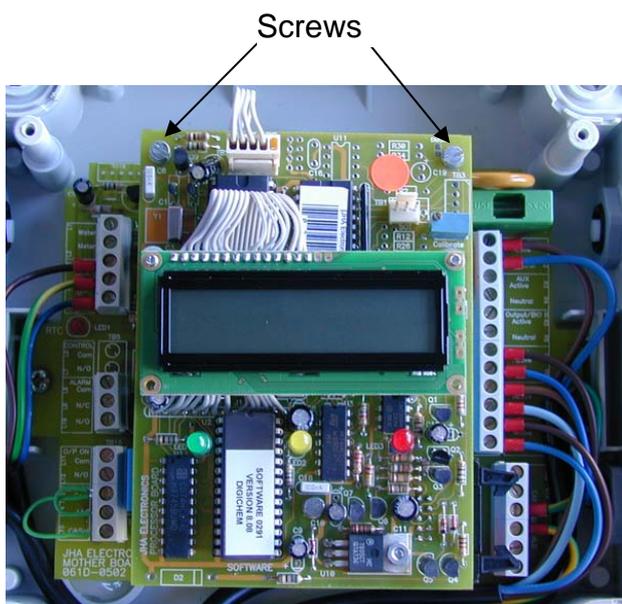
The **AF10A-XP2/AF10B-XP2** optional kit consists of the following:

1. BMS card
2. Interconnecting communications cable (2-way).
3. 2 x 40mm metal spacers (F/F).
4. 2 x screws & washers

Your controller may also require a software upgrade if it does not recognise the card on power-up. The card is recognised if the LED on the card pulses after power up. If you are unsure, please provide CWC with the serial number of the controller to determine if the software needs upgrading. A software upgrade entails purchasing a new EPROM pre-programmed with the updated software.

You may skip section 3.1 if the card is factory fitted.

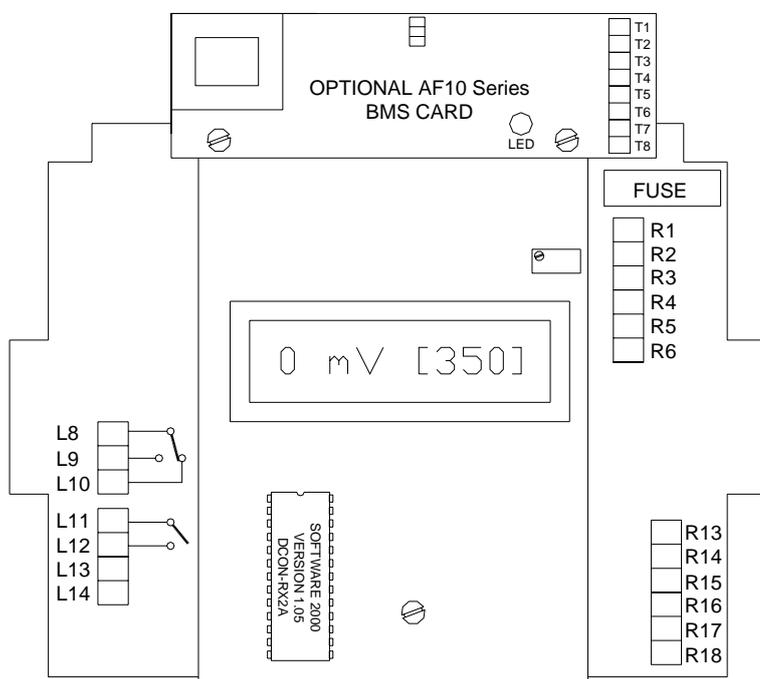
### 3.1 Installing a BMS card in a DCON Series Controller



**CIRCUIT WITHOUT THE BMS CARD**



**CIRCUIT WITH THE BMS CARD**



- T1: Power Signal - N/C
- T2: Unused
- T3: Unused
- T4: Unused
- T5: Control Output ON – N/O
- T6: Alarm Signal – N/O
- T7: GND / -mA (0V)
- T8: +mA

Max 4-20mA O/P impedance: 500 Ω

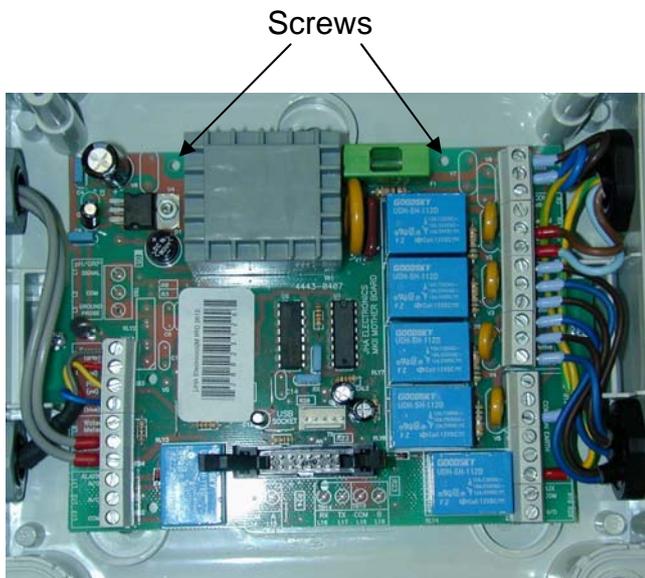
- A: Active lead from BMS card
- N: Neutral lead from BMS card
- R3: BMS card Active 240VAC
- R4: BMS card Neutral

**WIRING DIAGRAM OF DCON controller with BMS CARD**

1. Make sure that the power is switched off and the controller is unplugged from mains power.
2. Remove cover of enclosure.
3. Locate the two top screws as indicated in the diagram and photographs above and remove. **Do not discard these screws.**
4. Plug the new interconnecting cable from the BMS card into USB socket.
5. Screw the 2 metal spacers into space where the screws were removed.
6. Locate the two mounting holes on the interface card.
7. Use the screws removed in step 3 and fasten the card to the 2 metal spacers (installed in step 5).
8. Connect the RED wire of the interface card to R3.
9. Connect the BLACK wire of the interface card to terminal R4.
10. Connect terminals 1 to 8 on the BMS card per the electrical diagram in section 3.3.
11. Replace cover of enclosure, ensuring that the seal is in place and no wires are trapped between the lid and the base.
12. Plug into mains and switch on.

### 3.2 Installing a BMS card in a PH-XP2 or ORP-XP2 Controller

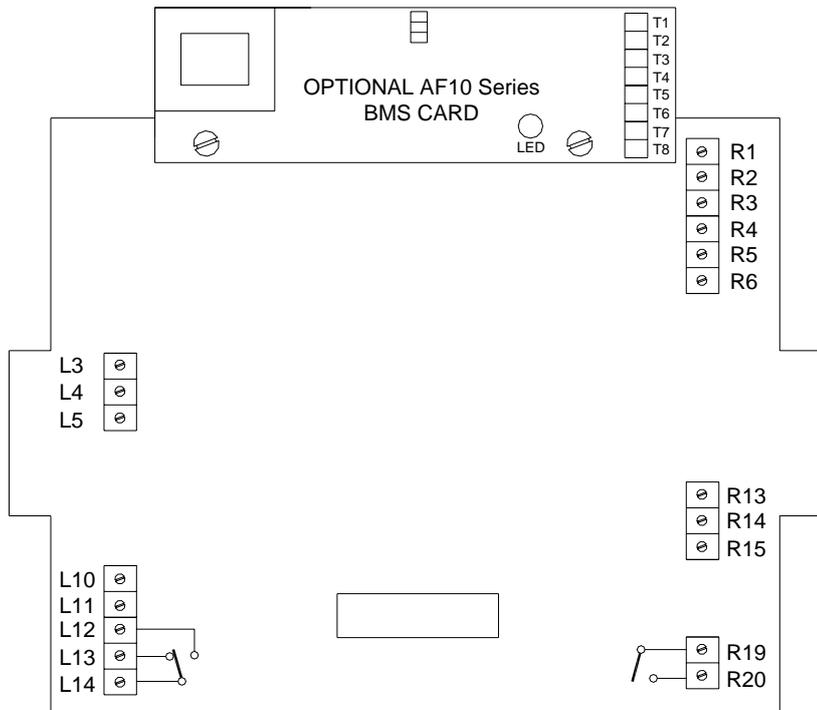
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**CIRCUIT WITHOUT THE BMS CARD**



**CIRCUIT WITH THE BMS CARD**



T1: Power Signal - N/C  
 T2: Unused  
 T3: Unused  
 T4: Unused  
 T5: Control Output ON – N/O  
 T6: Alarm Signal – N/O  
 T7: GND / -mA (0V)  
 T8: +mA

Max 4-20mA O/P impedance: 500 Ω

A: Active lead from BMS card  
 N: Neutral lead from BMS card

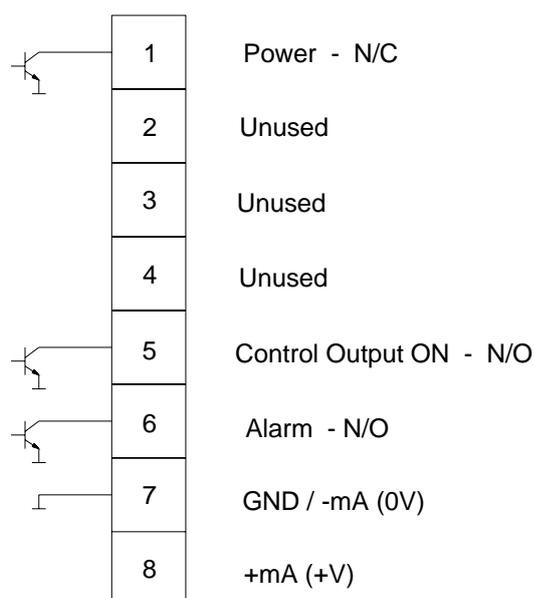
R3: BMS card Active 240VAC  
 R4: BMS card Neutral

**WIRING DIAGRAM OF PH-XP2 or ORP-XP2 controller with BMS CARD**

1. Make sure that the power is switched off and the controller is unplugged from mains power.
2. Remove cover of enclosure.
3. Locate the two screws (male threads) as indicated in the LHS photograph.
4. Screw the 2 metal spacers onto the 2 male threads on the motherboard.
5. Plug the new interconnecting cable from the BMS card into the USB socket on the motherboard.
6. Use the two screws provided and fasten the card to the 2 metal spacers.
7. Connect the RED wire of the interface card to R3.
8. Connect the BLACK wire of the interface card to terminal R4.
9. Connect terminals 1 to 8 on the BMS card per the electrical diagram in section 3.3.
10. Replace cover of enclosure, ensuring that the seal is in place and no wires are trapped between the lid and the base.
11. Plug into mains and switch on.

### 3.3 Wiring Information for a BMS card in a PH-XP2 or ORP-XP2 Controller

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1. Connect the -ve and +ve terminals (ie 7 & 8) of the BMS card to your chart recorder, data logger, building management system or CWC RSD Remote SMSlog dialler (with 250 ohm resistor across output to convert to 1-5VDC). It is important to observe the correct polarity of these connections.
2. Connect all the other outputs to the building management system NPN inputs or potential-free switch inputs. The same applies if connecting to a CWC RSD.
3. The ground for the NPN outputs is the same ground as the analogue 4-20mA (1-5V) output.
4. The LED on the BMS card should pulse if it is working correctly.

**NOTE:** The 4-20mA (1-5V) signal transmitted spans 0-14pH (PH-XP2) or 0-1000mV (ORP-XP2)

## 4. SPECIFICATIONS

<b>Power Supply:</b>	220 – 240 VAC (50 – 60Hz)
<b>Inputs</b>	Internal from DIGICHEM, DCON or XP2 controllers
<b>NPN Open Collector Output Status</b>	<ol style="list-style-type: none"> <li>1. Power ON – NPN N/C, ie opens on power failure</li> <li>2. Biocide A - NPN N/O, ie closes when pump on</li> <li>3. Biocide B - NPN N/O, ie closes when pump on</li> <li>4. Inhibitor C - NPN N/O, ie closes when pump on</li> <li>5. Solenoid/Control Output ON - NPN N/O, ie closes when valve opens</li> <li>6. Alarm - NPN N/O, ie closes when alarm is raised</li> <li>7. GND – ie common ground</li> <li>8. 4-20mA output (without jumper) or 0-5V output (with jumper)</li> </ol>
<b>NPN Open Collector Specifications</b>	<p>Max Open Collector Voltage: 50Vdc  Max Continuous Current: 100mA</p>
<b>4-20mA Output</b>	<p>Maximum impedance: 500 <math>\Omega</math>  Conductivity (XP2 Controller): 0-5000 TDS/<math>\mu</math>S = 4-20mA  Conductivity (DCON Controller): 0-2 x Setpoint = 4-20mA  ORP: 0-1000mV = 4-20mA  pH: 0-14pH = 4-20mA</p>
<b>LED Indication</b>	Pulsing indicates correct operation
<b>Controller Enclosure rating</b>	IP55 (ie. Completely weatherproof), if mounted inside DIGICHEM, DCON or XP2 controllers.
<b>EMC compatibility</b>	C-tick approved
<b>Operating Temperature</b>	0 - 50°C