

EMH500 Series Electronic Register



Installation Manual

Version 2.1a

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Other Manuals in the Series:

Hardware Reference Manual
Software Settings Reference Manual
Developer Interface Manual
General User Guide
Revision History (Internal Use Only)

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1. Introduction

Thank you for supporting this product and taking the time to read this installation manual.

The Liquip Group has been manufacturing Electronic Meter Heads (Electronic Registers) for over 15 years. The EMH500 being the 5th and latest series has undergone a complete transformation with many new technologies being employed to greatly enhance overall functionality.

The EMH500 has been specifically designed to meet the many different Weights & Measures standards for metered delivery systems found around the world. Especially, where the use of mobile computing, point of sale invoicing and other electronic administration automation is being considered.

The EMH500 is a significant departure from traditional Electronic Meter Heads. While the device remains fairly self-contained and easy to install, the large number of set-up parameters and functional options suggests a good understanding of this manual will greatly reduce potential configuration errors.

1.1 Use of this Manual

This manual is designed as a guide for experienced installation technicians familiar with all local codes and standards associated with this type of work. It is supplied with the intent of providing a broad view on installing and configuring the EMH500 only.

It should be used as a reference for both basic (Stand-alone) and more complicated (Interfaced with Computer) installations. However, separate manuals provide the necessary details for associated equipment.

We recommend you become familiar with the contents of this manual before attempting to install the product. We also assume you have detailed local knowledge on and certified where required in,

- Electrical Safety Standards.
- Weights & Measures certification and verification.
- Electronic systems installation.
- Hazardous Environment Installation (where applicable)

Ensuring compliance with the highest safety and regulatory standards is of critical importance.

1.2 Document Revision History

Version 1.0 – Original Document (combined manual)

Version 2.0 – Split into component documents 08/07/99

Version 2.1a – Revise power wiring and add shielding wiring diagrams 05/11/01

2. Parts Supplied

EMH500 Complete – P/N^o: 699750

Comprising:

EMH500 Register Head

EJB101 Power / Junction Box

Aluminium Shaft Adaptor

Roll pin 1.5 x 10mm

Split pin 1.5 x 20mm stainless steel

4 off ¼" x ¾" UNF Mounting Bolts

The following parts are not supplied but are available from your local solution centre

¾" NPT Plug (for sealing unused conduit entry points)

¾" NPT to 20mm Reducing Bush (for adapting to metric conduit)

M8 x 30mm Bolts, Nuts and Washers (for mounting junction box)

Conduit Fittings

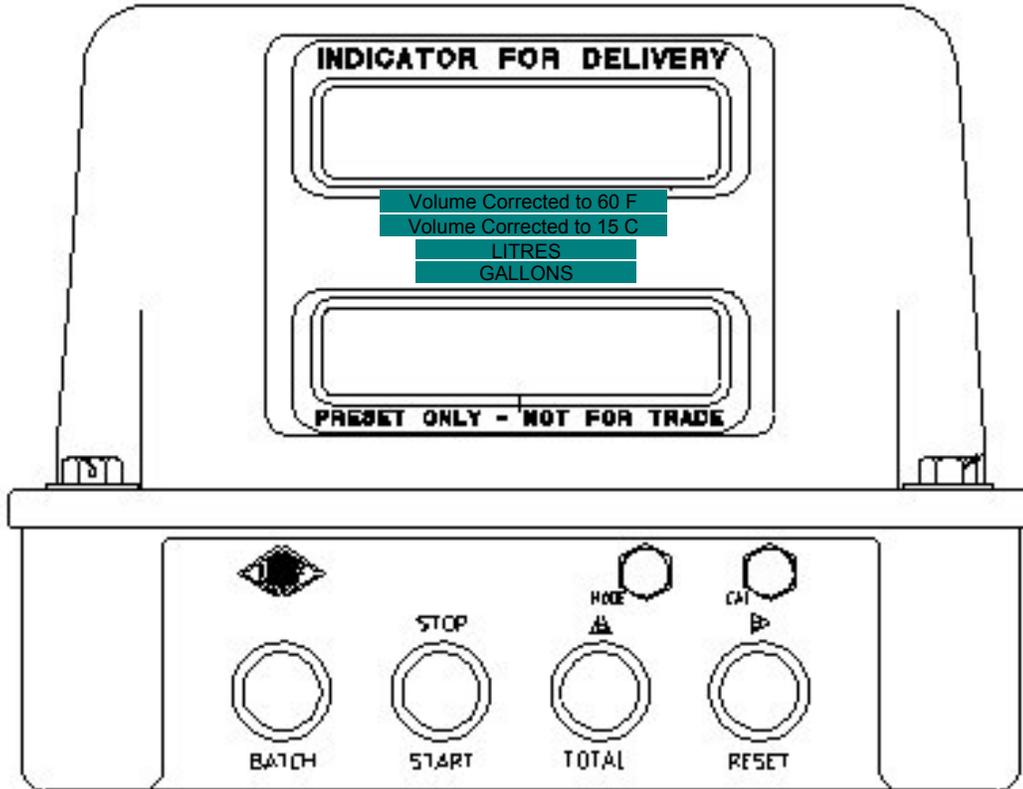
Conduit & Cable

Drive adaptors for various meters

3. Installation – Mounting

3.1 EMH500 Register

3.1.1 Label Diagram



Sticker that can be removed to show text underneath

Ensure either the metric or imperial display labels are showing

3.1.2 Mounting on an LC Meter

Mounting bolts: 4 off 1/4" x 3/4" UNF with flat and spring washers. The 4 hole bolt pattern matches the standard 4 hole pattern of the LC Meter; a cover plate is used to enclosed the remaining parts of the LC meter head mounting.

Without the LC Calibrator

- The LC Calibrator is not required for either setting the K-factor (done within the EMH500), or for shaft speed reduction. The LC extension shaft kit (EMH500-21) replaces the calibrator. The kit includes
 1. The extension shaft
 2. The shaft support bush plate
 3. Aluminium shaft adaptor
 4. Roll pin 1.5 x 10mm
 5. Split pin 1.5 x 20mm stainless steel
- The shaft support bush plate is mounted in place of the calibrator.
- The extension shaft attaches to the register with the aluminium shaft adaptor and fits down through the bush and over the crown wheel shaft as the register is fitted.
- Screw in the 4 mounting bolts.

With the LC Calibrator

- The LC Drive Dog is attached to the aluminium shaft adaptor
- Using a 1/16" x 3/8" roll pin.
- The shaft adaptor is attached to the Register using a 1.5 x 20mm stainless steel split pin.
- The drive dog fits into the top of the calibrator as the register is placed onto the meter and the mounting bolts done up.

3.1.3 Mounting on a Neptune Meter

Mounting bolts: 4 off 1/4" x 3/4" UNF with flat and spring washers.

- Mount the EMH-5 casting adaptor to the Neptune Meter using 2 off 3/8" x 1 1/4" UNC bolts with flat & spring washers
- Attach the Neptune Drive fork to the aluminium shaft adaptor using a 1/16" roll pin.
- Attach the shaft adaptor to Register using a 1.5 x 20mm s/s Split pin.
- The Drive fork fits into the Star Drive as the register is placed onto the Casting Adaptor.
- Screw in the 4 mounting bolts.

3.2 Mounting With ERP100 Remote Pulser

Refer to Hardware Reference manual for diagrams.

3.2.1 Remote Pulser - LC Meter

Additional Parts required

Side Mount - 697732/001 - Mount Kit ERP100/LC Meter Direct

Top Mount - 697731/001 – Mount Kit ERP100/LC Meter Top

Installation

- Attach Drive dog
- Attach ERP100 to cast adaptor using screws supplied (3/8" UNC)
- Fit adaptor and ERP100 to meter

3.2.2 Remote Pulser - Neptune Meter

Additional parts required

697734/001 - Mount Kit EPR100

- Attach 200-1 to 200-5 Casting
- Follow remote pulser instructions

3.3 Power Junction Box (EJB101)

- The location of the Junction Box is dependent on the length of cable to the Register and the length of cable of the Temperature Probe.
- The standard length of cable to the Register is 1 metre. Optional lengths are 2, 3 and 4 metre.
- The EMH500 automatically calibrates for a change in the Temperature Probe cable length, whether it is lengthened or shortened.
- The location should also allow for the easy removal of the lid and access for wiring
- The box is mounted to the chassis using 4 off 8mm bolts.
- Conduit threads in Ex e junction box are 3/4" NPT. Adaptors can be used to change to 20mm.

3.4 Remote Display

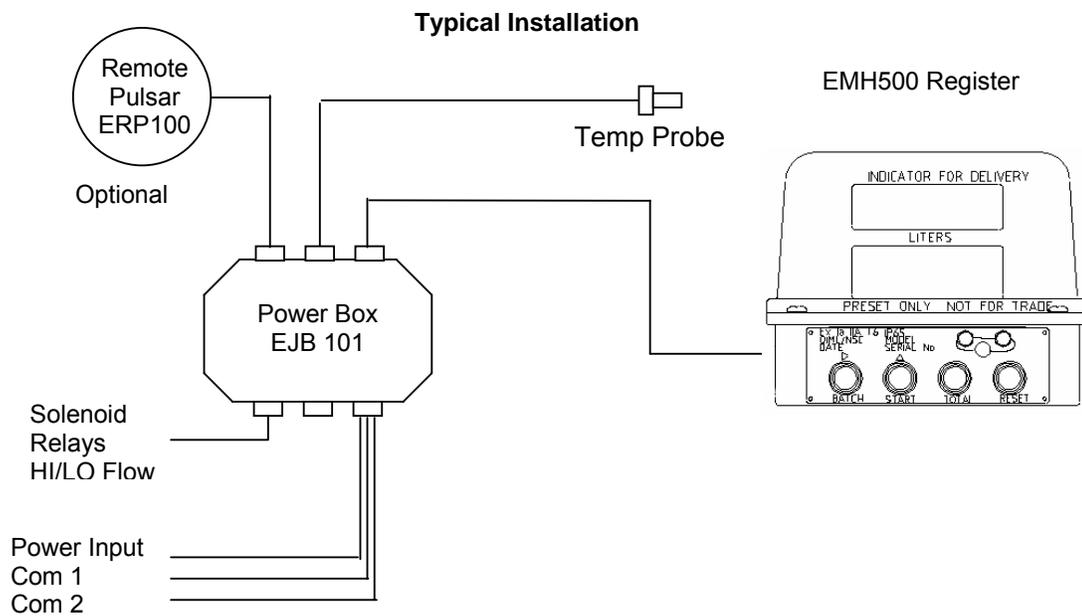
- Ensure mounting of the Display is in plain view.
- The remote display should be securely mounted.
- Ensure vibration effects to the Display are minimal.

3.5 Temperature Probe

- The Temperature Probe can be mounted directly in product, or preferably, in a thermowell.
- Care needs to be taken for the location of the probe so that the wiring will be protected.
- The probe has a 1/4" NPT thread.
- If the probe is mounted in a thermowell a conductive substance has to be used.

4. Installation – Wiring

- The wiring and conduit must be done in conjunction with standards and rules of the local authorities.
- The Register and the cable to Junction box are intrinsically safe.
- Data and Power cable should be shielded.
- Input power is auto sensing between 11 – 30 V DC
- Input Power should be connected either to the main supply in the cabin of the vehicle or the Isolation Switch.
- The power box is internally fused by 3 anti-surge fuses.
 - 800mA glass 20x5mm
 - 2 x 2Amp glass 20x5mm Relay outputs
- Typically the serial comm port 1 (Com 1) is connected to an invoicing system such as the TouchPC.
- A serial printer eg TouchStar Blaster Printer with a 9 pin D connector or an Epson Slip printer with a 25 pin D connector is typically connected to the serial comm port 2 (Com 2)
- All wiring should be run in conduit and all wires and conduit should be securely held with cable ties.



4.0.1. Recommended Cable Types For System Wiring

Item	Usage	Cable type	Comments
1.	EMH500 to EJB	25 Core, 25 x 7/0 Foil shielded with drain wire RS232 cable, 10.7mm N.O.D. Polyurethane sheath	Supplied
2.	Power Supply	2 Core Shielded (16 x 0.2) Foil shielded with drain wire. (Red/Black)	Rated @ 24Vdc5A or 12Vdc 5A
3.	RS232 Port 1 or 2	4 core 24AWG 7 x 0.2 Foil shielded with drain wire COMM 1 : Sheath Black COMM 2 : Sheath BLUE	Wire colours inside are blue, white, red and black
4.	Temperature Probe	N/A	
5.	HI-Speed Pulser	5 core 24 AWG (7 x 0.2) foil shielded cable with drain wire	
6.	Remote reset	Single core cable (7 x 0.2)	Standard cable
7.	Pulse Output	4 core 24AWG (7 x 0.2)	Standard cable
8.	Solenoid (each)	2 Core Shielded (16 x 0.2) Foil shielded with drain wire. (Red/Black)	

4.1.2 Shielding & Earth Resistance

Never rely on using the vehicle chassis as an electrically continuous common ground without first measuring the resistance between the chosen earth point and the negative battery terminal. The cabin earth point or the battery terminal.

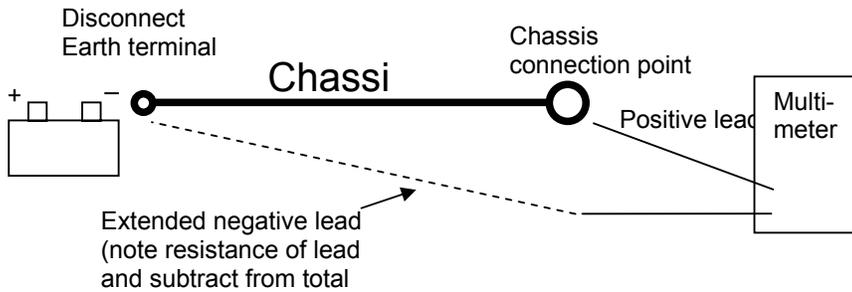
Not checking the earth resistance could be the cause of intermittent equipment malfunctions with operational reliability being sacrificed.

The measurement must be taken in the following manner:

- Extend the multimeter lead with a low resistance cable long enough to reach from the battery to the chosen earth point. The resistance of this cable should be measured and taken into account when calculating the final resistance.
- Disconnect the negative terminal from the battery and measure from the negative lead to the point you intend to use as the central vehicle earth point. (The central vehicle earth point is the point that all TouchStar equipment earth connections are connected to)
- The earth resistance should be measured for each vehicle and must be less than 1 ohm. (i.e. the earth point resistance less the test lead resistance).

In the event that a resistance measurement of less than 1 ohm cannot be achieved it is necessary to run a cable from the isolation switch or negative terminal of the battery into the cab for the vehicle earth. The size of this cable should be equivalent to 65 x 0.3mm, 6mm Auto cable.

Earth Resistance Measurement Diagram



Positive Power Connections

The connection to the positive terminal must be treated in the same way. There must be less than 1 ohm resistance between the Positive battery terminal and the positive connection point in the EJB101. This includes wiring through fuse panels, ignition switches, relays.

Shielding

All shielded cables must be grounded at one end only at the central earth point.

Below 30 meters, one overall shield in multi-core cable is sufficient but above this distance every cable should be individually screened.

Small millivolt signals should be transmitted by shielded twisted pair wire.

In this case all the register power and data cables must be shielded, and have their shields earthed in the EJB101.

The shield on the Register cable from the cradle is connected to the shield on the cable from the EJB 101 junction box. Where this cable connects to the EJB101 junction box the shield is connected to the ground connection (as is the blue core wire, which is the signal ground connection, and the red core wire, which is a spare). This is Register Com 1 in the attached drawing.

The same is true for the shield on the printer comms cable. This is Register Com 2 in the attached drawing.

The Power cable and the Temperature probe cables are grounded in the same way.

The 1-ohm reading between the EJB101 and the negative battery terminal applies as it does for the cabin central earth point.

The 1-ohm reading between the EJB101 and the positive battery terminal also applies, as it does for the cabin mounted equipment

4.1 EMH500 Register

The EMH500 Register has a single cable connection from the junction box to the rear of the EMH500 Register. It is a bayonet style connector and is keyed for alignment.

4.2 Remote Pulser

4.2.1 ERP100 Remote Pulser

The Remote Pulser (ERP100) requires a 6 wire shielded cable connected to CON.104 in the EJB101 and should be contained within a suitable conduit that satisfies local regulations.

The white plug inside the EMH500 that connects the internal pulser must be disconnected and secured to the support bracket with a cable tie. Connecting both the internal and remote pulser will cause OPTO errors.

The shield is to be grounded at the EJB and care should be taken within the pulser so as not to interfere with the rotational operation of the pulser.

The conduit entry is a ½" NPT thread and ½" NPT to 16mm adaptors are available.

4.2.2 Single Pulse Input

If a single pulse is used, connections inside the EJB101 are to P1 and GND with 0.4V and 1.5V thresholds and single pulse input must be selected in the calibration settings of the EMH500. The internal pulser connector located on the main board of the EMH500 must be disconnected as above.

4.3 EJB101 Power Junction Box

See attached wiring diagram.

Connections

Relay Connection (To Solenoids)

Rel1, Rel2 - The connection directly leading to the input of the solenoids
GND - Ground connection

Communication Port

TX1, TX2 - Data lines for sending data (transmit) from the EMH500 to the printer/Touch PC. This is typically connected to the RX lines of the printer/Touch PC.
RX1, RX2 - The direct opposite of the TX lines. Used for receiving data from the printer/Touch PC
GND - Ground.

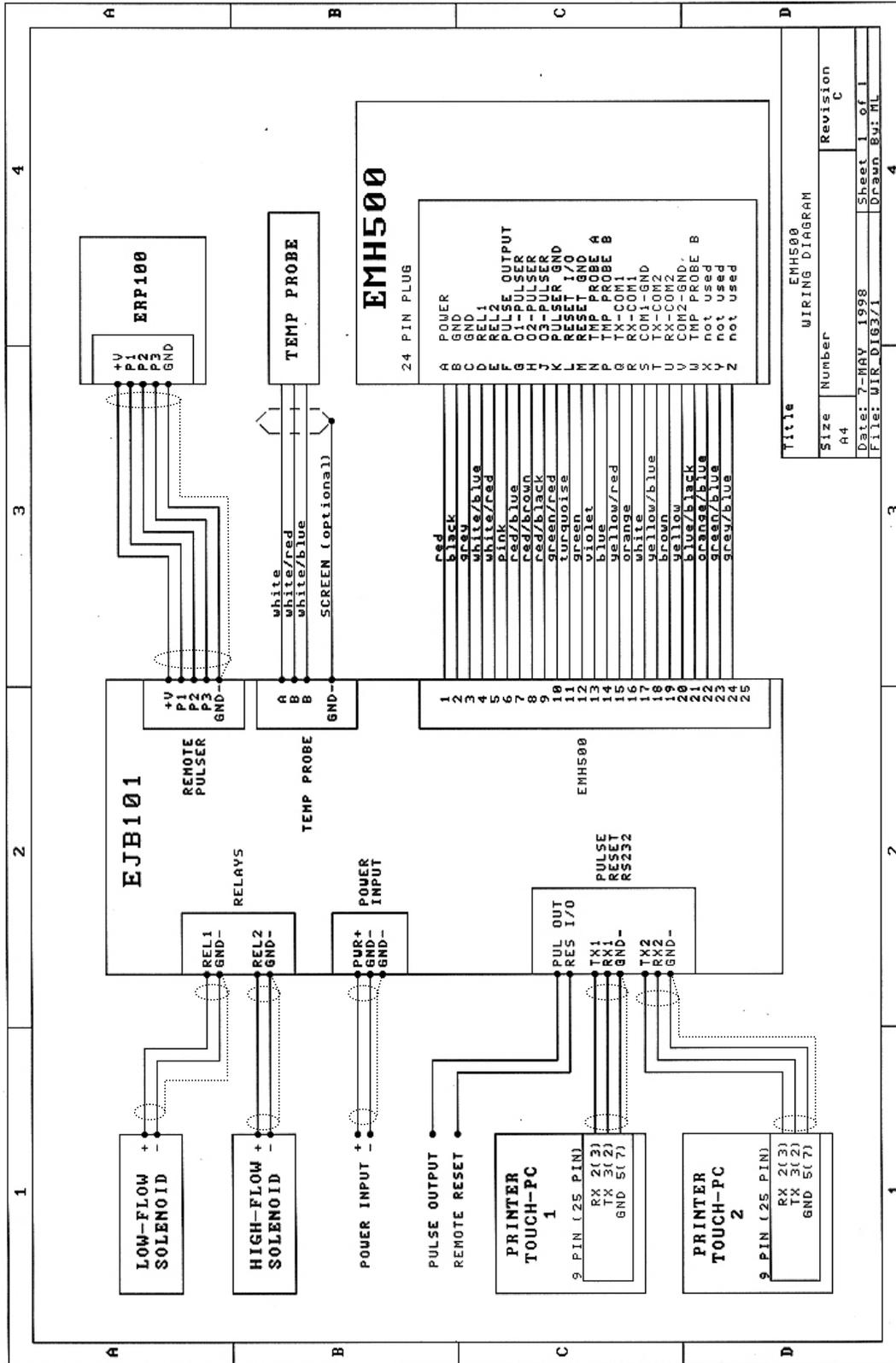
Remote Pulser Connection

V+ - Power for the remote pulser
Px - P1, P2, P3 lines are the three channels (pulse lines) used for calculating volume.
GND - Ground.

Temperature Probe Connection.

A - Connection for the white wire of the probe
B1, B2 - Two connections to the white/red and white/blue wires of the probe. A second wire is required for compensating wire resistance.
GND - Ground (optional)

4.3.1 EJB101 Wiring Diagram-For power and signal only. See previous wiring diagram for shielding



4.4 Remote Display

Additional Parts required

4 Wire Data

2 Wire Power

10k Pull up Resistor (Reset)

3/4" NPT - 20mm Adaptor (Brass)

20mm – 16mm Brass Adaptor

1070703 – 16mm Adaptors

Conduit

- Wire the Remote Display to the Power Junction Box at CON103 using shielded 2 Pair cable ensuring shield is grounded at both ends.
- Refer to the Remote Display manual for input voltage and as to whether a pull up resistor is required on the pulse input.
- Depending on whether the Remote Display is 24V or 12V will determine what voltage is supplied to the Power Junction box as the input power is paralleled from the power box supply using 2 wire shielded cable

4.5 Temperature Probe

1070703 16mm Adaptor and Seal Cap

3/4" NPT/20mm (Brass)

20mm – 16mm Reducer (Brass)

1070701 - Conduit

697701/001 – Temperature Probe

The Temperature Probe should be wired to CON.105 of the Power Junction Box with the resistive path between terminals 'A' & 'B'

The shield should be connected to the Ground terminal in the Power Junction Box

4.6 TouchStar Blaster Printer

The printer requires a 24V power supply. If the vehicle is 12V a power inverter must be connected.

The power is wired through a noise suppressor to the 2.1mm DC plug. The centre pin is positive.

The data connection is made to the 9 pin serial connector on the back of the printer.

Detailed connections to the TouchPC can be found in the appropriate TouchPC manual.

4.7 Slip Printer

The printer requires a 24V power supply. If the vehicle is 12V a power inverter must be connected.

The power is wired through a noise suppressor to the 3 pin connector.

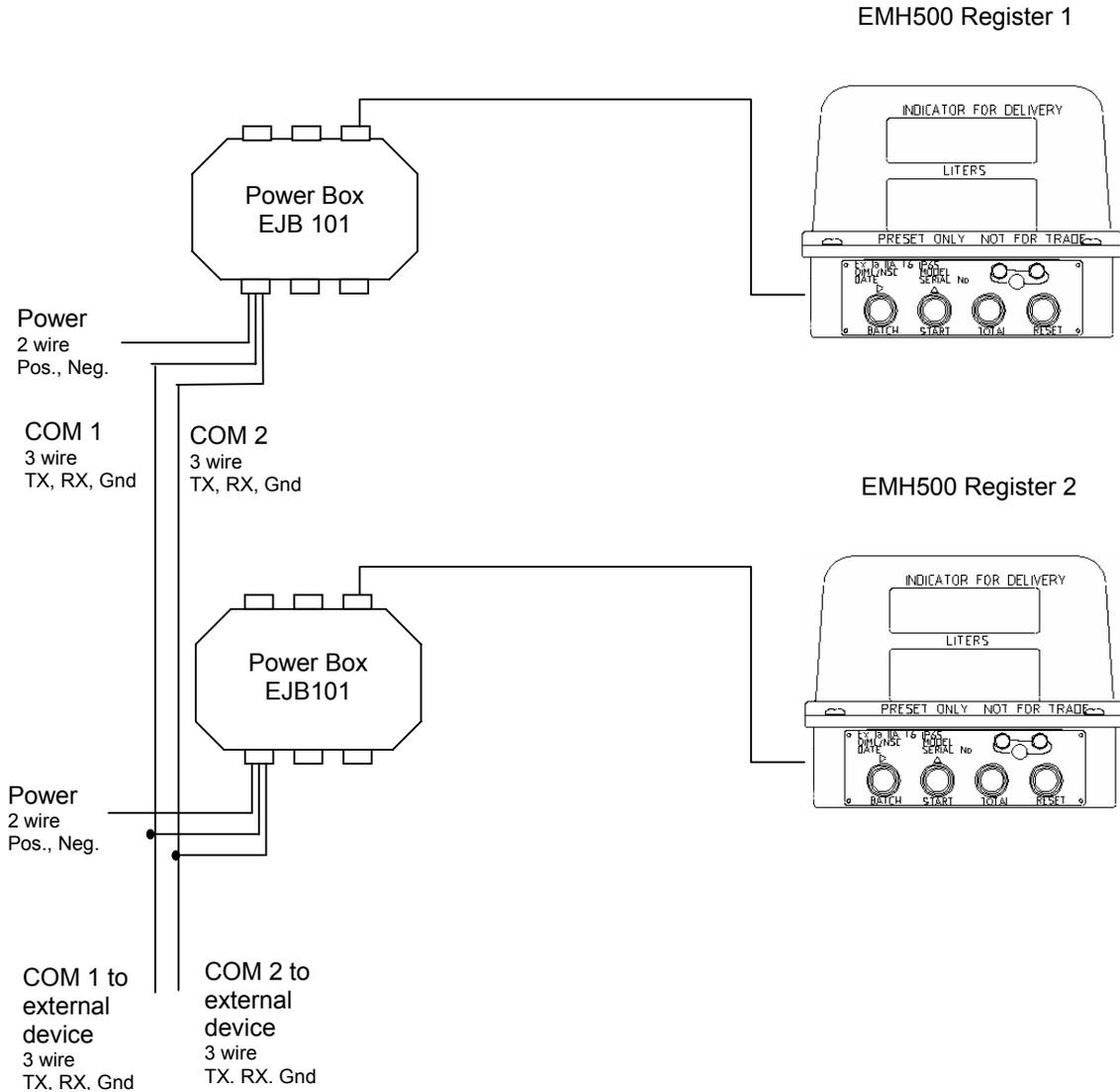
The data connection is made to the 25 pin serial connector on the back of the printer

4.8 Connecting Multiple EMH500 registers

More than one EMH500 can be connected in parallel from situations where multiple pumping occurs.

1. Install the register excepting COMS connections as normal
2. Loop the comms channel terminals between the separate power boxes.
3. (ie Register 1 com1 TX terminal to Register 2 com1 TX terminal and so forth)
4. Connect the external comms devices (TouchPC or Printer) as normal to one register.

As an example the following diagram shows two registers connected together



5. Calibration Set-up

5.1 Typical Printout

-----SETUP---01.01.22-----		Menu	Menu Options
COMPANY NAME	LIQUIP	MANAG?	[CONAME] LIQUIP
METER NUMBER	0120	MANAG?	MeNo0000
DATE	02/01/1998	CLOCK?	[DATE] 00/00/00
DATE_FORMAT	MM/DD/YY	CLOCK?	DD/MM/YY
TIME	12:54	CLOCK?	[TIME] 00:00:00
K-FACTORS RANGE	STANDARD	KO CAL?	Range ST
K0-FACTOR	1500.000	KO CAL?	[KO] 1500.0000
OPERATION MODE	NORMAL	MANAG?	ModeNORM
PRODUCT TYPE	LPG	MANAG?	LPG?N
S.G. MAN. ENTERED	0.500	MANAG?	[S.G.]0.0000 or [DENSITY]0.0000
TEMPERATURE CONV	ENABLED	MANAG?	[TEMPERAT] automatically detects probe status
UNCONVERTED VOL	ENABLED	MANAG?	UnconV?N
UNITS	GALLONS	MANAG?	UNITS L
RESOLUTION	0.1 G	MANAG?	Rsln 0.1
ACCUM. TOTAL	00001034.4 G	MANAG?	[AC.TOTAL] 00000000
POWER INTERRUPTS	000	MANAG?	PInt 000
PULSER INPUT NO.	1	MANAG?	PulsInp1
DIR OF ROTATION	ANTICLOCKWISE	MANAG?	DirRot?A
SINGLE PULSE IN	DISABLED	MANAG?	Sinput?N
REMOTE SG CAL	DISABLED	MANAG?	RemDEN?N
REMOTE CLK CAL	ENABLED	MANAG?	RemCLK?N
REMOTE BATCH CAL	ENABLED	MANAG?	RemBAT?N
PULSE OUTPUT	LOW SPEED	MANAG?	P/O LO
RESET TIMEOUT	000 SEC	MANAG?	RsTm000
PRODUCT RETURN	DISABLED	MANAG?	PRmode?N
REMOTE RESET	ENABLED	MANAG?	RemRES
PRESET VOLUME	0000000 G	BATCH?	B00000.0
RAMP UP	000 G	BATCH?	RmUP 000
RAMP DOWN	000 G	BATCH?	RmDwn000
FLOW RATE START	00000 GPM	BATCH?	Fup00000
FLOW RATE MAX	10000 GPM	BATCH?	Fmx10000
FLOW RATE STOP	00000 GPM	BATCH?	Fdn00000
N/PULSE TIMEOUT	000 SEC	BATCH?	TmOut 000
OVERSHOOT	00.0 G	BATCH?	Over 00.0
PRINT DELAY	00 SEC	BATCH?	Delay 00
AIR BLOW	00 SEC	BATCH?	Blow 00
PORT 1	TOUCH-C,9600,NAC	COMM?	PORT1?N
PORT 2	BLST PRN, 9600, ACK	COMM?	PORT2?N
INDEX-PORT1	YES	COMM?N	PORT1?Y - P1 IND?N (printer only)
INDEX-PORT2	YES	COMM?N	PORT2?Y - P1 IND?N (printer only)
DEL.TICK. COPIES	1,1	COMM?N	COPIES 1 (Blaster Printer Only)
SPECIAL DOCKET	N/A, N/A	COMM?N	SpecialN (Printer Only except Blaster)
DATA BLOCK	N/A, N/A	COMM?N	DatablkA (Printer Only except Blaster)
SPACE LINES	N/A, N/A	COMM?N	Lines00 (Printer Only except Blaster)
NEGATIVE ACK	Y, N/A	COMM?N	NegACK?Y (TouchPC only)
EMH400 EMULATION	N, N/A	COMM?N	EMH400?Y (TouchPC only)
NON-LIN CORRECTN	DISABLED		
Fa_00000 GPM	Ka-FACTOR_015.0000	N-LIN?	Fa00000 + Ka?
Fb_00000 GPM	Kb-FACTOR_015.0000	N-LIN?	Fa00000 + Kb?
Fc_00000 GPM	Kc-FACTOR_015.0000	N-LIN?	Fa00000 + Kc?
Fd_00000 GPM	Kd-FACTOR_015.0000	N-LIN?	Fa00000 + Kd?
Fe_00000 GPM	Ke-FACTOR_015.0000	N-LIN?	Fa00000 + Ke?
Ff_00000 GPM	Kf-FACTOR_015.0000	N-LIN?	Fa00000 + Kf?
Fg_00000 GPM	Kg-FACTOR_015.0000	N-LIN?	Fa00000 + Kg?
Fh_00000 GPM	Kh-FACTOR_015.0000	N-LIN?	Fa00000 + Kh?

5.2 Setting the Average K-factor (KO CAL)

This mode allows the user to manually set or to automatically calculate the K factor. It is required that a volume be dispensed into a certified measuring container and that this value then be compared to the reading on the register.

- 1 From the delivery mode, press CAL to enter into the main menu.
- 2 KO CAL? N, will appear with the cursor flashing on the N. This indicates that this option can be changed. If you are already in the main menu, toggle through the options by pressing TOTAL until this option is reached.
- 3 Press TOTAL to toggle this option to Y (for yes). This allows the user to change the K factor.
- 4 Press STOP/START to enter this option.
- 5 XXX.XXXX appears on the display with the cursor flashing on the left most digit.
- 6 To enter a new K factor manually:-

6.1 The new K-factor to be entered must firstly be calculated.

$$\text{New K-factor} = \frac{(\text{Register Reading}) \times (\text{Old K-factor})}{\text{Measuring Container Reading}}$$

6.2 The user can change the value of the first digit by pressing TOTAL.

6.3 Press RESET to toggle to the next digit and so on for each digit.

6.4 When the K factor has been set, press STOP/START to save this option.

6.5 Press MODE. The display will now read KO ACN? N, with the cursor flashing on the N. This option is asking the user if they want to automatically calculate the K factor. Since the K factor has already been manually set, leave this option as N (for no).

6.6 Press MODE to return to the Main Menu.

- 7 To automatically calculate the K factor, follow steps 1 to 5, then:

7.1 Press MODE. The display will now show KO ACN? N, with the cursor flashing on the N. This indicates that this option can be changed.

7.2 Press TOTAL to toggle this option to Y (for yes).

7.3 Press STOP/START to enter this option.

The display will now show XXXXX.X with the cursor flashing on the left most digit. This is the volume which was dispensed in the previous delivery, according to the register. This value may differ to the reading on the approved test tank. Enter the true value of the delivery according to the reading of the test tank.

7.4 Press TOTAL to set the first digit.

7.5 Press RESET to select the next digit, and so on until the true volume reading has been entered.

7.6 Press STOP/START to enter this value.

The register will now calculate the new K factor. This new K factor will momentarily be displayed, followed by WAIT, then SAVED, before returning the display to the previously dispensed volume measured by the register. Note that in this procedure, the user was not asked to perform any calculations.

7.7 Press MODE to return to the Main Menu.

- 8 Press CAL to return to delivery mode.
- 9 We recommend that a re-test be done using at least three calibration runs to verify the result. If recalibration is required, repeat steps 1 to 6 (manual calculation), or steps 1 to 7 (for automatic calculation).

6. Connecting a Ticket Printer

Installation and configuring a ticket printer is dependent on the model of the printer. The EMH500 can support the following printers:

- TM-295
- CTM-290
- TouchStar Blaster Printer.

Most ticket printers are available in +24V only, therefore a voltage doubler will need to be used if run off a +12V source. All printers have data connections to the register via the Power Junction Box.

Note: Always mount the ticket printer in the cabin.

6.1 Ticket Printer DIP Switch Settings.

There are 3 Ticket Printer models supported by the EMH500's software; they are the Epson CTM-290, TM-295 and the TouchStar Blaster. Following are two tabulated listings for the Epson CTM-290 and TM295 printers.

DIP Switch Settings for the TM-295 printer.

Switch	Function	On	Off
1	Data Receive Error	Ignored	PRINTS"?"
2	Receive Buffer Capacity	Data Buffer 35 Bytes	DATA BUFFER 512 BYTES
3	Handshaking	XON/XOFF	DTR/DSR
4	Data Word Length	7 Bits	8 BITS
5	Parity Check	Yes	NO
6	Parity Selection	Even	ODD
7	Baud Rate Selection	Transition Refer to	Speed Selection
8			Table Below
9	Pin 6: Reset Signal	Used	Not Used
10	Pin 25: Reset Signal	Used	Not Used

TM-295 Transmission Speed.

Transmission Speed	Switch 7	Switch 8
1200 bps	ON	ON
2400 bps	OFF	ON
4800 bps	ON	OFF
9600 bps	OFF	OFF

TM-295 Default DIP Switch Settings. (1200 Baud)



DIP Switch Settings for the CTM-290 printer.

Switch	On	Off
1	International Character	Set Selection. Table Below
2	Refer to	
3		
4	7 bit length	8 bit length
5	Parity check enabled	Parity check disabled
6	Even Parity	Odd Parity
7	Baud Rate	Selection Table Below
8	Refer to	
9		
10	Not Used	Always OFF

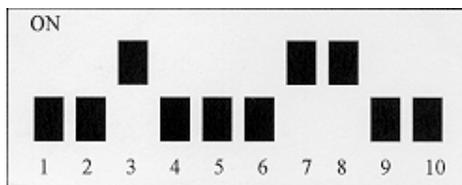
CTM-290 International Character Set Selection.

Country	Switch 1	Switch 2	Switch 3
U.S.A	ON	ON	ON
FRANCE	OFF	ON	ON
GERMANY	ON	OFF	ON
U.K.	OFF	OFF	ON
DENMARK	ON	ON	OFF
SWEDEN	OFF	ON	OFF
ITALY	ON	OFF	OFF
SPAIN	OFF	OFF	OFF

CTM-290 Baud Rate Selection.

Baud Rate (BPS)	Switch 7	Switch 8	Switch 9
110	ON	ON	ON
150	OFF	ON	ON
300	ON	OFF	ON
600	OFF	OFF	ON
1200	ON	ON	OFF
2400	OFF	ON	OFF
4800	ON	OFF	OFF
9600	OFF	OFF	OFF

CTM-290 Default DIP Switch Settings. (1200 Baud/UK Character Set)



Check that your Ticket Printer has an ink ribbon fitted.
Set up the comm ports and the printer type in the register (refer to software).

6.2 Installing the TouchStar Blaster Printer

The TouchStar Blaster Printer has no DIP switches therefore once it is wired up, you only have to setup the register (refer to Software Settings Reference Manual).

Note: Always set the EMH500 to 9600 baud rate when using the TouchStar Blaster Printer.

6.3 Checking the Operation of the Ticket Printer

Supply power to the Register and Ticket Printer, checking for the GREEN (POWER) LED on the printer. Press the RELEASE button and note that the GREEN (RELEASE) LED appears. Insert your ticket so that the top of the top line is aligned with the arrow on the side of the printer.

Note: If the ticket is inserted correctly, the RED (PAPER OUT) LED will go out but if the RED LED remains ON, remove and insert ticket again until NO RED LED is visible.

Perform a delivery run or simply rotate the Register by hand. Print a Delivery Ticket by pressing RESET not sooner than 6 seconds after the end of the delivery.
Press the RELEASE button on the ticket printer to release the ticket from the printer.

6.4 Connecting multiple registers to one printer.

Connect wires in the following way:

- EMH/EJB's transmit wires joined together to the receive input of the printer,
- EMH/EJB's receive wires joined together to the transmit output of the printer,
- EMH/EJB's ground wires joined together to the ground input of the printer,
- Do NOT join shields of communication cables – each individual cable must have its shield connected to the ground inside the EJB junction box ONLY.

7. Various DIP Switch Settings

7.1 EMH500 Mainboard DIP switch specifications.

The DIP switches are located under the plastic hood of the register head and approximately in the centre of the main board. The register will only read the new settings immediately after a power-up.

Dip Switch No.	Function
Sw1	By setting the switch to ON, it will ENABLE the erasing option for the internal software settings. Immediately following power on the display will read 'ERASE?N', press TOTAL and then STOP/START to erase all software settings and re initialise with default settings. The register will then read "ERASE!", and scroll "memory cleared – restart register". Power the register off then back on again. The "data error" message will be displayed, to reset the EMH500 to default values press the CAL button.
Sw2	By setting the switch to ON, it will DISABLE the automatic compensation of resistance of the temperature probe leads. You have to restart the register after switching it. The register will then require manual zero-adjustment of temperature reading. It helps using temp. probe with two wires only, or when resistance of leads is higher than 2.5 Ohms.
Sw3	N/A
Sw4	N/A

This table is for the EMH 500 Rev D Mainboard

Note: Other EMH 500 main PCB marked as below has the following DIP switch settings

- Rev 0: Dip Switch 2 for erasing memory
- Rev 1: Dip Switch 1 for erasing memory
Dip Switch 4 for supplying power to the internal EMH500 pulser board (Opt PCB). You must set this option to OFF to connect a ERP100 remote pulser to the EMH500.
- Rev 2: same as Rev 1
- Rev 3: same as Rev 1
- Rev 4(D): Dip Switch 4 unused
- Rev 5: same as Rev 4

8. Displayed Messages

Display	Description	Notes
00000000 XX.YY.ZZ	Boot up sequence, software version.	See section 2.2 For a description of the software version control.
Print dt	Printing delivery ticket	
Print mt	Printing management ticket	
Print st	Printing software settings report	
<input type="checkbox"/> <i>steady</i>	Temperature probe connected.	
Error	Calculation or data input error	Please re-enter correctly
correctn	Non-linearity correction flow rates have not been setup in the correct order.	The register has re-arranged the values automatically.
<input type="checkbox"/> <i>flashing</i>	Temperature probe disconnected.	Check temperature probe connections
'Wrng dir'	Wrong Direction of rotation	Check calibration settings
'F 0'	Reset pressed while still in flow rate mode	Flow rate mode finishes 5 seconds after flow stops.
Opto off	Opto PCB disconnected	Check connections. Permanently on.
Opto fty	Opto PCB faulty	Contact manufacturer
Memory cleared	RAM cleared and default values loaded	Check calibration settings
data error	Some data in memory has been corrupted and replaced with default values.	Check calibration settings
'Port <i>n</i> no paper'	Paper out signal received on port <i>n</i> where <i>n</i> = 1 or 2	Check paper for Epson printer.
'Port <i>n</i> pmt err'	No response from receiver on port <i>n</i> where <i>n</i> = 1 or 2	Check comms cabling or Liquip Thermal printer.
'Port <i>n</i> Comm err'	No response from receiver on port <i>n</i> where <i>n</i> = 1 or 2	Check comms cabling, Touch PC or Epson printer.
'no probe'	While displaying temperature a problem has occurred with the temperature probe.	Check temperature of product. Check wiring between register and temperature probe. Check functionality of temperature probe.

9. Changing the EPROM

IMPORTANT

Before changing the eprom take a print-out of the current configuration by entering the MANAG? menu and setting Report?Y

To install the eprom you firstly need to power down the register. Take off the housing and remove the old eprom. Write 'Old' on the removed eprom and insert the new one.

Change Dip Switch No. 1 to ON, then power up the register. When the register asks you if you wish to erase memory press the 'Total' button to say yes and press 'Start' to save the yes and erase memory

A message will come up asking you to reset the power. Switch the power off and then back on again. You will get a data error and will now be required to calibrate the unit to the same values as your printout.

10. General Troubleshooting

	Problem	Probable Cause	Corrective Action
1.	Display lights up but there are no digits shown.	Faulty display.	Notify TouchStar Pacific Pty Ltd.
2.	Display does not light up or cuts out.	<ol style="list-style-type: none"> 1. No power to display. 2. No power to register. 	<ol style="list-style-type: none"> 1a. Display not connected to main PCB 1b. Faulty display. 2a. Register not connected to power box. 2b. D-connector not connected to PCB correctly. 2c. Power not on. 2d. Check fuses.
3.	Button not working when display is on.	<ol style="list-style-type: none"> 1. No power to button. 2. Button faulty. 	1a. Button not connected.
4.	Pulser reading incorrect volume.	<ol style="list-style-type: none"> 1. Incorrect K-factor. 2. Drive shaft incorrectly connected. 3. Problem with opto board. 	<ol style="list-style-type: none"> 1. Correct K-factor. 2. Check drive shaft. 3. Notify TouchStar.
5.	Ticket printer or Touch PC connected to one of the communication ports does not function correctly.	<ol style="list-style-type: none"> 1. Incorrect settings for the communication port. 2. Incorrect power settings. 3. Printer not set correctly. 	<ol style="list-style-type: none"> 1a. Select the correct device attached to the port. 1b. Check the baud rate matches the settings on the printer. 1c. Set ACK to Y. ACK checks the status of the device before sending data. 2. Check power connections are correct (24V). 3a. Ensure DIP switch settings are correct. (some models). 3b. Check that the ribbon has been correctly installed. (some models).

10.1 Temperature Probe

The EMH500 is designed to work with the Temperature Probe (Part No: 697701/001). No calibration needs to be performed by the user, as the register is already preset with the following data:

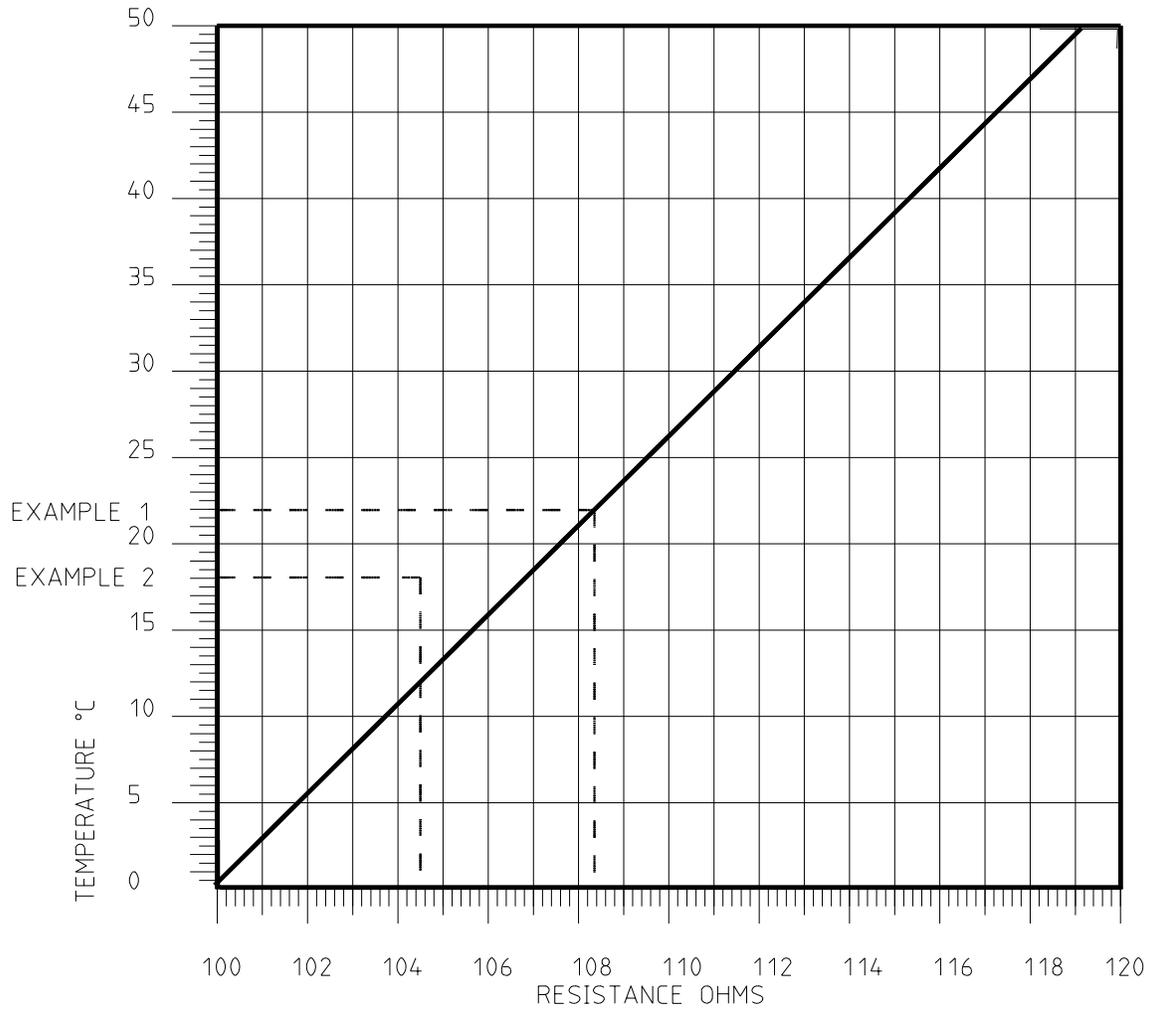
At 15°C, Probe resistance = 105.775Ω

At 45°C, Probe resistance = 117.325Ω.

Using Figure on the following page and the following procedure, the user can test the accuracy and the functionality of any given probe.

Test Procedure:-

1. Remove the plug from the rear of the EMH500.
2. With a resistance meter (multimeter set to ohms and properly zeroed), measure the resistance between pins N and P on the plug. (Do not put the meter across any pins in the socket of the register nor any wires while the plug is connected as this could damage the register.
3. Record this measurement.
4. Determine the temperature of the probe by using a thermometer to measure the probes environment, i.e. if the probe is immersed in a liquid, measure the temperature of the liquid.
5. Record this result.
6. Using the Figure, draw a vertical line from the horizontal axis using the value from step 3.
7. Draw a horizontal line from the vertical axis using the value from step 5.
8. If the two lines intersect on the line, the probe is reading correctly and its accuracy can be derived from its deviation from the nominal value. If the lines do not intersect on the line, repeat the test and check your calculations. If the reading is confirmed to be wrong, the probe or its wiring are faulty and further investigation will be required.



EXAMPLE 1
 TEMPERATURE=22°C
 RESISTANCE=108.29 OHMS
 THE LINES INTERSECT ON THE LINE
 THEREFORE PROBE IS CORRECT

EXAMPLE 2
 TEMPERATURE=18°C
 RESISTANCE=104.5 OHMS
 THE LINES INTERSECT OFF THE LINE
 THEREFORE THE PROBE IS FAULTY

Figure 9.1 -Temperature vs Probe Resistance

Appendix

1 EMH500 Calibration Certificate

EMH500 Calibration Certificate

Please return a completed copy to TouchStar Pacific & a copy to the vehicle owner
TouchStar Ph: +61 (0)2 9739 9000 Fax: +61 (0)2 9739 9050

Resistance Checks

Resistance between EJB casting and negative terminal of battery - _____ ohms (≤ 1 Ohm)

Resistance between EJB positive connection and positive terminal of battery - _____ ohms (≤ 1 Ohm)

Resistance between EJB earth strap and central earth point - _____ ohms (≤ 1 Ohm)

Unit information

EMH500 Serial No: _____
Vehicle owner _____
Location _____
Date of Calibration _____
Vehicle Registration _____
Fleet number _____
Vehicle Make _____
Vehicle Model _____
Vehicle voltage 12V 24V

Installation Details

Installing Company Name _____
Installer's Name _____
Address _____ Telephone No: _____
_____ Fax No: _____

Printer connected to cradle COM port: parallel 2 5 6

Register connected to cradle COM port: 2 5 6

Remote pulser used: Yes/No

Batching used: Yes/No

Remote reset used: Yes/No

Print out of calibration details attached: Yes/No

(Calibration printout to be faxed to TouchStar Pacific Pty Ltd prior to unit being sealed to ensure parameters have been setup correctly)

Installers Signature _____

Date: _____