

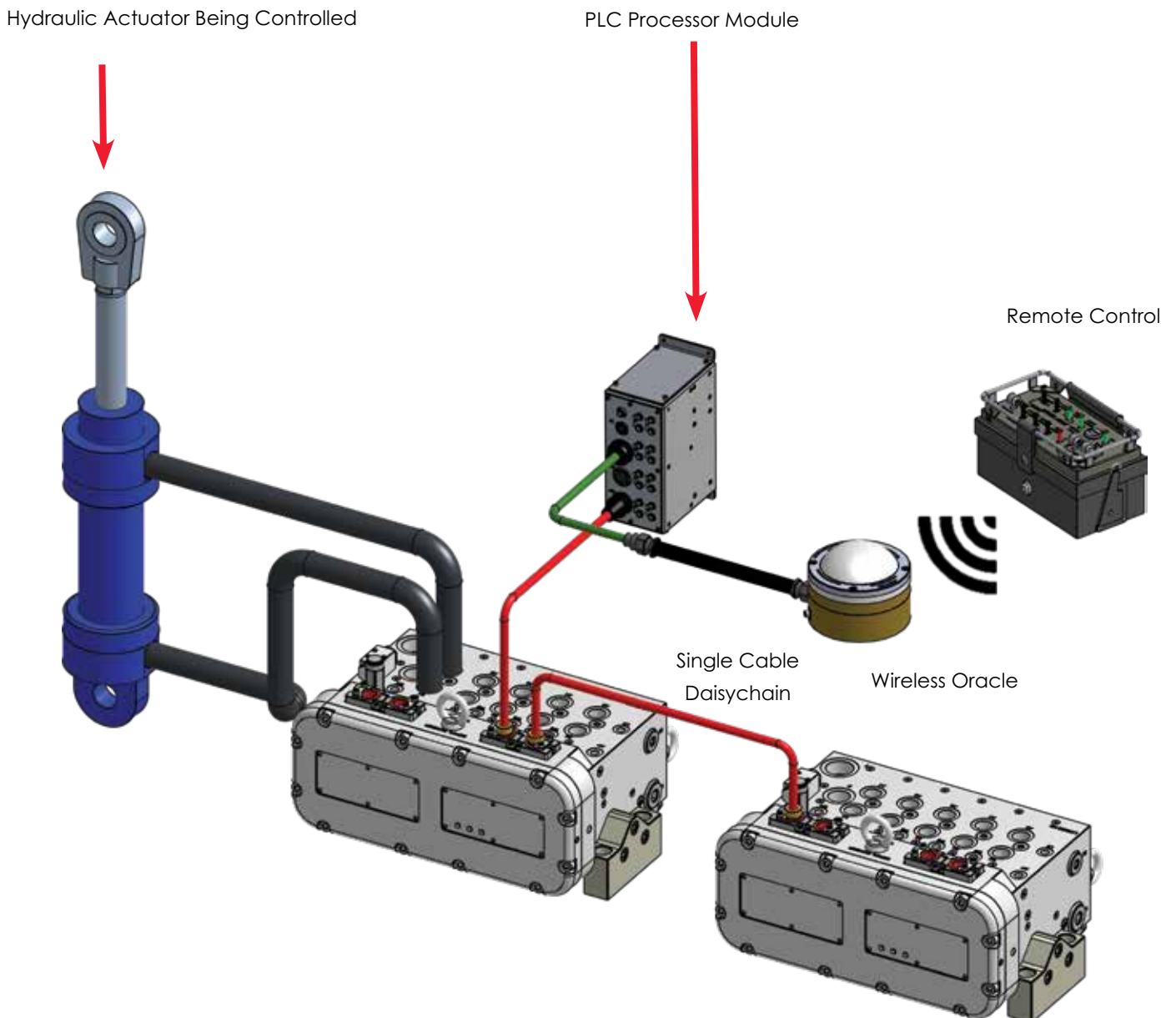
Complete Flameproof Hydraulic Control System

HBox

Pempek's HBox flameproof hydraulic control manifold with in-built electronic control and monitoring offers SIL 2 functionality.

Pempek's HBox reduces control cabling to **ONLY ONE CABLE**. The highly integrated design moves control and monitoring from main flameproof enclosure to the HBox.

Only One Control Cable – a Complete System of Safe and Reliable Hydraulic Automation



HBox Key Features & Benefits

- Operating successfully for over a decade in Australian and South African mining industry with more than 120 units in operation as of Dec 2019
- Proven Record on 12CM & MB600 Series Continuous Miner & Bolter Miner
- Requires ONLY ONE Control Cable
- Pempek warrants and supports the complete package through its global partnerships
- Individual flow control and over pressure limit function for each spool
- Solenoids Don't Leak or Fill with Water (Rated to 315 Bar Continuous)
- Safety Isolation Valve - Built in and Automatically Controlled by Firmware to Maintain Safety
- Spool Safety - Built Into Product Firmware
- Pressure monitoring for internal and external functions (No I/O required)
- Temperature Monitoring - Internal Oil Temperature Sensor (No I/O required)



Fast and Easy Maintenance Hydraulic Control System

- Tell Tail LEDs on cover show: 1. Comms (green/red) 2. Status (blue/red/green) 3. Power (green)
- Replacing a Spool (eg After Swarf Ingestion) and Self Calibration take less than 3 Minutes
- Spool Self Diagnostic Built into Firmware Commanded from Remote Exercises all Circuits Without Oil Pressure
- HBox Diagnostic Road case Available that Exercises H-Box (See Diagnostic Screen)



Why Pempek? Industry Comparison

Typical 13 Slice Sandwich Valvebank Competitor

- Requires 13 sets of 10 core cable from Main Flameproof Enclosure to Valvebank
- Terminations in the Flameproof Box Typically require More Than 104 Wires
- Multiple PLC Inputs and Outputs Must be Managed by Separate PLC IOs Requiring Complex PLC Software to Manage Operation and Safety
- Additional Safety Valve Must be Installed, Wired and Managed by PLC Software
- Spool Safety Must be Managed by PLC

Pempek

- Requires just 1 Cable (CAN / 24VDC) from Main Flameproof box for 2 Manifolds from the Main Flameproof box (as they Daisychain)
- Terminations Within the Flameproof Box Require 5 Wires (3 x CAN bus / 2 x 24VDC)
- PLC Inputs and Outputs **DO NOT** Require Additional Electrical Connection
- Small Bore Hydraulic Cables can be Connected Directly to H-Box to Monitor External Pressure

Main Flameproof Box

One Cable
One Opening



Technical Information and Model Comparison Chart

		HBox 5-150	HBox 5-300	HBox 7-180	HBox 7-300
Work Spools [Qvmax] Lpm*	High Flow	150 x 5	300x 1	180 x 2	300 x 2
	Medium Flow	X	140 X 4	140 x 5	140 x 3, 70 x 2
External Pilot Functions	On/Off	X	X	3	2
	Proportional	3	3	1	2
Max Pump Flow	[qVmax]	240	300	350	500
Pump Pressure	[p BAR]	315	350	315	350
P&T Port	P	NB25 [OPT x 2]	NB32 [OPT x 2]	NB25 x 2	NB38
	T	NB25 [OPT x 2]	NB32 [OPT x 2]	NB25 x 2	NB38
Load Sensing Capable	Standard	✓	X	✓	X
	Turbo	X	✓	X	✓
Pilot Filtration***	Full	X	✓	X	✓
	External	✓	X	✓	X
Oil Temperature Monitoring	°C	✓	✓	✓	✓
Internal Pressure Monitoring	P Bar	2	2	4	8
External Pressure Monitoring	P Bar	1	1	5	5
Spool Position Monitoring	Safety	✓	✓	✓	✓
	Diagnostics	✓	✓	✓	✓
Port Pressure Limiting	P Bar	✓	✓	x4	✓
Reduced Mechanical Adjustment		✓	✓	✓	✓
Fast Cartridge Replacement		✓	✓	✓	✓
Self Cleaning Orifices	No Blockages	X	✓	X	✓
Options Configured By Pempek	Easy Commissioning	✓	✓	✓	✓
Reduced Leak Points	No Slices	✓	✓	✓	✓
Pempek Safety Integrated	Verified	✓	✓	✓	✓
System Status Led	X 3	✓	✓	✓	✓
Flame Path Openings	Single Opening	✓	✓	✓	✓
	Single Inspect.	✓	✓	✓	✓
Can Bus	Single Cable	✓	✓	✓	✓
	Daisychain	✓	✓	X**	✓

* Higher flow rates can be achieved by combining spool outputs. Spool flow rate depends on pump flow and compensator settings.

** Two HBox 7-180 can be installed to a machine with two can cables.

*** Other pilot filtration options and recommendations available.



HBox 5-150



HBox 7-180

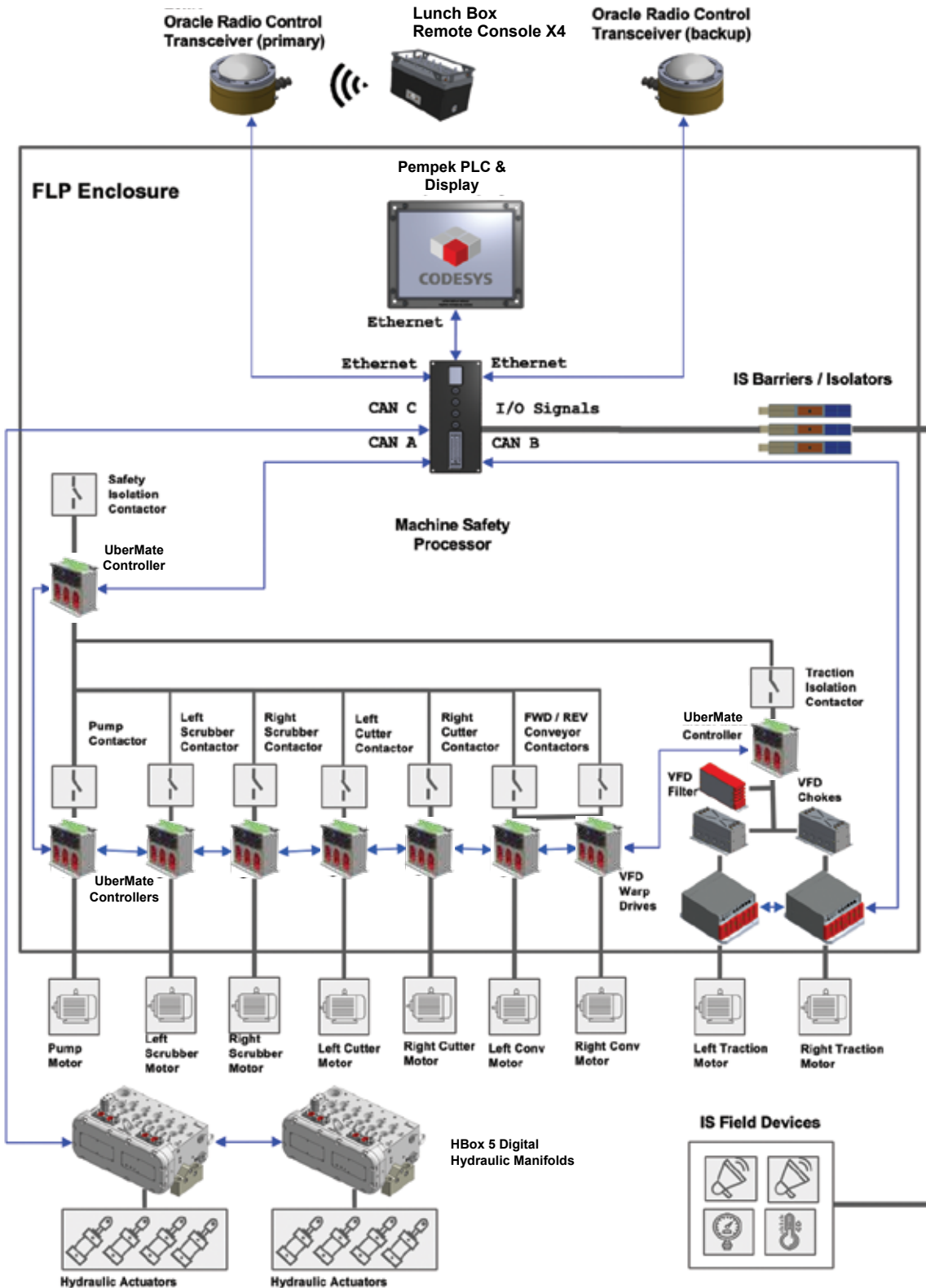


HBox 7-300

Systems Architecture Example

Continuous Miner System (12CM Class / AC Traction)

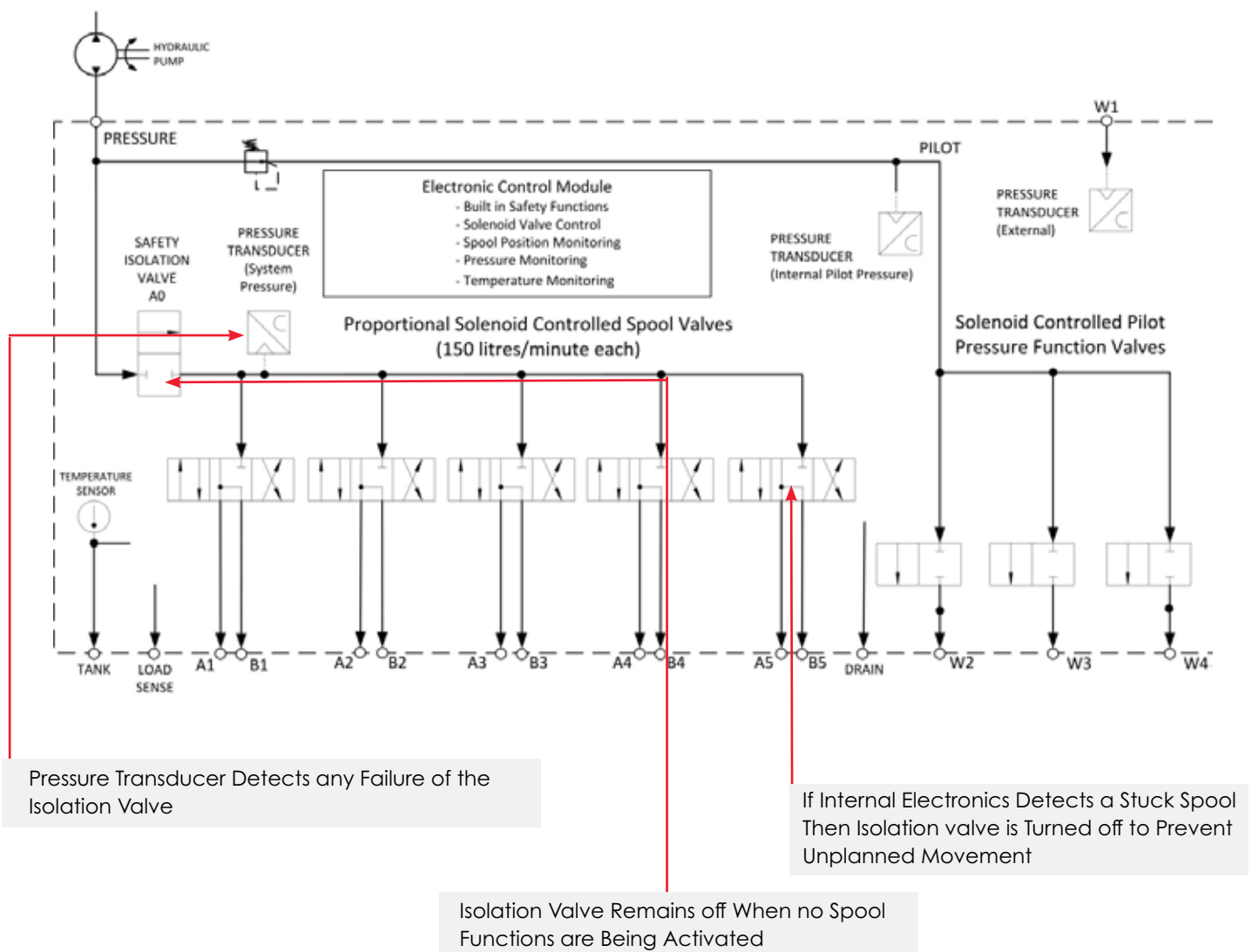
Remote Console sharing and data upload station.



Hydraulic Control with built in Safety Integrity Level 2 (SIL2)

Spool Safety is Built In!

- Built in Safety Functions
- Solenoid Valve Control
- Spool Position Monitoring
- Pressure Monitoring
- Temperature Monitoring
- No Unplanned Movements



Pempek certified to IECEx

IECEx Certificate of Conformity

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

Certificate No.: **IECEx TSA 14.0038X** Issue No.: **0** Certificate history:

Status: **Current**

Date of Issue: **2014-12-19** Page 1 of 3

Applicant: Pempek Systems Pty Ltd
Unit 3 /13 Hoyle Ave,
Castle Hill NSW 2154
Australia

Electrical Apparatus: L8W6 Hydraulic Block
Optional accessory:

Type of Protection: Ex db I Mb

Marking: Pempek or trade mark
Model Number: _____
Serial Number: _____
IECEx TSA 14.0038X
Ex db I Mb IP66/IP57 T_a 50 °C (105 °C for lens)

Approved for issue on behalf of the IECEx Certification Body: **Uyen Singh**

Position: **Quality & Certification Manager**

Signature:
(Or printed version)

Date: **19 DECEMBER 2014**

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 the Official IECEx Website.

Certificate issued by: **TestSafe Australia**
819 Londonserry Road
Londonserry NSW 2753
Australia

IECEx Certificate of Conformity

Certificate No.: **IECEx TSA 14.0038X** Issue No.: **0**

Date of Issue: **2014-12-19** Page 2 of 3

Manufacturer: Pempek Systems Pty Ltd
Unit 3 /13 Hoyle Ave,
Castle Hill NSW 2154
Australia

Additional Manufacturing location (s):

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 set 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 Q2 and Operational Documents as amended.

STANDARDS:
The electrical apparatus 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 : 2011 Explosive atmospheres - Part 0: General requirements
Edition: 6.0
IEC 60079-1 : 2014-08 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "fl"
Edition: 7.0

This Certificate does not indicate compliance with electrical 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 Report:
AUTSA/EXTR14.0054/00

Quality Assessment Report:
AUTSA/QAR06.0015/08

IECEx Certificate of Conformity

Certificate No.: **IECEx TSA 14.0038X** Issue No.: **0**

Date of Issue: **2014-12-19** Page 3 of 3

Schedule

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

The Type L8W6 S Shooter is a flameproof hydraulic control manifold with in-built electronics, control and monitoring intended for mobile mining machinery applications. It consists of 5 proportional spool valves, internal electronics module to monitor the position of each spool and 3 pilot function outputs to support pilot pressure signal control of machine functions.

The L8W6 S Shooter enclosure is manufactured from ductile iron grade A21831 400-250-12 and mild steel grade A53678-250 or A53678-350 or A53678-350L or ISO 630-F430A4308. The enclosure comprises a base manifold assembly and a cover mounted by 12 x M10 grade A2-70 socket head cap screws. The base manifold assembly has four Ø 33 mm cable connector type VR sockets (grade ISO CuZn 39P03 or F316 stainless steel), which are fastened to the base by three M6 socket head cap screws grade A2-70. These four sockets can be fitted with either flameproof connector type VR or flameproof connector blanking plugs, all detailed in the drawing ZL0W0151. The connector type VR and connector blanking plugs are made from grade ISO CuZn 39P03 or F316 stainless steel. The connector type VR and also blanking plug are retained by a locking state and two M6 grade A2-70 socket head cap screws. The blanking plugs are spot welded or brazed to distributor sleeves.

There are drilled through holes on the base manifold and wall and all are connecting external hydraulic hoses. The control enclosure houses solenoid valve, pressure sensor, inclinometer, liquid level detector components and PCB for operation at up to and including 24 V dc, 5 A and 150 W maximum power dissipation. An O-ring seal between the base manifold and cover, also between connector type VR to housing provides protection against the ingress of dust and water. The hydraulic port system is designed to shut down as a consequence of a catastrophic hydraulic pressure of maximum 300 bar.

CONDITIONS OF CERTIFICATION: YES as shown below:

The hydraulic porting cannot contain hazardous environment due to the continual presence of hydraulic fluid. The system is designed to shut down as a consequence of a catastrophic of hydraulic pressure of maximum 300 bar.

The special fasteners used to assemble the cover and the gland socket/keeper plate must be minimum grade A2-70 (Minimum yield stress 450 MPa).

IECEx Certificate of Conformity Annexe

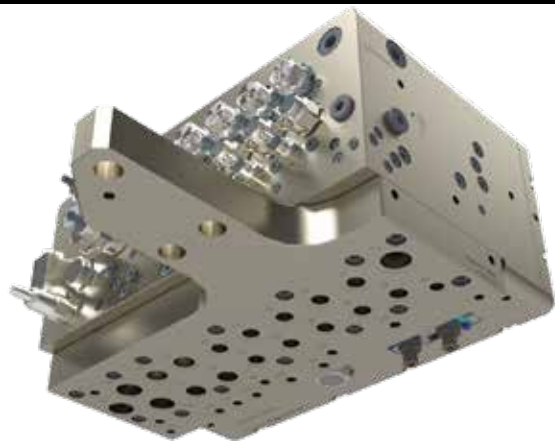
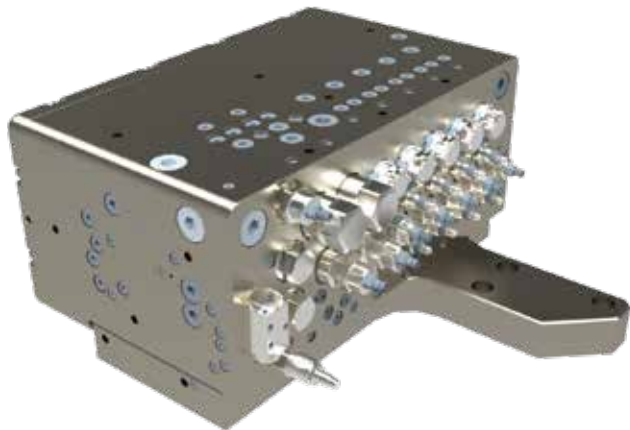
Annexe for Certificate No.: **IECEx TSA 14.0038X** Issue No.: **0**

Drawing list pertaining to issue 0 of this Certificate:

Drawing/Document Number:	Page/s:	Title:	Revision Level:	Date: (yyyy-mm-dd)
ZGOW07801	1	MARKING PLATE, IECEx	1	2014-12-15
ZLOW00101	4	5-SHOOTER - HYDRAULIC CONTROL MODULE	1	2014-12-15
ZLOW00102	1	TYPICAL COMPONENT LAYOUT- HEAT DISSIPATION	1	2014-12-15
ZLOG252102	2	MAIN MANIFOLD	1	2014-12-15
ZMOW00501	1	LED LENS, COVER	1	2014-12-15
ZMOW00801	1	PLATE, COVER	1	2014-12-15
ZMOW1501	1	O-RING, COVER	1	2014-12-15
ZHOVR0601	1	FP Connector For Group 1	1	2014-12-15
ZHOVR0802	1	FP Connector For Group 1	1	2014-12-15
ZHOVR8501	1	FP Connector Arrangement Configuration For Group 1	1	2014-12-15
ZHOVR8601	1	Approval Flameproof Connector Configuration For Group 1	1	2014-12-15
ZM0VR0301	1	Flameproof Socket For Group 1	1	2014-12-15
ZM0VR1301	1	Locking Plate IEC	1	2014-12-15
ZM0VR1302	1	Locking Plate IEC With Shroud	1	2014-12-15
ZM0VR1303	1	Locking Plate IEC With Shroud	1	2014-12-15
ZM0VR3401	1	FP Enclosure Wall For Group 1	1	2014-12-15
ZM0TU4601	1	Connector Sleeve CG 1 For Group 1	1	2014-12-15
ZM0TU4701	1	Connector Sleeve CG 2	1	2014-12-15
ZM0TUS001	1	Blanking Plug	1	2014-12-15
ZM0TUS101	1	Nut CG	1	2014-12-15

Certificate issued by: **TestSafe Australia**
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