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Revolution Not Evolution

7327

**DIPTRONIC™ MEASURING
SYSTEM MK1 & L.I.P.S**

AUTOMATIC CALIBRATION RIG MANUAL



Issue D March 2010



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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.



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.



Contents

1.0 The Automatic Calibration Rig	5
1.1 Automatic Calibration Rig in Conjunction with Diptronic CPU (DIP200/240) and Sensors (DIP100)	5
1.2 Automatic Calibration Rig Installation	6
1.2.1 Metal Box Hole Layout	7
1.2.2 Diptronic Automatic Calibration Rig	8
1.2.3 Solenoid Mounting.....	9
1.2.4 Electrical Layout	10
1.2.5 Harness Layout Between Rig, CPU & Front of Trailer ...	12
1.2.6 Wiring Layout Between Rig, CPU & Front of Trailer	13
2.0 EMH500 Software Configuration.....	14
2.1 EMH500 Button Navigation	14
2.2 EMH500 Software Upgrade Procedure.....	15
2.3 Button Operation of EMH500 During Standby & Delivery Modes.....	16
2.4 Setup of EMH500 for Diptronic	16
APPENDIX 1 - Wiring Diagrams	18
APPENDIX 2 - Associated Documentation.....	21
APPENDIX 3 - Parts List	23
APPENDIX 4 - Diptronic Reference Booklets.....	24



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1.0 The Automatic Calibration Rig

1.1 Automatic Calibration Rig in Conjunction with Diptronic CPU (DIP200/240) and Sensors (DIP100)

This booklet contains information on the EMH500 button operation and setup parameter as well as wiring diagrams for the rig.

This rig is designed to connect to the Diptronic CPU (DIP200 or DIP240). The rig communicates with the Diptronic CPU which monitors the status of calibration and controls peripheral devices such as the EMH500.

The primary function of the rig is for automatic calibration of a Diptronic sensor (DIP100). The Diptronic CPU still allows for a manual calibration if an auto-cal rig is unavailable.

Refer *P7326 Diptronic calibration manual* for information on how to use the rig as part of an automatic calibration.

Once the calibration parameters are set in the following pages, the rig requires no further calibration.



1.2 Automatic Calibration Rig Installation

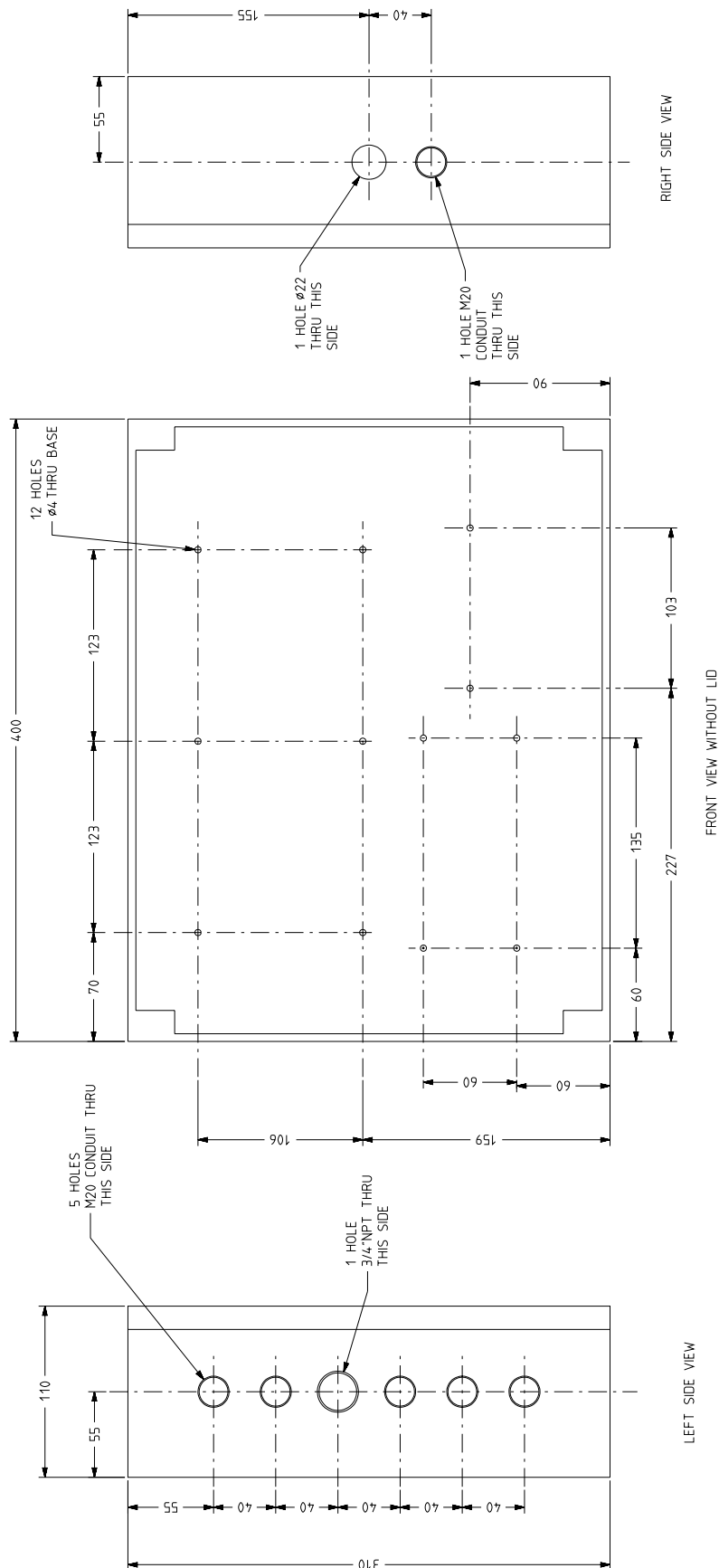
The steps outlined below should be used with the wiring diagrams in appendix 1 as an installation guide for the automatic calibration rig.

1. Refer associated documentation in appendix 2 & parts list in appendix 3 for specific part installation & parts to use.
2. Drill holes in metal box for mounting components as per dimensions provided in drawing X356702 on the following page.
3. Mount EJB100 using 20mm standoffs and screw to base of metal box using M4x35 screws, nyloc nuts & fibre washers.
4. Mount Omron Power Supply & DIN rail to box using M4x18 screws, nyloc nuts & fibre washers.
5. Mount relay & circuit breaker on DIN rail.
6. Mount ON/OFF switch to side of metal box as shown.
7. Connect EMH500 harness from EJB101 (EJB102 for UK) through side of box via harness cable gland.
8. Install all cable glands as shown.
9. Connect all cables/wires as shown in appendix 1. Ensure the EJB100 is earthed to the metal box.
10. Seal metal box with lid when wiring complete.
11. Construct hydraulic circuit as shown in appendix 1.
12. Mount metal box & hydraulic circuit to suitable frame to form rig.
13. Connect cables from hydraulic circuit to metal box.
14. Connect appropriate cables from rig to junction box and connect corresponding cables from junction box to power, printer & auto cal mil spec connectors as shown.
15. Connect power to rig and power up via switch.



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1.2.1 Metal Box Hole Layout



X356702
Issue: A

METAL BOX 400 x 310 x 110
RS COMPONENTS 222-761

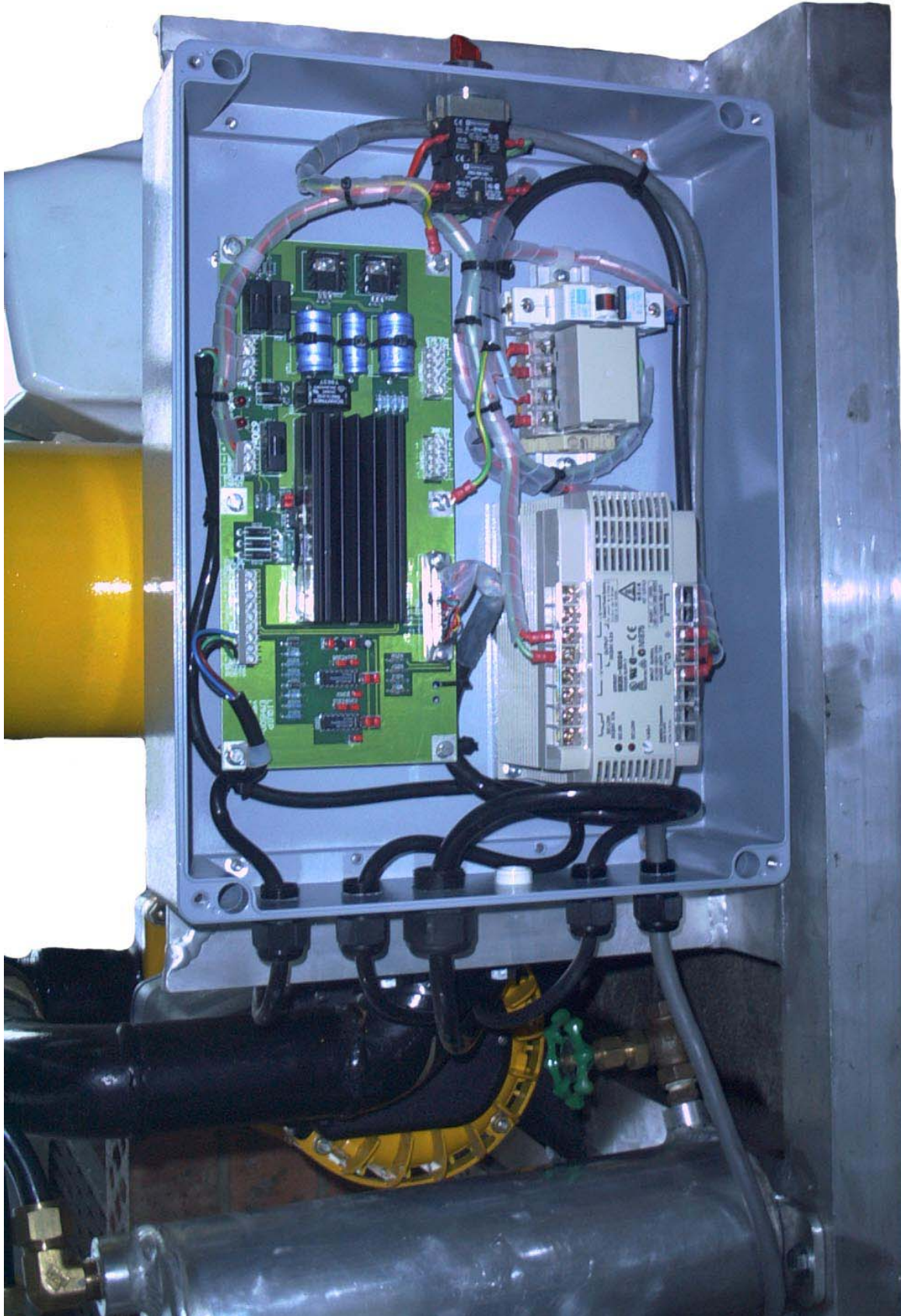
1.2.2 Diptronic Automatic Calibration Rig

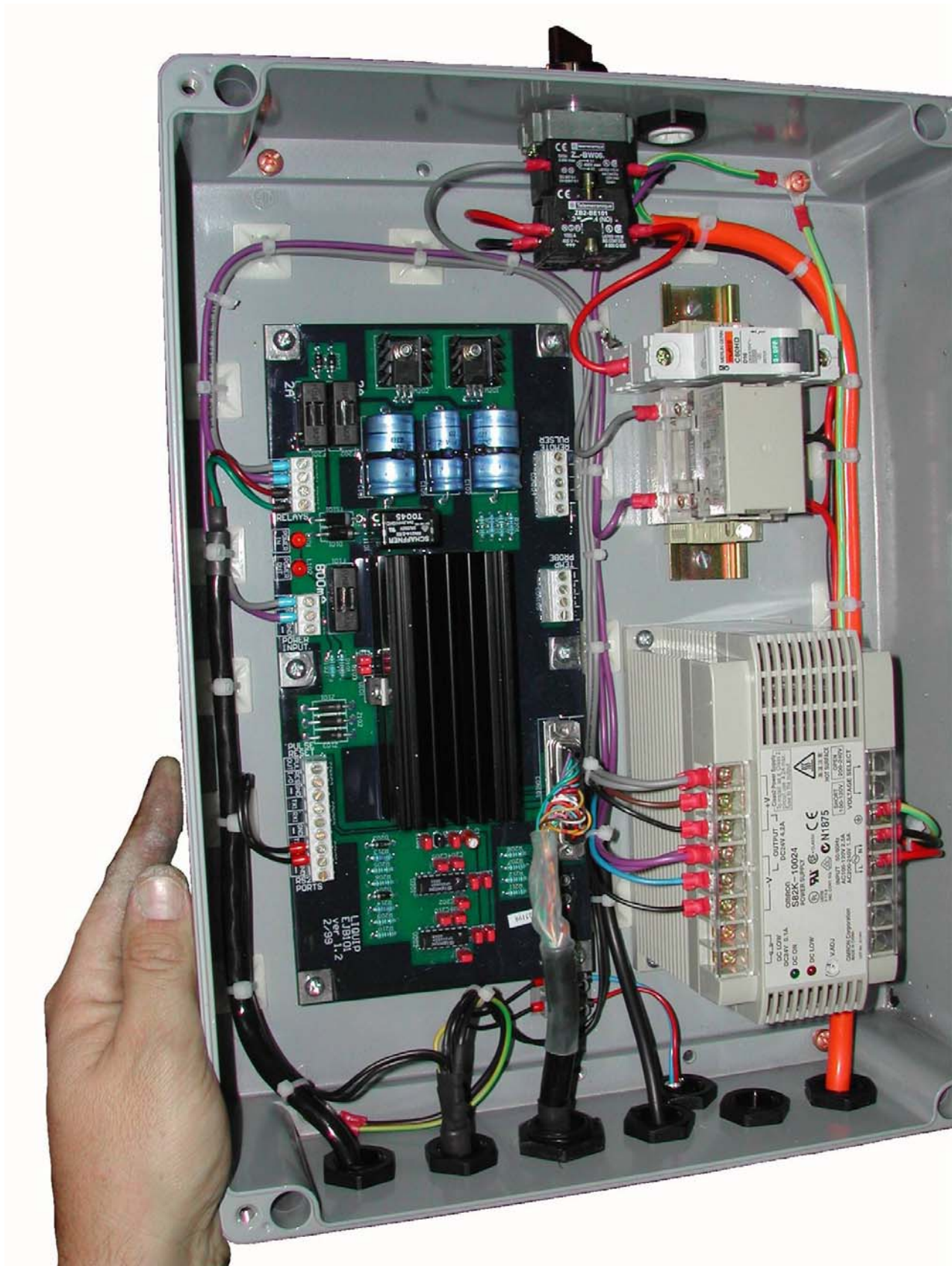


1.2.3 Solenoid Mounting

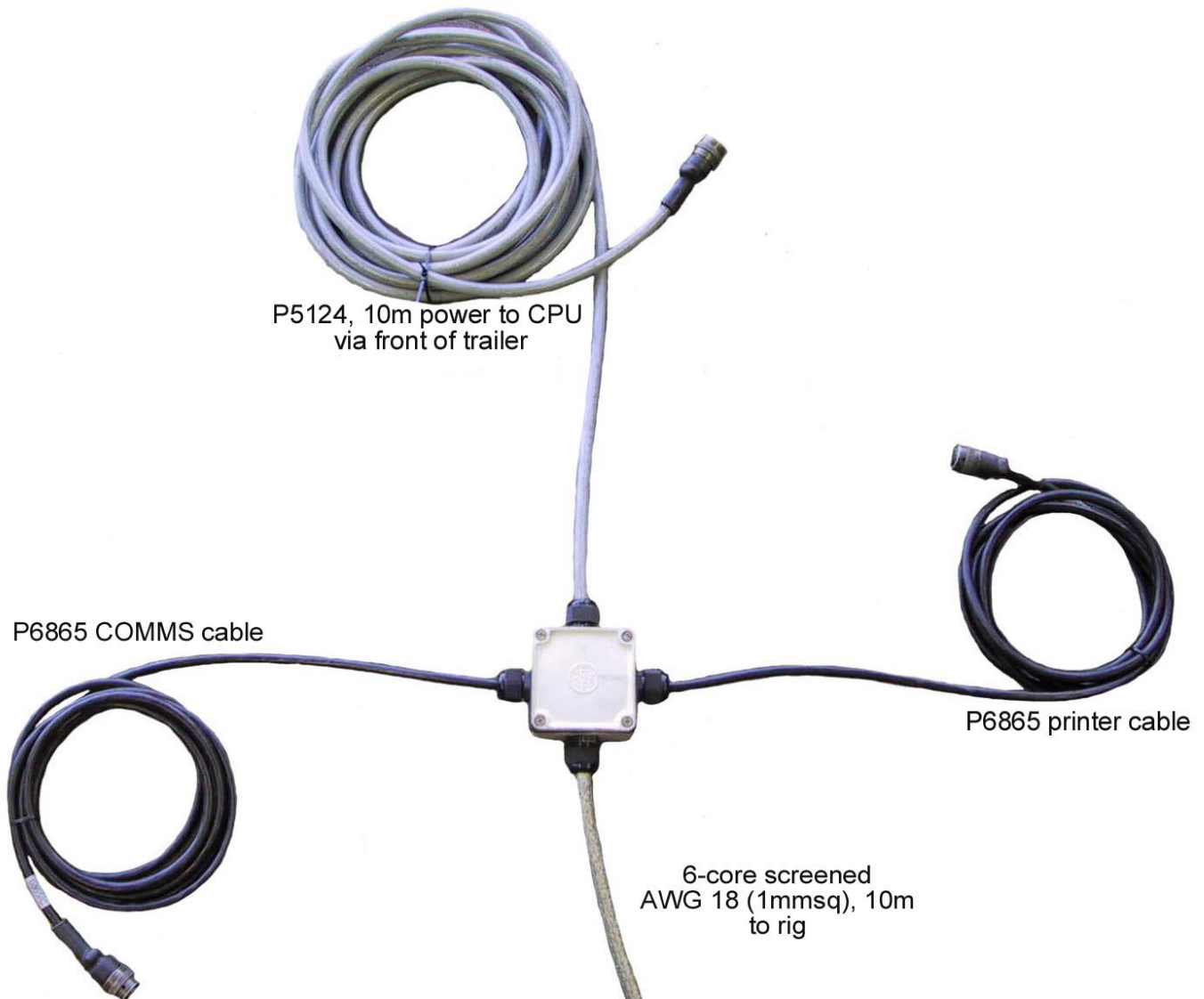


1.2.4 Electrical Layout





1.2.5 Harness Layout Between Rig, CPU & Front of Trailer



Note: An adaptor harness is required to connect between the mil spec of the auto rig (power out to CPU) to a 10-pin harness connector mounted on a tanker. Contact Liquip for further details.



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1.2.6 Wiring Layout Between Rig, CPU & Front of Trailer

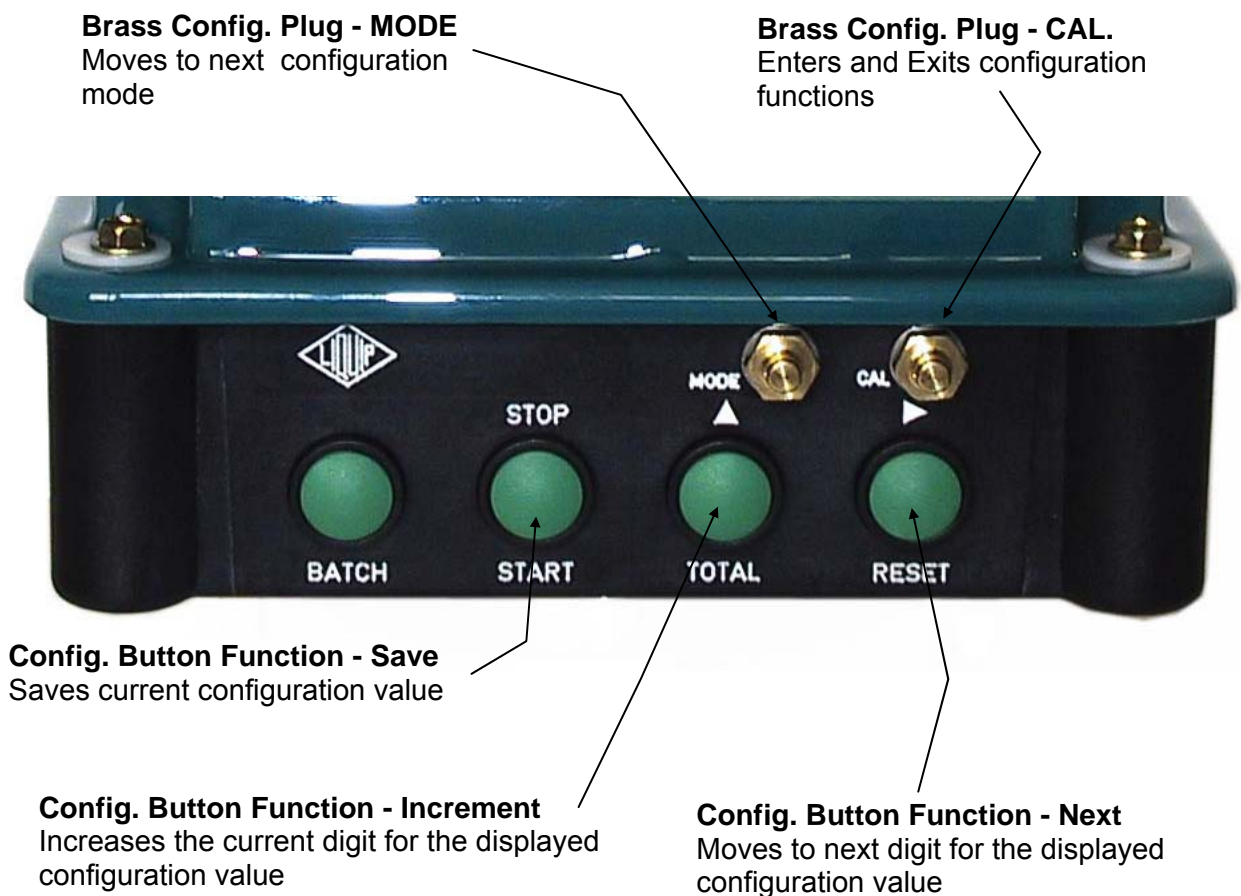
DEVICE	DEVICE WIRE	CONNECTS TO:	PURPOSE
Printer	Red	Wire 3	Positive
	Blue	Wire 4	Negative
	Green/Shield	Green/Yellow	GND
CPU COMMS	Red	Wire 5	Positive
	Blue	Wire 6	Negative
	Green/Shield	Green/Yellow	GND
CPU Power	Wire 1	Wire 1	Positive
	Wire 6	Wire 2	Negative



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2.0 EMH500 Software Configuration - Note: ensure correct version EPROM is installed - 01.09.00.

2.1 EMH500 Button Navigation



The EMH500 register configuration for use with Diptronic is achieved by the switches under the two front panel brass calibration plugs and the four front switches each assigned with the above functions.



2.2 EMH500 Software Upgrade Procedure

Following insertion of the new EPROM complete the steps listed below. This will configure the EMH500 for auto calibration operation:

1. Power OFF.
2. Remove the lid.
3. Gently remove the EPROM from the socket.
4. Insert new EPROM into the socket, check orientation and whether it is fully pushed into the socket, all pins are straight.
5. Toggle DIP switch #1 to ON. Make sure the other switches are OFF.
6. Power ON.
7. Erase the memory: On display ERASE?N, press TOTAL to "Y", press START to accept. Display shows message "ERASE!" then "memory reset-restart register".
8. Power OFF.
9. Toggle DIP switch #1 back to OFF.
10. Put the cover back on, make sure the gasket is properly installed.
11. Power ON.
12. After the start-up, the display shows "data error" message, press the CAL button once to enter calibration.
13. Change calibration parameters as required.
14. Press the CAL button to exit calibration.
15. Power OFF.



2.3 Button Operation of EMH500 During Standby & Delivery Modes

BUTTON	STANDBY MODE	DELIVERY MODE
Batch	Enter batch mode Exit batch mode & save data	Show batch quantity for 5 sec
Start/Stop	N/A	Stops calibration
Total ▲	N/A	Show total for 5 sec
Reset ►	Reset display	Show flowrate for 5 sec

2.4 Setup of EMH500 for Diptronic

Setup the EMH500 to the configuration below. Refer to *EMH500 Series Electronic Register Software Settings Reference Manual* for information on how to navigate the internal menu structure.

Function	Format/id	Setting for auto cal rig
KO– Factor	K0	As required
Register mode	ModeNORM	ModeNORM
LPG Vehicle?	LPG? N	N
Specific Gravity	DENSITY	0.000
Pulser Input	PulsInp1	1
Direction of Rotation	DirRot?A	As required
Single Input	SnglPs?N	N
RemDen or RemSG	RemDEN? N	N
Enable Rem Clock?	RemCLK? N	N
Enable Rem Batch?	RemBAT? N	Y
Set Meter Number	MeNo 0000	0000
Output Pulse Speed	P/O LO	HI
Reset Time Out	RsTm 000	000
Enable Remote Res	RemRES?N	Y
Set Unit type	Units L	L
Set Resolution	Rsln 0.1	0.1
Product Return	PRmode?N	N



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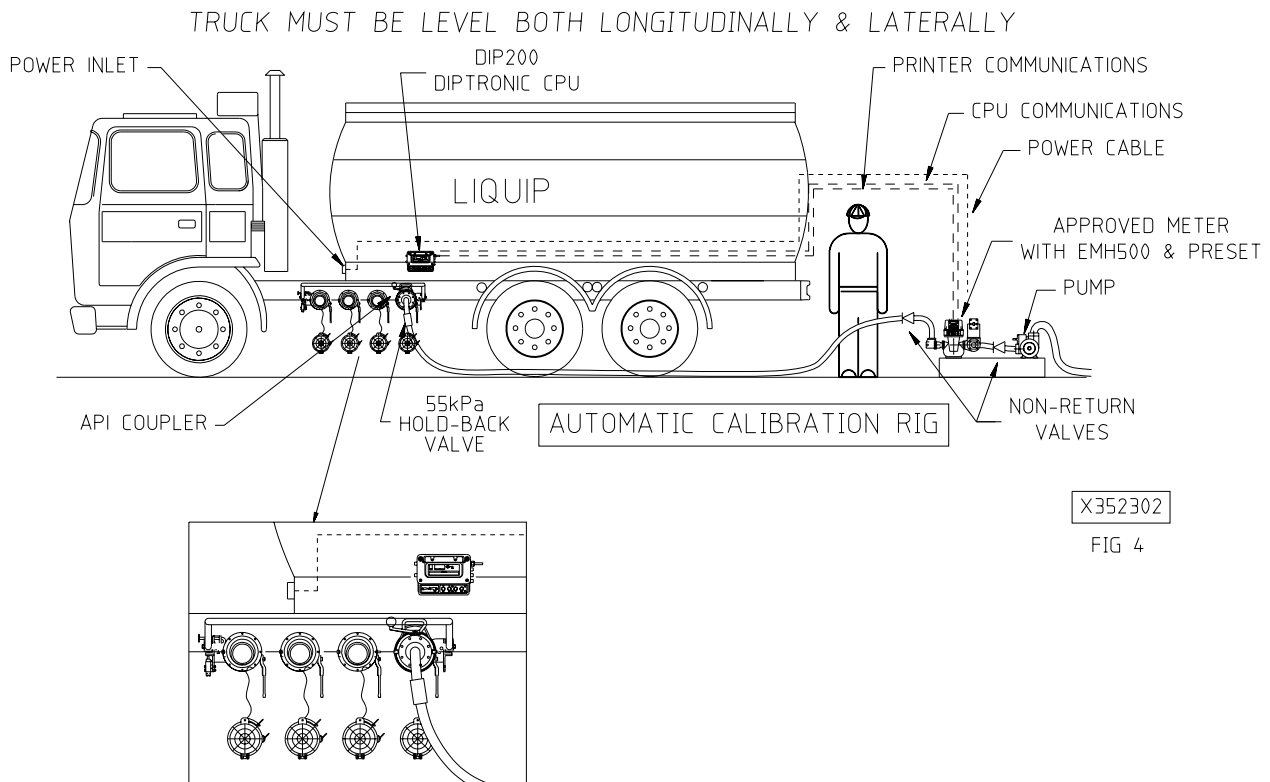
Function	Format/id	Setting for auto cal rig
Max Ramp Up Flow Rate	Fup00000	00000
Max Delivering Flow Rate	Fmx00000	10000
Max Ramp Dn flow Rate	Fdn00000	00000
No Pulse Timeout	TmOut 000	002
Overshoot	Over 00.0	As required
Comm Port Modify?	PORT1?N	OFF
Comm Port Modify?	PORT2?N	TOUCH-PC
		P2: 9600
		P2 ACK? N
		NegACK?Y
		EMH400?N
Non-Linear Correction	N-LIN? N	N

Note: Once the above settings have been made it will not be necessary to input this information again unless the EMH500 is replaced.



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APPENDIX 1 - Wiring Diagrams



Voltage settings:

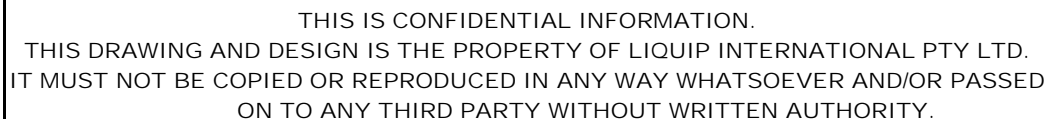
Solenoid valve (to ASCO): 24Vdc

CPU power: 24Vdc

Printer: 24Vdc

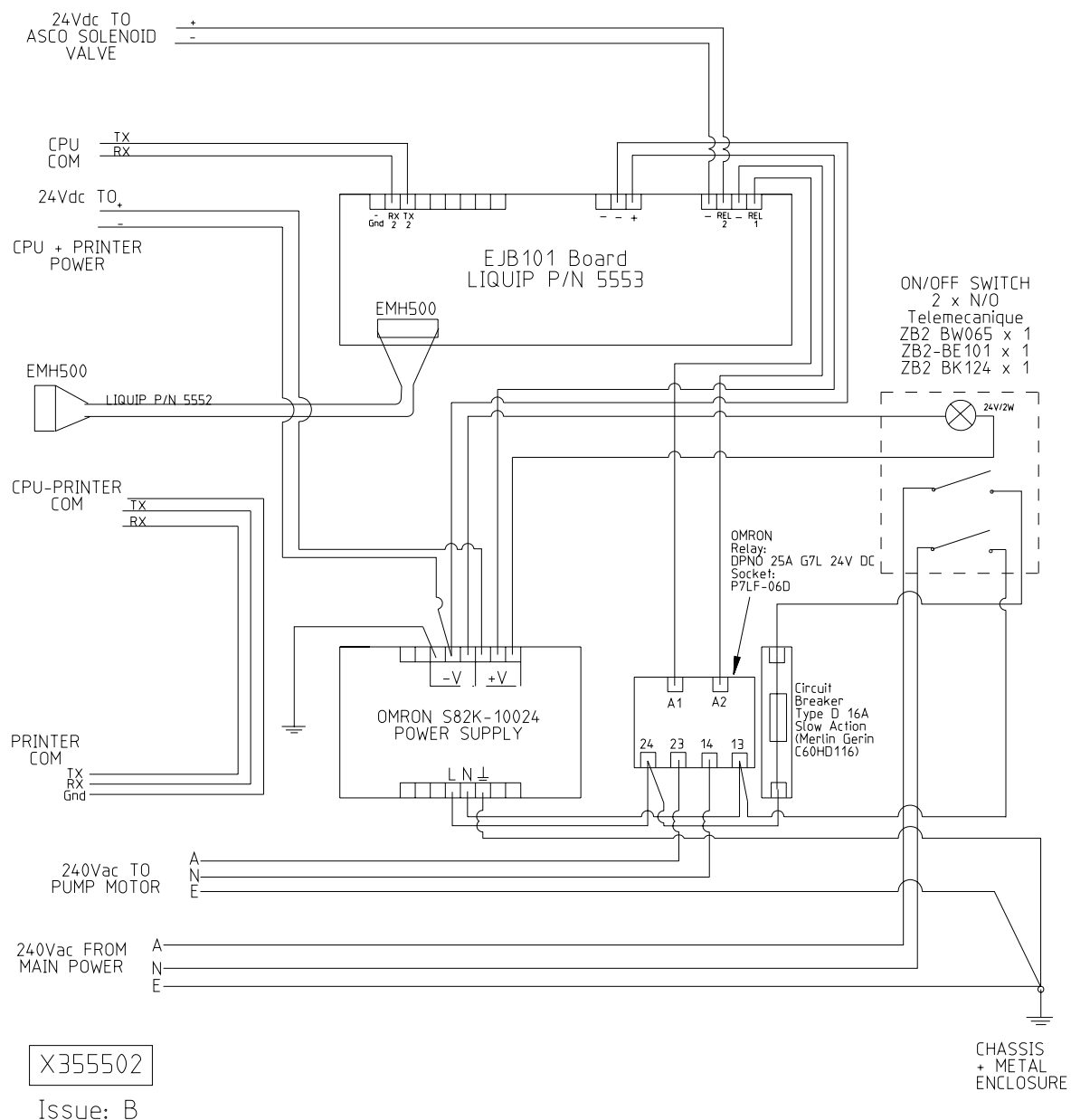
Pump motor: 240Vac

Main power: 240Vac



DIPTRONIC AUTOMATIC CALIBRATION UNIT

ELECTRICAL CIRCUIT



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



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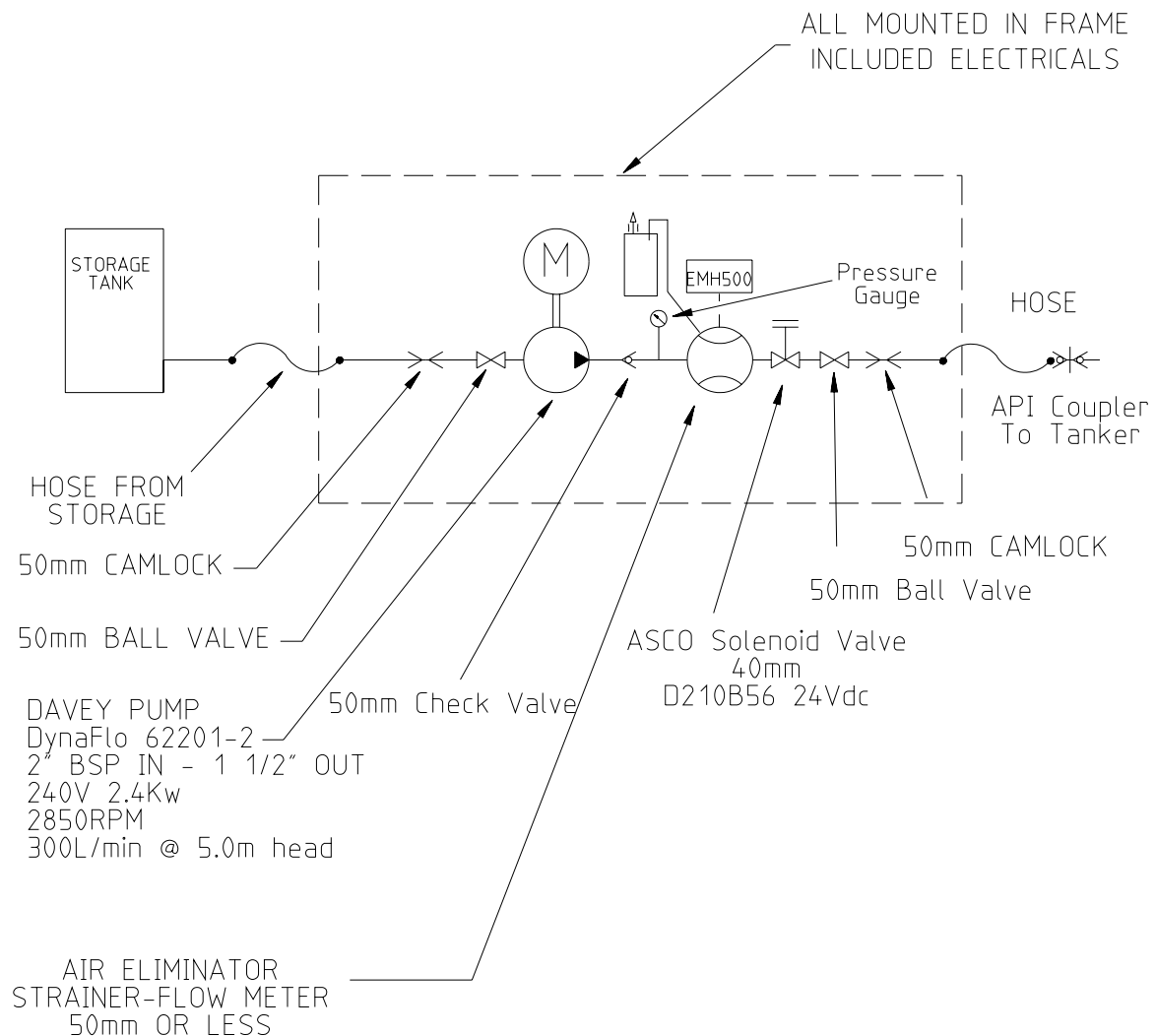


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LIQUIP

DIPTRONIC AUTOMATIC CALIBRATION UNIT

HYDRAULIC CIRCUIT



X355402

Issue: B

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



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APPENDIX 2 - Associated Documentation

The following documents are used in conjunction with this one for the Diptronic rig operation:

Note: These documents are available from Liquip if need be, collated in a folder.

1. *P6379 EMH500 SERIES REGISTER MANUAL FOR DRIVER*

The Liquip EMH500 drivers manual.



2. *EMH500 SERIES REGISTER MANUAL* *PART A: HARDWARE & INSTALLATION* *PART B: SOFTWARE SETTINGS*

The Liquip EMH 500 manual.

Note: The EMH manual also includes relevant information on EJB101/102 installation.



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3. OMRON RELAY DETAILS

Refer instructions available with purchase. DPNO, 25A, G7L2, 24Vdc, 303 ohm coil relay.

4. OMRON POWER SUPPLY DETAILS

Refer instructions available with purchase. S82K-10024, 100W, 24Vdc, 4.2A general purpose power supply.

5. ASCO SOLENOID VALVE DETAILS

Refer instructions available with purchase. 40mm, 24Vdc general purpose solenoid valve.

6. DAVEY PUMP INSTALLATION & OPERATING INSTRUCTIONS

Installation and operating instructions for Dynaflo Electric Pumps model 6220 (refer instructions available with purchase).

7. ISOIL FLOW METER SERVICE MANUAL

Service Manual, P.D. Meter Oil Meter Type SBM 75 Aluminium Execution November 1992 (refer instructions available with purchase).



APPENDIX 3 - Parts List

The following is a list of parts required for assembly of an automatic calibration rig. Sample supplier listed for convenience.

Qty	Description	Part no.	Supplier
1	Metal Box (400x310x110) (IP65 with rubber seal gasket)	222-761	RS Components
1	Circuit Breaker (1pole, Type D, 16A)	716-4713	Farnell
1	DIN Rail (150mm long)	176-652	RS Components
2	End Stop for DIN Rail	6969	Liquip Store
1	Omron Power Supply S82K-10024	156-2032	RS Components
1	Omron Relay (24V)	329-963	RS Components
1	Socket for Relay	376-105	RS Components
1	PTO switch	1928	Liquip Store
1	N/O module for PTO switch	-	-
1	EJB101/102 Power Regulator	5553	Liquip Store
1	Solenoid Valve 1 1/2"	SCD210D22-24V	ASCOMP
1	Gen purpose box - 105x105x72mm	Clipsal 265/1	Lawrence & Hanson
1	Davey Pump - Dynaflow	02884155	Blackwoods
1	Socket Harness 26 pin & gland	5552	Liquip Store
10m	Cable (mains), Orange	3556	Liquip Store
10m	Harness 10core scrn with mil plug	-	Open Wiring
1	Adaptor harness for 10 core 10m	-	Open wiring
1	Harness for Printer	6868	Liquip Store
1	Power Cable for Printer	4188	Liquip Store
1	Cable Plug, 3 pin clear	Clipsal 439*HD	Lawrence & Hanson
10	Cable Gland (M20x1.5)	5060	Liquip Store
1	Locknut 3/4"	-	Farnell
1	Plug (M20x1.5)	-	Lawrence & Hanson
1	Locknut M20	-	Lawrence & Hanson
1	Cable Gland for Solenoid (6-12mm, 1/2"NPT)	1.209.1201.70	Polycom
2m	3 Core Shielded Comm. Cable		Open Wiring
6	M4x35 Pan Hd Z/P screws	ACA/M435PX2	Express Ind. Suppl
24	M4x18 Pan Hd Z/P screws	4837	Liquip Store
12	M4 Nyloc Nuts	6454	Liquip Store
12	M4 Fibre Washer	5321	Liquip Store
6	Standoff for EJB101/102 (plastic - 20mm, 4.3mm id)	6875	Liquip Store
6	Eye Terminal 6.3mm, 2.5-3/red	1412	Liquip Store
20	Fork Terminal 4mm/red	209-612	Farnell
2	Harness	6865	Liquip Store
1	Terminal strip	5074	Liquip Store



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APPENDIX 4 - 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



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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