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Revolution Not Evolution

7330

**DIPTRONIC™
L.I.P.S. & GPS**

INSTALLATION MANUAL



Issue F October 2012



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P7403 Electrical equipment service and installation guide for road tankers

Liquip supplies the following document as a guide for installing and operating electrical equipment on road tankers. It should be used in conjunction with local legislation and standards, owner's requirements and tank manufacturer procedures.

INFORMATION PERTAINING TO WORKING ON A TANK VEHICLE

1. Prior to working on a tank vehicle it must be degassed or certified to work on. Before working in a tank compartment an appropriate device must be used to check for the presence of volatile gases.
2. Any work carried out on a tank vehicle must be done so in a non-hazardous area.
3. Before working on any electrical equipment on a tank vehicle power must be isolated either via the battery isolation switch (BIS), by disconnecting the truck battery or by disconnecting the positive of the electrical equipment.
4. Never weld on a tank vehicle unless all electronic equipment is completely disconnected electrically from both the tanker and other equipment.
5. Hazardous conditions may be present when working with high voltage devices (such as gantry monitors). Qualified technicians only should be servicing these devices.
6. Do not connect a battery charger or other pulsed power supply to the truck battery without first isolating all electrical equipment as permanent damage may result.
7. Long sleeve and pants protective clothing should be worn at all times. Clothing must be non-static generating. Any petroleum contact with skin should be washed off immediately.
8. Always follow manufacturer guidelines when working on electrical equipment. Failure to do so may void warranty or cause damage.

INFORMATION PERTAINING TO INSTALLING EQUIPMENT ON A TANK VEHICLE

1. All electrical equipment and fittings must be suitable for use on a tanker and meet all local regulations for operation.
2. Use high quality waterproof conduit and fittings to IP66 minimum for all wiring and junction boxes.
3. Use waterproof flexible compound such as Silastic in all glands and joints not available as waterproof by design.
4. Mount all equipment away from direct spray areas such as behind the tyres and out of direct sunlight. Always select the most sheltered aspect.
5. Ensure all installations adhere to appropriate guidelines.
6. Coat all terminals, cable end and joints with non-conducting grease or Vaseline after final testing. This will prevent corrosion.



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7. Prior to crimping, check wiring connections are electrically correct. When crimping make sure there is good electrical contact between the wire strands and metal section of the crimp terminal. Pull on the crimp to ensure a good connection has been made.
8. Cable ends may be crimped with ferrules for better connection. Do not solder the cable ends (fatigues and corrodes). Pre-coat with non-conductive grease for corrosion protection.
9. At any point a cable is extended or joined to a standard cable assembly, all cable screens must be connected to the chassis, refer to relevant wiring diagram. Insulate exposed screen wire using heat shrink, terminate with an eye terminal and attach to the junction box mounting screw. If the junction box is mounted to a panel not electrically connected to the chassis, the screens must still be joined together and connected to the chassis at one point, as per wiring diagram.
10. Common grounding of a system is most important. Do not rely on common chassis grounding at various points, run a full-length dedicated ground cable. Max resistance, battery ground to any ground point to be 1Ω. Refer Liquip Tech Talk #48: Electrical Bonding on Tankers. The electrical resistance between the tank and tanker chassis, prime mover chassis, or trailer undercarriage, and between the tank and the connection of the tanker pipework to the delivery hose, shall not exceed 10Ω (refer to AS2809.2).
11. Always fit as much loose cable length into junction boxes and housings as practicable to allow for future servicing.
12. Always segregate power and intrinsically safe wires in accordance with I.S wiring rules.
13. Carry out a complete wiring check for accuracy and continuity before connecting power to any device.
14. Observe international and local legal requirements. In the event of conflicting instructions seek qualified advice before proceeding.
15. Do not route communication cables past 'noisy' electrical apparatus such as solenoids and alternators.
16. Check instruction manual for recommended cable type and torque settings.
17. Use specialised, genuine tools for all electrical work.
18. Mount equipment to clean, dry, bare surfaces on a metal bracket mounted to the chassis/sub-frame. It is recommended the bracket be welded to the chassis/sub-frame to facilitate good electrical contact.
19. Ensure adequate clearance around equipment being installed. This will provide for ease in future maintenance.
20. When bolting equipment into place, the use of Teflon tape or anti-seize compound on threads is advised.
21. Fuses located in hazardous areas must be suited to that location.
22. Always allow suitable separation between intrinsically safe wiring and power from line power source.



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1.0 The Diptronic LIPS installation instructions

1.1 Electrical characteristics

DIP240 with PPM340 and 8 compartments	- Total of 0.8 Amps at any voltage from 11.5V to 30V dc
EPSON ticket printer & blaster on stand-by	- 0.1 Amps at 24V dc
EPSON ticket printer & blaster normal printing	- 0.6 Amps at 24V dc
EPSON ticket printer & blaster max (interm.)	- 3.0 Amps at 24V dc

1.2 Notes on Hardware

It is essential that the pneumatic control system is via the guard bar (opens all vapour vents, puts brakes on trucks, allows air through to footvalve control) and a SINGLE pneumatic valve. When the guard bar is actuated the footvalves should open sequentially and the pressure switch close.

The pressure switch (DPS100) enables/disables the printer. A printed record of the transaction is mandatory for sealed parcel operation.

The Zener barrier in the printer communications line is a safety requirement. Refer drawing X351306.

The two main Diptronic components are the DIP100 sensors and DIP240 CPU's. A sensor is mounted in each compartment and communicates with the CPU the level in that compartment. Refer sensor and CPU photos on following pages.

“Protector” uses the gantry overfill protection system to prevent loading (e.g.. if tanker has “returns”). Diptronic LIPS has no other active interlocks.



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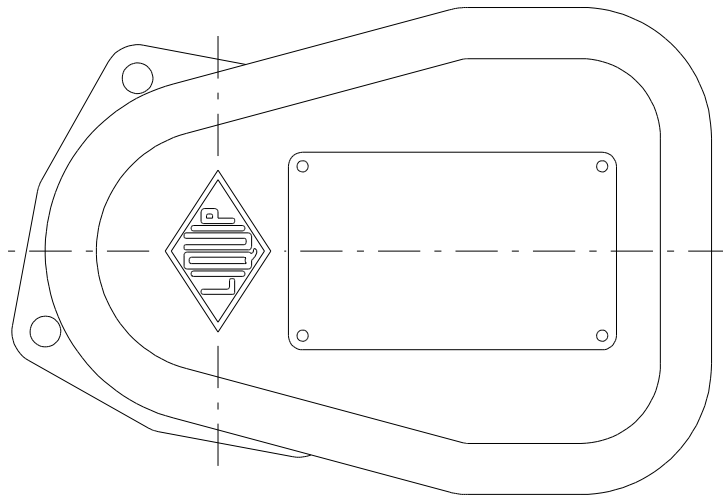
2.0 'DIPTRONIC' COMPONENTS

2.1 Sensor – DIP100 series

The sensor is constructed of a cast aluminium cover and base with a stainless steel tube and internal rod. The electronics are fully potted in epoxy contained in an aluminium cup. The cup is mounted on the base and wires connect the terminals protruding from the epoxy surface through a waterproof gland (Refer section 3 for dimensions).



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ALUMINIUM COVER

HOUSING BASE WITH
FLANGE MOUNT TO SUIT
LIQUIP WELD FLANGES
OR MANHOLE COVERS

CABLE
GLAND

X351501
Issue: B



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Diptronic Sensor



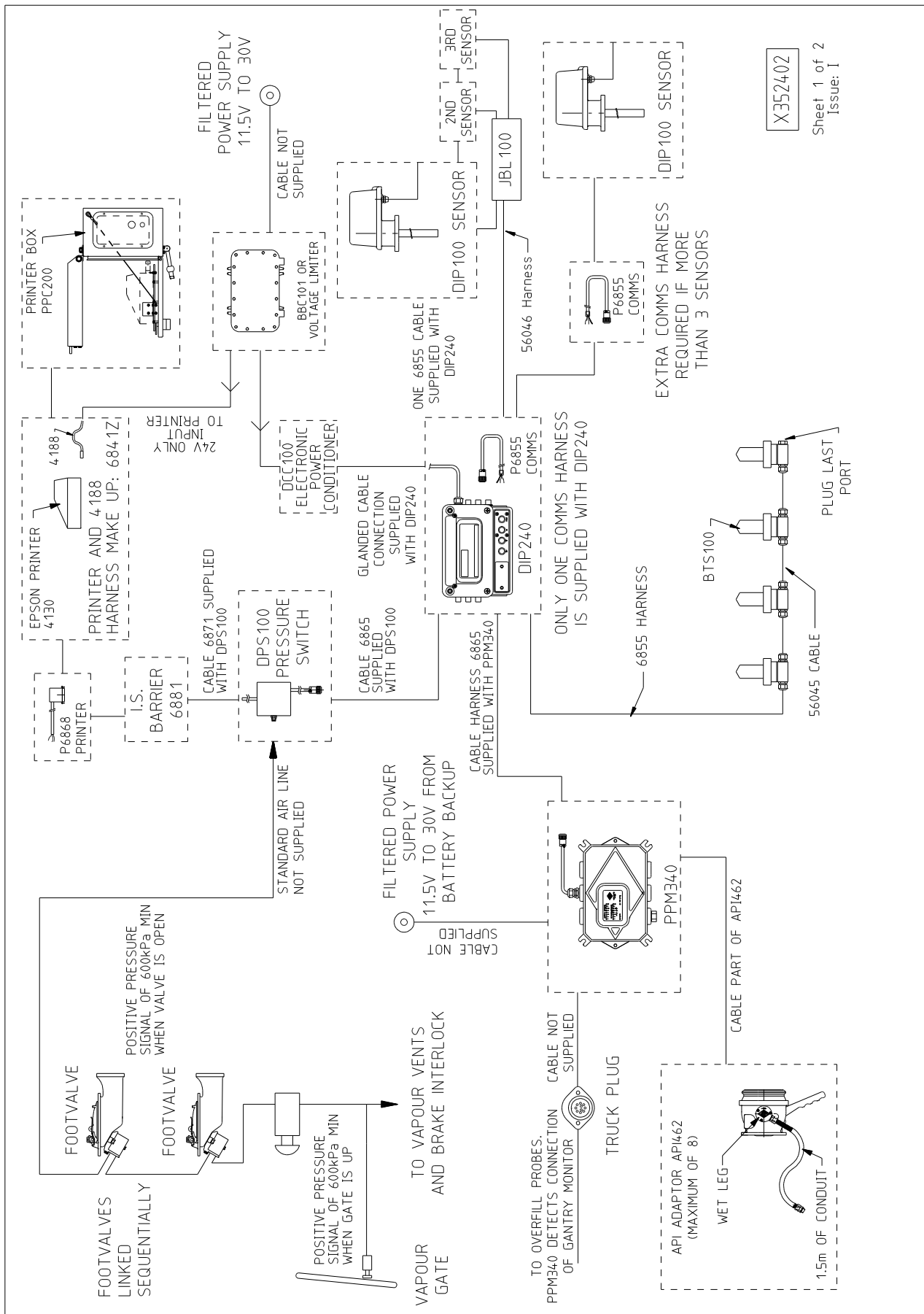


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Diptronic CPU



On the following page is the basic Diptronic component layout.



X352402

Sheet 1 of 2
Issue: I

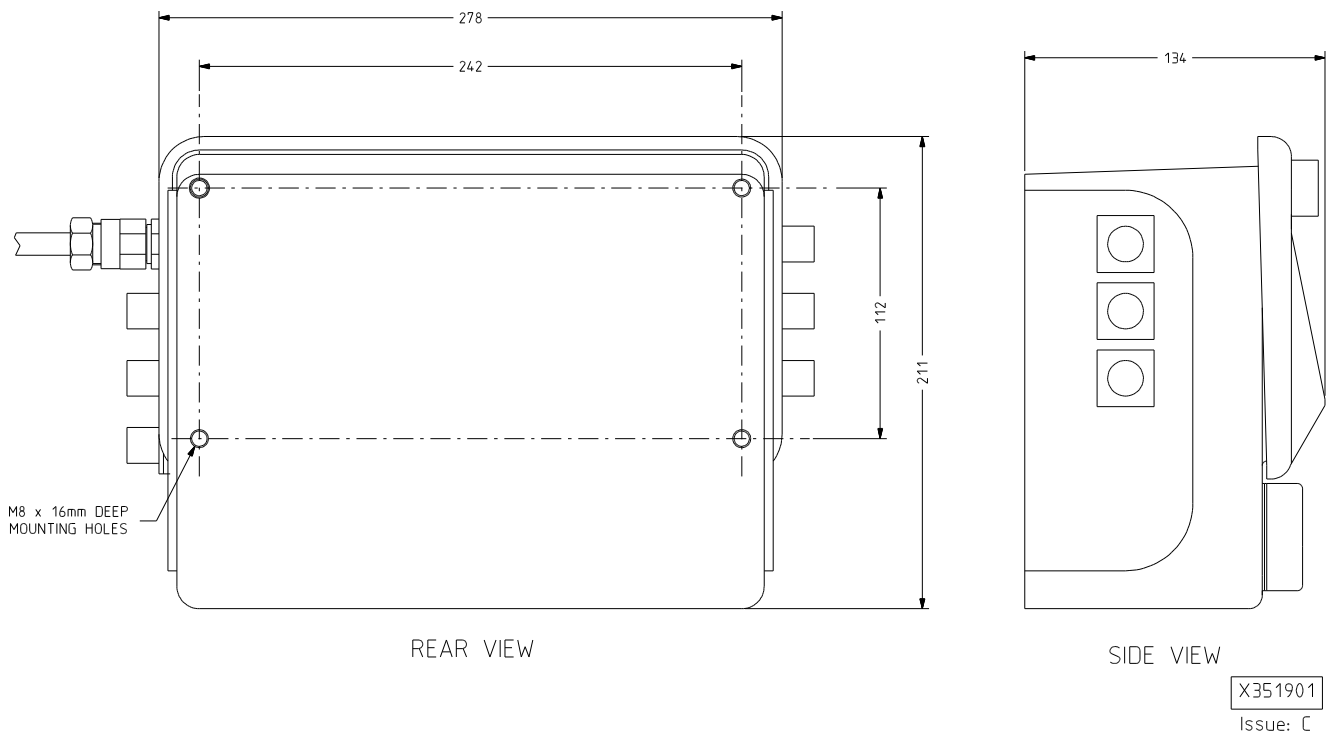


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2.2 Central Processing Unit (CPU) – DIP240

The CPU has up to six military specification connectors that connect to the sensors, printer and sealed parcel sub-system. When using sealed parcel, the CPU is linked with a second control housing - PPM340.

The CPU is mounted using 4 M8 bolts tapped into the rear of the body. It may be mounted direct to a plate or via brackets.



The CPU is sealed at the factory before delivery and access inside the CPU is not required at anytime. All wiring is done externally by military spec connectors or junction boxes. The front calibration buttons are sealed once the CPU has been calibrated.



WARNING
REPAIRS OR ALTERATIONS TO PIPING OR VALVES
MUST NOT BE MADE WITHOUT PRIOR OBLITERATION OF
VERIFICATION AND DATE STAMPS

NOTICE
THIS VEHICLE TANK IS NOT APPROVED
AS A MEASURING INSTRUMENT
FOR DISCHARGE THROUGH A MANIFOLD

**THIS TANK IS CALIBRATED WITH
THE INTERNAL VALVES OPEN**

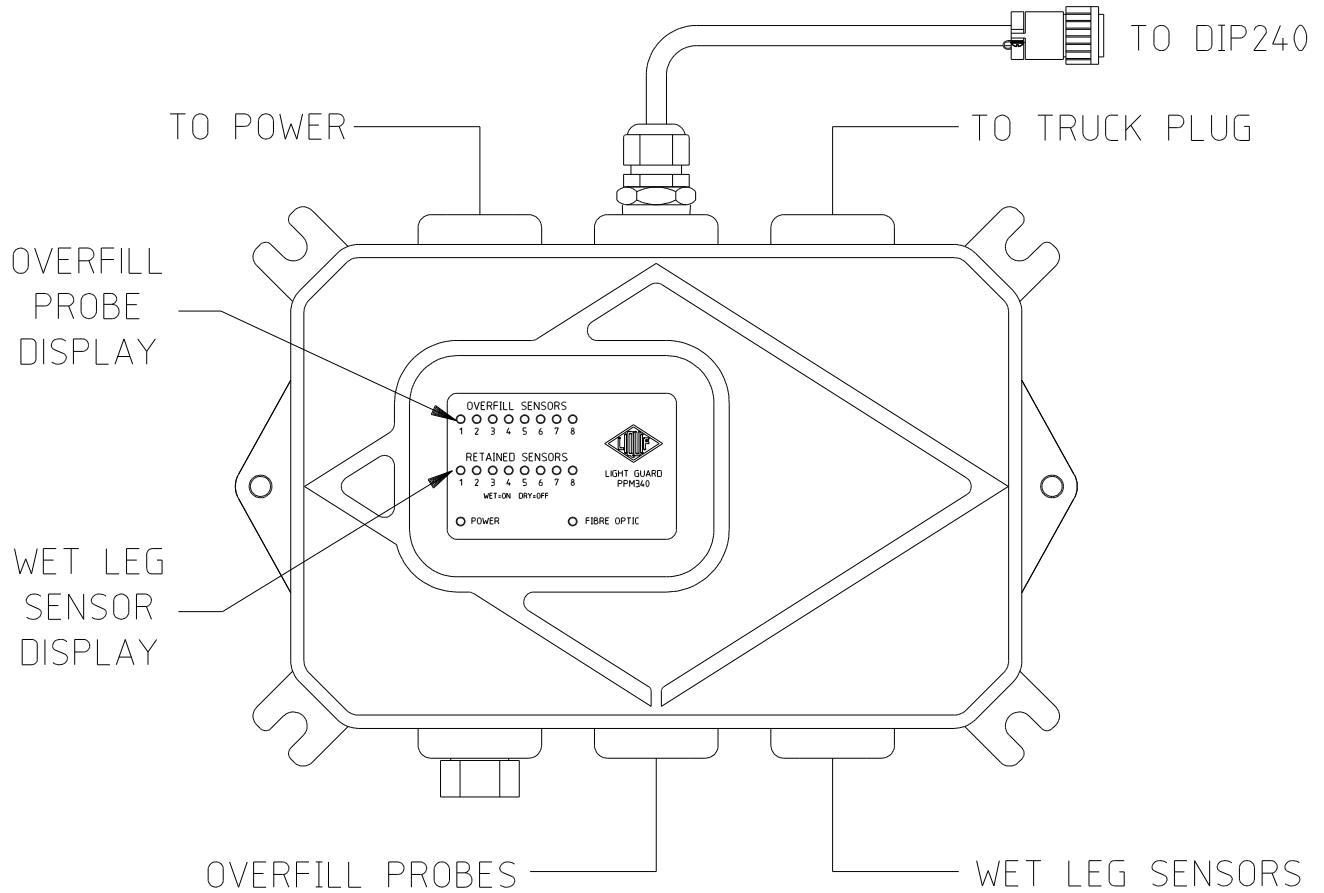
LIQUIP
CHECK PRODUCT

COMP No:	SFL:	MIN VOL:	MIN DEL:
5	8,950	300	1,000



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2.3 PPM340 sealed parcel housing



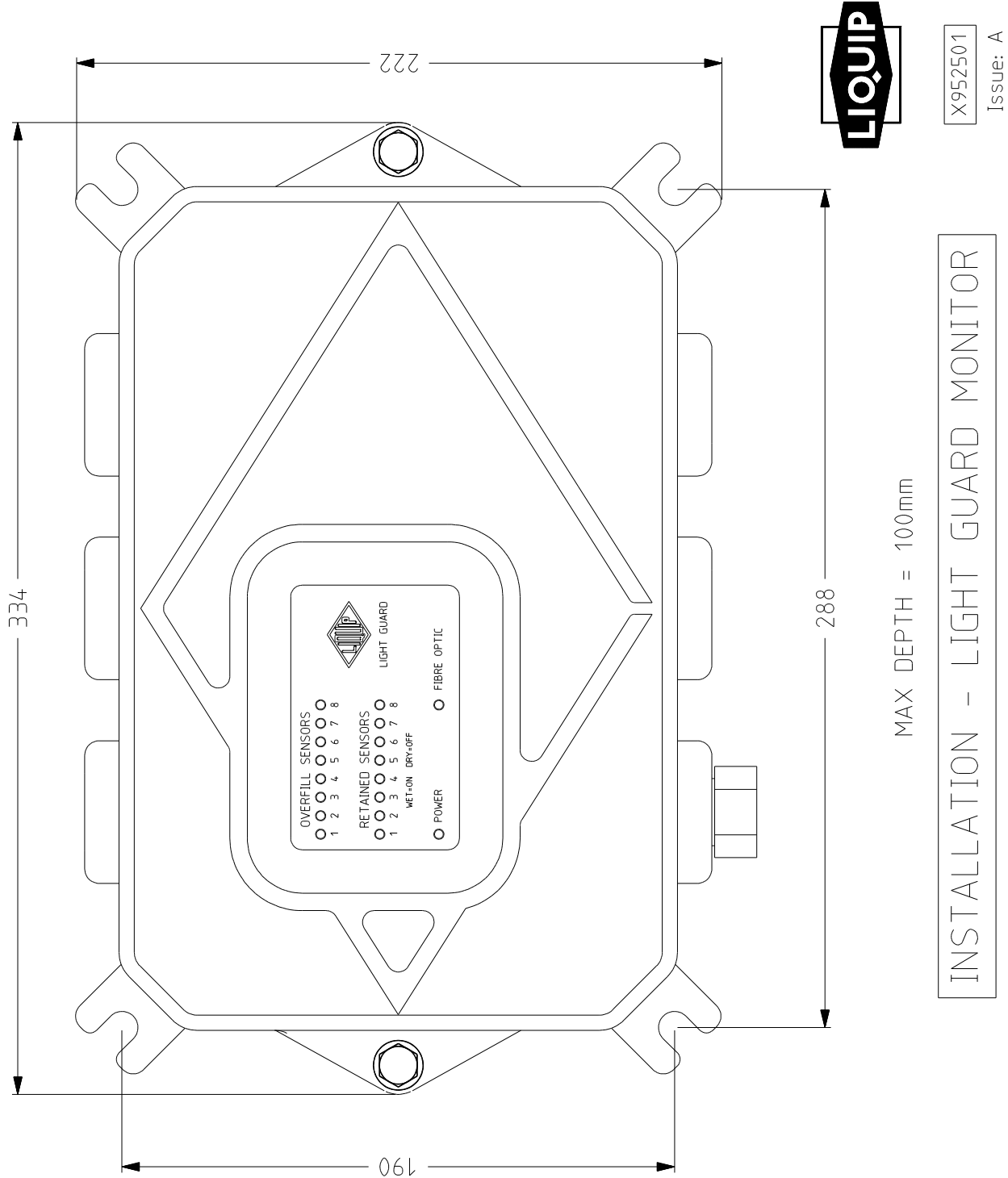
X352402

Fig 3

Note: Refer P6439 PPM00201 PPM300 SERIES LIGHT GUARD document for instructions on installation.



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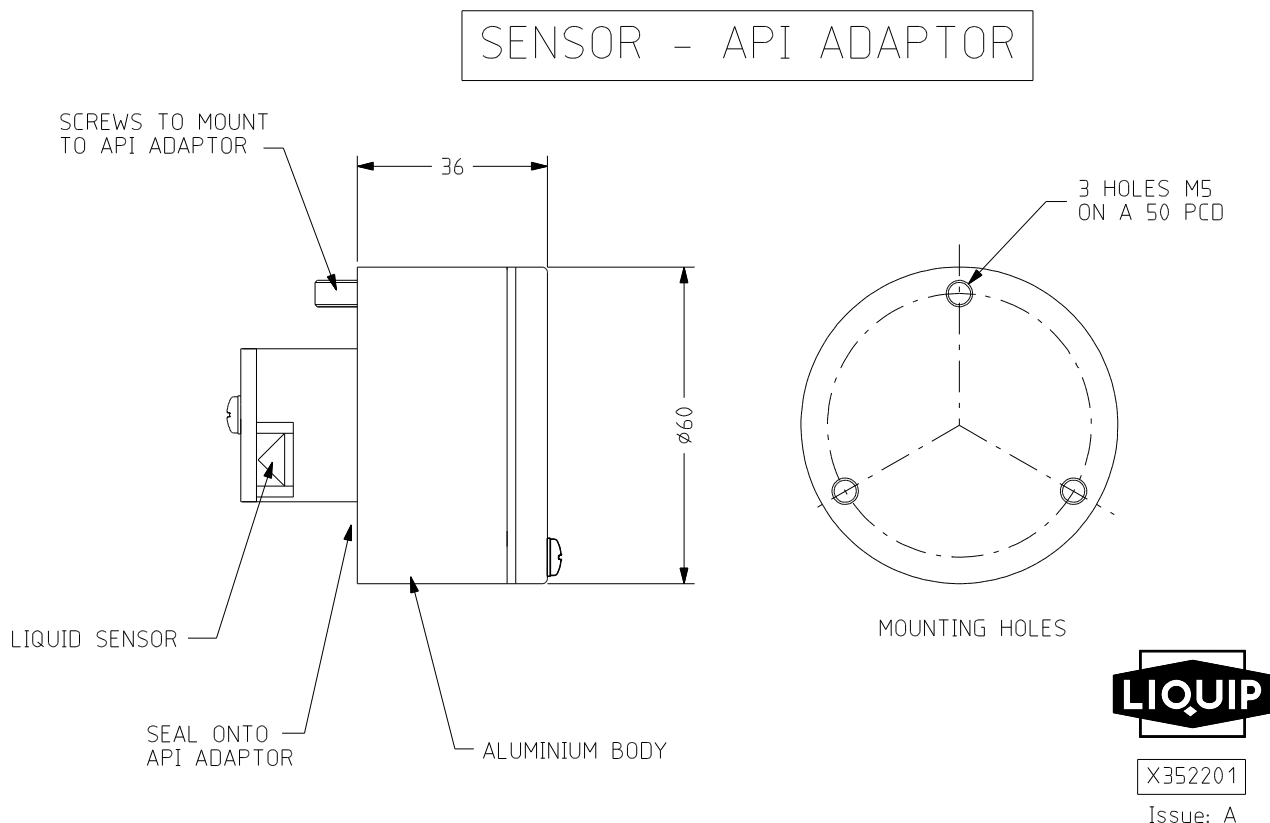
2.4 Wet leg sensor

The wet leg sensor is used to check for product in the pipeline where the Diptronic radar can not sense product. The wet leg sensors can be either in the API adaptor or mounted in the pipeline via a weld socket.

API Adaptor Liquid Sensor – API462-5 (wet leg only)

The Liquip API450 series has provision for mounting a sensor housing on its side. The complete API adaptor assembly number is API462.

The sensor housing accommodates a wet-leg, using fibre-optics and the PPM400 unit to communicate with each API 'leg'.





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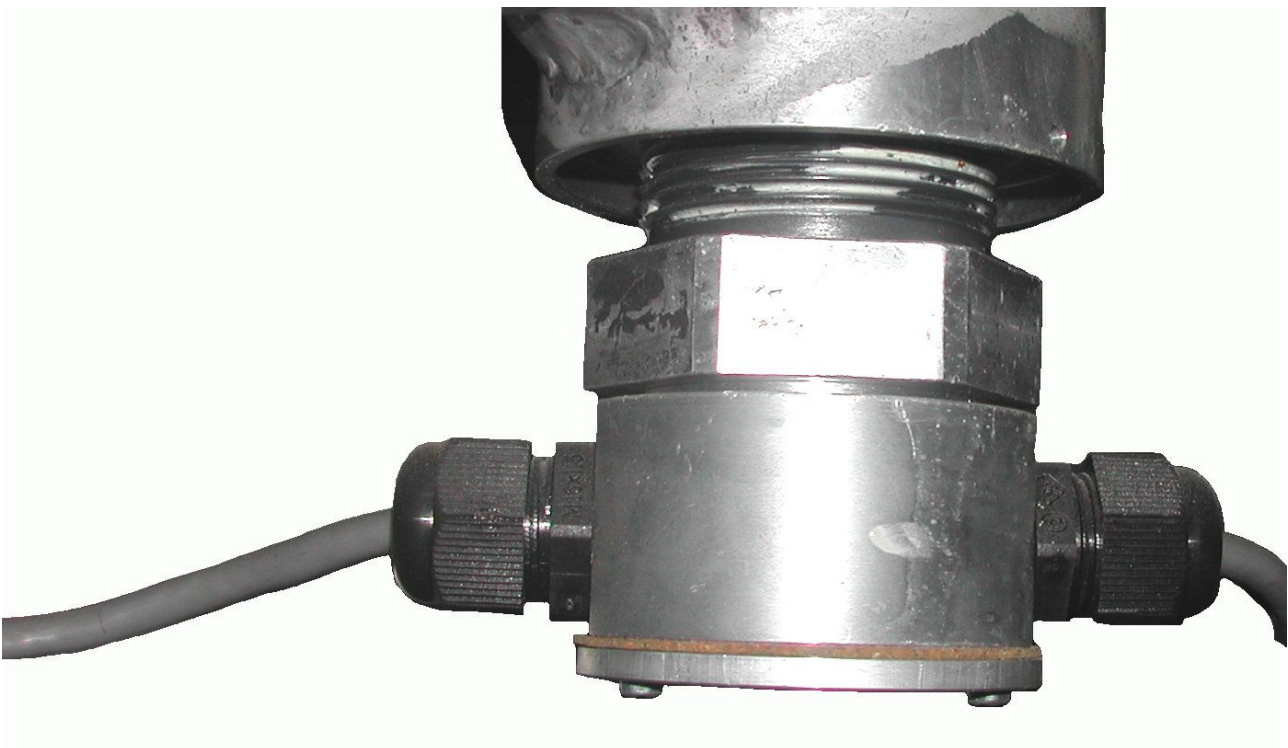
2.5 Temperature Sensor Probe

The temperature sensor probe (BTS100) is designed to measure the temperature of the product. This information is used by the CPU to compensate for changes in volume of the product due to temperature change.

The BTS100 has a built in junction box so that the wiring can be set up in a daisy chain style from one probe to the next. Each probe has a unique ID preset by the factory that enables identification by the CPU.

The probes are connected to the middle left hand side port of the CPU (HART 4) via a mil spec connector (6855). Cable (56045) is used between each probe.

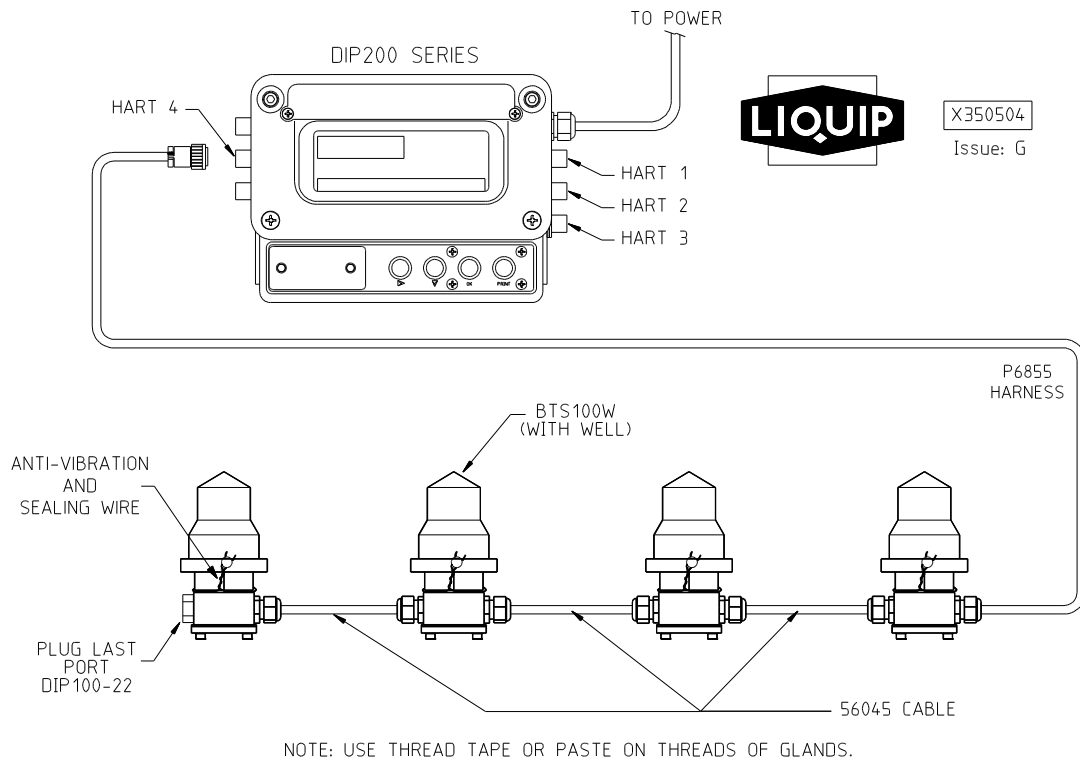
Ensure the correct probe is mounted in each compartment. As with the Diptronic sensors, probe ID 1 must be located in compartment 1, probe ID 2 in compartment 2 and so on.



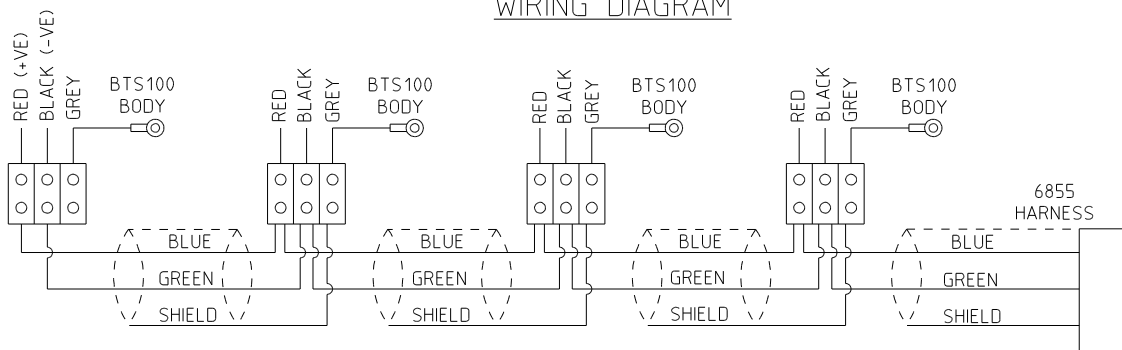
BTS100 probe mounted in tank belly.



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WIRING DIAGRAM



The temperature sensor screws into an aluminium (grade 6061) socket that is welded into the bottom of the tank (1 1/2" BSPP).

Refer to X250005 for locating the temperature sensor into the bottom of the tank.

When the CPU is first powered up, use the NEXT button to cycle through each compartment and check there is a temperature displayed on the lower LCD panel.

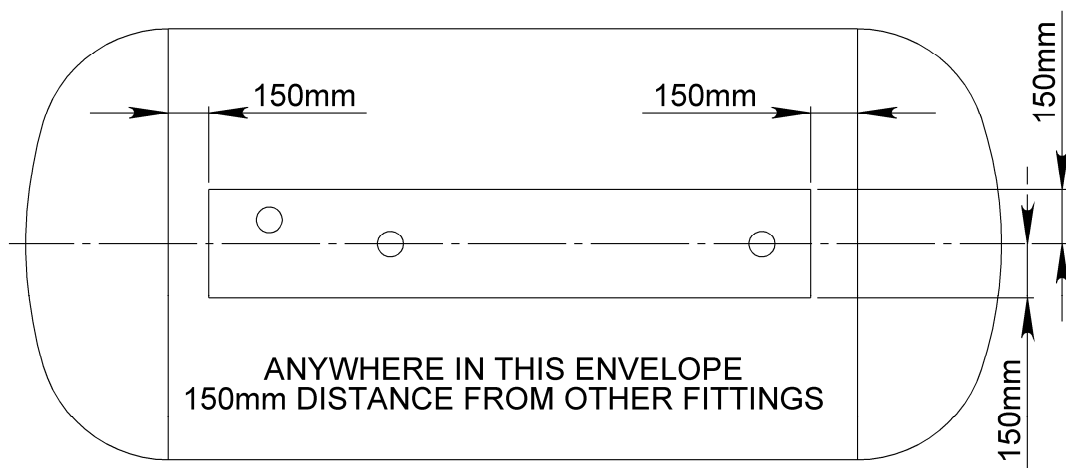


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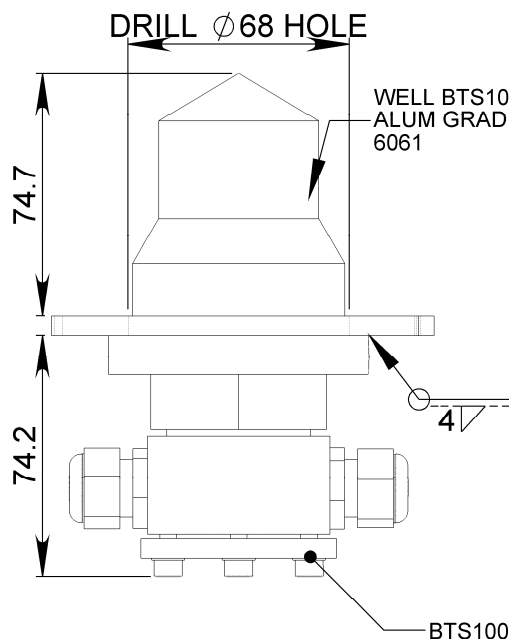
LIQUIP

BTS100W

MOUNTING POSITION AND DIMENSIONS FOR BTS100 DITPRONIC TEMPERATURE SENSOR WHEN USING A WELL.



VIEW FROM BOTTOM OF TANK



- CUT HOLE Ø68 IN TANK TO SUIT WELL.
- POSITION WELL SO IT BOTTOMS OUT IN HOLE.
- USE A 1 1/2" BSPP SOCKET IN WELL WHEN WELDING TO STOP DEFORMATION OF THREAD. ALSO USE HIGH TEMP GREASE TO PREVENT THREAD SEIZURE.
- WRAP A WET RAG AROUND THE WELL INSIDE THE TANKER
- WELD OUTSIDE FULL FILLET MINIMUM. ALSO INSIDE AS OPTIONAL. WHEN WELDING THE WELL INTO THE TANK FLOOR ENSURE MIG WIRE GRADE IS COMPATIBLE WITH TANK SHELL GRADE.
- USE THERMAL CONDUCTIVE GREASE, (7949) SUPPLIED WHEN SCREWING THE SENSOR INTO THE WELL. METHOD: HOLD BTS100 UPRIGHT, PLACE CONDUCTIVE GREASE ALL AROUND THE CONICAL TIP ONLY, AS A 4mm TO 5mm THICK LAYER. CAREFULLY SCREW INTO WELL. TIGHTEN TO A TORQUE OF 50 to 60Nm.

X250005

Issue: B

METERS - VALVES - VENTS - MANHOLES - PUMPS - HOSEREELS - OVERFILL PROTECTION - LOADING ARMS - ELECTRONIC DIPSTICKS



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3.0 Sensor – DIP100 series installation

The Diptronic sensor can be mounted to either a weld flange on the walkway or onto the manhole cover.

Insert each sensor into its corresponding compartment and bolt to the dip pads. Ensure they sit correctly in the tank bottom steadies. Note that each sensor must be inserted into the same compartment as indicated in the Determining Length of 'Diptronic' Electronic Dipstick form (refer P7331 Customer Reference booklet). The compartment number has been engraved into the flange of each sensor. It is also written on a tag attached to the sensor head prior to shipping.

When mounting the sensor to a manhole, it is important to check that the sensor head does not interfere with other components on the manhole cover such as the overfill probe housing, etc. Refer drawing X352202.

Check the operation of the emergency lid opening with the sensor in place.

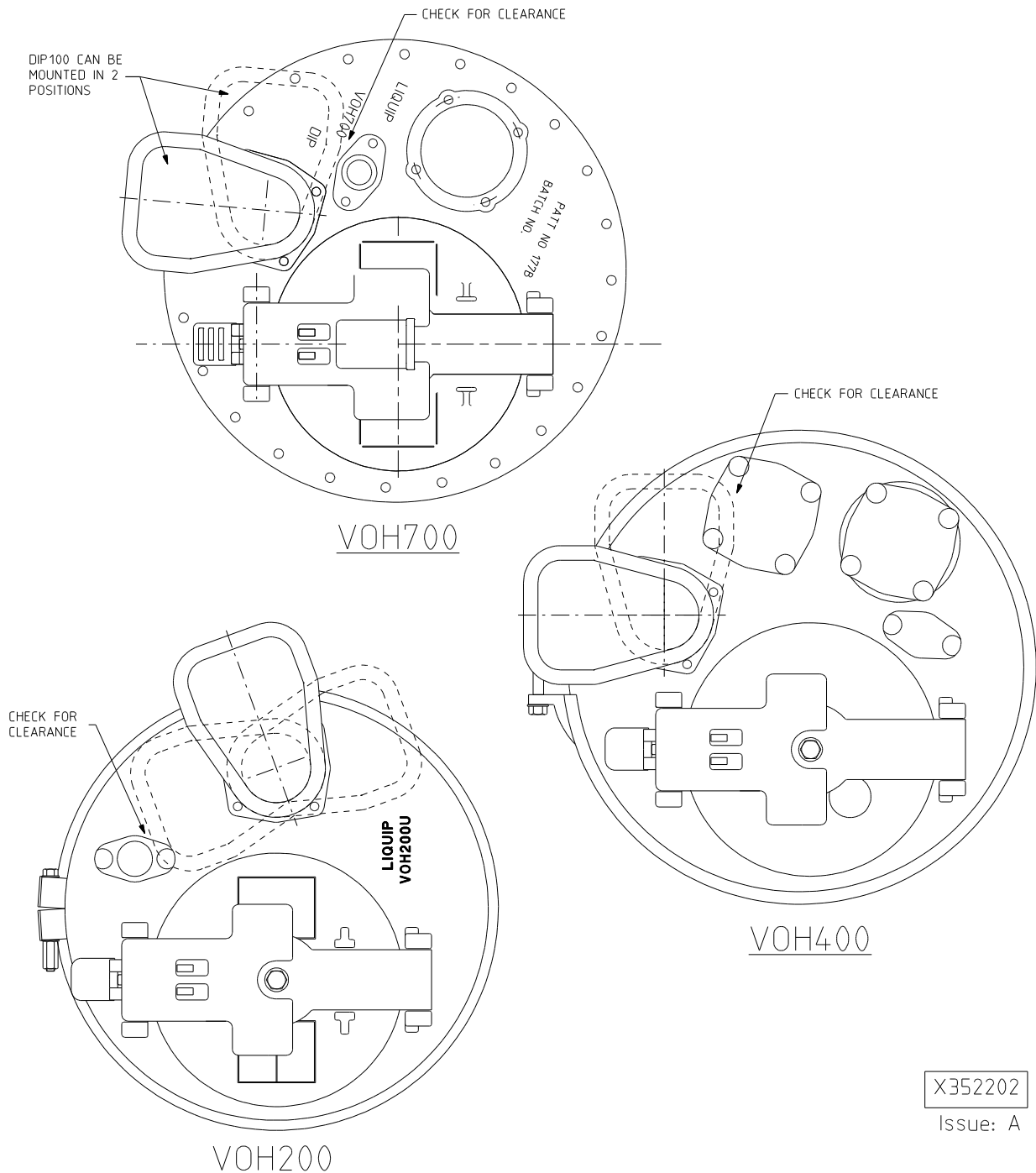
Note: ***Each sensor must be mounted in the volumetric centre of its designated compartment. Tolerance to be within $\pm 25\text{mm}$. This is crucial in adhering to NMI requirements.***





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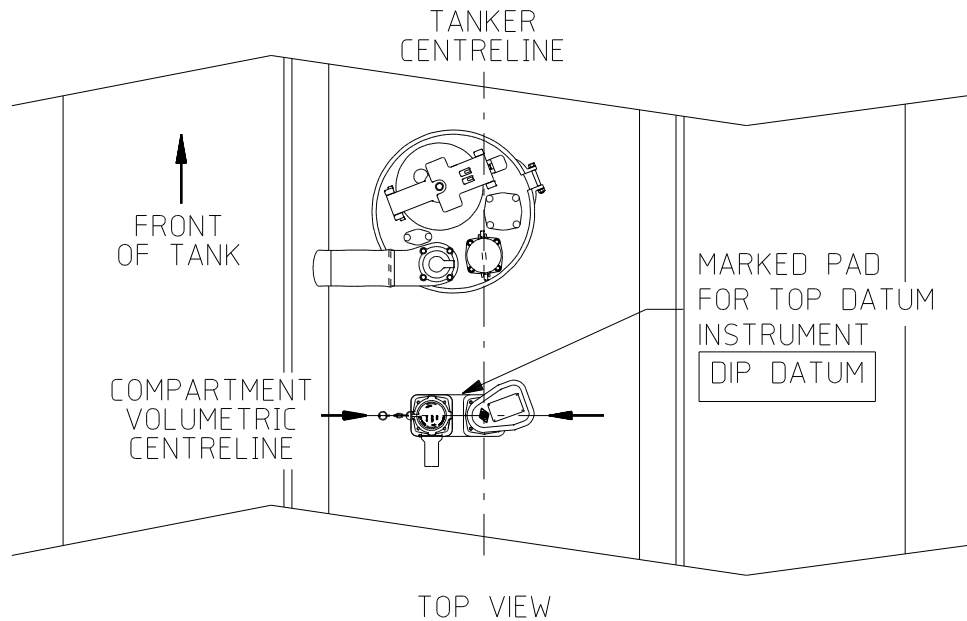
Check for clearance when mounting each sensor.



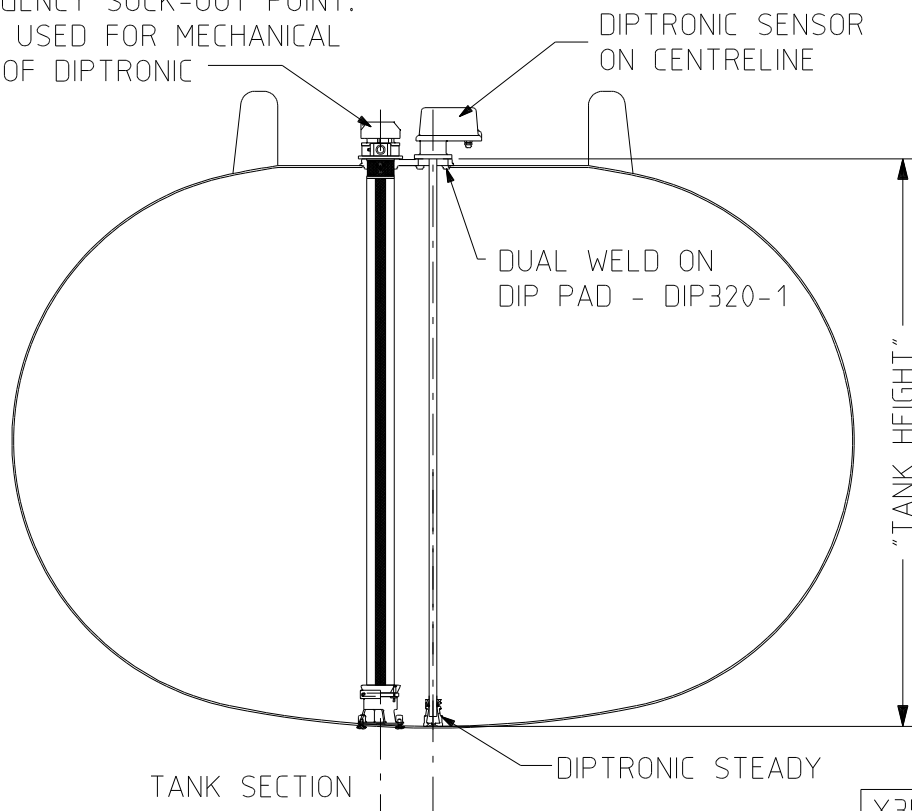


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DIPTRONIC MOUNTED ON WALKWAY



OPTION: EMERGENCY SUCK-OUT POINT.
 CAN ALSO BE USED FOR MECHANICAL
 VERIFICATION OF DIPTRONIC



X351801

FIG 3

Issue: C

The sensor extends into a steady that is welded to the bottom of the tank. The steady ensures the sensor is vertical and gives it support at the bottom.



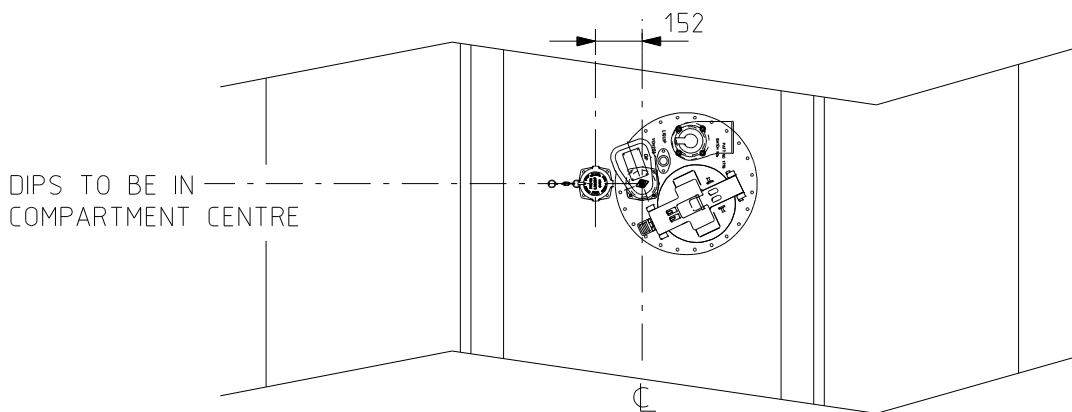
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When mounting the Diptronic sensor to a manhole cover, the sensor must be positioned so as not to interfere with the emergency vent or other items on the manhole such as the overfill probe housing or the vapour vent.

DIPTRONIC MOUNTED ON MANHOLE COVER

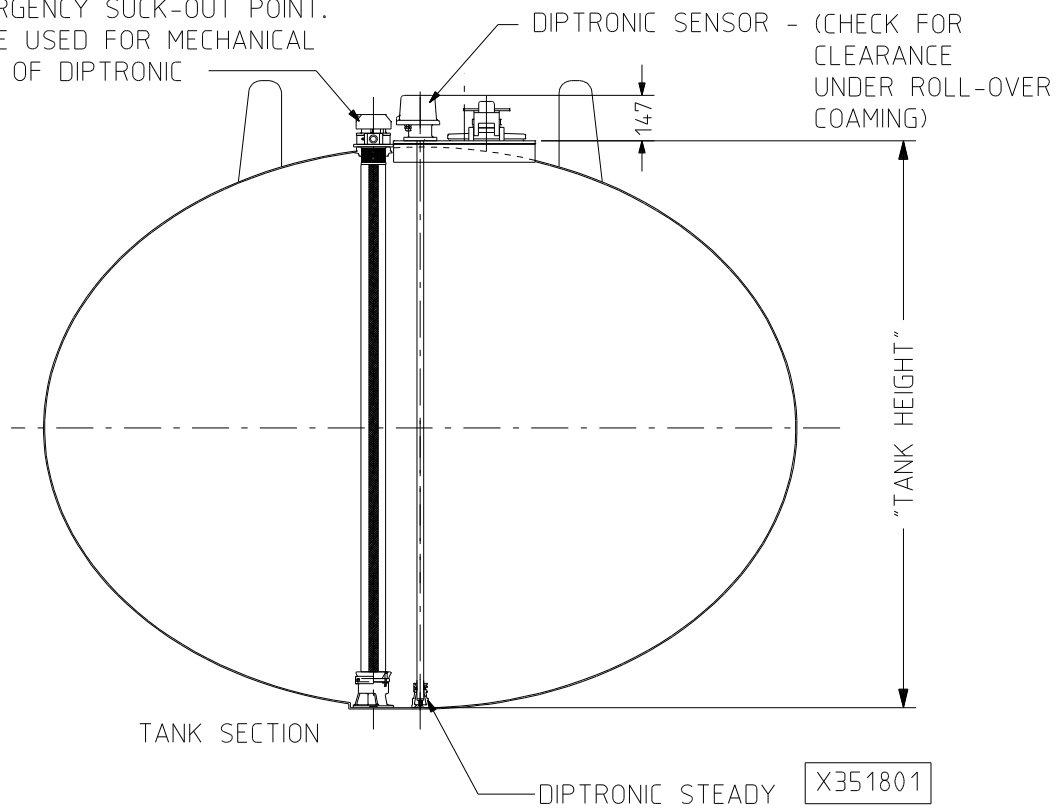
NOTE: CHECK WEIGHTS & MEASURES REGULATIONS. SOME REQUIRE A FIXED MOUNT.

FRONT OF TANK



TOP VIEW

OPTION: EMERGENCY SUCK-OUT POINT.
CAN ALSO BE USED FOR MECHANICAL
VERIFICATION OF DIPTRONIC



X351801
ISSUE: C



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Cut all sensor cables to the lengths required by measuring between the sensor mounting points to determine the required lengths.

Insert the sensor cables through the cable gland/s (refer drawing X350206). Attach the positive & negative wires to the terminals protruding from the epoxy surface using fork or eye terminals.

It is critical the screen wire is connected to the base of the sensor (make sure any exposed bare wire is insulated with heat shrink). **DO NOT CONNECT THE SCREEN AND NEGATIVE WIRES TOGETHER INSIDE THE DIP130 HOUSING OR ANYWHERE ELSE.**

Refer to wiring diagrams for detailed wiring instructions.

Sensors 1 to 3 should be connected to HART1, the mil spec plug located at the top right hand side of the CPU below the power harness. Sensors 4 to 6 should be connected to HART2, the mil spec connector located just below HART1. Sensors 7 to 9 should be connected to HART3, the mil spec connector located just below HART2.

Place the sensor aluminium cover over the sensor (DIP1x0-12) and bolt into place. Tighten glands to specified torque. Refer appendix 5 for torque specifications.

Note:

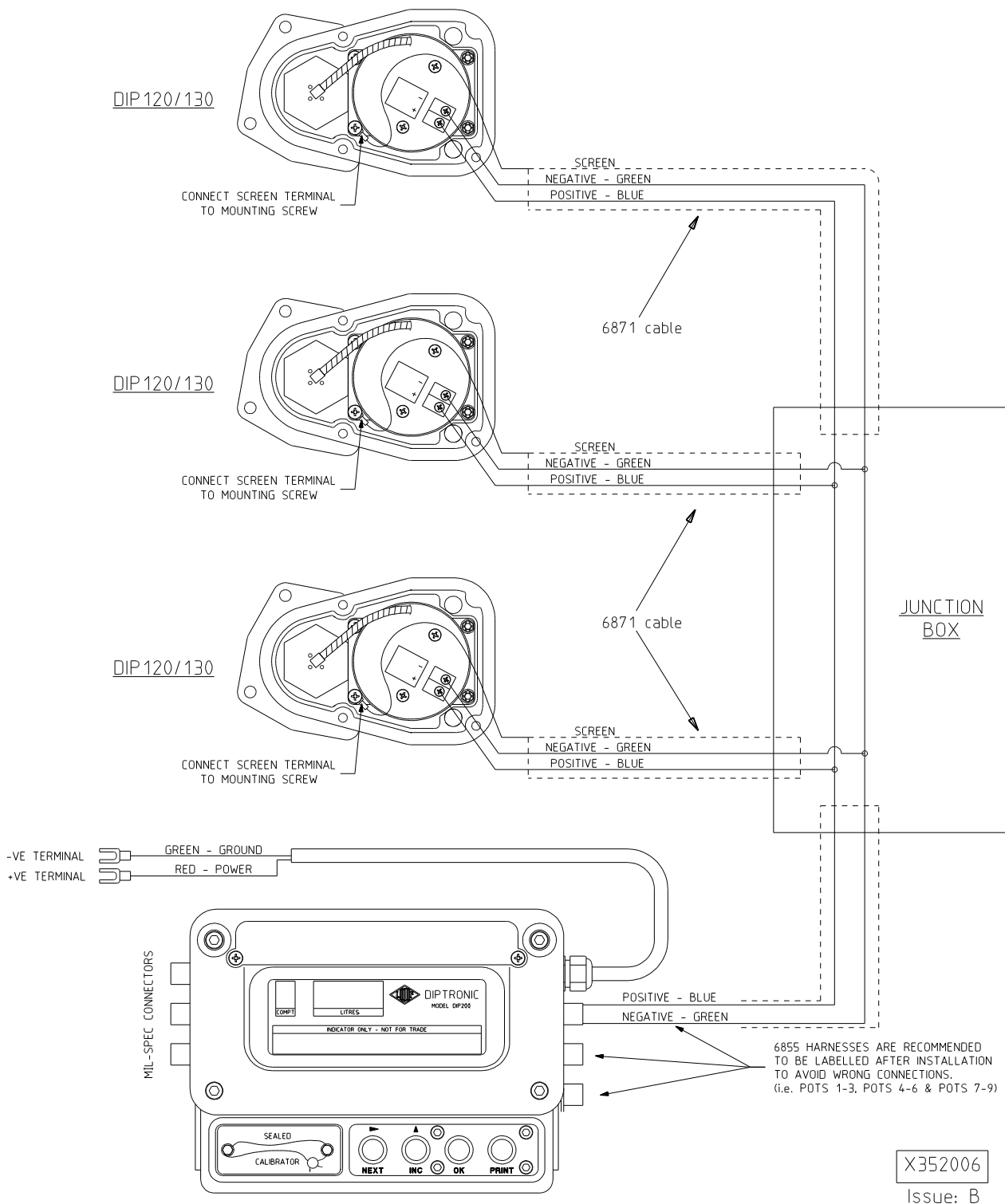
1. Communication cables and power cables must run through separate junction boxes.
2. All exposed screen wires must be insulated using appropriate heat-shrink.
3. BTS100 temperature sensors should be mounted in the same manner as the radar sensors in a chain. Refer X350504.



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Wiring of Diptronic Sensors:

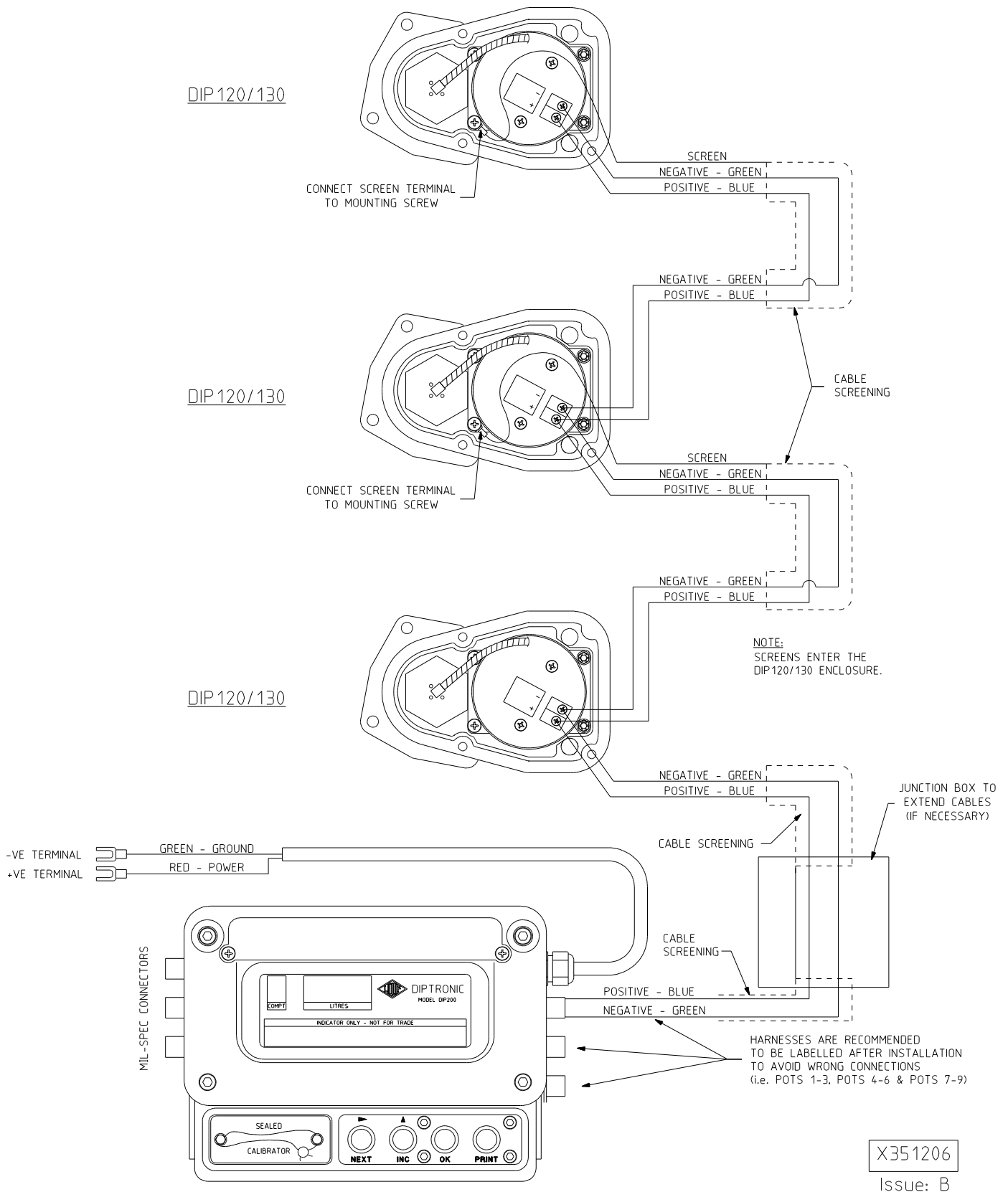
It is strongly recommended to wire as indicated in X352006 below. X351206 is an optional mounting method only when unable to wire as in X352006. Refer X351706 when 'C' and 'E' pots are mixed.



When using acetal plug to blank last port of sensor do not over tighten.
Max torque 12Nm.



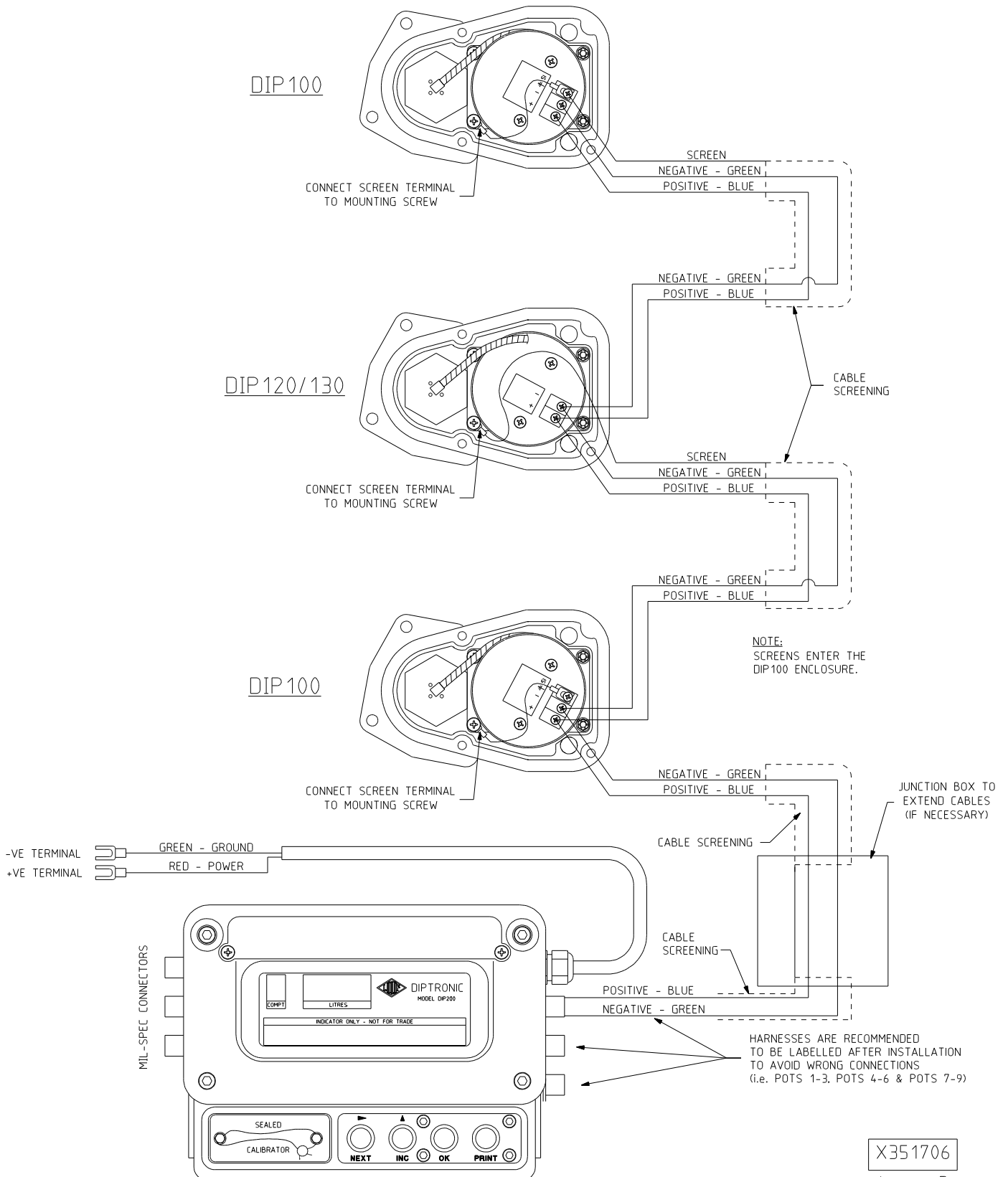
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X351206—optional wiring method to be used only when unable to wire as indicated in X352006



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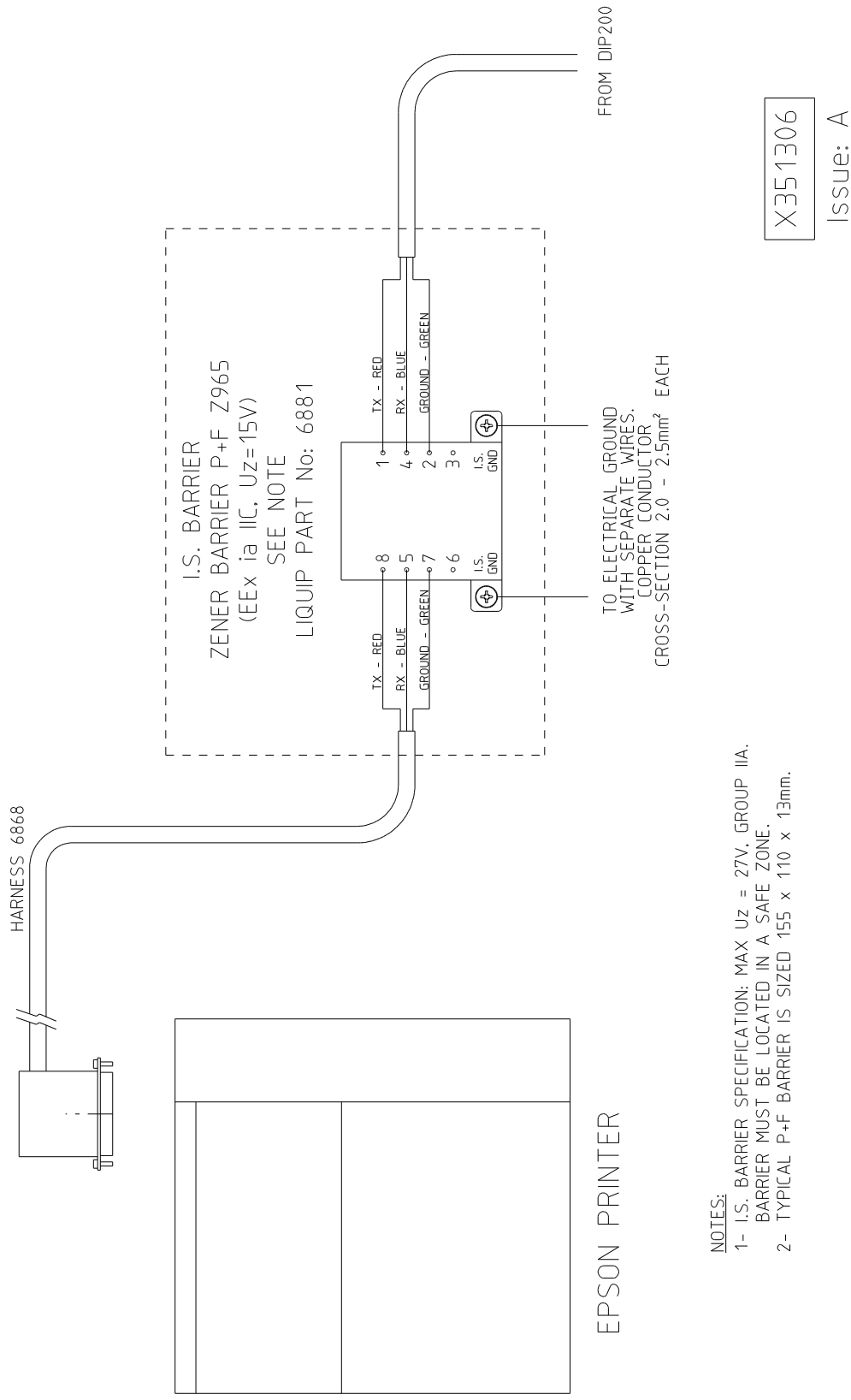
X351706
Issue: B



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4.0 Printer Configuration

For those cases where a printer is to be installed refer X351306 for communication wiring details.



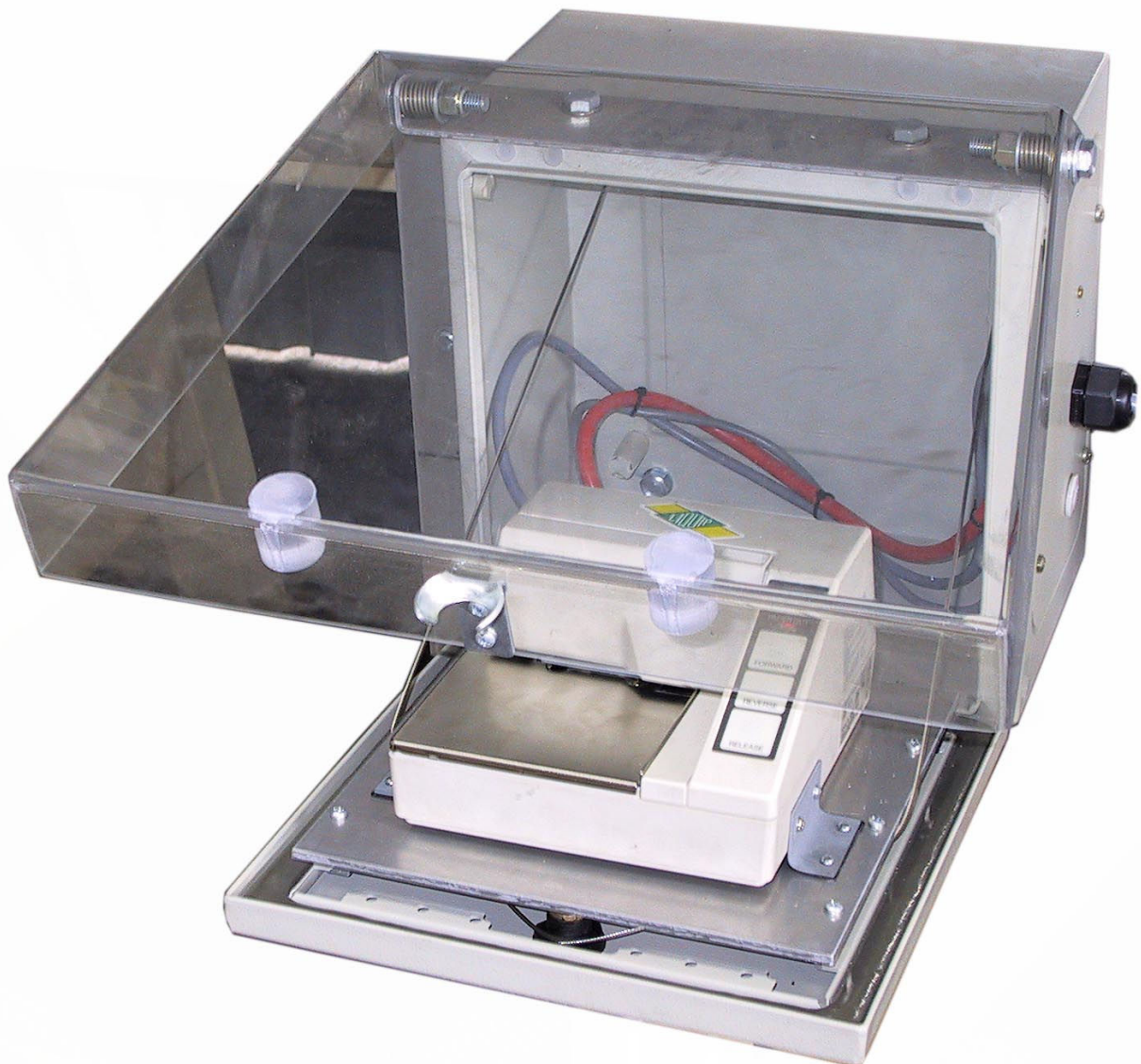


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The printer should be mounted in a suitable enclosure, Liquip PPC100 series. The Zener barrier mounted between the printer and CPU must be located in a safe area in a junction box. For 12V installations, a voltage doubler is required for the printer power input.

Note: Dip switch settings:

1. Power off printer
2. Toggle dip switches #1 & #3 to ON position. Remaining switches to be in the OFF position.
3. Power printer on.





5.0 Electrical Installation

Refer wiring diagrams in appendix 2 for details on wiring from battery isolation switch to CPU. These diagrams cover installation for Rigid, Rigid-Dog, Semi or A/B-Double combinations with no peripheral devices.

For configurations that require installations of ticket printers, registers and PC's, alternate wiring diagrams are available from Liquip. For these cases the appropriate wiring diagram should be selected at the time of order.

The Zener Barrier that is mounted between the printer and DIP200 is required to meet safety approvals. However, the printer will still operate without the barrier if safety approvals are not required to be met.

Notes:

1. For safety requirements *power and communication* must run through separate cables and junction boxes.
2. In the case of printer, register or PC installation, a Zener barrier must be used. The Zener barrier must be mounted according to safety requirements.
3. If welding needs to be carried out on the tanker, the CPU mil spec connectors must be disconnected. Also, the power lead in the first junction box from the truck battery must be isolated. Failure to do so will void warranty and may permanently damage the sensors and CPU.
4. A power conditioner (DCC100 series) must be fitted as near the battery isolation switch as possible (not on the trailer) in accordance with the wiring diagrams of Appendix 2. For Australia only it is permissible to mount the DCC100 in the junction box on the trailer connecting power to the CPU in a safe area only.



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5. Insulate all exposed screen wires using appropriate heat-shrink.
6. For all Diptronic installations it is a requirement that power be taken directly from the battery isolation switch (use the lugs on the output side of the battery isolation switch). This will ensure a 'clean' power supply to each CPU.
7. For all Diptronic installations it is a requirement that 2 wires are used for positive and 2 wires used for negative on rigid trucks.
For Prime-mover / Trailer applications utilizing sockets and plugs, 2 wires are used for positive and 3 wires used for negative.
8. Two separate wires per plug are connected to Chassis Ground and prevent static build up between the prime mover and trailer.
9. Refer Liquip Diptronic Electrical Installation and Commissioning Checklist to ensure correct electrical installation.

Adhere to Liquip general wiring guidelines summarised in Appendix 1.



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6.0 Final Configuration

Fit the sensor cover ensuring the main seal is seated correctly. Make sure the delay line and wires are not crushed in the process.

Position the cover square to the base when fitting to prevent the seal being dislodged by a sliding action. Tighten to 4 - 5Nm (do not over tighten as it may damage the sensitive electronics in the housing). Carry out final checks on the security of all sensors, glands and conduit brackets.

Lead sealing is required at all points where the sensor can be removed or tampered with. Two of the screws that are supplied with the dip guides have holes in them that are required to be sealed. Also, two of the screws that hold the cover onto the base of the sensor have holes that are required to be sealed.

The PPM340 is to be sealed using lead seals and wire through the heads of the lid mounting screws.

Switch on the battery isolation switch. The CPU screen may flicker followed by a boot up routine where the software version is displayed and sensor communication established.

The main display (top) should be blinking as it is in dynamic measurement mode. The bottom display will indicate if the system is sealed or broken as well as the foot valves, rack monitor and wet legs status.

Press and hold the *NEXT* button on the front panel of the CPU to cycle through each of the sensors and ensure there is communication between each sensor and the CPU (there should be no COMMUNICATION ERROR messages). Follow APPENDIX 9, System messages / Troubleshooting if any error messages occur.

Following Diptronic installation it is a Liquip requirement that an installation and commissioning checklist be completed and returned to Liquip. Refer Diptronic Electrical Installation and Commissioning Checklist. Failure to complete the checklist may void warranty.

Note: Connect DIP240 to PPM340 with corresponding pressure switch, printer, footvalves, overfill probes, I.S. barrier etc connected as per drawing X352402.



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7.0 Cable Protection

All electrical cabling must be protected from external environmental influences. This can be achieved by using appropriate conduit, sealed to IP68. In the case of the supplied harness, the cable is protected by a polyurethane coating and sealed using a military specification connector and water proof gland. Refer to the appendix for recommended conduit.

All harnesses should be secured close to the mil spec connectors to remove any strain on the connectors. Special care should be taken for off-road applications where harnesses must be firmly attached to prevent excess movement.



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APPENDIX 1 - General Wiring Guidelines

TYPICAL CONDUIT

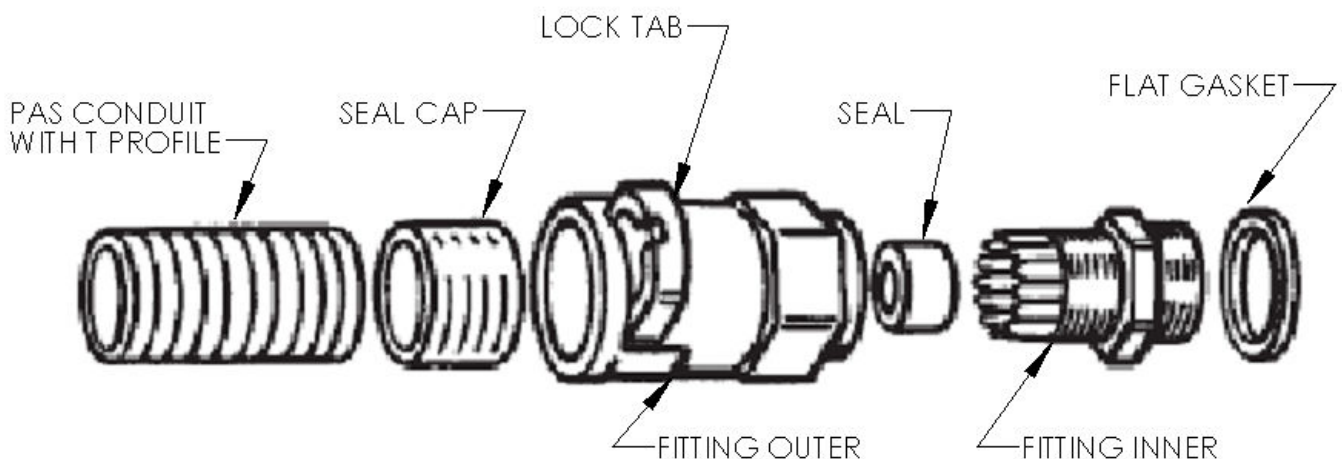
PMAFLEX is a product used for many years in arduous conditions such as mine sites, and is distributed in many countries. Type PAS is tolerant to petroleum fuels and temperatures from -40°C to $+100^{\circ}\text{C}$ (order as suffix "U" for U-V resistance - see example later).

Sizes available are from 6mm OD to 47mm OD.

Threads are available in NPT and Metric.

Colours black or grey.

Adaptors come in straight, 45° or 90° with threads in plastic or metal.



Adapter Strain Relief Gland

Liquip Part Number: 56044

Conduit: 20mm

Torque: 5Nm for Fitting Inner thread.

3Nm Fitting Outer strain relief.

Use sealant or adhesive:

Loctite 4212 Adhesive, Liquip Part: 7837

Loctite 5331 Sealant, Liquip Part: 7597

To achieve IP68 rating (waterproof) it is essential that strain relief type glands are used and seal caps be fitted to the conduit ends before clipping into the threaded adaptor. The flat gasket is under the shoulder of the screw fitting. Thread sealant should be applied as additional protection against leaks and vibration.



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RECOMMENDED CABLE TYPES FOR “DIPTRONIC” SYSTEM WIRING:

Item	Usage	Cable Type	Comments
1	Power Supply (CPU power harness)	3-core shielded 1.0mm ² (32x0.2mm) with drain wire. (Red/Green/Blue). PVC inner sheath and Polyurethane outer sheath.	Typical cable type: Liquip Part #6871
2	Power supply (BIS to CPU power harness)	12-core shielded 0.75mm ² PVC GREY 9.9 OD. Numbered cores + green/ yellow.	Typical cable type: Liquip Part #6930
3	Sensor to sensor	2-core shielded 1.0mm ² (32x0.2mm) with drain wire. (Blue/Green). PVC inner sheath and Polyurethane outer sheath.	Typical cable type: Liquip Part #56045

When servicing wiring to the sensor terminals, it is necessary to strip the wires back by 6mm before crimping with a fork terminal. The terminals on the epoxy surface of the sensor must be fully screwed open before inserting the fork terminal. Refer P7359.

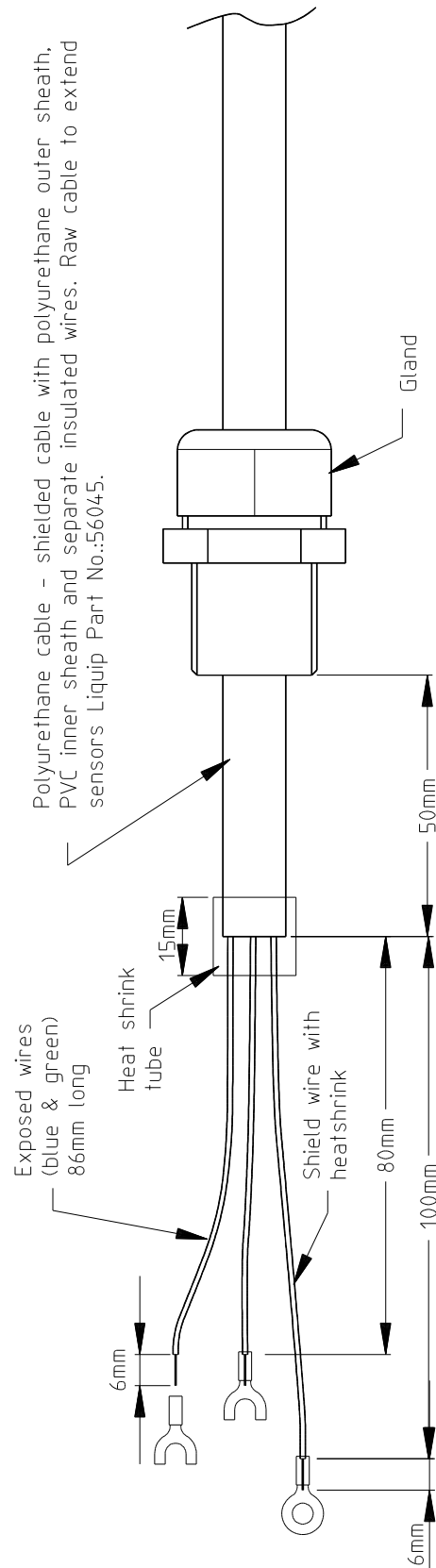
After electrical connections have been made, apply a small amount of non-conductive grease or lube to all connections to prevent corrosion.

Use ferrules on the wires when terminating the wiring into cage clamp terminals, or use fork or eye terminals when terminating the wiring into screw block terminals.

Refer X350206 for cable gland installation and insertion of cable.

Cable gland installation:

DIPTRONIC GUIDELINES FOR SENSOR CABLE AND GLAND INSTALLATION



NOTES:

1. Tighten gland dome nut to 3Nm using calibrated torque wrench.
2. Recommended torque of 3Nm is approximately 1.5 turns after initial clamping of cable by gland.
3. Ensure sealing ring (internal rubber grommet) is seated correctly when passing cable through gland.
4. Only pull cable when gland is not tightened.
5. Cut polyurethane cable to 156mm from gland.
6. Trim polyurethane cable sheath to 50mm from gland to expose wires. Do not cut wires.
7. Cut blue and green wire to 86mm, use cable strippers to expose 6mm of bare wire to crimp on fork terminals.
8. Heat shrink 100mm of heat shrink tube over shield wire.
9. Heat shrink 15mm of heat shrink tube over wires and cable as indicated.
10. Crimp eye terminal (Red, 5mm stud, 8mm width) on end of shield wire.
11. Cable sheath to be installed at least 50mm above gland (5mm above the pot).
11. Use teflon tape on all threaded parts.

X350206

Issue: D

Not to scale



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General Guidelines for Diptronic Electronics on Vehicles.

- Never weld on a vehicle unless all electronic equipment is completely disconnected electrically from both the tanker and other equipment. Isolate power to the CPU by disconnecting inside the 1st junction box from the battery isolation switch. Disconnect all military spec connectors.
- Check entire electrical circuit and housings for potential water entry prior to sign off.
- Always completely segregate power and intrinsically safe wires in accordance with I.S. wiring rules.
- All equipment is to be supplied from a fused power supply.
- Do not route communication cables past 'noisy' electrical apparatus such as solenoids and alternators.
- When installing DIP200 or DIP100 covers ensure no cables will be compressed when tightened. DIP200 internal cables to the terminal connector should be pushed flush against the side of the casting. The lid should then be placed in a sliding motion ensuring the cables are not compressed against the terminal.
- It is permissible to degas with Diptronic still mounted so long as it is in accordance with the AIP code of practice CP13...."temperature of tank must not exceed 75°C...."
- Ensure all communication port protection caps and cables are properly connected to avoid moisture ingress.

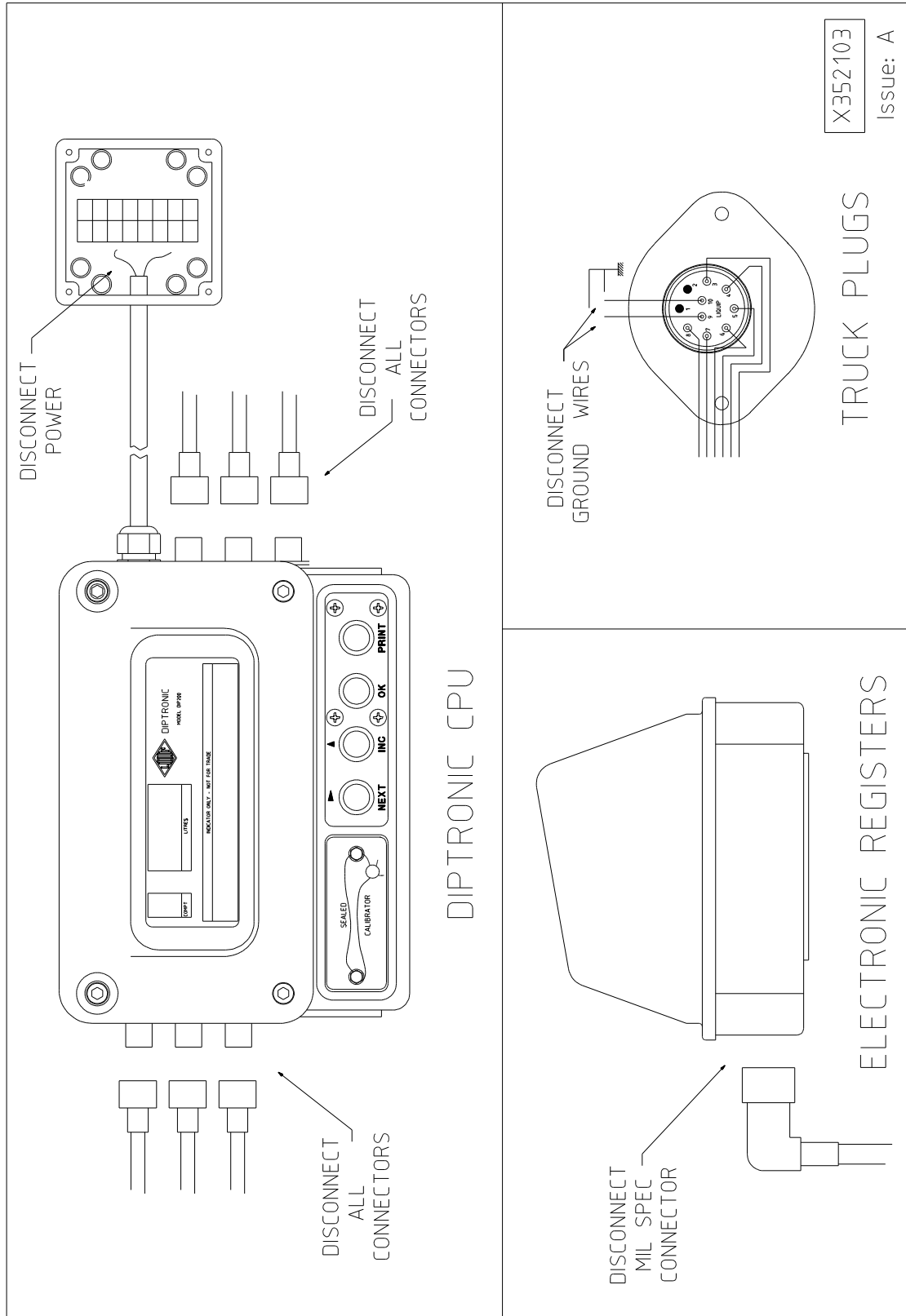
Note, refer P7403 Electrical equipment service and installation guide for road tankers at the beginning of this document.



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Welding on Tanker

When welding or plasma cutting on a tanker disconnect all electronics as indicated. Also ensure all electronic hardware is disconnected prior to jump starting the engine.



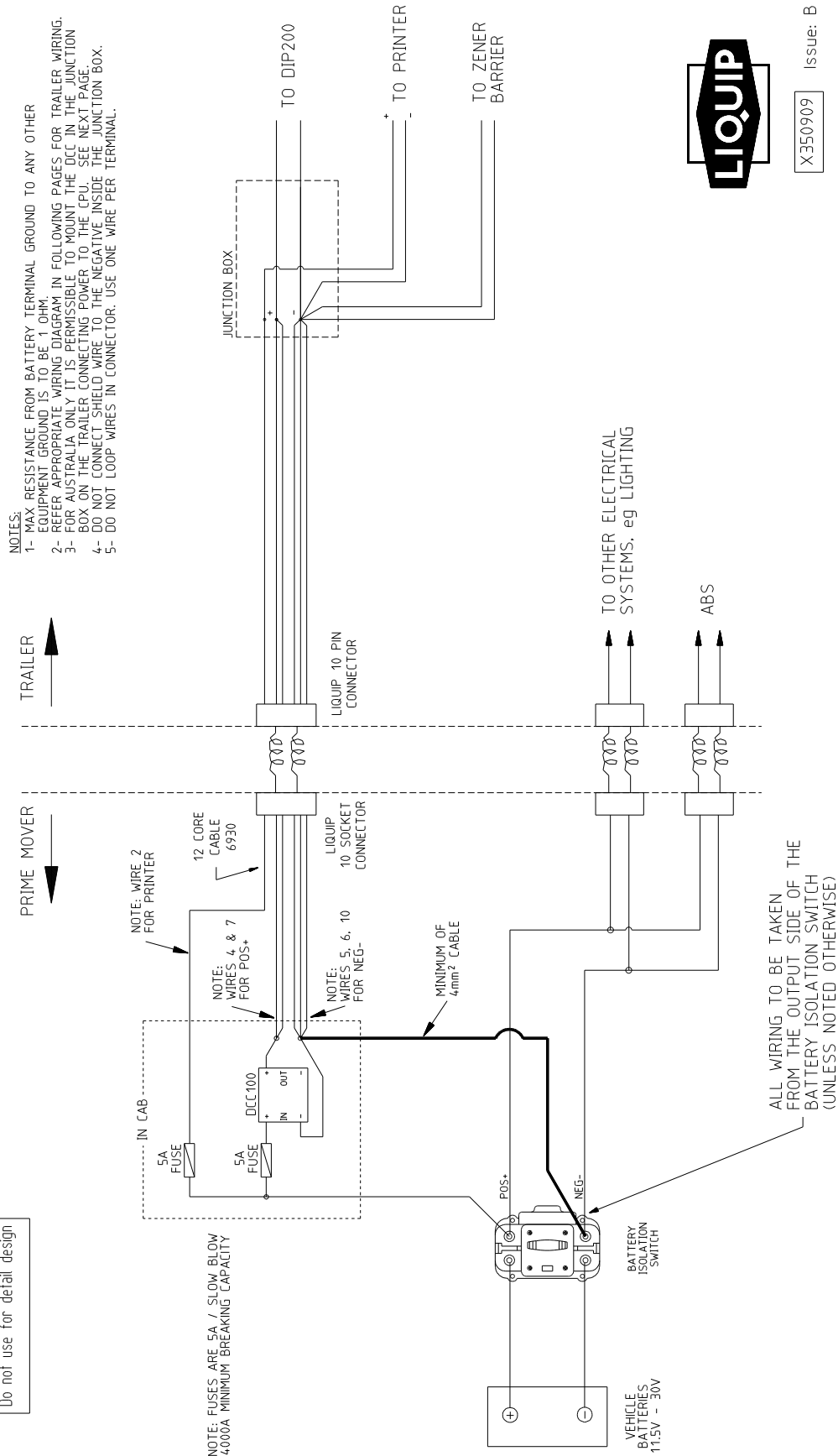


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APPENDIX 2 - Wiring Diagrams

DIPTRONIC POWER WIRING

IMPORTANT
Not a certified drawing
Do not use for detail design



X350909

Issue: B

OPTION: DCC100 MOUNTED IN PRIME MOVER

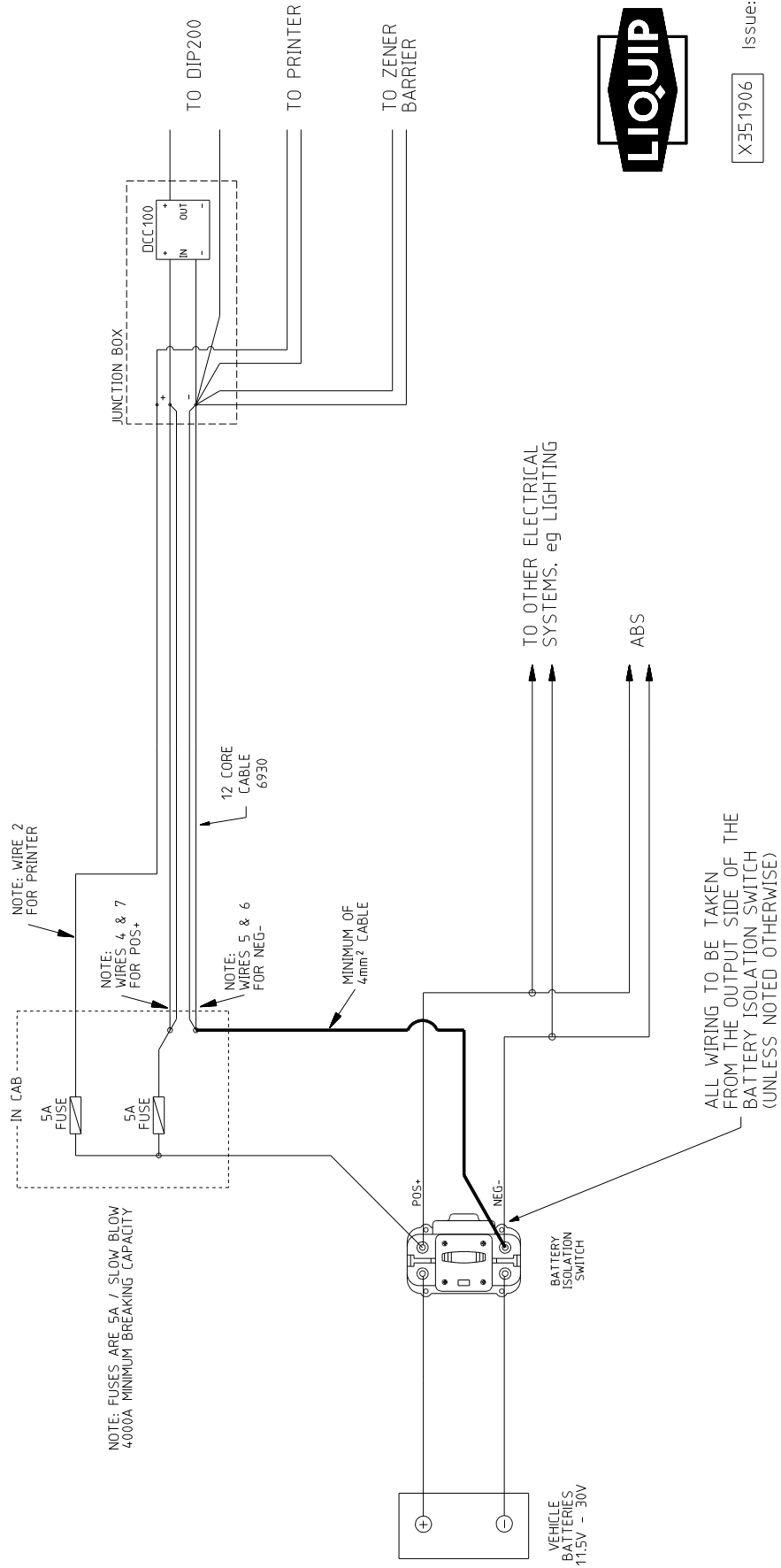


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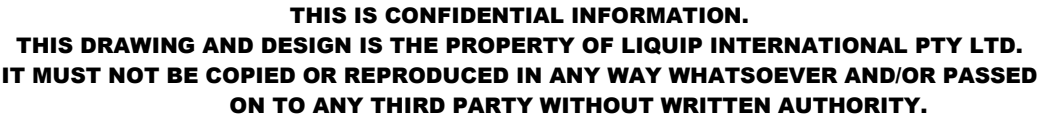
DIPTRONIC POWER WIRING – RIGID VEHICLE ONLY

IMPORTANT
 Not a certified drawing
 Do not use for detail design

- NOTES:**
- 1- MAX. RESISTANCE FROM BATTERY TERMINAL GROUND TO ANY OTHER EQUIPMENT GROUND IS TO BE 1 OHM.
 - 2- REFER APPROPRIATE WIRING DIAGRAM IN FOLLOWING PAGES FOR WIRING.
 - 3- DO NOT CONNECT SHIELD WIRE TO THE NEGATIVE INSIDE THE JUNCTION BOX.
 - 4- DO NOT LOOP WIRES IN CONNECTOR; USE ONE WIRE PER TERMINAL.



X351906 Issue: B

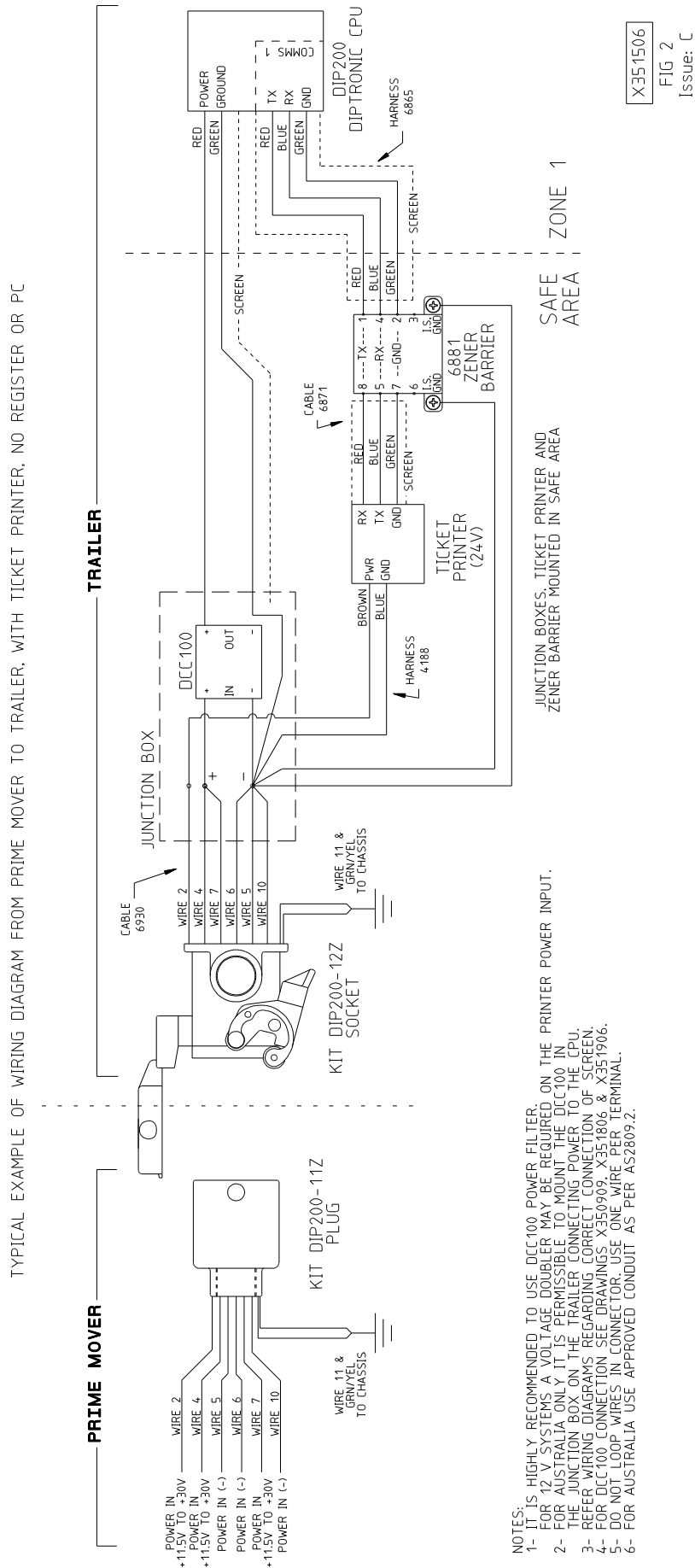
[illegible]

- 1- IT IS HIGHLY RECOMMENDED TO USE DCC100 POWER FILTER.
FOR 12 V SYSTEMS A VOLTAGE DOUBLER MAY BE REQUIRED ON THE PRINTER POWER INPUT.
- 2- REFER WIRING DIAGRAMS REGARDING CORRECT CONNECTION OF SCREEN.
- 3- FOR DCC100 CONNECTION SEE DRAWINGS X350909, X351806 & X351906.
- 4- DO NOT LOOP WIRES IN CONNECTOR. USE ONE WIRE PER TERMINAL.
- 5- FOR AUSTRALIA USE APPROVED CONDUIT AS PER AS2809.2.

Issue: C

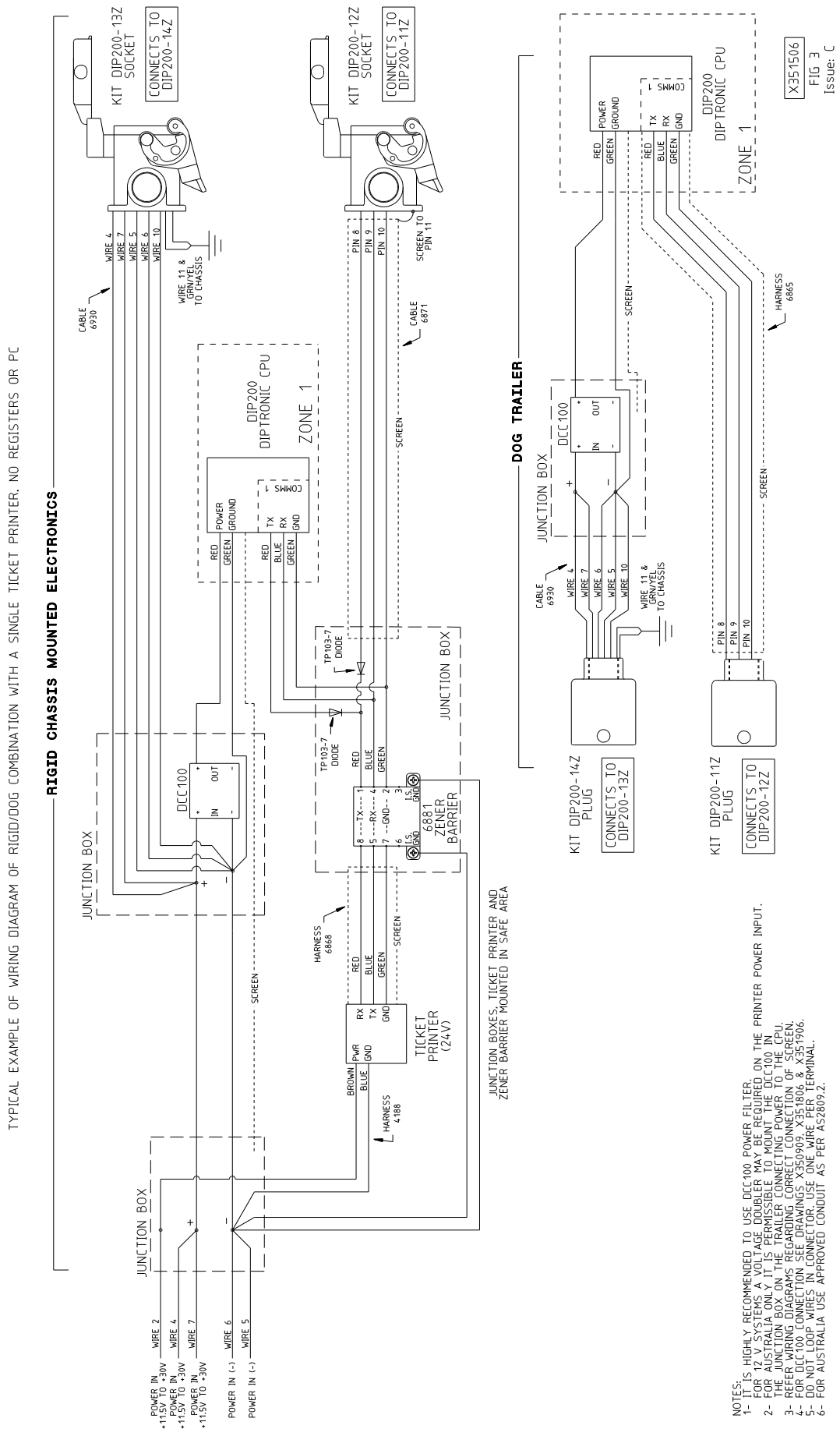


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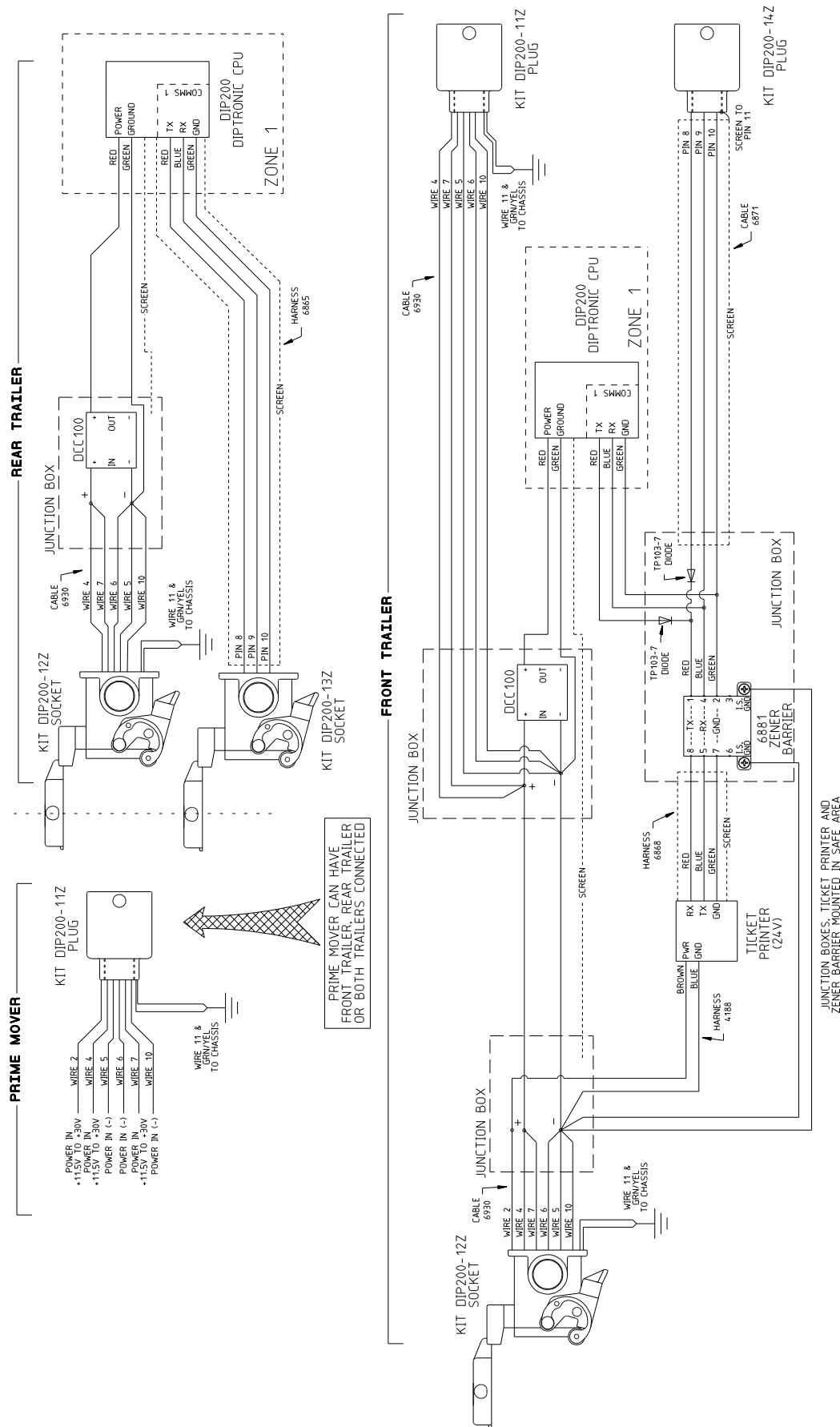
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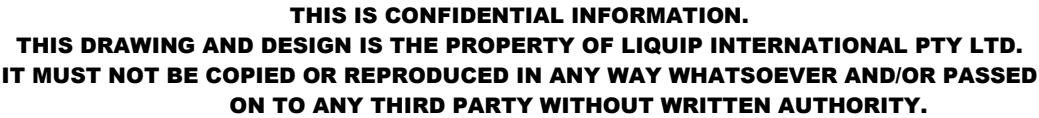
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TYPICAL EXAMPLE OF WIRING DIAGRAM FROM PRIME MOVER TO TRAILER & B-DOUBLE WITH A SINGLE TICKET PRINTER, NO REGISTERS OR PC



X351506
 FIG 4
 Issue: C

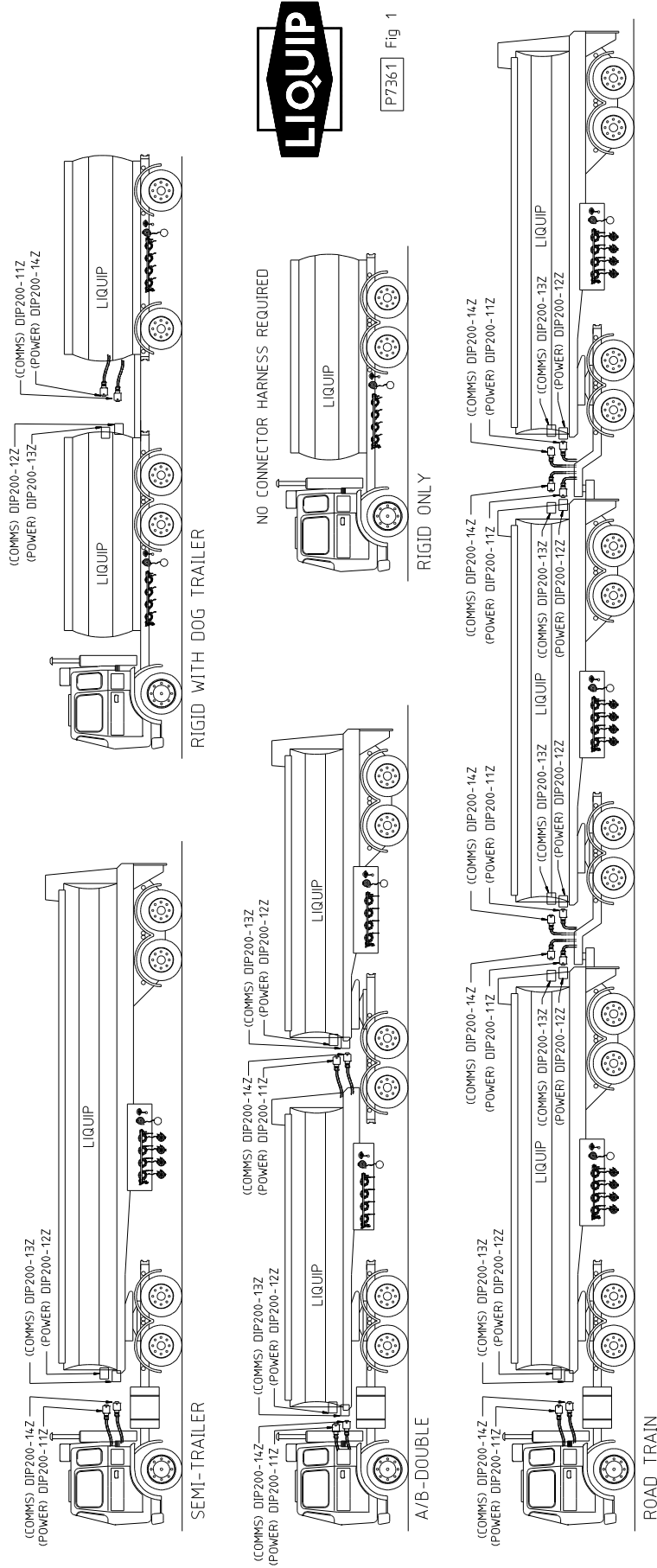
- NOTES:
- 1- IT IS HIGHLY RECOMMENDED TO USE DCC100 POWER FILTER.
 - 2- FOR AUSTRALIA ONLY, IT IS PERMISSIBLE TO MOUNT THE DCC100 IN THE JUNCTION BOX ON THE TRAILER CONNECTING POWER TO THE CPU.
 - 3- REFER WIRING DIAGRAMS REGARDING CORRECT CONNECTION OF SCREEN.
 - 4- FOR DCC100 CONNECTION SEE DRAWINGS X350909, X351806 & X351906.
 - 5- DO NOT LOOP WIRES IN CONNECTOR. USE ONE WIRE PER TERMINAL.
 - 6- FOR AUSTRALIA USE APPROVED CONDUIT AS PER AS2809.2.



APPENDIX 3 - Diptronic Connector Harness

The type of connection components installed depends on the tanker configuration.

ELECTRICAL POWER CONNECTIONS BETWEEN PRIME MOVER & TRAILER



Kit DIP200-11Z

Plug, cable end, body – female electrical contacts

Kit DIP200-12Z

Socket, surface mount, body – male electrical contacts

Kit DIP200-13Z

Socket, surface mount, body – female electrical contacts

Kit DIP200-14Z

Plug, cable end, body – male electrical contacts

Note: Refer appropriate wiring diagram for printer electrical connections.



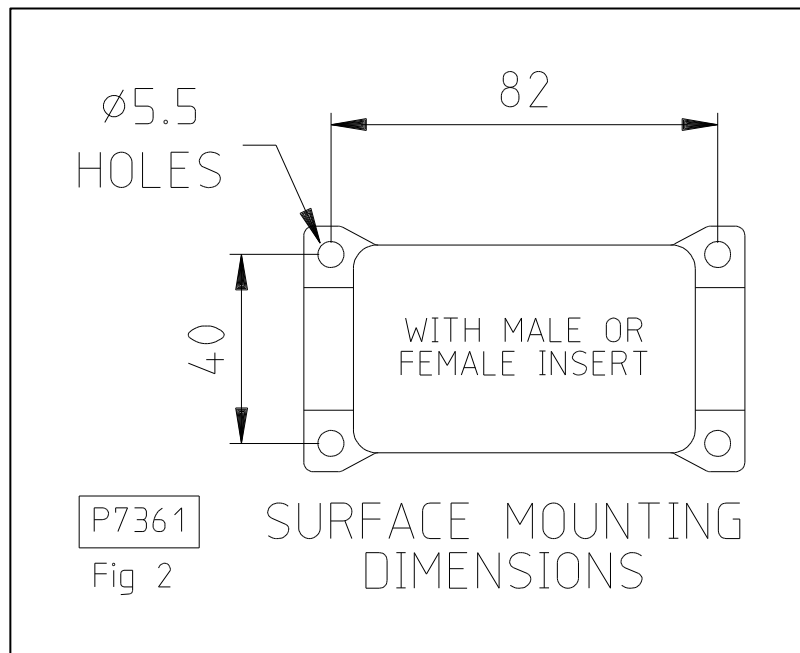
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For surface mounted socket bodies, 4 off M5 x 30mm long capscrews are supplied with star washers and nyloc nuts. Drill 4 x Ø5.5 holes spaced as shown at right through panel that connector is to be mounted to.

Be careful not to drill into any wiring that may be behind the panel or into a tank compartment!



When mounting body onto panel, ensure star washers are used under the head of the capscrew and under the nyloc nut. Star washers are used so that tightening the mounting bolts cause the washer to bite into both the connector housing and the panel it is mounted onto to provide optimal electrical continuity between the ground connection in the housing and the chassis of the vehicle.

To connect the wires coming out of the connectors to the appropriate hardware/connections, see the wiring table following. (Note: cores within cable are numbered from 1 to 11 plus a green/yellow).

Cable will need to have approximately 60mm of outside sheath removed and sufficient insulation removed from each core.

Liquip recommends the use of crimped or soldered ferrules on wire ends to ensure long life and secure connections.



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Power Connector

SOCKET

Core No.	Pin No.	Trailer Connects to:
1	1	Not Used
2	2	POWER IN on printer
3	3	Not Used
4	4	POWER IN +11.5V to +30V on CPU (or to POWER IN (+) BBC)
5	5	ELECTRICAL GND (-) Negative return
6	6	ELECTRICAL GND (-) Negative return
7	7	POWER IN +11.5V to +30V on CPU (or to POWER IN (+) BBC)
8	8	Not Used
9	9	Not Used
10	10	ELECTRICAL GND (-) Negative return
11	Housing	Chassis of Vehicle
GRN/YEL	Housing	Chassis of Vehicle

PLUG

Core No.	Pin No.	Prime Mover Connects to:
1	1	Not Used
2	2	POWER IN
3	3	Not Used
4	4	POWER IN +11.5V to +30V, DCC100
5	5	ELECTRICAL GND (-) Negative return , DCC100
6	6	ELECTRICAL GND (-) Negative return , DCC100
7	7	POWER IN +11.5V to +30V, DCC100
8	8	Not Used
9	9	Not Used
10	10	ELECTRICAL GND (-) Negative return
11	Housing	Chassis of Vehicle
GRN/YEL	Housing	Chassis of Vehicle



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Communications

SOCKET

Core No.	Pin No.	Trailer Connects to:
1	1	Tx on CPU, Rx on external device, COM 2
2	2	Not used
3	3	Rx on CPU, Tx on external device, COM 2
4	4	Not used
5	5	GND on external device, COM 2
6	6	GND on external device, COM 2
7	7	Not used
8	8	Tx on CPU, Rx on printer, COM 1
9	9	Rx on CPU, Tx on printer, COM 1
10	10	GND on printer, COM 1
11	Housing	Not used
GRN/YEL	Housing	Not used

PLUG

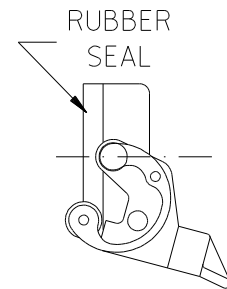
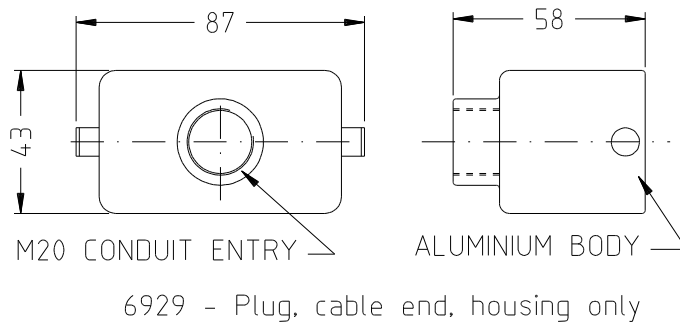
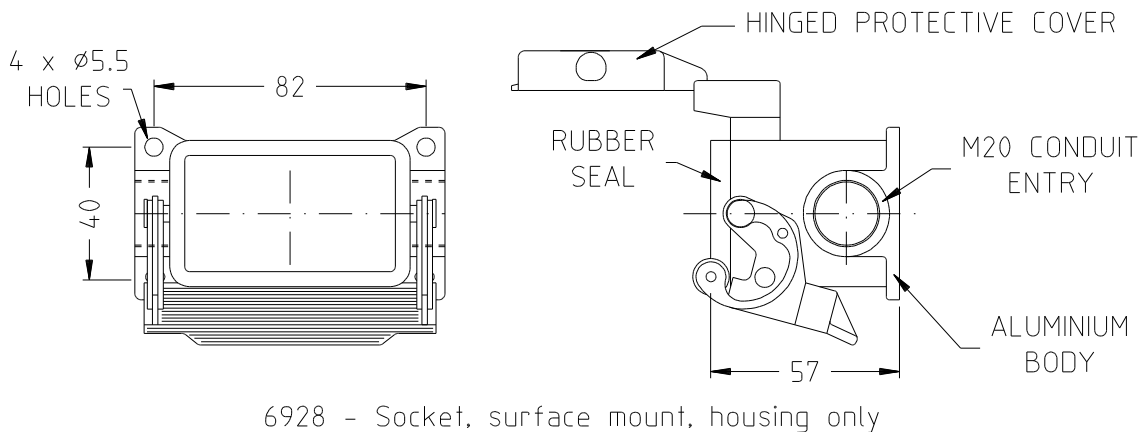
Core No.	Pin No.	Prime mover Connects to:
1	1	Tx on CPU, Rx on external device, COM 2
2	2	Not used
3	3	Rx on CPU, Tx on external device, COM 2
4	4	Not used
5	5	GND on external device, COM 2
6	6	GND on external device, COM 2
7	7	Not used
8	8	Tx on CPU, Rx on printer, COM 1
9	9	Rx on CPU, Tx on printer, COM 1
10	10	GND on printer, COM 1
11	Housing	Not used
GRN/YEL	Housing	Not used



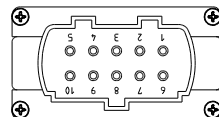
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LIQUIP

POWER HARNESS KITS

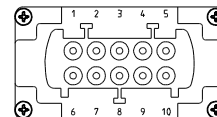


RATINGS
PROTECTION: IP65
CURRENT: 16A



6926 - Male Insert
(pin contacts)

VIEWS
FROM
FRONT



6927 - Female Insert
(socket contacts)

KIT PART No	COMPONENTS
DIP200-11Z	CABLE END PLUG (WITH COVER) & FEMALE INSERT
DIP200-12Z	SURFACE MOUNTED SOCKET & MALE INSERT
DIP200-13Z	SURFACE MOUNTED SOCKET & FEMALE INSERT
DIP200-14Z	CABLE END PLUG (WITH COVER) & MALE INSERT

X352203

Issue: A

CABLE (LIQUIP PART 6930) IS SUPPLIED SEPARATELY. WHEN ORDERING SPECIFY REQUIRED LENGTH
ALL KITS ARE SUPPLIED WITH CABLE GLAND (6931) AND INSTRUCTION LEAFLET FOR WIRING.
SURFACE MOUNTED HOUSINGS ARE SUPPLIED WITH MOUNTING FASTENERS.

METERS - VALVES - VENTS - MANHOLES - PUMPS - HOSEREELS - OVERFILL PROTECTION - LOADING ARMS - ELECTRONIC DIPSTICKS



LIQUIP INTERNATIONAL PTY LTD

13 Hume Road
Smithfield, Sydney
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Fax: +61 2 9725 1252

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APPENDIX 4 – PPM340 Instructions

Refer P6439 PPM00201 PPM300 Series Light Guard manual for installation instructions.

1.0 TEST AND COMMISSIONING

1.1 Setting Number of Compartments

After mounting monitor and prior to connecting probes, it is required to calibrate the monitor. As delivered, the 'LIGHT-GUARD' monitor is set for:

PPM340: 8 electronic overfill and 8 fibre optic tank belly sensors with mil spec connector for Diptronic LIPS.

PPM341: 8 fibre optic overfill and 8 fibre optic tank belly sensors with mil spec connector for Diptronic LIPS.

If it is required to change a configuration proceed through the following steps:

- 1) Enter calibration mode: With power off, link terminals CAL and GND with a length of wire (refer to appendix for diagrams).
- 2) Enable/disable fibre optic overfill:

To enable:

Link terminals SEC and GND to enable fibre optic overfill.

To disable:

If SEC and GND are not linked the electronic overfill terminals will be enabled instead of the fibre optic overfill.



- 3) Disable compartments:
All compartments are enabled by default. To disable compartments that are not required, link that particular compartment with the GND terminal.
E.g.. To disable compartments 7 and 8, link terminals 7 and 8 to GND. This will disable the entire compartment - both top and retain sensors (refer to appendix for diagrams). Note, for LIPS systems do not use dummy probes. Unused compartments should be disabled via the method described above.
- 4) Power on:
The links are checked when the power is turned on only. All LED's will switch on and off followed by the enabled channels only, blinking for 3 seconds.
- 5) Turn power off and remove all links.
- 6) Connect all probes according to wiring diagrams in Appendix.
- 7) Loosely replace cover of monitor.
- 8) Power on ready for commissioning.

1.2 Commissioning

1.2.1 Checking the Overfill Sensor Outputs

- Wet one of the overfill sensors.
- The corresponding LED should light.
- Repeat for the rest of the sensors for each compartment.

1.2.2 Checking the Retained Sensor Outputs

- Wet one of the retained sensors.
- The corresponding LED should light.
- Repeat for the rest of the retained sensors for each compartment.



1.2.3 Checking the Over-Ride Function

- Insert the 'Supervisor' key.
- The grace timer is activated and loading is permitted.
- During the 90 minute grace period, loading is not permitted if one of the overfill sensors becomes wet. Overfill protection operates at all times.
- After 90 minutes, loading is again refused as the monitor automatically resets.

1.2.4 Checking with Gantry Monitor

With the tanker and power on, connect to gantry monitor. The gantry monitor should go to 'green'.

Wet one overfill sensor and the gantry monitor should go to 'red'.

Disconnect gantry monitor and wet one 'retain' sensor and reconnect gantry. The gantry monitor should remain 'red'.

1.3 Make Secure

Fit cover onto on-board monitor ensuring main seal is seated correctly. Position the cover square to the base when fitting to prevent the seal being dislodged by a sliding action. Carry out final checks on the security of all sensors, glands and conduit brackets.



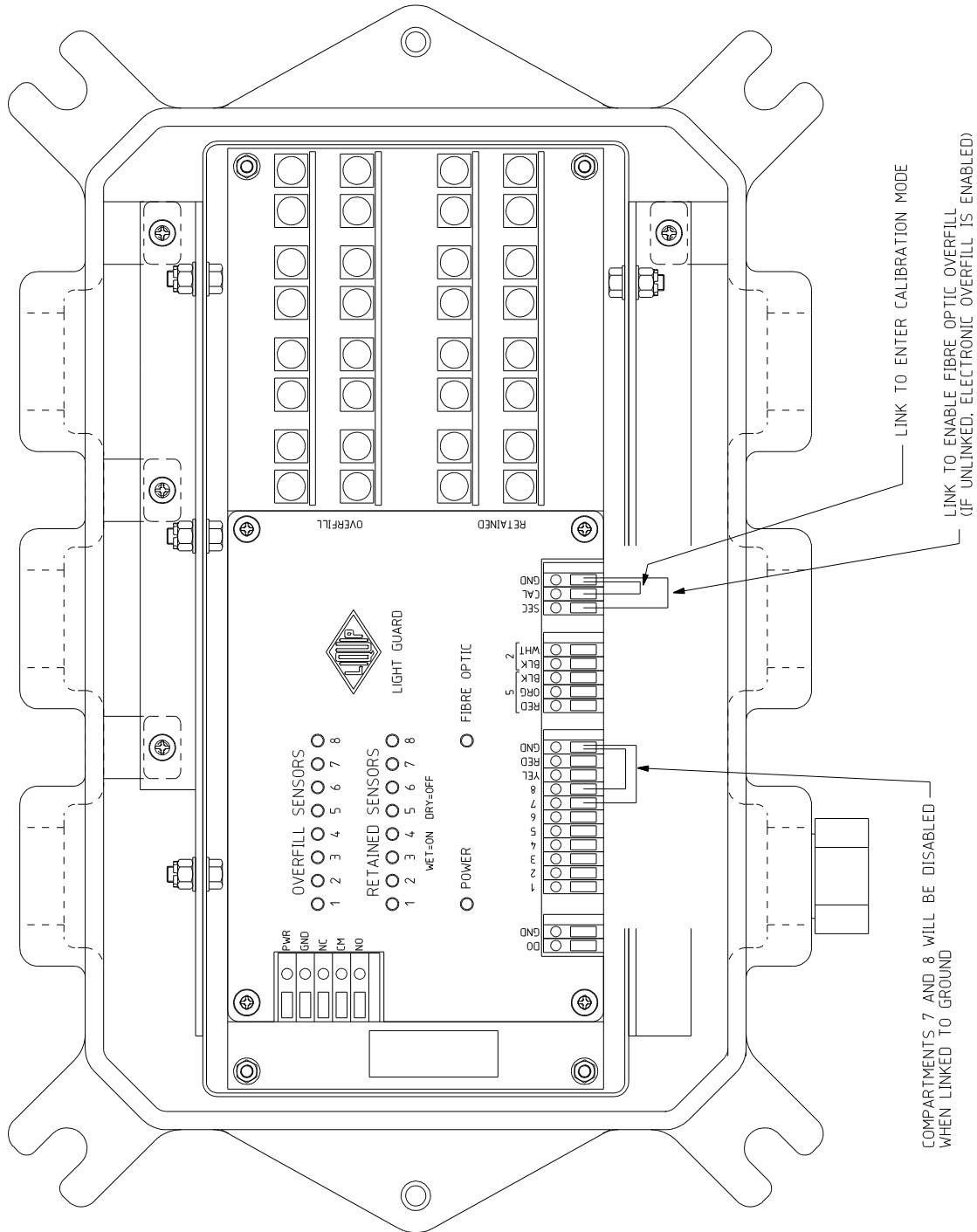
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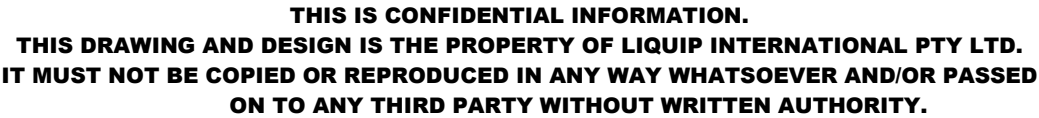


X953101

Issue: A

LIGHTGUARD: CALIBRATING COMPARTMENTS





LIQUIP
X950602
ISSUE: B

2 WIRE ELECTRONIC OVERFILL PROBES

FOR A SMALL PERCENTAGE OF INSTALLATIONS, A DIODE (1P103-7) MAY BE REQUIRED AS SHOWN
• SEE TRUCK PLUG (1P103/1P104) DATASHEET •

SMALL END
LARGE END
EARTH MUST TRAVEL THROUGH THE TANK STRUCTURE

REAR VIEW OF 4 BAYONET TRUCK PLUG

CHASSIS

OVERFILL SENSORS
RETAINED SENSORS
LIGHT SHIELD
FIBRE OPTIC
POWER

FROM VEHICLE ELECTRICAL SYSTEM (PREFER DMG X9508011)
FUSE
TO BATTERY

OUTPUT RELAY CONNECTED AS NORMALLY CLOSED

OUTPUT RELAY CONNECTED AS NORMALLY OPEN

11.5 - 30V OUTPUT
RATING MAX 30VAC @ 3A
OVERFILL PROBES ARE DRY

11.5 - 30V OUTPUT
RATING MAX 30VAC @ 3A
OVERFILL PROBES ARE DRY

1 2 3 4 5 6 7 8 9 10

WHT BLK

WHITE

WHT BLK WHT BLK WHT BLK WHT BLK WHT BLK WHT BLK WHT BLK WHT BLK



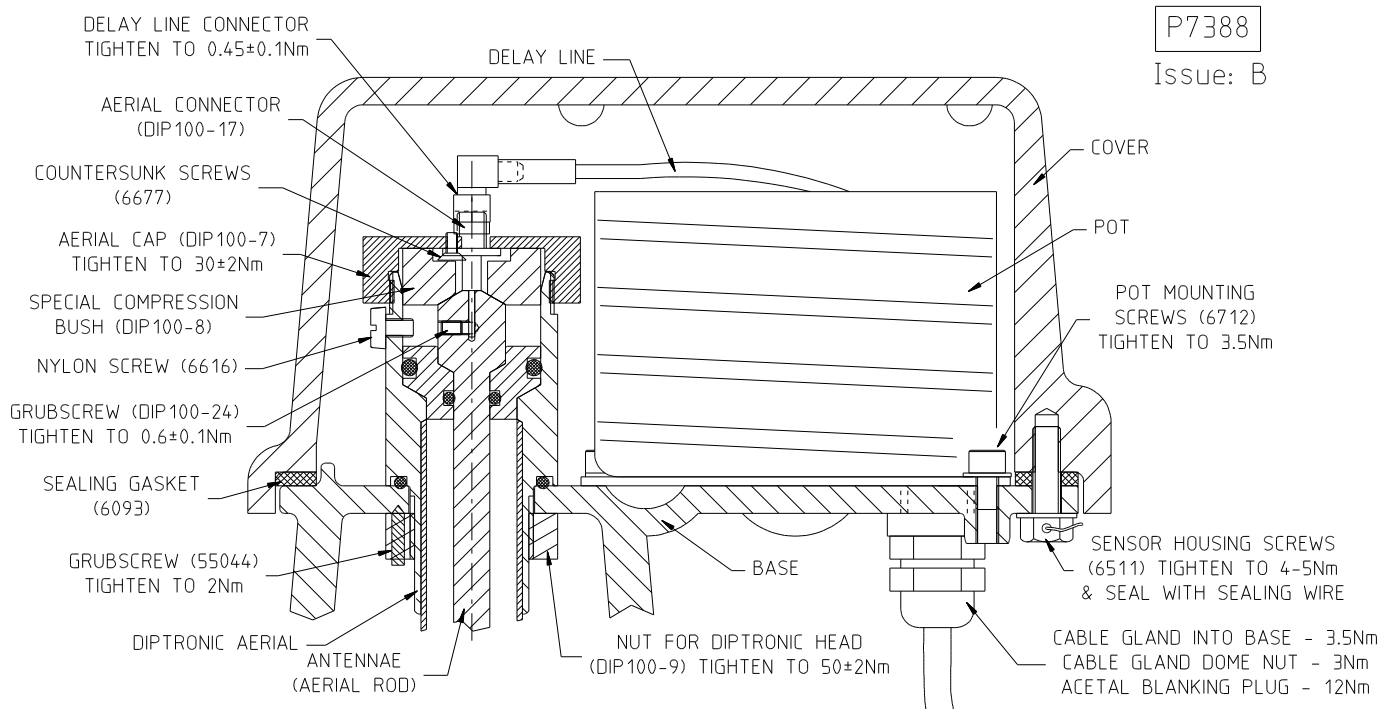
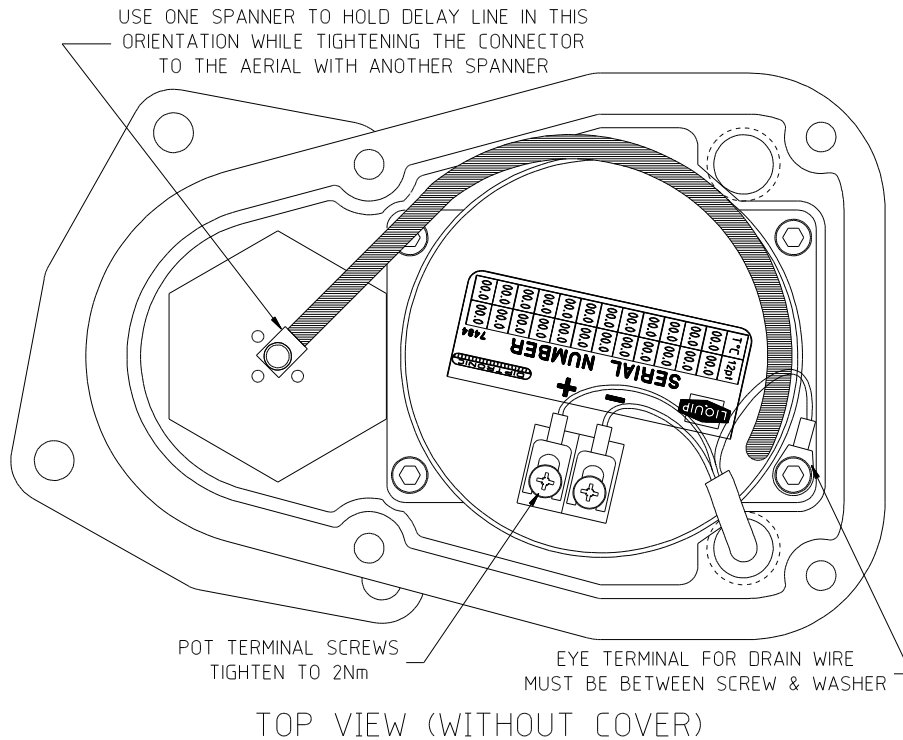
X950602

Issue: B



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APPENDIX 5 - Diptronic Sensor Torque Settings





APPENDIX 6 – Tanker Overfill Protection: Setting Trip Height of Probes

“Many tankers do not have their overfill probes installed deep enough to allow rack flow over-run to stop before overflow occurs.”

Comment from a major oil company in USA.

Oil companies in Australia have also issued bulletins and this note is a re-issue of previous reminders.

-
- * The requirement is that all road tankers should have their probes set to activate at least 200 litres below tank full (230L for API RP 1004).

This is because all loading racks require a delay of 4 to 6 seconds from the time a probe is wetted to the closure of the rack valve. This time delay is necessary to allow a flow rate of 2,400 litres/min to be stopped without any damaging shock or pulsations. 2,400 litres/min is 40 litres/second so in 5 seconds there is a flow of 200 litres at max rate.

- * Most current tankers have their safe-fill marked (and possibly entered into Terminal Automation Systems) as equal to 3% of the full capacity.

Where compartments are smaller than 7,000 litres, such a setting risks an overflow in the event of a probe activation due to the insufficient space left for the over-run volume during shut-down.



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APPENDIX 7 – Test harness

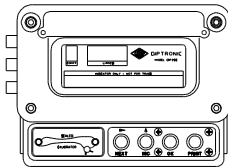
LIQUIP

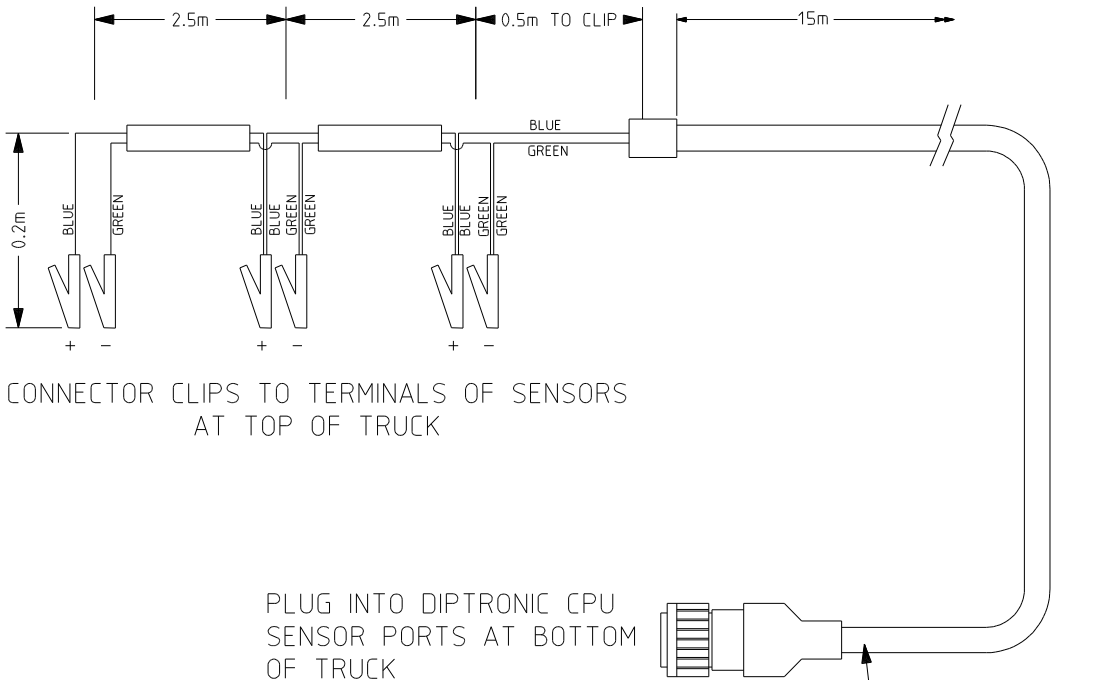
6888 TEST HARNESS FOR DIPTRONIC

HARNESS 6888 CAN BE USED TO CHECK SENSORS WHEN IT IS BELIEVED THAT THERE IS A POSSIBLE FAULT WITH THE WIRING OF THE SENSORS TO THE CPU.

CHECKING SENSOR WIRING:

1. TURN POWER OFF TO CPU AND SENSORS.
2. DISCONNECT THE SENSOR HARNESS FROM CPU.
(ON RIGHT HAND SIDE OF CPU)
3. REMOVE THE LID OF THE SENSORS THAT NEED CHECKING.
NOTE: 3 SENSORS CAN BE CHECKED WITH 1 OFF 6888 HARNESS.
4. CONNECT CLIPS TO THE SENSOR.
RED CLIP (BLUE WIRE) TO SIGNAL (+), BLACK CLIP (GREEN WIRE) TO GROUND (-).
5. TURN POWER ON TO THE CPU AND SENSORS AND CHECK THAT SENSORS ARE OPERATING PROPERLY.






CONNECTOR CLIPS TO TERMINALS OF SENSORS
AT TOP OF TRUCK

PLUG INTO DIPTRONIC CPU
SENSOR PORTS AT BOTTOM
OF TRUCK

SHIELDED CABLE WITH
POLYURETHANE SHEATH

X353802
Issue: A

METERS - VALVES - VENTS - MANHOLES - PUMPS - HOSEREELS - OVERFILL PROTECTION - LOADING ARMS - ELECTRONIC DIPSTICKS



LIQUIP

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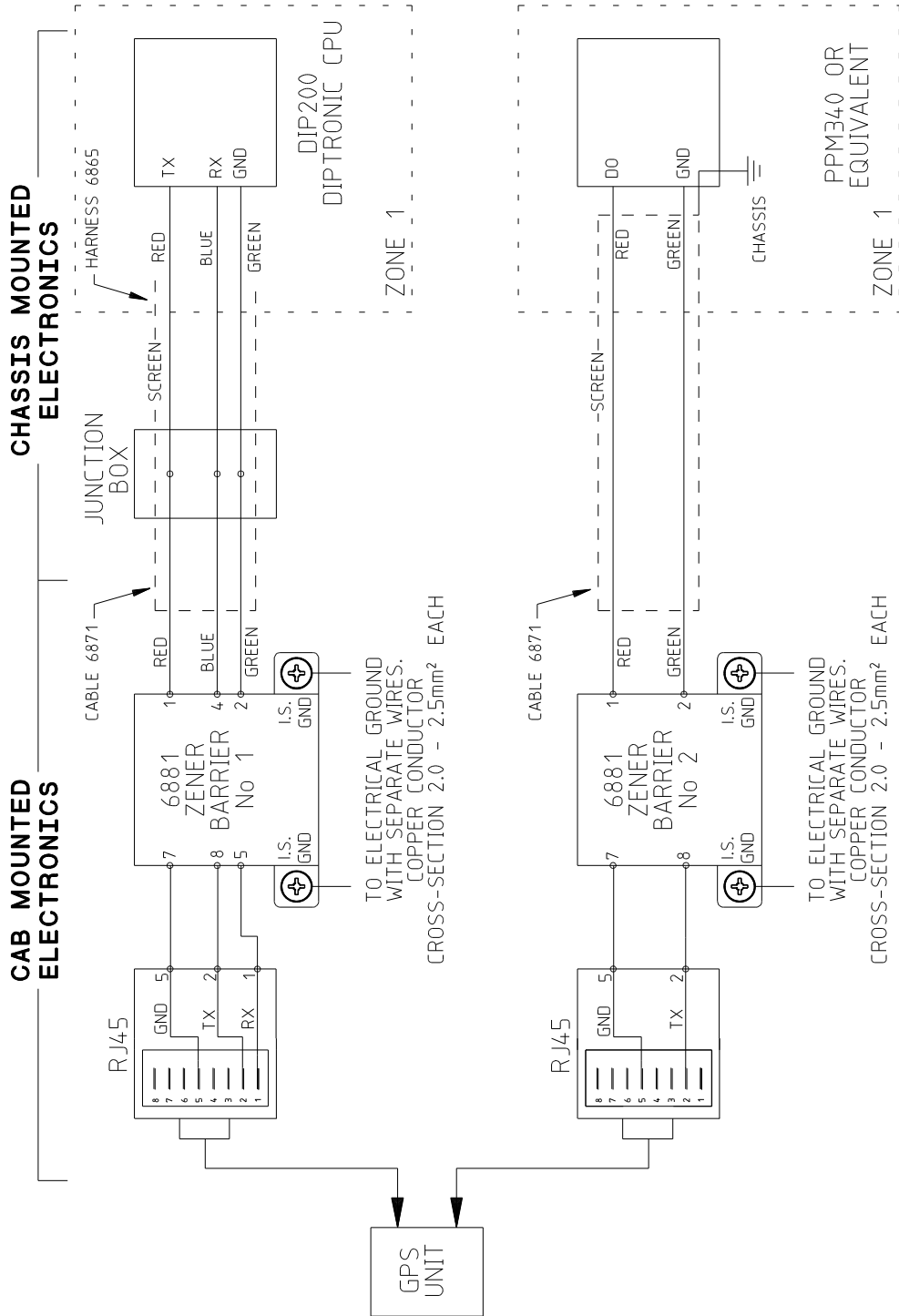
See inside front cover
for Liquip branches
and Distributors or visit

www.liquip.com

APPENDIX 8 - GPS Wiring Diagrams

DIPTRONIC & LIPS-GPS:

TYPICAL EXAMPLE OF WIRING DIAGRAM OF RIGID WITH NO TICKET PRINTER, REGISTER OR PC



NOTES:
 1- THIS DIAGRAM SHOWS COMMUNICATION LINES ONLY, FOR DETAILED WIRING DIAGRAMS, SEE OTHER DRAWINGS IN THE DIPTRONIC MANUAL.
 2- ALL CABLES ARE IN APPROVED CONDUIT AS PER AS2809.2.

X351606

FIG 1

Issue: C

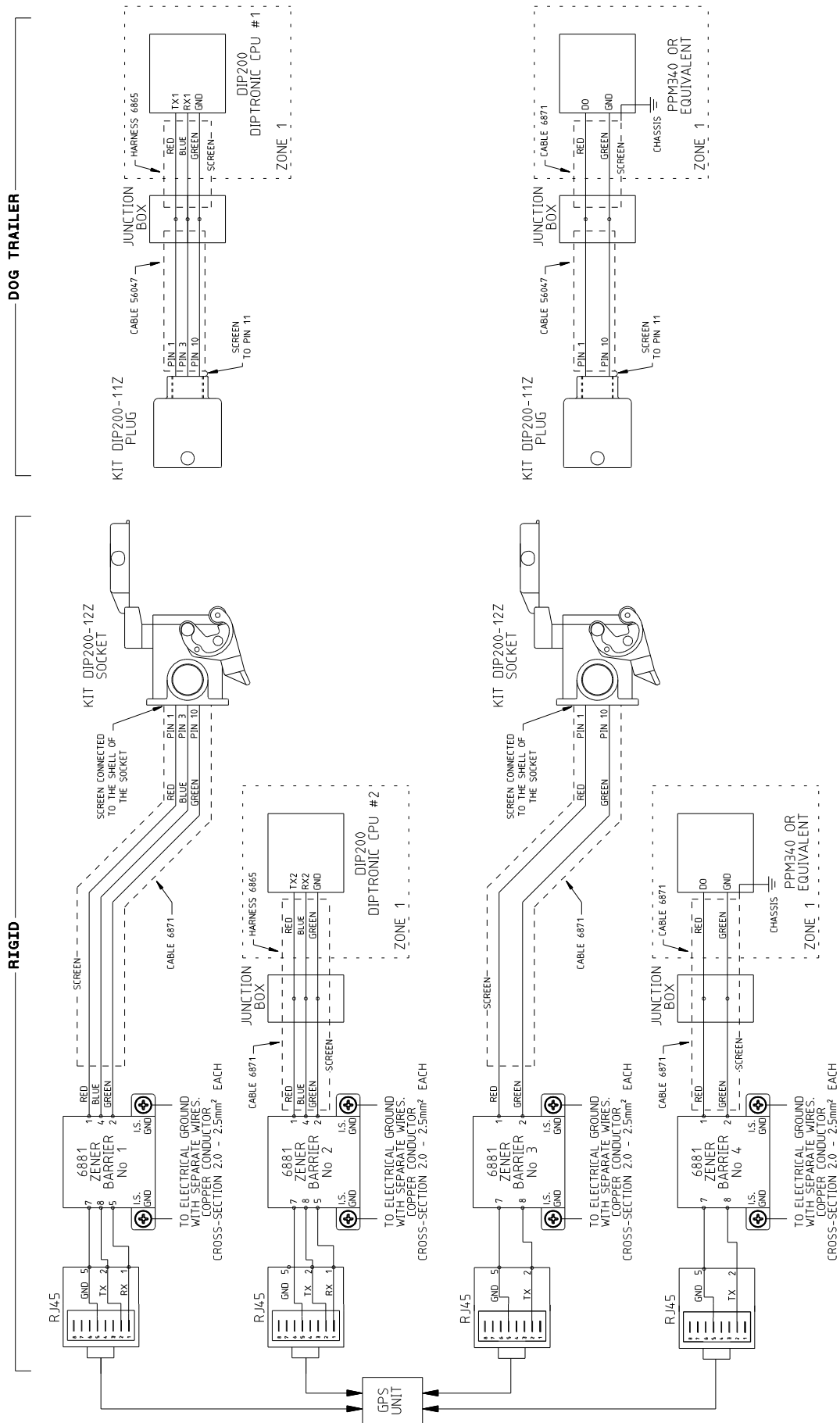
TYPICAL EXAMPLE OF WIRING DIAGRAM FROM **PRIME MOVER** TO **TRAILER**. NO TICKET PRINTER, REGISTER OR PC



X351606
FIG 2
Issue: C

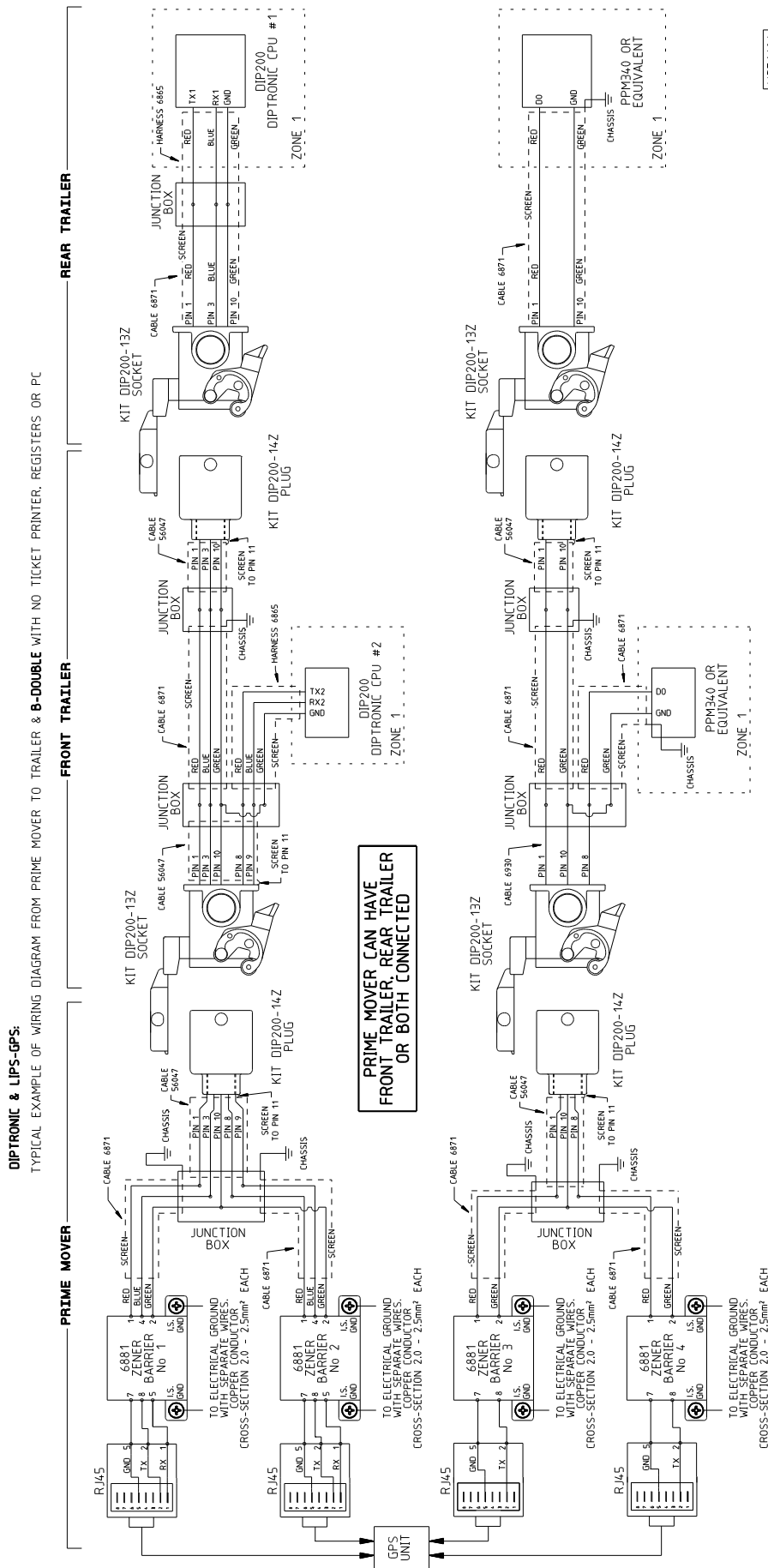
DIPTRONIC & LIPS-GPS:

TYPICAL EXAMPLE OF WIRING DIAGRAM OF RIGID/DOG COMBINATION WITH NO TICKET PRINTER, REGISTERS OR PC



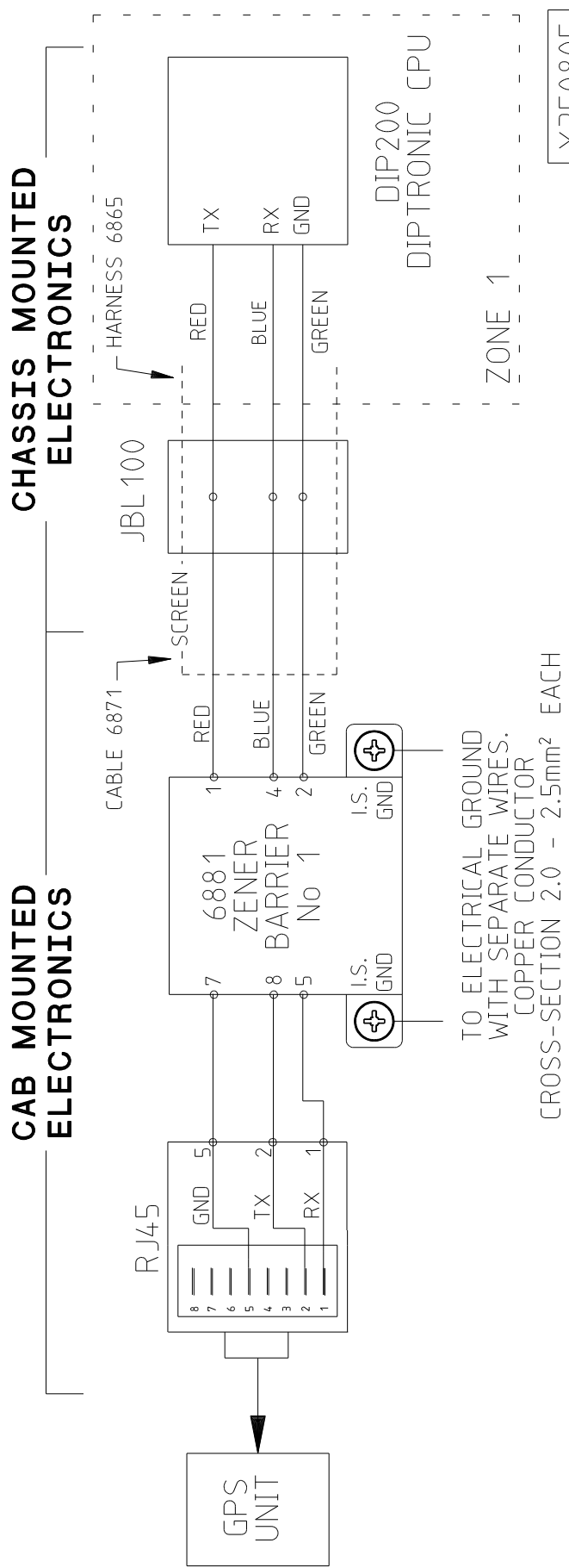
NOTES:
 1- THIS DIAGRAM SHOWS COMMUNICATION LINES ONLY. FOR DETAILED WIRING DIAGRAMS, SEE OTHER DRAWINGS IN THE DIPTRONIC MANUAL.
 2- ALL CABLES ARE IN APPROVED CONDUIT AS PER AS2809.2.

X351606
 FIG 3
 Issue: C



X351606
 FIG 4
 Issue: C

DIPTRONIC & GPS ONLY:
 TYPICAL EXAMPLE OF WIRING DIAGRAM OF RIGID WITH NO TICKET PRINTER, REGISTER OR PC

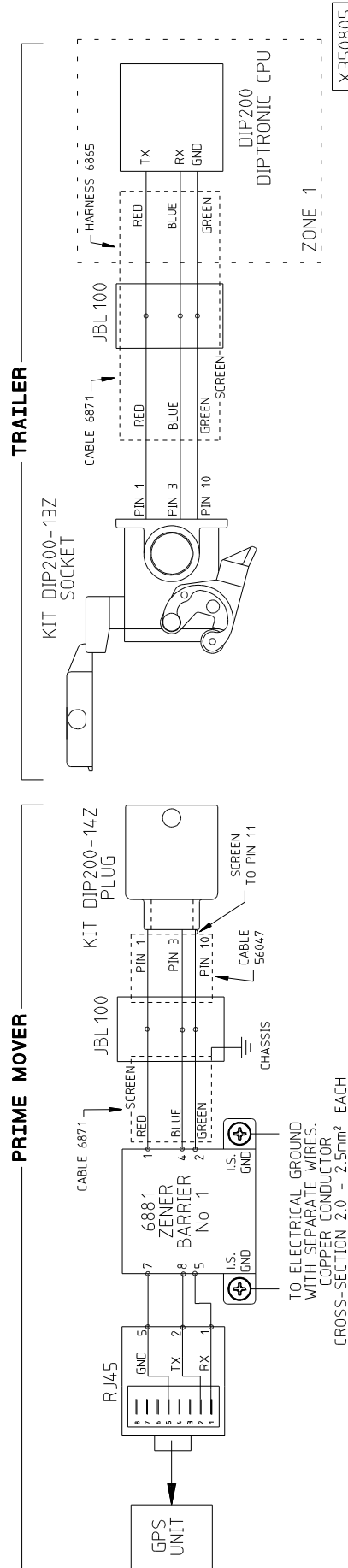


NOTES:
 1- THIS DIAGRAM SHOWS COMMUNICATION LINES ONLY. FOR DETAILED WIRING, SEE OTHER DIAGRAMS IN DIPTRONIC MANUAL.
 2- ALL CABLES TO BE IN APPROVED CONDUIT AS PER AS2809.2.

X350805
 FIG 1
 Issue: D

DIPTRONIC & GPS ONLY:

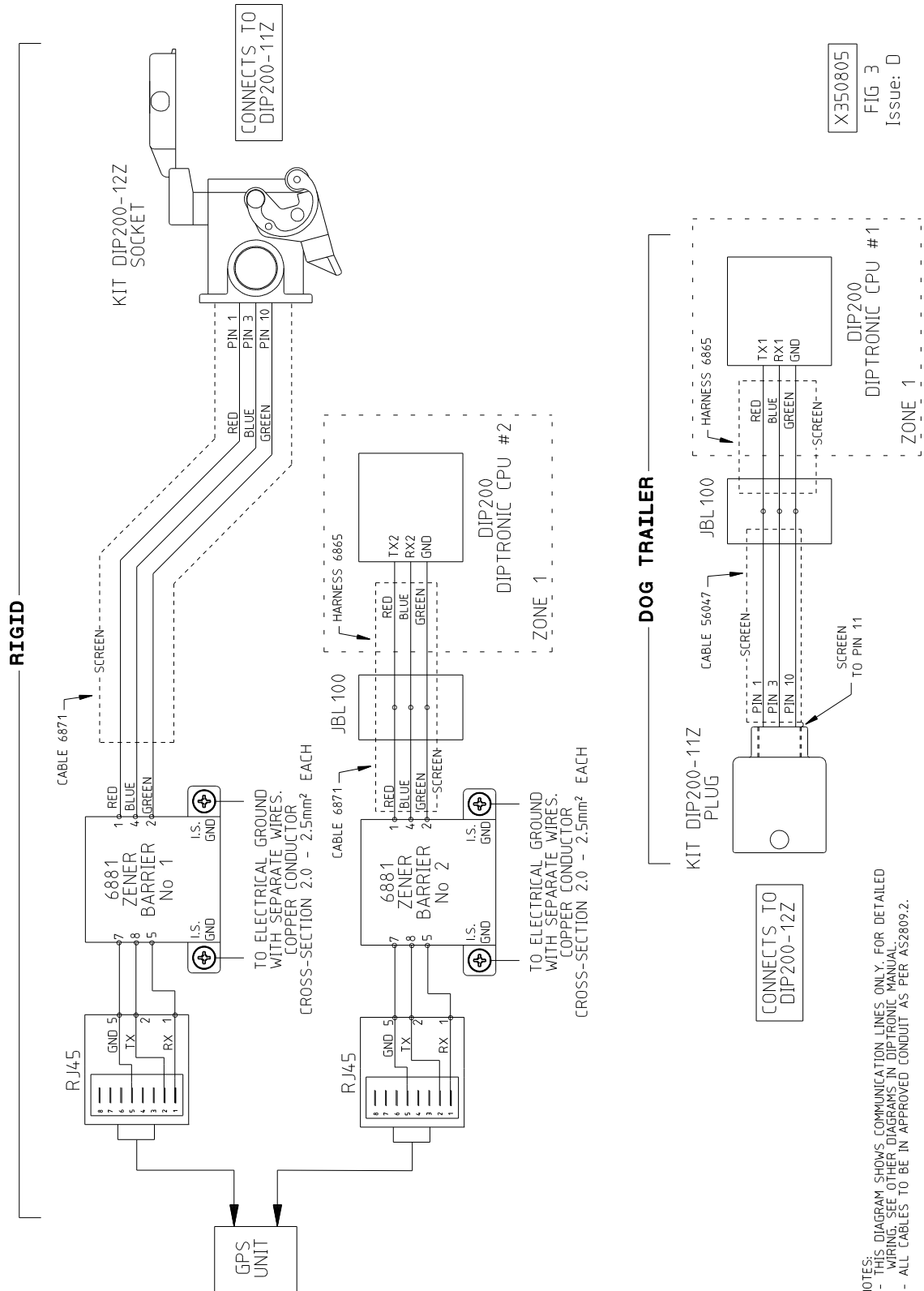
TYPICAL EXAMPLE OF WIRING DIAGRAM FROM PRIME MOVER TO TRAILER. NO TICKET PRINTER, REGISTER OR PC



NOTES:
 1- THIS DIAGRAM SHOWS COMMUNICATION LINES ONLY. FOR DETAILED WIRING, SEE OTHER DIAGRAMS IN DIPTRONIC MANUAL.
 2- ALL CABLES TO BE IN APPROVED CONDUIT AS PER AS2809.2.

DIPTRONIC & GPS ONLY:

TYPICAL EXAMPLE OF WIRING DIAGRAM OF RIGID/DOG COMBINATION WITH NO TICKET PRINTER, REGISTERS OR PC

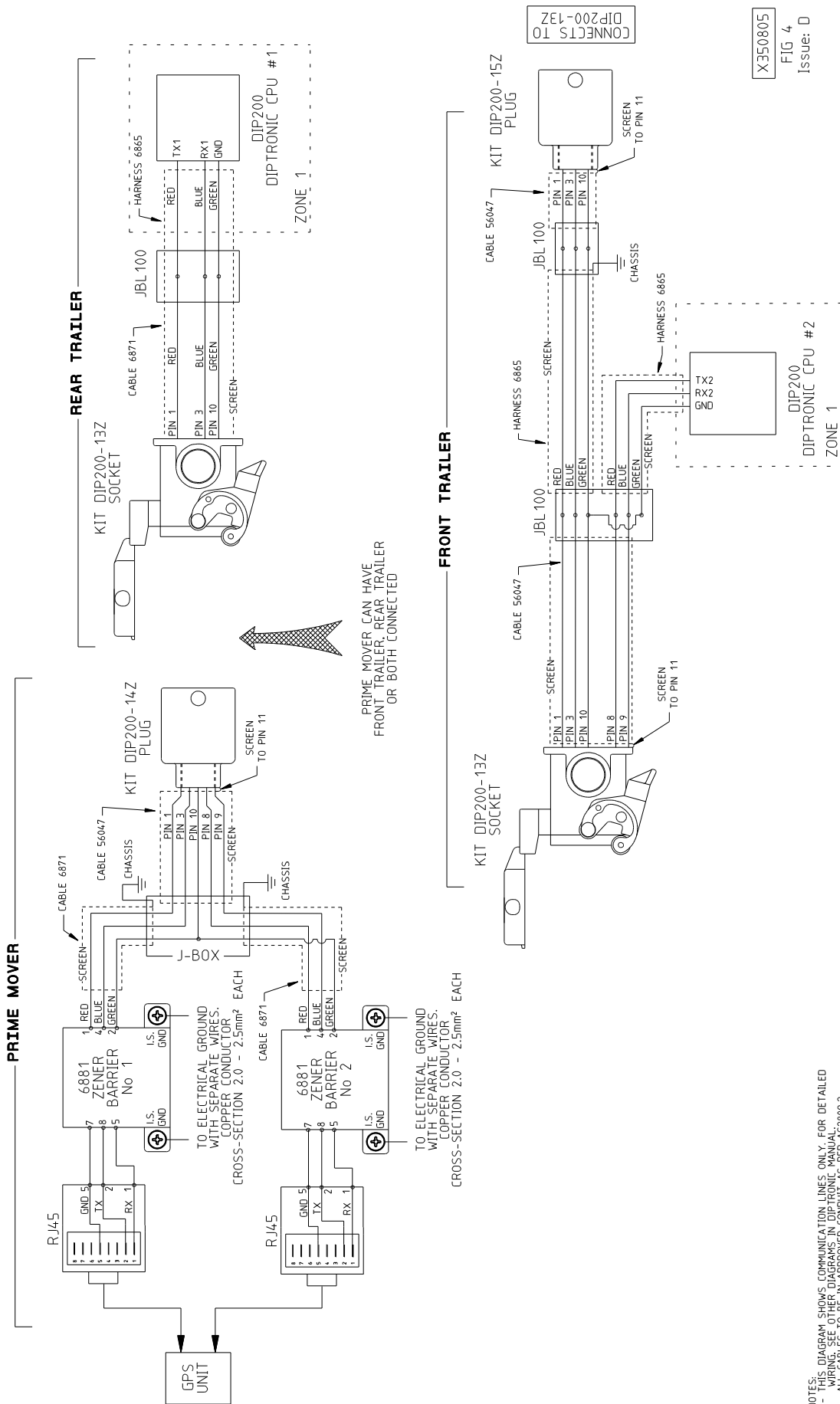


NOTES:
 1- THIS DIAGRAM SHOWS COMMUNICATION LINES ONLY. FOR DETAILED WIRING, SEE OTHER DIAGRAMS IN DIPTRONIC MANUAL.
 2- ALL CABLES TO BE IN APPROVED CONDUIT AS PER AS2809.2.

X350805
 FIG 3
 Issue: D

DIPTRONIC & GPS ONLY:

TYPICAL EXAMPLE OF WIRING DIAGRAM FROM PRIME MOVER TO TRAILER & B-DOUBLE WITH NO TICKET PRINTER, REGISTERS OR PC



NOTES:
 1- THIS DIAGRAM SHOWS COMMUNICATION LINES ONLY. FOR DETAILED WIRING, SEE OTHER DIAGRAMS IN DIPTRONIC MANUAL.
 2- ALL CABLES TO BE IN APPROVED CONDUIT AS PER AS2809.2.



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APPENDIX 9 - System Messages / Troubleshooting

SYMPTOM	CAUSE	CORRECTIVE ACTION
"Maximum level exceeded" message	Product overflow	Drain product
"Above measured limit" message	Product above sensor range	Drain product to a level that is within sensor range
"Safe fill level exceeded" message	Product above safe fill level	Drain product to a level that is within safe fill
Communication error message (sensor)	CPU unable to communicate with sensor	<ul style="list-style-type: none"> * Check wiring to sensors for open/ short circuits * Check wiring under sensor housing for short circuits
Communication error message (printer)	CPU unable to communicate with printer	<ul style="list-style-type: none"> * Switch on printer * Check wiring to printer for open/ short circuits * Check voltage to printer between 24 and 30V DC
CPU doesn't power up	No power from truck battery	<ul style="list-style-type: none"> * Check isolation switch is on * Check wiring between CPU and isolation switch * Check fuses
CPU powers intermittently	Voltage supply too low	Voltage should be minimum 11.5V
Printer doesn't power up	<ul style="list-style-type: none"> * Printer not turned on * Voltage to printer too low * No power to printer 	<ul style="list-style-type: none"> * Switch on printer * Voltage should be min 24V DC. * Check wiring to printer for open/ short circuits



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APPENDIX 10 - Diptronic Reference Booklets

PART #	DOCUMENT	FILENAME
7310	DIPTRONIC MEASURING SYSTEM MK1 DRIVERS MANUAL	DIP200_INST_DIPTRONIC_MEASURING_DRIVER_INSTRUCTIONS_P7310.pub
7326	DIPTRONIC MEASURING SYSTEM MK1 & L.I.P.S. (WITH GPS) CALIBRATION MANUAL	DIP200_INST_DIPTRONIC_CALIBRATION_P7326.pub
7327	DIPTRONIC MEASURING SYSTEM MK1 & LIPS AUTOMATIC CALIBRATION RIG MANUAL	DIP200_INST_DIPTRONIC_CALIBRATION_RIG_P7327.pub
7328	DIPTRONIC L.I.P.S DRIVERS MANUAL	DIP200_INST_DIPTRONIC_LIPS_DRIVER_INSTRUCTIONS_P7328.pub
7329	DIPTRONIC MEASURING SYSTEM MK1 INSTALLATION MANUAL	DIP200_INST_DIPTRONIC_MEASURING_INSTALLATION_INSTRUCTIONS_P7329.pub
7330	DIPTRONIC L.I.P.S. & GPS INSTALLATION MANUAL	DIP200_INST_DIPTRONIC_LIPS_INSTALLATION_INSTRUCTIONS_P7330.pub
7331	DIPTRONIC GENERAL INFORMATION	DIP200_INST_DIPTRONIC_GENERAL_INFORMATION_P7331.pub
7333	DIPTRONIC CPU (DIP200 & DIP240) SOFTWARE UPGRADE INSTRUCTIONS	DIP200_INST_DIPTRONIC_SOFTWARE_UPGRADE_INSTRUCTIONS_P7333.pub
7334	DIPTRONIC MEASURING SYSTEM MK1 & L.I.P.S. CPU REPLACEMENT INSTRUCTIONS	DIP200_INST_DIPTRONIC_CPU_REPLACEMENT_INSTRUCTIONS_P7334.pub
7335	DIPTRONIC MEASURING SYSTEM MK1 & L.I.P.S. SENSOR (ANTENNAE & DIP100-12, DIP120-12 & DIP130-12) REPLACEMENT INSTRUCTIONS	DIP200_INST_DIPTRONIC_SENSOR_REPLACEMENT_INSTRUCTIONS_P7335.pub
7400	DIPTRONIC MEASURING SYSTEM MK1 & L.I.P.S. DipRecall MANUAL	DIP200_INST_DIPTRONIC_DIPRECALL_INSTRUCTIONS_P7400.pub



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NOTICE FOR USE IN CEN

Instructions specific to hazardous area installations (reference European ATEX Directive 94/9/EC, Annex²², 1.0.6.)

The following instructions apply to equipment covered by certificate numbers Sira 02ATEX3323X (DIP200) and Sira 02ATEX2322X (DIP100):

1. The equipment may be used in a hazardous area with flammable gases and vapours with apparatus group IIA and with temperature classes T1, T2, T3, and T4.
2. The apparatus is only certified for use in ambient temperatures in the range -20°C to +60°C and should not be used outside this range.
3. The certified numbers have an 'X' suffix that indicates that special conditions of certification apply. These conditions are; The DIP100 has an aluminium cover and precautions must be taken to reduce the risk of a frictional spark occurring. The DIP200 power must be supplied via a fuse that has a breaking capacity capable of clearing the maximum short circuit current of the truck battery.
4. Installation shall be carried out in accordance with the applicable code of practice by suitably trained personnel.
5. Repair of this equipment shall be carried out in accordance with the applicable code of practice.
6. Certification marking as detailed in DIP100 series drawing number P7278 & DIP200 series drawing number P7284.
7. If it is likely the equipment will come in contact with aggressive substances, then it is the responsibility of the user to take suitable precautions to prevent the equipment being adversely effected, ensuring the type of protection is not compromised.

Aggressive Substances: e.g. acidic liquids or gases that may attack metals or solvents that may effect polymeric materials. inspections or establishing from the materials data sheet that it is resistant to specific chemicals.



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Notes:



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