

# **OPERATING AND INSTALLATION INSTRUCTIONS**

**Conductivity Operated Level Control System  
Having SIRA Approved Intrinsically Safe Electrode Circuits  
Conforming to the ATEX Directive 94/9/EC**

**Controller type P7/I.S. Certificate No SIRA03ATEX2160X**

**Electrode Holders Certificate No SIRA03ATEX2159X**

**Conductivity Operated Level Control System  
Certificate No Ex03E2161**

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## HAWKER ELECTRONICS LTD.

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The user should read this manual prior to installation or commissioning.

### 1. SYSTEM OVERVIEW

When used with Hawker electrodes, the P7/I.S. level controller forms an INTRINSICALLY SAFE Level Alarm or Control System. The controller is situated in the Safe Area and the electrodes in the Hazardous Area. This manual gives details of the P7/I.S controller, electrode holders and the overall system.

### 2. OPERATING PRINCIPLE

The controller supplies a small AC current to the electrodes. The Level Controller detects this current when an electrically conductive liquid touches the measuring electrode. A.C is used to prevent electrolytic action between electrodes. When the presence of a liquid is detected the unit either de-energises or energises its internal relay dependent on the fail-safe setting, providing the user with a set of volt free S.P.C.O contacts. The unit may be used for High or Low alarm using the P1 connection and G, or for control using P1, P2 and G. Where the P1 is the shortest electrode, the G electrode must be the longest electrode in the vessel.




- Intrinsically safe circuit allows use in explosion-hazardous area.
- Electrode circuits are electrically isolated from earth.
- Adjustable sensitivity and close switching differential to ignore electrode fouling.
- Single and double electrode operation for alarm or control applications.
- Fail safe operation.
- Wide range of approved hardware for Cat 1 (Zones 0, 1 & 2) applications.
- Finely tuned accuracy using well-proven technology.

### 3.0 GENERAL DESCRIPTION AND INSTALLATION

#### IMPORTANT

The P7/IS Controller, Holder and Electrode products must only be installed by suitably trained personnel who have the necessary experience in installation, connection and commissioning of instrumentation in explosion-hazardous areas, and are familiar with the relevant codes of practise.

The units contain NO USER SERVICEABLE PARTS. Each product carries an identification label, which shows its type and other important information.

1. The P7/I.S. is a conductivity operated level controller having approved intrinsically safe electrode circuitry, which complies with the latest European Harmonised Standards.
2. The P7/I.S. controller must be installed in the 'safe' area in a control panel or other protective housing. To comply with the certification, only approved Hawker level sensing electrode holders bearing the approved label, may be used in the 'hazardous' area.
3. The maximum operating temperatures must be taken into consideration when using single and multiple systems in different enclosure configurations i.e. panels. Adequate spacing, ventilation or cooling should be provided. Ambient operating temperature ranges other than -20°C to +40°C will be indicated on the product label. The equipment is intended to be used only in dry, clean and well-controlled environments.
4. The certificate stipulates that the controller must always be housed in its enclosure, even when fitted in a control panel. Separate conduit entries must be used for I.S and mains/high voltage circuits.
5. The output relay gives the user a single pole volt free changeover contact, which its  
Load must **not** exceed 100VA  
Current must **not** exceed 5amps  
Voltage must **not** exceed 250V  
The volt free contact is for '**safe**' area use
6. The P7/IS controller requires the connection of a mains earth to its  (earth) terminal for safety and not for functionality. It should be noted that all other terminals including the electrode circuitry P1, P2 and G are electrically isolated from the earth terminal.
7. The electrodes are certified for use in specific zones, check before specifying or installing. The electrode circuitry is electrically isolated from earth.
8. The maximum number of Holders, which may be installed in any one tank, sump or vessel, depends on the gas classification for the hazardous area in which the systems are installed. See system section and drawing 2920.

For safety reasons the maximum values of Inductance and Capacitance for holders, electrodes and cables must not exceed that stated in drawing 2920. It is worth noting that there is also a maximum capacitance value for controller functionality.

9. For multiple controller systems where a common multicore is used for the outputs the cable must be a Type "A" or Type "B" as defined in EN 50039:1980. If individual cables (or individual wires) are used for each controller output then they do not have to meet these requirements, see system section.
10. Supporting Standards used for certification. The electrical installation of the controller, electrode and electrode wiring must also comply -  
"Hawker Electronics" drawing 2920  
BS EN 50039:1980 / BS EN 60079-14 1997  
EN 50014:1997(A1-A2)  
EN 50020:1995  
EN 50284:1997  
And any other current relevant standards.
11. Hazards arising from power failure.  
Where equipment and protective systems can give rise to a spread of additional risks in the event of a power failure, it must be possible to maintain them in a safe state of operation independently of the rest of the installation; this is the responsibility of the user.
12. Hazards arising from connections.  
Equipment and protective systems must be fitted with suitable cable and conduit entries.  
When equipment and protective systems are intended for use in combination with other equipment and protective systems, the interface must be safe. The user is responsible for the provision of suitable cable for connection to the supplied terminals.
13. Care should be taken not to clean with aggressive substances or substances that may damage the enclosure, terminals or label. Use of a mild detergent with a dampened cloth is recommended.
14. If the sign 'X' is placed after the certificate number, it indicates the equipment is subject to special conditions of safe use specified on the EC - Type Examination Certificate, details of which are included with this manual.
15. The crossed-out bin symbol, placed on the product, reminds you of the need to dispose of the product correctly at the end of its life



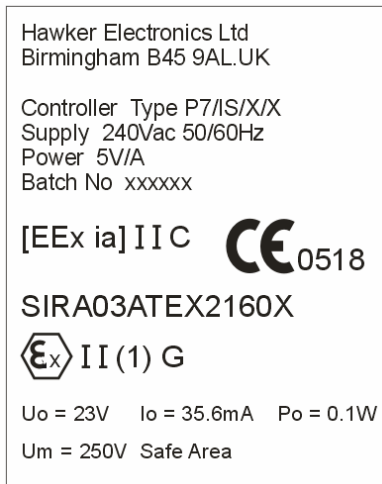
## P7/IS CONTROLLER

### 4.1 Essential information

#### 4.1.1 Identification

##### Controller Type P7/IS - Certificate Sira 03ATEX2160X

The certification marking is as follows



Example label contains all relevant details for the particular model. The parameters will vary between models.

#### 4.1.2 General information

1. The equipment must only be installed in a non-hazardous (safe) area.
2. The equipment is only certified for use in ambient temperatures in the range -20°C to +40°C and should not be used outside this range.
3. The equipment has not been assessed as a safety-related device (as referred to by Directive 94/9/EC Annex II, clause 1.5).
4. Installation of this equipment shall be carried out by suitably-trained personnel in accordance with the applicable code of practice.
5. Repair of this equipment shall only be carried out by the manufacturer or in accordance with the applicable code of practice.
6. The certification of this equipment relies on the following materials used in its construction:

Enclosure: Polycarbonate

If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

“Aggressive substances”- e.g. acidic liquids or gases that may attack metals or solvents that may affect polymeric materials.

“Suitable precautions”- e.g. regular checks as part of routine inspections or establishing from the material’s data sheet that it is resistant to specific chemicals.

#### 4.1.2.1 Special Conditions for Safe Use

(denoted by an X after the certificate number)

The supply to the equipment is limited to overvoltage category I/II as specified in IEC 60664-1.

#### 4.1.3 Hazardous and safe area parameters

##### Hazardous Area Terminals

U <sub>o</sub>	23V
I <sub>o</sub>	35.6 mA (2 channels, each 17.8 mA)
P <sub>o</sub>	0.1 W

	Group IIC	Group IIB	Group IIA
C <sub>o</sub>	0.143 μF	1.03 μF	3.71 μF
L <sub>o</sub>	27.8 mH	102.08 mH	213.74 mH
L <sub>o</sub> /R <sub>o</sub>	250 μH/Ω	947 μH/Ω	1786 μH/Ω

##### Safe Area terminals

U <sub>m</sub>	250V
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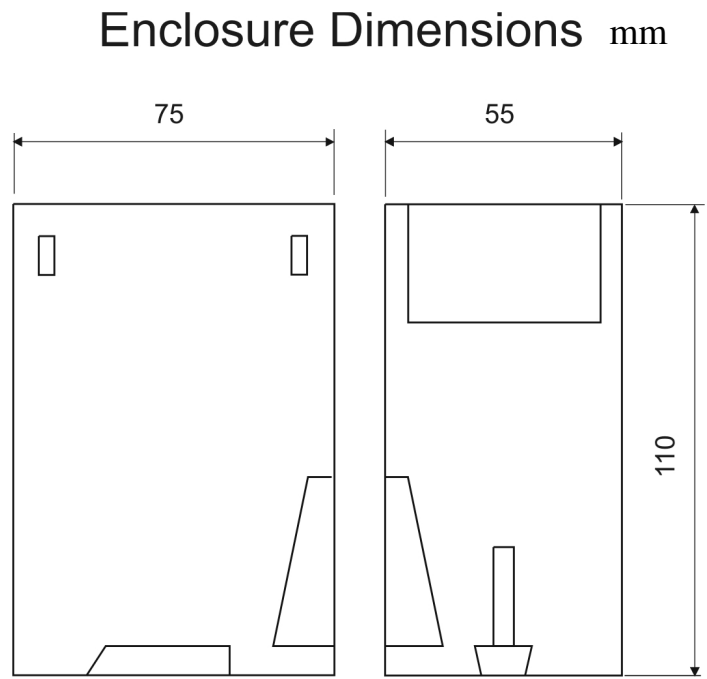
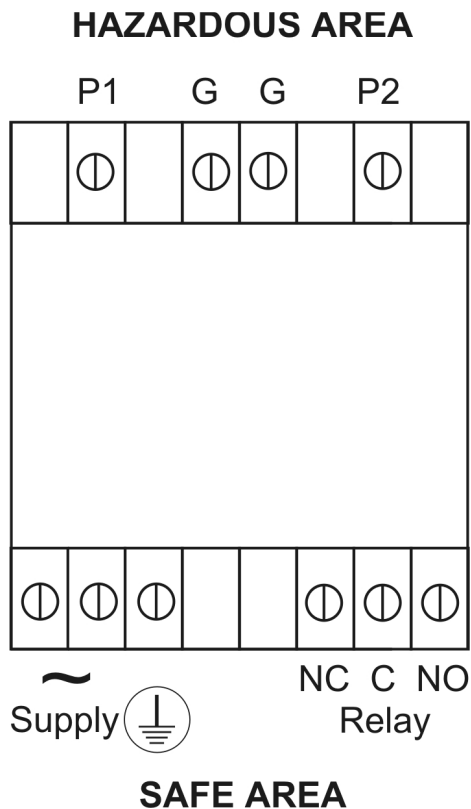
Terminals NC, C, NO are connected to internal relay contacts. These relay contacts must not switch more than 5A r.m.s or 250V r.m.s or 100 VA.

#### 4.1.4 Electrical connection and housing

The electrical connections are made to the terminal blocks situated on the front of the enclosure via captive self-locking screws.

The “Hazardous Area” connections are on the top consisting of P1, P2 & G terminals; these go to the electrodes in the vessel. Various Hawker data sheets are available giving P1, P2 & G configurations for pumping in/out and alarms etc. they can also be found on the company web site.

The “Safe Area” terminals are on the bottom, which consist of the ac supply, Earth and Volt free relay contacts; these are for Safe Area use only.



Certified drawing 2920 included in this manual gives specific information for installation and additional requirements for multiple system configurations, which should be strictly adhered to.

The housing can be mounted either by means of screws passed through two holes to DIN 46 121 and DIN 43 660 or by a snap fastener for fitting to DIN 46 277 and DIN EN50 022 assembly rails.

## 4.2 Setting up the P7/IS controller

Different versions of the controller are available; see the P7/IS technical specifications for ordering information. Always check to ensure the controller specifications are suited to the supply and its application before installing.

The input supply, fail-safe setting and sensitivity are fixed at the factory; the controller's label will indicate its fail-safe as either FSH (H) or FSL (L) and its supply voltage. Removing the front snap on trim will reveal the sensitivity control and a red Led. The relay is energised when the Led is 'ON'.

In general increasing the sensitivity control increases the sensitivity of the unit, i.e. increasing it will make the unit switch with cleaner liquids (less conductive), this is where we are not concerned with 'ragging' etc.

Turning the sensitivity control anticlockwise decreases the sensitivity, giving optimum control and switching differential over dirtier liquids such as sewage, this is useful where ragging can be a problem.

If the liquid is too high a resistance (not very conductive) the unit may not switch even when the control is turned fully clockwise. Conversely if the resistance is very low a few tens of ohms the liquid will be detected but with limited switching differential. It is worth bearing these few points in mind if having difficulty in sensing a liquid.

See technical data sheet for switching specifications. Please consult our sales department for guidance if unsure.

Facia Trim

Basic instructions are included on the facia trim, but it is recommended that this manual be used for optimum performance. No attempt should be made to remove this trim.

Precautions before testing.

Before disconnecting any mains leads or control wiring at the controller or in the system ensure that:

- a) Mains supply to the controller is OFF.
- b) The volt free contact wires supply is switched OFF.
- c) The Safety Officer has declared it is safe for the equipment to be disconnected or removed and that it is safe to perform the following operations bearing in mind any hazardous area implications such as application and connections.

**4.2.1 Single electrode applications P1 & G.**

Instruction	Relay Condition	
	FSH	FSL
Fill the vessel until liquid is in Contact with the electrode.		
Turn sensitivity control to 'max'.	de-energised	energised
Turn sensitivity control slowly anticlockwise until relay changes state.	energises	de-energises
Turn control clockwise 1 division, this is the optimum setting for the particular liquid.	de-energises	energises

## 4.2.2 Dual electrode applications P1, P2 & G

Instruction	Relay Condition	
	FSH	FSL
Fill the vessel until liquid is in Contact with the P2 electrode.		
Turn sensitivity control to 'max'.	energised	de-energised
Using a piece of wire, place a Momentary short circuit between P1 & G.	de-energises	energises
Remove Short circuit. Relay remains-	de-energised	energised
Turn sensitivity control slowly anticlockwise until relay changes state. Turn potentiometer clockwise By 1 division, this is the optimum setting for the particular liquid.	energises	de-energises

Note: If the above adjustment is not possible, the resistance of the liquid may be outside the range of the controller. In which case please consult our sales department. Following adjustment it is advisable to carry out a full operating cycle to ensure correct operation.

## 4.2.3 Basic controller testing

If necessary the controller can be tested without connecting to the electrode holders so its correct basic function and the user relay contacts can be checked. This test will not test the unit's capacity to sense a liquid of a specific conductance.

### For fail to safe Low Unit: -

Disconnect all electrode wiring from the terminal block.  
Turn on the mains supply to the controller.  
Turn the sensitivity control to midway.  
Short circuit P2 & G, the relay should be de-energised.  
Short circuit P1 & G, the relay should energise.  
Remove the P1 & G short, the relay should remain energised.  
Remove the P2 & G short, the relay should de-energise.  
8. Goto step 16.

### For fail to safe High Unit: -

9. Disconnect all electrode wiring from the terminal block.  
10. Turn on the mains supply to the controller.  
11. Turn the sensitivity control to midway.  
12. Short circuit P2 & G, the relay should be energised.  
13. Short circuit P1 & G, the relay should de-energise.

14. Remove the P1 & G short, the relay should remain de-energised.
15. Remove the P2 & G short, the relay should energise.
16. Testing the volt free contacts: -  
Ensure the supply to the volt free contacts has been switched OFF and remove the wires from the terminal block. Use an approved ohmmeter to measure the contact resistance.

Check with the Relay de-energised (Led OFF) that the-  
C & NO is greater than 1M Ohm and,  
C & NC is less than 1 Ohm.

Check with the Relay energised (Led ON) that the-  
C & NO is less than 1 Ohm and,  
C & NC is greater than 1M Ohm

### 4.3 P7/IS Controller technical specifications

Taken@25°C, specifications subject to alteration.

#### Supply

Supply voltage	240Vac/110Vac/24Vac $\pm 10\%$ factory set Note- the 240V unit will operate at 240V +10% but its Intrinsically safe certification is valid to 250V max (240V+4%).
Installation Cat	Overvoltage Cat II
Supply frequency	50/60 Hz
Consumption	approx 5 V/A

#### Electrode

Volts	8.0Vac max (open circuit electrodes)
Current	8mA max (short circuit electrodes)
Sensitivity	Standard: - approx 300 Ohms to 20K Ohms, user adjustable. Special:-low range to approx 7K Ohm

#### Switching response

<1s

**Operating Temp** -20°C to +40°C

#### Cable

Typically 70m.  
See drawing 2920 for maximum permitted Levels for intrinsic safety.  
Capacitance max before sensitivity is affected - 30nF @ 20KR, 100nF@500R, ignoring drawing 2920.

#### Output Relay

Volt free contact S.P.C.O rated 240Vac @ 5A max, resistive.  
For intrinsically safe model-  
Load must not exceed 100VA  
Current must not exceed 5amps  
Voltage must not exceed 250V

#### Output Led

Red Led "On" when relay energised

#### Fail-safe

High or Low factory set

#### Enclosure

Material	Polycarbonate
Mounting	Snap fastener for Din Rail mounting DIN 46 277
Weight	325g
Terminals	Captive self-locking screws, accepts up to 4mm <sup>2</sup> conductor.
Dimensions	55 x 110 x 75mm W x D x H

## 5.0 ELECTRODE HOLDERS

1. The equipment has not been assessed as a safety-related device (as referred to by Directive 94/9/EC Annex II, clause 1.5).
2. Installation of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice.
3. Repair of this equipment shall only be carried out by the manufacturer or in accordance with the applicable code of practice.
4. If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

“Aggressive substances” e.g. acidic liquids or gases that may attack metals, or solvents that may affect polymeric materials.

“Suitable precautions” e.g. regular checks as part of routine inspections or establishing from the material’s data sheet that it is resistant to specific chemicals.

The user must ensure the holder and installation is suitable for the application. The details on the product label will indicate its compliance parameters. If the sign ‘X’ is placed after the certification number, it indicates that the equipment is subject to special conditions for safe use as specified in the EC Type Examination Certificate and in this manual.

## 5.1 CAT 1 Electrode Holders

### 5.1.1 Type identification

#### Electrode Holders Type

*Type’s HPE5, HPE7, HPE7/P/F, HPE7/P, HPE7/PA, HPE8, HPE8/P, HPE12/P, HPE13A, HPE13A/P, HPE14/X, HPE22, HPE22/P/Fa, HPE22/P, HPE22/PA*

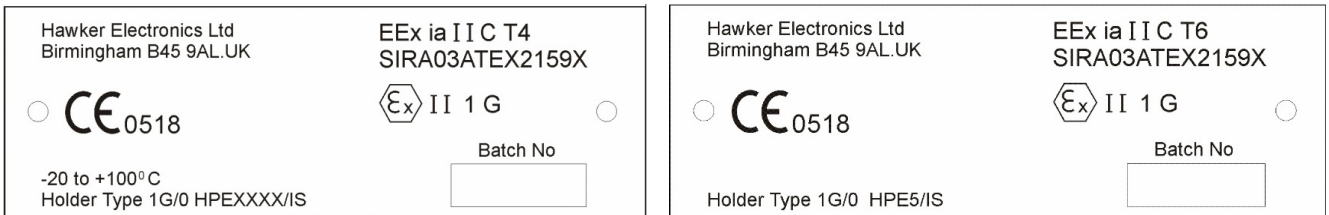
All CAT 1 certified Electrode Holders are identifiable by the following codes.  
Prefixed 1G/0 and suffixed IS e.g. 1G/0 HPE8/P/IS

### 5.1.2 Certification markings

Each Holder has a label affixed to its body that states its certification parameters, these are shown below.

*Type's, HPE7, HPE7/P/F, HPE7/P, HPE7/PA, HPE8, HPE8/P, HPE12/P, HPE13A, HPE13A/P, HPE14/X, HPE22, HPE22/P/Fa, HPE22/P, HPE22/PA*

*Type HPE5.*



### 5.1.3 Conditions of use

1. The Electrode Holder Type's HPE7, HPE7/P/F, HPE7/P, HPE7/PA, HPE8, HPE8/P, HPE12/P, HPE13A, HPE13A/P, HPE14/X, HPE22, HPE22/P/Fa, HPE22/P, HPE22/PA for Cat 1 version, (Certificate Sira 03ATEX2159X) may be used in zones 0, 1 and 2 with flammable gases and vapours with apparatus groups IIA, IIB & IIC and with temperature classes T1, T2, T3 and T4. The ambient temperature operating range is -20 to +100°C, and should not be used outside this range.
2. The Electrode Holder Type HPE5 Cat 1 version, (Certificate Sira 03ATEX2159X) may be used in zones 0, 1 and 2 with flammable gases and vapours with apparatus groups IIA, IIB & IIC and with temperature classes T1, T2, T3, T4, T5 and T6. The ambient temperature operating range is -20 to +40°C, and should not be used outside this range.
3. The certification of this equipment relies on the following materials used in its construction, and the special conditions for safe use are observed, section 5.1.4.

For Types Cat 1 Hawker models 1G/0 HPEXXX/IS only -

Enclosure: *HPE5 – UPVC.  
HPE7, HPE13, HPE14/X, HPE22 – Polypropylene.  
HPE8 – Phenolic.  
HPE12 – Di-Cast Aluminium powder coated cap, Phenolic body.*

Electrodes: *Low Carbon 316L S/S, Titanium, Hastelloy C, Monel, Hastelloy B, Galvanised Mild Steel. All may be bare or coated PPA/571*

#### **5.1.4 Special conditions for safe use**

(denoted by an X after the certificate number)

1. The Holder Type 1G/0 HPE5/IS shall not be used with an input current,  $I_i$ , that is in excess of 100 mA.
2. The equipment cannot be considered capable of withstanding 500 Vrms. a.c. voltage test to earth (a requirement of clause 6.4.12 of EN 50020:2002). This shall be taken into account when the equipment is being installed.
3. Holder Types 1G/0 HPEXXX/IS and 1G/0 HPE5/IS shall not be directly installed in any process where the plastic holder or plastic electrode coating might be charged by the rapid flow of a non-conductive medium, including application, cleaning, maintenance or other.
4. In any equipment installation the cap of the Holder Type 1G/0 HPE12/P and the electrodes of versions of the holders fitted with titanium electrodes shall be provided with protection from impact or installed such that impacts cannot occur.

#### **5.2 Installation**

Electrodes should preferably be mounted vertically in the vessel. Spacing between the electrodes and their distance from the side of the vessel is dependent on the likelihood of bridging due to floating matter and the degree of turbulence. For clean application the distances can be as low as 5 - 8cm but in the case of raw sewage the recommended distance is 23cm. Using plastic coated electrodes, which are available from stock, can eliminate bridging, always bare at least 50mm of the coating and have the reference 'G' electrode central.

Wall mounted brackets are available for the electrode holders. Where turbulence is expected, electrodes of long length should be fitted with steady brackets. Both these are available from stock.

Care must be taken when mounting to ensure that the electrode holder insulators protrude through the surrounding material e.g. concrete floors. If only the electrodes protrude they may find a conductive path through the concrete and not the liquid in the vessel.

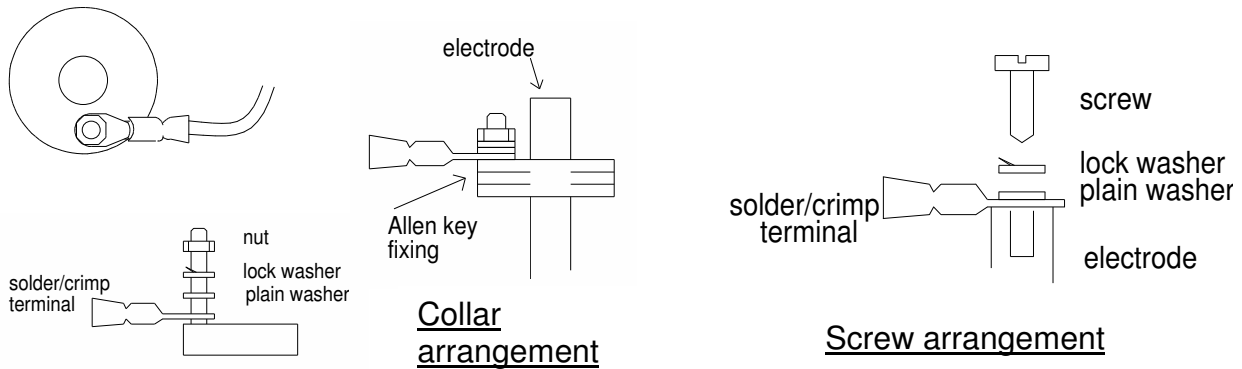
It is advisable to clean electrode rods and insulators at periodic intervals.

The electrode holder suitability should be confirmed as being correct for the hazardous location, and must carry the specific certification.

The electrode conductors are electrically isolated from earth. Using a separate 'G' probe as the common probe, and not the vessel or any part of its structure will provide the best operational performance, and will comply fully with the system certification.

Termination consists of crimp/solder terminals, washers and nut or screw, this may be by collar or direct to the electrode, depending upon holder type. All connecting hardware is provided with the holder. The user should ensure a sound connection, which does not interfere, contact or stress any other connection if present. Adequate clearance must be

maintained between the terminals if using multiholders to prevent them from touching one another. The collar is placed over the electrode and fixed using the Allen key provided; the terminating cable is then attached, or a screw is used for direct connection.



## 6.0 CABLE PROPERTIES

All cables have an inherent capacitance and inductance, these values must be limited to allow only small energy levels going into the hazardous area. The total allowable capacitance and inductance should be strictly adhered to so as not to infringe the certification, this is shown on drawing 2920, see also section on “system”.

The capacitance and inductance values stated are for the total amount of cable of all the systems in any one sump, tank or vessel. The capacitance being that of P1 and P2 conductors measured to the cable screen or armouring. The inductance is the sum of all conductors used for P1, P2 and G connections. Examples of calculating cable capacitance and inductance follow.

### 6.1 Cable inductance

#### Example of calculating cable inductance

*Method A.* As the L/R Ratio remains constant regardless of cable length, this is the easiest method. For example, it will be seen referring to Table 1 that for 1.5mm<sup>2</sup> steel wire armoured cable the L/R ratio is 28μH/Ω and looking at drawing 2920 tables this meets the requirements for all gas groups for up to 6 systems and groups 11A and 11B for up to 10 systems .

*Method B.* Assuming two controllers are being used for pump control using both P1 and P2, and two controllers for High and Low level alarms using the P1 connections and one earth electrode (G), thus 7 cables in all.

The maximum inductance permitted from drawing 2920 table for Group 11C for 6 systems is 0.78mH. Reference Table 1, a 2.5mm<sup>2</sup> steel wire armoured cable having an inductance of 0.32mH per 1000m so –

The total cable length permitted is  $(0.78 / 0.32) \times 1000 = 2437\text{m}$ , or  $2437 / 7 = 348\text{m}$  per electrode circuit.

## 6.2 Cable capacitance

### Example of calculating cable capacitance

Normally it is the cable capacitance that will limit the length of the conductors.

Using the same scenario as above 4 x P1 and 2 x P2, for capacitance we ignore the 'G' so are concerned with 6 cables.

The maximum capacitance permitted from drawing 2920 table for Group 11C for 6 systems is 0.143 $\mu$ F. From Table 1, a 2.5mm<sup>2</sup> Steel wire armoured cable having a capacitance of 0.43 $\mu$ F per 1000m so –

The total cable length permitted is  $(0.143 / 0.43) \times 1000 = 332\text{m}$ , or  $332 / 6 = 55\text{m}$  per electrode circuit.

Similarly for two core 1.5mm<sup>2</sup> cable we have: -

$(0.143 / 0.39) \times 1000 = 366\text{m}$ , or  $366 / 6 = 61\text{m}$  per electrode circuit.

## 6.3 Electrode capacitance

The electrodes will also contribute to the overall capacitance of the system by a tiny amount, which is normally negligible; allowing up to 200pF between any two electrodes will present no problem in normal practice. For example heavy-duty electrodes such as the HPE8 when mounted 230mm apart may be up to 18m in length before this figure is exceeded. Light duty electrodes such as the HPE7, mounted 75mm apart may be up to 15m in length, which is far beyond normal requirements.

## 6.4 Cable selection guide

There are many different types of commercially available cables all with different specifications. If the cable length is restricted using S.W.A cable it is possible to use instrument cable since these generally have a lower capacitance. A selection has been given in this document for reference purposes, table 1, the user should check with the manufacturers data that the cable is suitable, see also system section "Permissible interconnecting cables".

For functionality it is important not to exceed the units operational capacitance input as it will affect its sensitivity, these can be found in the controllers technical specifications. The overall system capacitance/inductance can either be calculated or directly measured using a calibrated capacitance/inductance meter, which is preferable. This can be used to confirm the total maximum table values in drawing 2920 have not been exceeded.

Table 1. PARAMETERS OF SOME COMMERCIALY AVAILABLE CABLES.

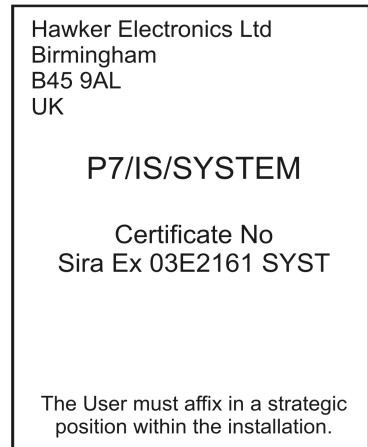
This table shows some parameters of 600/1000V-armoured cable to BS6346. P.V.C. insulated. P.V.C. Inner sheathed steel wire armoured and P.V.C. Oversheathed.

	<u>Two Core</u>			<u>Three Core</u>		
	1.5	2.5	4.0	1.5	2.5	4.0
Nominal area of Conductor, mm <sup>2</sup>	1.5	2.5	4.0	1.5	2.5	4.0
Inductance per Core per 1000m Cable, mH	0.33	0.32	0.31	0.33	0.32	0.31
Max.Capacitance per 1000m between one conductor and the other conductor and armour earthed at 50Hz, µF	0.39	0.43	0.51			
Max. equivalent star Capacitance per 1000m of cable, µF				0.46	0.51	0.61
Nominal L/R Ratio µH/Ohm	28	45	70	28	45	70

## 7.0 SYSTEM INFORMATION

A “System” is defined when the P7/IS controller is used in conjunction with approved Hawker electrode holders and installed in line with the information in this section. A system certificate of conformity Sira Ex 03E2161 applies. See also drawing 2920 and Section 3 ‘General description and installation’.

A “System” label is supplied with this manual or on request. This label must be positioned within a strategic position within the installation and in an environment it will not be harmed.



### 7.1 Equipment located in a non-hazardous (safe) area

- i Equipment which is unspecified except that it must not be supplied from, nor contain, under normal or abnormal conditions, a source of potential with respect to earth (ground) in excess of 250V a.c. r.m.s. or 250V d.c.and
- ii Controllers Type P7/IS – Certificate number Sira 03ATEX2160X.

### 7.2 Equipment located in a hazardous area

- i Holders Types 1G/0 HPE5/IS or 1G/0 HPE XXXX/IS – Certificate number Sira 03ATEX2159X (Zone 0 applications).

### 7.3 Configuration

Up to ten controllers may be used within a system with up to three holders per controller connected i.e. one holder to each of the controller terminals 'G', 'P1' and 'P2'. Multiple controller systems may employ a common 'G' holder with the controllers connected together via links between the controller 'G' terminals.

Where a multiple controller system uses a Holder Type 1G/0 HPE5/IS as a common 'G' holder the maximum number of 'P1' / 'P2' holders that may be fitted is five.

#### **7.4 Permissible interconnecting cables**

For multiple controller systems where cable cores associated with the outputs of different controllers are contained within the same cable then such cables must be either:

Type A in accordance with clause 5.3.1 of EN 50 039:1980

or

ii. Type B in accordance with clause 5.3.2 of EN 50 039:1980

### SAFE AREA APPARATUS

Unspecified except that it must not be supplied from nor contain under normal or abnormal conditions a source of potential with respect to earth in excess of 250V

Supply

L,N 240Vac nominal

L,N 110Vac nominal

~ 24Vac nominal

Relay contacts / Supply

Um = 250V max

System Label

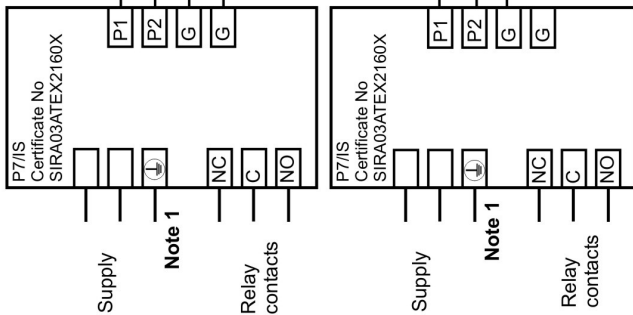
**Note 4**

Hawker Electronics Ltd Birmingham B45 9AL UK  P7/IS/SYSTEM  Certificate No Sira EX03E2161 SYST  The User must affix in a strategic position within the installation.
--

**Note 1**

**Note 1**

### SAFE AREA

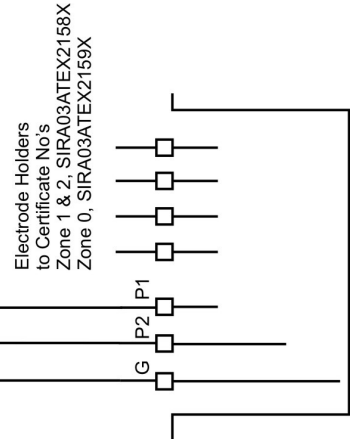


Notes 2,3 & 6

Notes 2 & 6

### HAZARDOUS AREA

SIRA Certified Product  
No modifications permitted without reference to SIRA



Electrode Holders to Certificate No's  
Zone 1 & 2, SIRAO3ATEX2158X  
Zone 0, SIRAO3ATEX2159X

### Notes 3 & 6

for upto 10 systems

Group	Cap uF	mH	L/R $\frac{\mu H}{\Omega mm}$
II C	0.143	0.25	19
II B	1.03	0.76	56
II A	3.71	2.03	148

for upto 6 systems

Group	Cap uF	mH	L/R $\frac{\mu H}{\Omega mm}$
II C	0.143	0.78	33
II B	1.03	2.33	138
II A	3.71	6.20	277

### NOTES:-

- These notes are provided for guidance only, the installation must comply with BS EN 60079:14 and / or any current relevant standards.
- The Controllers must be earthed.
- For multiple systems using a common 'G' electrode, connections may be linked from controller to controller. Electrode cables & holders must comply with any specific requirements for the particular zone.
- The capacitance and either the inductance or the inductance/resistance (L/R) ratio of the hazardous area cable must not exceed the values shown in the tables.
- A system label is provided which should be fixed in a strategic position within the installation. Approx dimensions 48 X 61mm.
- For multiple controller systems where cable cores associated with the outputs of different controllers are contained within the same cable then such cables must be either:
  - A Type A cable in accordance with clause 5.3.1 of EN 50 039:1980 or.
  - A Type B cable in accordance with clause 5.3.2 of EN 50 039:1980
- For multiple systems using a common type HPE5/IS 'G' electrode the maximum number of P1 / P2' electrodes that may be fitted is 5.

ISS	MODIFICATION	SIG	DATE				
F	Update	MA	22-2-10				
E	Update	MA	20-6-03				
D	Update	MA	18-6-03				
C	Update	BD	20-5-03				
B	Update	BD	23-4-03				
ISS	A	B	C	D	E	F	
DRN.	BD						DATE 4.12.02
CHECKED:	<i>del Armstrong</i>						APPROVED <i>del Armstrong</i>
HAWKER ELECTRONICS LTD 57, The Avenue, Rubery Industrial Estate, BIRMINGHAM B45 9AL ENGLAND.							
CUSTOMER							
ACK No							
TITLE							
P7/IS Installation Diagram for upto 10 Systems							
DRG No 2920							
D767.cdr							

According to the  
EC Directive 94/9/EC of 23 March 1994 (ATEX 100a)

Type of equipment: **Conductivity Level Controller**  
Type model: **P7/I.S**  
Certificate Number: **SIRA03ATEX2160X**

Type of equipment: **Conductivity Electrode Holder Cat 1.**  
Type model: **1G/0 HPE5/IS, 1G/0 HPE7/IS, 1G/0 HPE7/P/F/IS, 1G/0 HPE7/P/IS,  
1G/0 HPE7/PA/IS, 1G/0 HPE8/IS, 1G/0 HPE8/P/IS, 1G/0 HPE12/P/IS,  
1G/0 HPE13A/IS, 1G/0 HPE13A/P/IS, 1G/0 HPE14/X/IS, 1G/0 HPE22/IS,  
1G/0 HPE22/P/Fa/IS, 1G/0 HPE22/P/IS, 1G/0 HPE22/PA/IS**  
Certificate Number: **SIRA03ATEX2159X**

Type of equipment: **P7/I.S Conductivity Level System**  
Type model: **P7/I.S Controller used with Approved Electrode Holders**  
Certificate Number: **Ex03E2161**

Manufacturer: **Hawker Electronics Ltd**  
Manufacturers Address: **57 The Avenue, Rubery Industrial Estate, Rubery, Birmingham, B45 9AL. U.K.**

Notified Body: **Sira Certification Service (0518)**  
**Rake Lane**  
**Eccleston**  
**Chester**  
**CH4 9JN**

**Conformity has been demonstrated with reference to the following documentation:**

EC type-examination certificate Sira 03ATEX2160X, dated 27/07/10  
EC type-examination certificate Sira 03ATEX2159X, dated 14/08/03, Issue 05/08/05  
EC type-examination certificate Sira Ex 03E2161 SYST, dated 30/06/03

**Compliance with the essential Health & Safety Requirements has been assessed by reference to the following standards, see individual certificates for specific listings.**

EN 50014:1997 +A1 & A2, EN 50020:2002, EN 60079-11:2007, EN 50284:1999, EN 50039:1980

Indicate below compliance



The product complies with parts of the European safety standards / other safety standards / technical specifications listed above.



Hawker Electronics Ltd has an internal production control system that ensures compliance between the manufactured products and the technical documentation.

Signed.....  
Mark Armstrong  
Technical Director

29-07-10  
Date.....

**DECLARATION OF CONFORMITY**

According to the  
EMC Directive 89/336EE and Low-Voltage Directive, 73/23/EEC  
Including amendments by the CE Marking Directive, 93/68/EEC

Type of equipment: **CONDUCTIVITY LEVEL CONTROLLERS**

Brand name: **AC SERIES**

Type model: **P3,P4,P5, P7 & AC1**

Manufacturer: **HAWKER ELECTRONICS LTD  
57 The Avenue, Rubery Industrial Estate, B45 9AL**

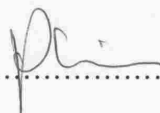
The following harmonised European standards or technical specifications have been applied:

<i>Standards</i>	<i>Description</i>
EN50081/2	Generic standards
EN55011	Class A, conducted emissions
EN55011	Class A, radiated emissions
EN61000-4-4	Fast transient bursts
EN61000-4-2	Static discharge
BS 61010-1:2001	Electrical safety

***Additional information***

Indicate below compliance

- The product complies with parts of the harmonised European safety standards / other safety standards / technical specification listed above.
- We have an internal production control system that ensures compliance between the manufactured products and the technical documentation.

Signed .....  ..... Date..... 02-06-03  
John Slevin  
Managing Director