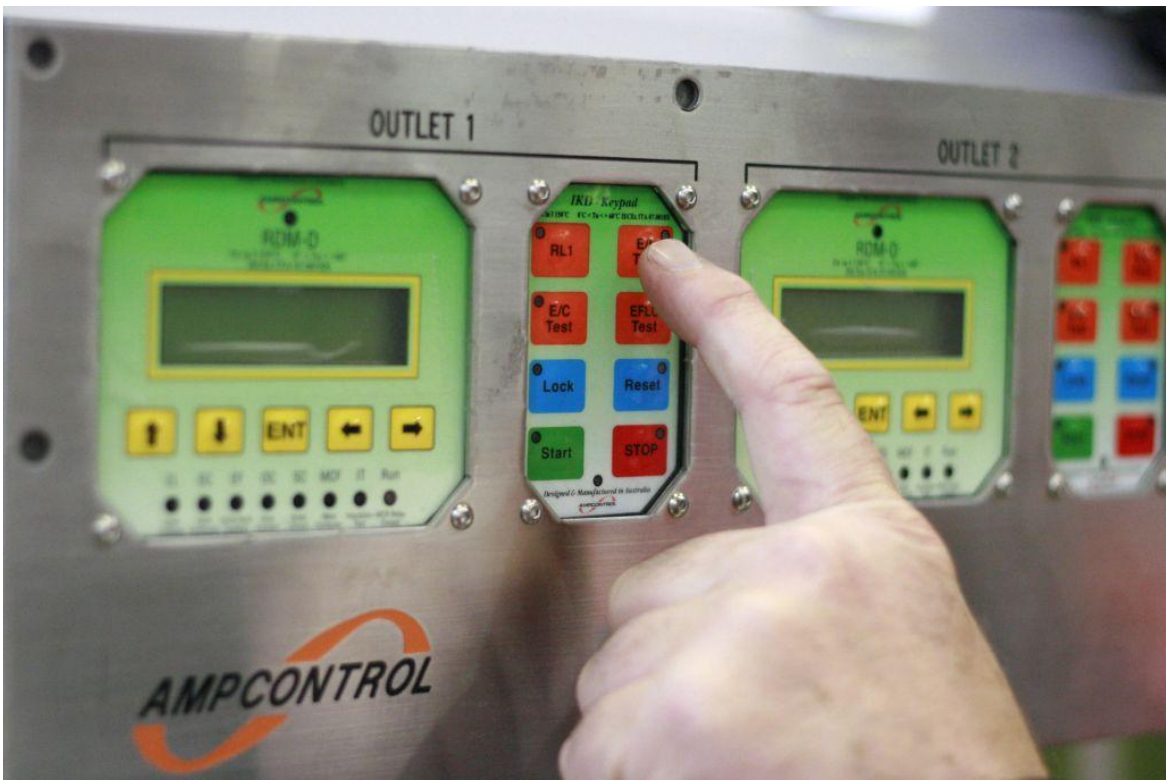
IKDV01 KEYPAD PUSH BUTTON SYSTEM
User Manual

Issue: R4 Mar 2020

ECN: 9436

Ampcontrol User Manual Part No: 110910

Designed and Manufactured in Australia by Ampcontrol CSM Pty Limited.



AMPCONTROL®

Safety and other Warnings

WARNING! 	**This safety alert symbol identifies important safety messages in this manual and indicates a potential risk of injury or even death to the personnel. When you see this symbol, be alert, your safety is involved, carefully read the message that follows, and inform other operators.**

CAUTION! 	**This safety alert symbol identifies important information to be read in order to ensure the correct sequence of work and to avoid damage or even destruction of the equipment, and reduce any potential risk of injury or death to the personnel.**

	Supplementary information not directly affecting safety or damage to equipment. Carefully read the message that follows, and inform other relevant personnel.

	**Information concerning possible impact on the environment and actions required for prevention and proper response.**

If this document is being read via a computer the hyper links may be used (Press control and click on the blue highlighted text to go to that topic).

Copyright Notice

Disclaimer

Ampcontrol CSM Pty Ltd will make no warranties as to the contents of this documentation and specifically disclaims any implied warranties or fitness for any particular purpose.

Ampcontrol further reserves the right to alter the specification of the system and/or manual without obligation to notify any person or organisation of these changes.

Before You Begin

We would like to take a moment to thank you for purchasing the IKDV01 Keypad Push Button System.

WARNING! 	**To ensure the correct and safe operation of this equipment the user is to become completely familiar with the safety requirements and correct operating procedures detailed in this user manual.**

Ampcontrol Electronics Contact details:

Ampcontrol CSM Pty Ltd
7 Billbrooke Close, Cameron Park, NSW, 2285
P +61 1300 267 373 | F +61 2 4903 4888

EMAIL: customerservice@ampcontrolgroup.com
WEB: www.ampcontrolgroup.com

Table of Contents:

1 Receiving and Storage

1.1 Receiving

All possible precautions are taken to protect the equipment against damage or losses during shipment, however before accepting delivery, check all items against the packing list or Bill of Lading. If there are shortages or evidence of physical damage, notify Ampcontrol immediately.

Notify Ampcontrol within 7 days (maximum) in case of shortages or discrepancies, according to the packing list. This action will help ensure a speedy resolution to any perceived problems. Keep a record of all claims and correspondence. Photographs are recommended.

Where practicable do not remove protective covers prior to installation unless there are indications of damage. Boxes opened for inspection and inventory should be carefully repacked to ensure protection of the contents or else the parts should be packaged and stored in a safe place. Examine all packing boxes, wrappings and covers for items attached to them, especially if the wrappings are to be discarded.

1.2 Storage after Delivery

Where equipment is not to be installed immediately, proper storage is important to ensure protection of equipment and validity of warranty.

All equipment should be stored indoors protected from the elements in a cool dry area. If storing on the ground, ensure that the storage area is not an area where water will collect.

1.3 Unpacking of Equipment

The method of packing used will depend on the size and quantity of the equipment. The following cautions should be interpreted as appropriate.

CAUTION! 	**Take care when unpacking crates as the contents may have shifted during transport.** **Make sure that cable drums are securely attached to their shipping pallets before attempting to move them (if applicable).**

	The disposal of packaging materials, replaced parts, or components must comply with environmental restrictions without polluting the soil, air or water. Ensure that any timber and cardboard used as packaging is disposed of in a safe and environmentally responsible manner. Where possible, dispose of all waste products i.e. oils, metals, plastic and rubber products by using an approved recycling service centre.

2 General Safety

2.1 Personnel Safety Warnings

2.1.1 Relevant Personnel

Ensure all personnel directly responsible or involved with the installation, operation and maintenance of the equipment reference this manual in conjunction with any relevant risk assessments to identify all foreseeable hazards.

2.1.2 Safety Communication

All safety instructions and design requirements within this manual must be communicated to all users. These requirements are necessary to identify and control any foreseeable risk associated with this piece of equipment. In the event of any damage or malfunction that results in the potential to harm the health or safety of any person; the owner/operator should notify the manufacturer immediately.

2.2 Safe Use of Equipment

Equipment supplied has been manufactured within the guide lines of the relevant Australian Standards and state legislative requirements. Equipment identified within this manual has been designed for a specific intended purpose; therefore any modification or damage must be reported to the manufacturer for repair.

The instructions within this manual must be observed as an aid towards achieving maximum safety during operation.

2.2.1 Changes to Equipment

Changes in the design and modifications to the equipment are not permitted

2.2.2 Equipment Knowledge

Experience with, or understanding of, this equipment is essential for the safe installation and removal of the equipment. If in doubt, contact Ampcontrol immediately.

Mechanical and or Electrical installation, and maintenance of plant and equipment, must only be carried out by appropriately trained, qualified and competent personnel.

2.3 Conditions of Conformity – IEC [Ex ia]

WARNING! 	**To comply with the Conditions of Certification, ensure full serviceable life of the product, and avoid nullifying the warranty, it is essential to exercise great care with the installation, use and storage of the System components. Failure to comply with the Conditions of Certification (Appendix B – Approvals) may seriously compromise the integrity of the system and/or its components, and the consequence can be fatal. The user must ensure that the "Conditions of Safe Use" outlined in the certificate are met or the certificate will not be valid.**

3 Overview of the IKDV01 Keypad System

The Ampcontrol IKDV01 Keypad Push Button System is used in conjunction with the Ampcontrol range of Integrated Protection Relays. The Keypad is approved to Ex ia Intrinsic Safety Standards so that it can be installed outside the flameproof enclosure.

The use of the IS Keypad System eliminates the conventional flameproof buttons normally used on a Distribution Control Box (DCB).

A faulty keypad can be changed out at the face, whereas a damaged flameproof actuator requires the DCB to be removed from service for repairs.

CAUTION! 	**The user is responsible for assisting in the maintenance of the Ex ia Intrinsic Safety rating by complying with the "Conditions of Safe Use" outlined in the certificate (Appendix B – Approvals).**

The keypad module consist of eight (8) push button keys, each fitted with acknowledge LEDs and associated electronics.

The keypad module is connected to the IKDV01 Interface Module by a three-wire cable. The keypad module receives power and communicates with the IKDV01 Interface via this cable. The setting of DIP Switches 2 and 3 will configure the Interface Module for Standard Operation (See **Mode 1 in Section 5**) or PLC Control (See **Mode 2 in Section 6**).

When a keypad key is operated the corresponding relay or opto-isolated output in the IKDV01 Interface Module responds and activates its output.

A typical basic system is shown in Drawing **IKDB001** in **Appendix A – Drawings**.

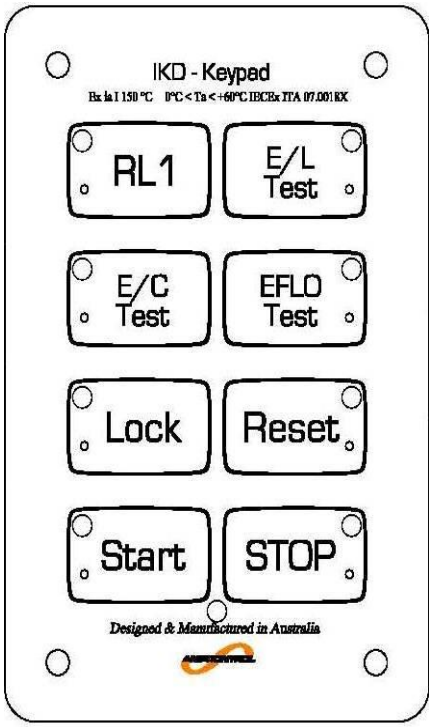
4 Initial Power-up

When power is applied to the IKDV01 Interface Module, the outputs remain off until communications with the keypad is healthy and the Stop key has been pressed (only applies when **Mode 1** is selected).

When power is first applied to the keypad (via the IKDV01 Interface) all LEDs on the push button keys will flash simultaneously until communication is established. This flashing may continue if wiring to the keypad is faulty or the Interface Module itself is faulty.

5 Mode 1: Standard Operation

To set the Interface for Standard operation set DIP Switch 2 **OFF** and Dip Switch 3 **ON**. The switches are located on the IKDV01 Interface Module, see Drawing **IKDA003** in **Appendix A – Drawings**.



5.1 Stop

Activation of the Stop key causes the Stop opto-isolated output to turn on. This output is connected to the stop input (terminals 19 and 20) on the Integrated Protection Relay.

The Stop key also activates the stop relay output. The relay output is a normally open contact on an internal relay and is normally directly connected in the main control circuit. The contact closes when the keypad and interface are powered up. The contact will open if the Stop key is pressed.

To ensure the Stop key is functioning correctly, a special test function has been attached to this key. When power is first applied to the system the stop LED on the IS Keypad flashes continuously. The Stop outputs on the IKDV01 Interface Module are held in an off state. This condition (indicated by the flashing stop LED) will remain until the Stop key is pressed.

Once the Stop key is pressed, the Keypad and Interface Module go into the normal operating mode.

To add further safety to the Keypad / Interface system, a “watchdog timer”, continually tries to open the stop relay output contact. If the keypad system is functioning correctly, the timer is being continually reset and the output remains closed.

CAUTION! 	**To enable the additional safety feature of the “watchdog timer” to be fully utilised it is important that the stop relay output contact be used in the control circuit.**

5.2 Start

When the Start key is pressed the Start opto-isolated output turns on. This output is connected to the start input (terminals 25 and 26) on the Integrated Protection Relay. This function is ignored unless the stop key has been operated following power up.

5.3 Lock

Before the Lock key is operative the I.S. Digital Input must be closed to allow the lock key to function. The I.S. Digital Input (located on the rear of the Keypad Module) is intended to be connected to a push button which is either locked or behind a lockable cover, to prevent unauthorised operation.

Operation of the Lock key causes the lock opto-isolated output to turn on. This output is connected to the lock input (terminals 21 and 22) on the Integrated Protection Relay.

5.4 Reset

Operation of the Reset key causes the reset opto-isolated output to turn on. This output is connected to the reset input (terminals 23 and 24) on the Integrated Protection Relay.

5.5 Earth Continuity (E/C) Test

Operation of the E/C Test key triggers the test operation contacts, which are connected into the pilot circuit.

The test alternates between an open circuit and a short circuit on the pilot line. The alternations occur every 2 seconds. This can be observed by viewing the Earth Fault Information Pages on the Remote Display Unit of the Integrated Protection Relay.

If the Stop key is pressed simultaneously with the E/C Test key, a diode is switched between the pilot and earth to perform a “Relay Healthy” test. This allows the operator to determine if the fault is in the DCB or in the external circuit.

When this test is performed the Stop relay remains off for 1.5 seconds after the E/C Test key is released.

5.6 Earth Fault Lockout (EFLO) Test

Operation of the EFLO Test key allows external test resistors to be switched between VcmA, VcmB, and VcmC terminals (3, 4 and 5 on the Integrated Protection Relay) and earth.

To perform this test the Start key must be operated while holding the EFLO Test key operated.

5.7 Earth Leakage (E/L) Test

This test is to be performed with the outlet of the equipment energised to test the integrity of the trip circuitry.

Operation of the E/L Test key operates the internal E/L Test relay, which closes the output contact. The relay is intended to be used to apply a test current through the earth leakage toroid. One side of the E/L Test relay output is connected to the 110 Volt AC supply. This can be used as the injection source or can be used to operate an auxiliary relay.

The relay contact closes for 150 ms or 600 ms, depending on the setting of DIP switch 4. This switch is located on the IKDV01 Interface Module. See Drawing **IKDA003** in **Appendix A – Drawings**.

5.7.1 Switch 4 Settings:

Off = 150 ms

On = 600 ms

The 150 ms selection should be used for testing earth leakage relays that provide primary protection.

5.8 RL1

Operation of the RL1 key operates the internal RL1 relay, which closes the output contact.

6 Mode 2: PLC Control

To set the Interface for PLC Control set DIP Switch 2 **ON** and Dip Switch 3 **OFF**. The switches are located on the IKDV01 Interface Module. See Drawing **IKDA003** in **Appendix A – Drawings**.

When the IKDV01 Interface Module has been set to Mode 2 the Programmable Logic Controller controls the outlet of the DCB. The main differences to the Standard Operation are as follows:

1. No stop reset is required on power up
2. Operation of the Start key causes RL1 output to close (while key is closed)
3. Operation of RL1 Key has no action
4. Start opto-output is disabled

6.1 Description of Operation

RL1 relay output contact is connected to a PLC Input.

A PLC Output is connected to the start input (terminals 25 and 26) on the Integrated Protection Relay.

Operation of the Start push key operates an internal relay RL1 in the IKDV01 Interface Module. This relay output closes the PLC input.

Depending on the user's PLC code, the PLC may be used to initiate any pre-start procedures, such as the operation of warning alarms etc.

At the successful conclusion of any pre-start routines, the PLC output should be closed which will operate the Integrated Protection Relay that energises the outlet.

All other key operations for Test, Reset, Lock and Stop are as previously described in Section 5, **Mode 1: Standard Operation**.

7 Specifications

Supply Volts:

110 Vac ± 20% 10VA, 50 Hz ± 2 Hz

Relay Contacts:

RL1, E/L Test, Stop:

1 N/O 5A/ 190 VAC 100 VA maximum

8 Settings.

8.1 Operation Mode Settings:

8.1.1 Mode 1 - Standard Operation

Dip Switch 2 **OFF**
Dip Switch 3 **ON**

8.1.2 Mode 2 – PLC Control

Dip Switch 2 **ON**
Dip Switch 3 **OFF**

8.2 Earth Leakage Test Time Setting:

Dip Switch 4 **ON** – 500 ms
Dip Switch 4 **OFF** – 150 ms

9 Maintenance & Disposal

9.1 Equipment Maintenance

WARNING! 	**The Keypad Push Button System has no user serviceable parts. All repairs must be carried out by Ampcontrol personnel only. If a fault develops return the component/s to Ampcontrol for repair. It is essential that no attempt be made to repair the component/s as any attempt to dismantle or repair them can seriously compromise the safety of the system and/or unit, and the consequence can be fatal.**

The Keypad Push Button System and its components do not have any customer serviceable parts and are not provided with any user adjustments.

9.2 Disposal of System Parts

	The electronic equipment discussed in this manual must not be treated as general waste. By ensuring that this product is disposed of correctly you will be helping to prevent potentially negative consequences for the environment and human health which could otherwise be caused by incorrect waste handling of this product.

10 Part Numbers

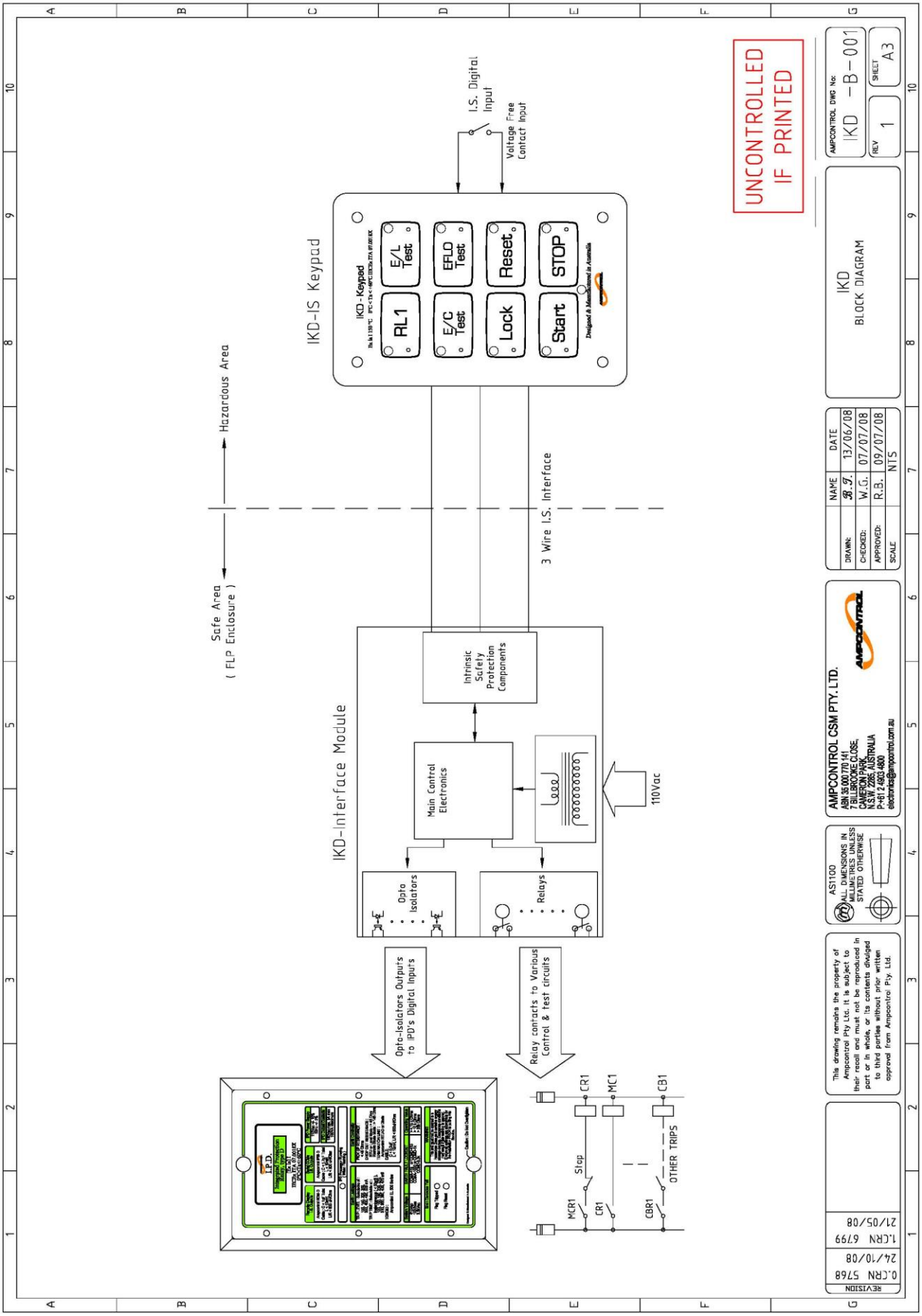
110142	IKDV01 Interface
110143	Standard IS Keypad
△3 101826	Earth Fault Test Module-415 V
△3 101826	Earth Fault Test Module – 1 kV
△3 121170	Earth Fault Test Module - 3.3 kV
110910	IKDV01 User Manual

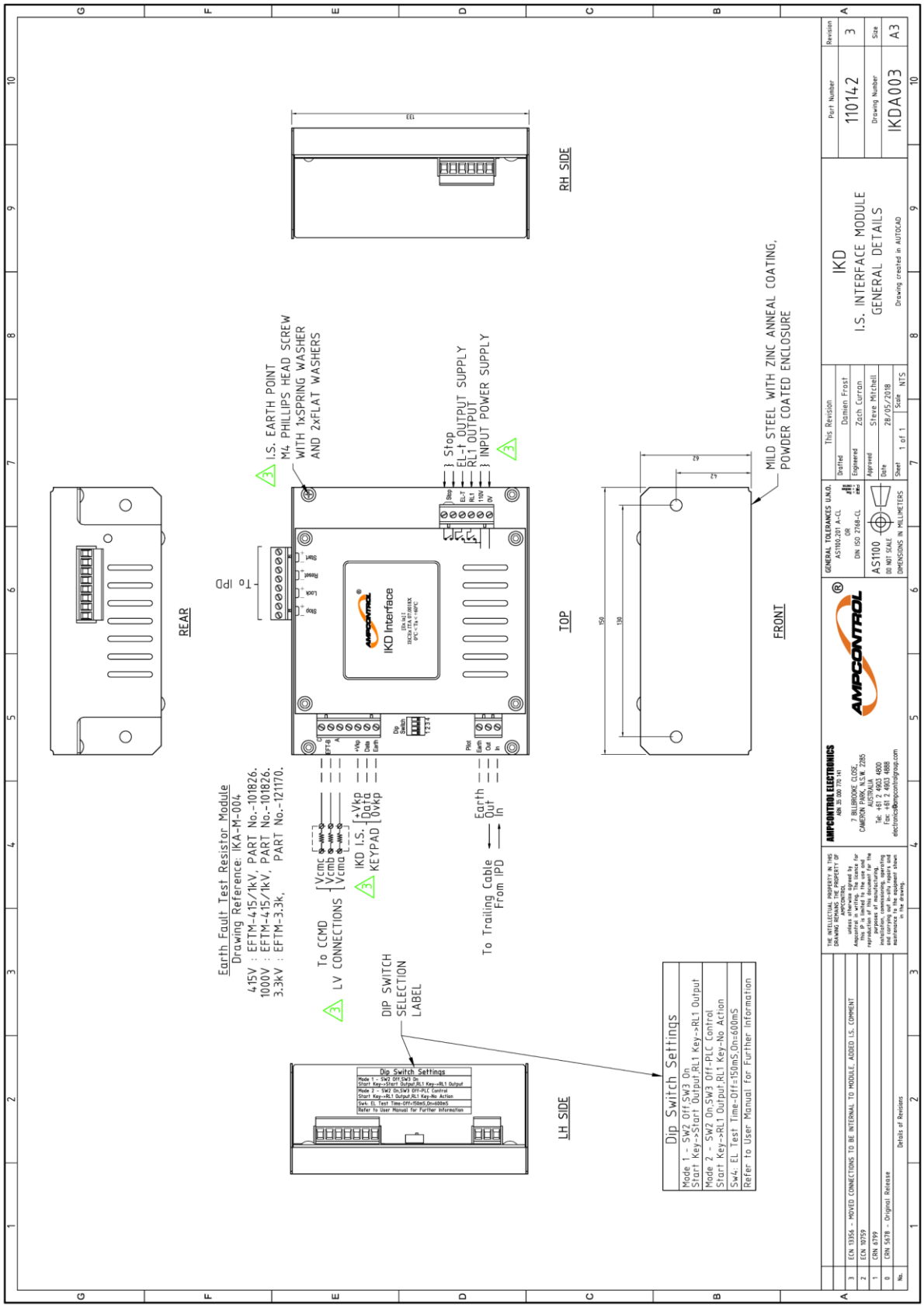
Appendix A – Drawings

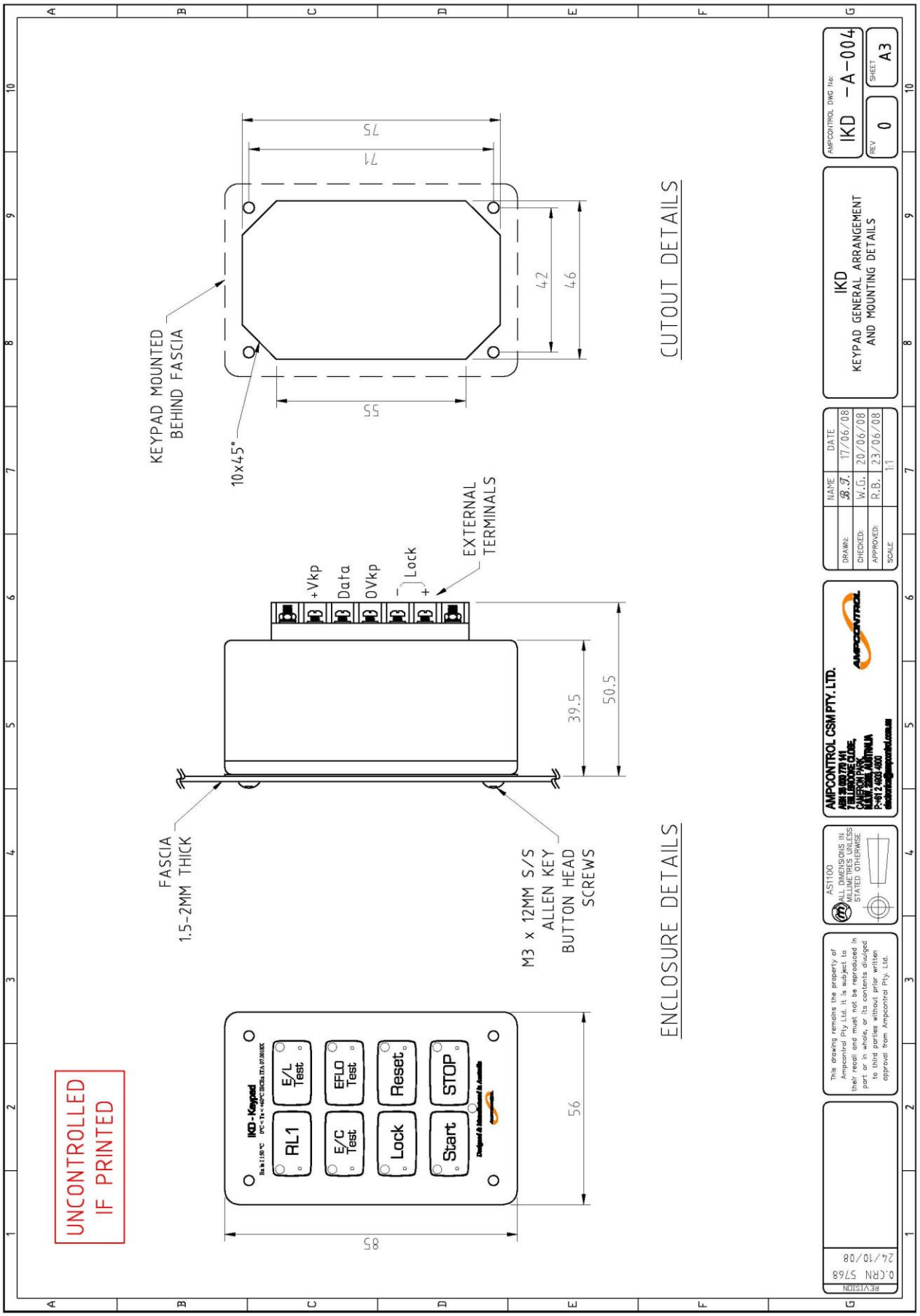
Drawing Number	Description
IKDB001	IKA Block Diagram
IKDA003	Interface IS Module – General Details
IKDA004	Keypad General Arrangement and Mounting Details

The drawings appear in the following pages in the same order in which they are listed in the table above.

If this document is being read via a computer the hyper links may be used (Press control and click on the drawing number to go to that drawing).


UNCONTROLLED IF PRINTED
IKD BLOCK DIAGRAM
AMPCONTROL DWG No: IKD -B- 001
REV 1
SHEET A3
AMPCONTROL CSM PTY. LTD.
ABN 16 000 770 141
7 BILLBROOKE CLOSE,
CAMERON PARK,
N.S.W. 2285, AUSTRALIA
P:+61 2 4903 4800
electronics@ampcontrol.com.au
DRAWN: B.F. 13/06/08
CHECKED: W.G. 07/07/08
APPROVED: R.B. 09/07/08
SCALE NTS
AS1100
ALL DIMENSIONS IN MILLIMETRES UNLESS STATED OTHERWISE
This drawing remains the property of Ampcontrol Pty Ltd. It is subject to their recall and must not be reproduced in part or in whole, or its contents divulged to third parties without prior written approval from Ampcontrol Pty. Ltd.
REVISION
0.CRN 5768 24/10/08
1.CRN 6799 21/05/08
IKD-IS Keypad
IKD - Keypad
RL1
E/C Test
E/L Test
Lock
EFLD Test
Reset
Start
STOP
I.S. Digital Input
Voltage Free Contact Input
Hazardous Area
Safe Area (FLP Enclosure)
3 Wire I.S. Interface
IKD-Interface Module
Intrinsic Safety Protection Components
Main Control Electronics
Load
110Vac
Opto Isolators
Relays
Opto-Isolators Outputs to IPD's Digital Inputs
Relay contacts to Various Control & test circuits
IPD
CR1
MC1
CB1
Stop
MCR1
CR1
CBR1
OTHER TRIPS


RH SIDE
TOP
FRONT
REAR
LH SIDE
IKD Interface
I.S. EARTH POINT
M4 PHILLIPS HEAD SCREW
WITH 1xSPRING WASHER
AND 2xFLAT WASHERS
Stop
EL-T OUTPUT SUPPLY
RL1 OUTPUT
INPUT POWER SUPPLY
MILD STEEL WITH ZINC ANNEAL COATING,
POWDER COATED ENCLOSURE
To IPD
Earth Fault Test Resistor Module
Drawing Reference: IKA-M-004
415V : EFTM-415/1kV, PART No.-101826.
1000V : EFTM-415/1kV, PART No.-101826.
3.3kV : EFTM-3.3k, PART No.-121170.
To CCMD
LV CONNECTIONS
Vcmc
Vcmb
Vcma
IKD I.S.
KEYPAD
+Vkp
Data
0vkp
To Trailing Cable
From IPD
Earth
Out
In
DIP SWITCH
SELECTION
LABEL
Dip Switch Settings
Mode 1 - SW2 Off,SW3 On
Start Key->Start Output,RL1 Key->RL1 Output
Mode 2 - SW2 On,SW3 Off-PLC Control
Start Key->RL1 Output,RL1 Key-No Action
Sw4: EL Test Time-Off=150mS,On=600mS
Refer to User Manual for Further Information
IKD
I.S. INTERFACE MODULE
GENERAL DETAILS
Drawing created in AUTOCAD
Part Number
110142
Drawing Number
IKDA003
Revision
3
Size
A3
AMPCONTROL ELECTRONICS
7 BILLBROOKE CLOSE,
CAMERON PARK, N.S.W. 2285
AUSTRALIA
Tel: +61 2 4903 4800
Fax: +61 2 4903 4888
electronics@ampcontrolgroup.com
3 ECN 13356 - MOVED CONNECTIONS TO BE INTERNAL TO MODULE, ADDED I.S. COMMENT
2 ECN 10759
1 CRN 6799
0 CRN 5678 - Original Release
No. Details of Revisions


CUTOUT DETAILS
KEYPAD MOUNTED BEHIND FASCIA
10x45°
75
71
55
42
46
EXTERNAL TERMINALS
+Vkp
Data
0Vkp
-
Lock
+
39.5
50.5
ENCLOSURE DETAILS
FASCIA 1.5-2MM THICK
M3 x 12MM S/S ALLEN KEY BUTTON HEAD SCREWS
IKD - Keypad
E/L Test
EFLO Test
Reset
STOP
RL1
E/C Test
Lock
Start
56
85
UNCONTROLLED IF PRINTED
IKD
KEYPAD GENERAL ARRANGEMENT AND MOUNTING DETAILS
AMPCONTROL DWG No: IKD -A-004
REV 0
SHEET A3
DRAWN: B.T. 17/06/08
CHECKED: W.G. 20/06/08
APPROVED: R.B. 23/06/08
SCALE 1:1
AMPCONTROL CSM PTY. LTD.
AS1100 ALL DIMENSIONS IN MILLIMETRES UNLESS STATED OTHERWISE
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REVISION
D.CRN 5768
24/10/08

Appendix B – Approvals

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	**IECEx ITA 07.0018X**	Page 1 of 4	Certificate history:
Status:	**Current**	Issue No: 2	Issue 1 (2009-04-20) Issue 0 (2008-07-07)
Date of Issue:	2019-10-14		
Applicant:	**AMPCONTROL CSM Pty Ltd** 7 Billbrooke Close Cameron Park, NSW, 2285 **Australia**		
Equipment:	**Integrated Protection Relay IS System Type IPD**		
Optional accessory:			
Type of Protection:	**Ex ia**		
Marking:	[Ex ia] I Ex ia I -20°C < Ta < +60°C		

Approved for issue on behalf of the IECEx Certification Body: **James Bes**

Position: **Certification Authority**

Signature: (for printed version)

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:

Ex Testing and Certification Pty Ltd
1/30 Kennington Drive
Tomago NSW 2322
Australia

Ex TESTING & CERTIFICATION

IECEx Certificate of Conformity

Certificate No.: **IECEx ITA 07.0018X** Page 2 of 4

Date of issue: 2019-10-14 Issue No: 2

Manufacturer: **AMPCONTROL CSM Pty Ltd**
7 Billbrooke Close
Cameron Park, NSW, 2285
Australia

Additional manufacturing locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements.This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :
The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2000 Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
Edition:3.1

IEC 60079-11:1999 Electrical apparatus for explosive gas atmospheres - Part 11: Intrinsic safety 'i'
Edition:4

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Reports:

AU/EXTC/ExTR19.0026/00 AU/ITA/ExTR08.0015/00 AU/ITA/ExTR08.0015/01

Quality Assessment Report:

AU/TSA/QAR06.0007/10

IECEx Certificate of Conformity

Certificate No.: **IECEx ITA 07.0018X** Page 3 of 4

Date of issue: 2019-10-14 Issue No: 2

EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

The IPD System comprises of the following items of equipment which are to be located in a non-hazardous area;

1. Integrated Protection Relay Type IPD.
2. CCMA or CCMD interface module
3. IKD Interface
4. IPSI-D module
5. RTU-D module
6. EFLO Test Module 11KV

Connected to the non-hazardous area equipment listed above are the following equipment which may be located in a hazardous area;

1. RDM-D Module
2. IKD Keypad

Refer to the attachment to this IECEx Certificate of Conformity, available for download, at the end of this On-Line IECEx Certificate of Conformity, for full product details.

SPECIFIC CONDITIONS OF USE: YES as shown below:
Refer to the attachment to this IECEx Certificate of Conformity, available for download, at the end of this On-Line IECEx Certificate of Conformity for full details of Conditions of Safe Use that MUST be met in order for this to remain valid.

IECEx Certificate of Conformity

Certificate No.: **IECEx ITA 07.0018X** Page 4 of 4

Date of issue: 2019-10-14 Issue No: 2

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)
See annex for details

Annex:

IECEx_ITA_07.0018X_2 Certificate Annex final .pdf

IECEx Certificate of Conformity Annexe			
Annexe for Certificate No.:	**IECEx ITA 07.0018X**	**Issue No.:**	**02**

Description (applies to all issues of this certificate):

1. Associated Intrinsically Safe Apparatus:

The Integrated Protection Relay Type IPD comprises 5 printed wiring boards (PWBs) upon which electronic components are mounted, including a lithium manganese dioxide battery. The pwbs are enclosed within a metallic enclosure fitted with plugs and sockets for connections of external circuits. The apparatus is designed to restrict the transfer of energy from the non-hazardous area to the hazardous area by limitation of the voltage and current to intrinsically safe levels with the application of 2 faults applied. External connections are made via terminal blocks mounted on the rear of the apparatus.

EFLO Test Module 11kV (added in Issue 1 of this certificate) that allows the IPD to be used on 11kV systems. It consists of three encapsulated high voltage resistors, two specified pwbs, and one unspecified pwb, all enclosed in a metallic enclosure that is connected to the Chassis Earth. Connections to the 11kV system are via integral flying leads that connect to the high voltage resistors. Plug terminals are used for connections to the IPD Relay. An interface port is also provided for connection to an external 24V and measurement signal from a separate (non certified) HV test module to be selectively channeled through to the IPD relay.

The CCMA modules comprise of a single printed wiring board upon which are mounted resistors and zener diodes. The modules are designed to restrict the transfer of energy from the non-hazardous area to the hazardous area by limitation of the voltage and current to intrinsically safe levels with the application of 2 faults applied. The modules come in three different versions namely, the 110V, the 415V and the 1000V. External connections are made via screw connections located on the top of the apparatus.

The CCMD Interface modules comprise up to 4 printed wiring boards upon which are mounted resistors, zener diodes and other electronic components. The modules are designed to restrict the transfer of energy from the non-hazardous area to the hazardous area by limitation of the voltage and current to intrinsically safe levels with the application of 2 faults applied. The modules come in three different versions namely, the 415V, the 1000V and the 3.3kV. External connections are made via screw connections or integral cables.

The IKD Interface module comprises of a single printed wiring board upon which electronic components are mounted. The pwb is partially enclosed within a steel or stainless steel enclosure fitted with four terminal blocks for connections of external circuits. The apparatus is designed to restrict the transfer of energy from the non-hazardous area to the hazardous area by limitation of the voltage and current to intrinsically safe levels with the application of 2 faults applied. External connections are made via terminal blocks mounted on the apparatus.

IECEx Certificate of Conformity Annexe			
Annexe for Certificate No.:	**IECEx ITA 07.0018X**	**Issue No.:**	**02**

The IPSI-D module comprises of a single printed wiring board upon which electronic components are mounted. The pwb is enclosed within a plastic enclosure fitted with terminal blocks for connections of external circuits. The modules are designed to prevent the transfer of energy from the non-hazardous area to the hazardous via galvanically isolating opto couplers with the application of 2 faults applied.

The RTU-D module comprises of a single printed wiring board upon which electronic components are mounted. The pwb is enclosed within a steel enclosure fitted with a terminal blocks mounted on the top of the enclosure for connections of external circuits.

The Integrated Protection Relay Type IPD, CCMA, CCMD, IKD Interface, IPSI-D and RTU-D modules are intended to be located either in a non-hazardous area or within a suitably certified Group I flameproof enclosure.

2 Hazardous Area Intrinsically Safe Apparatus

The RDM-D module comprises of a single printed wiring board upon which electronic components are mounted. The pwb is partially enclosed within an enclosure made from a steel fascia and a plastic box fitted with a terminal block mounted on the rear wall of the enclosure for connections of external circuits. The front of the enclosure is fitted with 5 membrane switches with 8 indicating Light Emitting Diodes (LED's) and a Liquid Crystal Display (LCD).

The IKD Keypad comprises of a single printed wiring board upon which electronic components are mounted. The pwb is enclosed within plastic enclosure fitted with a terminal block mounted on the rear wall of the enclosure for connections of external circuits. The front of the enclosure is fitted with 8 membrane switches with indicating 8 Light Emitting Diodes (LED's)

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Specific Conditions of Use pertaining to Issue 0, Issue 1 and Issue 2 of this Certificate:

1. The following parameters shall be taken into account during system interconnection:

Um Parameters

Apparatus	Terminals	U_m (V)
Integrated Protection Relay Type IPD	1,2, & 15 to 56	132 V
EFLO Test Module 11kV	Integral HV cables Va, Vb, Vc	13,200 V rms max phase to phase (3 ϕ) 7,622 V rms max phase to earth Earth Fault Current limited to less than 10A r.m.s.
	Terminals 1 to 4	250 V
	Terminals 5 to 8	The connections to these terminals must be directly connected to the IPD Relay module terminals J3, J4, J5 (schematic IPD-Z-002 Rev 6 Sht 2).
IKD Interface	J2, J4	132 V
IKD Interface	Pilot	5 A.
IPSI-D	DNIP+, DNIP	250 V
CCMA 110 V	A, B, C	132 V
CCMA 415 V	A, B, C	415 V
CCMA 1000 V	A, B, C	1000 V
CCMD 415 V,	Va, Vb, Vc	415 V
CCMD 1kV	Va, Vb, Vc	1000 V
CCMD 3.3kV	Va, Vb, Vc	3300 V

Terminal ID	U_i (V)	I_i (mA)	P_i (mW)	C_i (µF)	L_i (µH)
RDM-D	18	60	700	8	Negligible
IKD Keypad	16	100	700	10	Negligible
IPSI-D	18	78.3	352	Negligible	Negligible
RTU-D	20.4	144	737	3	Negligible

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Output Parameters:

	U_o (V)	I_o (mA)	P_o (mW)	C_o (µF)	L_o (mH)	L/R (µH/Ω)
IPD +Vsc, RDI, TXD, & 0V	18	78.3	352	9	76	1325
IPD +Vdm, Data, & 0V	18	60	267	9	129	1749
IPD FIO & 0V	18	19.35	87.1	9	1246	5359
IPD Pilot & Earth	20.4	144	737	6.74	22.5	417
CCMA (110V) A, B, C	19.62*	11	54	7.8	3,000	1,000
CCMA (415V) A, B, C	19.62*	3	13	7.8	3,000	1,000
CCMA (1000V) A, B, C	19.62*	2	6	7.8	3,000	1,000
CCMD (415V) Va, Vb, Vc	19.62*	< 0.01	< 0.01	7.8	3,000	1,000
CCMD (1kV) Va, Vb, Vc	19.62*	< 0.01	< 0.01	7.8	3,000	1,000
CCMD (3.3kV) Va, Vb, Vc	19.62*	< 0.01	< 0.01	7.8	3,000	1,000
EFLO Test Module 11kV Va, Vb, Vc	19.62*	<0.01	< 0.05	7.8	3,000	1,000
IKD Interface A, B, C, EFT, +Vkp, Data, Earth	7.14	0.75	1.35	1,000	1,000	6,000
IKD Interface +Vkp, Data, Earth	15.78	53	176	13.9	166	1700
IKD Interface Pilot, Earth	0	0	0	0	0	N/A
IPSI-D module	0	0	0	0	0	N/A
RTU-D module	0	0	0	N/A	N/A	N/A

* Maximum output voltage determined by IPD Relay module.
Note: The above load parameters apply where:
a. The external circuit contains no combined lumped inductance Li and capacitance Ci greater than 1% of the above values. or

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b. The inductance and capacitance are distributed as in a cable. or
c. The external circuit contains only lumped inductance or only lumped capacitance in combination with a cable.

In all other situations, e.g. the external circuit contains combined lumped inductance and capacitance, up to 50% of each of the inductance and capacitance values is allowed.

2. The IKD Interface must be infallibly connected to the main system earth via at least one of the earthed mounting bolts on the chassis.

3. The Integrated Protection Relay Type IPD must be infallibly connected to the main system earth via the earth terminals provided (J2, J7 and J12).

4. The pilot circuit connections to the IPD Integrated Protection Relay and the IKD Interface module must not be connected to a source of power source where the nominal pilot to earth fault current may exceed 5 A r.m.s. unless protected by a fuse. The fuse must be suitable for the system voltage, having a breaking capacity not less than 1,500 A and have a maximum rating of 3A.

5. The following modules are to be mounted such that the connection facilities have a minimum ingress protection level of not less than IP20;
   a. Integrated Protection Relay Type IPD
   b. CCMA and CCMD
   c. RDM-D
   d. IKD Keypad
   e. RTU-D module
   f. IPSI-D
   g. IKD Interface
   h. EFLO Test Module 11KV

6. The RDM-D module shall be installed such that the exposed area of the front membrane is less than 100cm^2.

7. The IPD module contains a single non-rechargeable non user replaceable cell. This must be taken in to account when the apparatus is installed within a flameproof (Ex d) enclosure.

8. The IPD Module contains significant amount of capacitance that may be considered as becoming charged to the supply voltage (U_m = 132 V) under fault conditions. When the IPD module is installed within a suitably certified flameproof enclosure the enclosure is to be durably marked with the test **"Warning – Do not open when an explosive gas may be present"**

9. The High voltage connections of the CCMD Modules are NOT Intrinsically Safe while terminals RL 4 and 110Vcom are energized.

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10. The High voltage connections of the EFLO Test Module 11kV are NOT Intrinsically Safe while terminals 1 to 4 are energized.

11. The chassis of the EFLO Test Module 11kV must be reliably connected to the main system earth via the dedicated connection.

12. The IS Earth of the EFLO Test Module 11kV must be infallibly connected to the IS Earth via the dedicated connection.

Variations permitted by Issue 1 of this certificate:

- The addition of the 'EFLO Test Module 11kV' allows the IPD to be used on 11kV systems.

Variations permitted by Issue 2 of this certificate:

- 11kV EFLO resistors are now allowed in sheet metal casing made of brass, copper in addition to the earlier aluminum.
- A plastic cap made of ABS is now fitted on top of the casing where the 11kV flying leads emerge from the encapsulated metal casing.
- The encapsulant is now allowed to be a silicon encapsulant.
- The PCB on which the resistors for the 11kV EFLO resistors is now modified

Drawing list pertaining to Issue 0, Issue 1 and Issue 2 of this Certificate:

Document No.	Document Title	Issue	Date (yyyy/mm/dd)
IPD-Z-037	IPD Parallel Feeder Configuration General Arrangement	0	2007/02/20
IPD-Z-001 Sheets 1 to 6	IPD Analogue Board PCB Artwork	5	2005/09/27
IPD-Z-002 Sheet 1	IPD Analog Board Main	6	2007/11/23
IPD-Z-002 Sheet 2	IPD Analog Board Earth Leakage & CCM Inputs	6	2007/11/23
IPD-Z-002 Sheet 3	IPD Analog Board Comms and Fan Interlock	6	2007/11/23
IPD-Z-002 Sheet 4	IPD Analog Board Earth Continuity Pilot	6	2007/11/23

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Document No.	Document Title	Issue	Date (yyyy/mm/dd)
IPD-Z-004 Sheets 1 to 5	IPD Processor Board PCB Artwork	3	2005/08/05
IPD-Z-005 Sheet 1	IPD Processor Board Schematic Diagram Main	2	2007/11/23
IPD-Z-005 Sheet 2	IPD Processor Board Schematic Diagram Inputs	2	2007/11/23
IPD-Z-005 Sheet 3	IPD Processor Board Schematic Diagram CPU	2	2007/11/23
IPD-Z-005 Sheet 4	IPD Processor Board Schematic Diagram ADC	2	2007/11/23
IPD-Z-005 Sheet 5	IPD Processor Board Schematic Diagram Battery, RTC, RAM	2	2007/11/23
IPD-Z-007	IPD Integrated Protection Relay Fascia Plate Marking Details	0	2007/12/12
IPD-Z-030	IPD Integrated Protection Relay Enclosure Details PCB Mounted Detail and Clearance	0	2007/04/11
IPD-Z-031	IPD Power Board Schematic Diagram	1	2006/12/18
IPD-Z-032	IPD Relay Board Schematic Diagram	0	2006/10/13
IPD-Z-033	IPD Top Level Schematic Diagram	2	2007/11/23
IPD-Z-034	IPD IPD BASE IS CIRCUIT PROTECTIVE BARRIERS	1	2008/05/21
IPD-Z-011	IPD RDM-D Enclosure & Marking Details	3	2007/11/26
IPD-Z-012	IPD RDM-D Schematic Diagram	2	2006/12/14
IPD-Z-013	IPD RDM-D Marking Details	3	2007/11/26
IPD-Z-017	IPD IPSI-D Schematic Diagram	6	2008/06/30
IPD-Z-018 Sheets 1 to 3	IPSI-D PCB Artwork	5	2008/07/03
IPD-Z-019	IPD IPSI-D Enclosure and Marking Details	5	2008/05/12
IPD-Z-022	IPD CCMD 3.3kV Dimension & Marking Details	4	2008/06/18
IPD-Z-024	IPD CCMD 3.3kV Construction Details	2	2007/02/27
IPD-Z-025 Sheets 1 to 3	CCMD 1 kV & 415 V PCB Artwork	3	2005/10/14
IPD-Z-026 Sheets 1 to 3	CCMD 3.3 kV PCB Artwork	4	2005/10/14
IPD-Z-029	IPD CCMD 3.3kV Schematic Diagram	2	2007/02/26
IKD-Z-001	IKD IKD Interface Schematic Diagram	6	2008/06/17

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IKD-Z-002 Sheets 1 to 4	IKD Interface Artwork	3	2005/08/08
IKD-Z-003	IKD IKD Interface Enclosure & Marking Details	3	2007/11/27
IKD-Z-004	IKD IKD Keypad Enclosure Details	1	2006/12/13
IKD-Z-005	IKD IKD Keypad Schematid Diagram	1	2006/12/13
IKD-Z-006	IKD IKD Keypad Marking Details	3	2007/11/27
IPD-Z-014 Sheet 1	IPD RTU-D Schematic Processor and Line Interface	3	2007/11/26
IPD-Z-014 Sheet 2	IPD RTU-D Schematic Inputs and ADC	3	2007/11/26
IPD-Z-015 Sheets 1 to 5	RTU-D Artwork	1	2005/10/12
IPD-Z-016	IPD RTU-D Enclosure Details	2	2006/12/04
IPD-Z-020	IPD CCMD 415 V Dimension & Marking Details	4	2008/06/17
IPD-Z-021	IPD CCMD 1 kV Dimension & Marking Details	4	2008/06/17
IPD-Z-023	IPD CCMD 1 kV & 415 V Construction Details	3	2007/11/28
IPD-Z-027	IPD CCMD 415 V Schematic Diagram	2	2007/02/26
IPD-Z-028	IPD CCMD 1 kV Schematic Diagram	2	2007/02/26
CCMA-Z-001	CABLE CONNECTION MODULE, TYPE A, 1000V ARTWORK	0	2004/05/18
CCMA-Z-002	CABLE CONNECTION MODULE, TYPE A, 1000V CONTRUCTION DETAILS	0	2004/05/18
CCMA-Z-003	CABLE CONNECTION MODULE, TYPE A, 1 kV DIMENSIONS AND MARKING	2	2007/12/12
CCMA-Z-004	CABLE CONNECTION MODULE, TYPE A, 415V ARTWORK	0	2004/05/18
CCMA-Z-005	CABLE CONNECTION MODULE, TYPE A, 415V CONTRUCTION DETAILS	0	2004/05/18
CCMA-Z-006	CABLE CONNECTION MODULE, TYPE A, 415V DIMENSIONS AND MARKING	2	2007/12/12
CCMA-Z-007	CABLE CONNECTION MODULE, TYPE A, 110V ARTWORK	0	2004/05/18
CCMA-Z-008	CABLE CONNECTION MODULE, TYPE A, 110V CONTRUCTION DETAILS	0	2004/05/18
CCMA-Z-009	CABLE CONNECTION MODULE, TYPE A, 110V DIMENSIONS AND MARKING	2	2007/12/12

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Document No.	Document Title	Issue	Date (yyyy/mm/dd)
	EFLO Module		
IPD-Z-009	IPD Integrated Protection Relay Typical IS System Diagram	3	2009-03-05
IPDZ035 2 Sheets	*IPD 11kV EFLO Module Mechanical Certification Detail	1	2019-08-20
IPD-Z-036	IPD 11kV EFLO Module Schematic	2	2009-03-06
IPD-Z-037 6 Sheets	IPD 11kV EFLO PCB Artwork *(PCB layouts)*	0	2009-01-30
IPD-Z-038 Sheets 1 to 3	IPD 11kV HV Resistor PCB Artwork *(replaced by IPDZ041 in Issue 2 of this certificate)*	1	2009-03-09
IPD-Z-040	IPD 11kV Relay Marking Details	1	2009-03-09
IPDZ041 5 Sheets	*IPD 11kV HV Resistor V2 (PCB layouts)	0	2019-08-26

*Note: An * is included before the title of documents that are new or revised.*

This form is identified as QMA-HAE-08-710 Issued 2019-03-15

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