



## INSTALLATION GUIDE

### PROPANE FUEL LEVEL MONITORING KIT

MODEL LPGS-1



**IMPORTANT:** Only qualified personnel or licensed electricians should install the propane fuel monitoring kit.

#### 1 SAFETY PRECAUTIONS

- 1.1 Please read this installation guide carefully before installing and wiring the monitoring kit.
- 1.2 Follow all applicable and national electrical codes for wiring requirements.
- 1.3 The hazardous area around a single LPG/propane container of 1200 gallons of water capacity or less extends over a radius of 3m (10 feet). In cases of larger or many smaller containers, the hazardous area extends over 7.5m (25 feet) from any container.
- 1.4 The maximum nonhazardous location voltage where the Intrinsic Safety (IS) barrier will be installed must not exceed 250V RMS.
- 1.5 Do not apply power before having completed and checked the installation.
- 1.6 In the eventual case of malfunction, the IS barrier cannot be repaired by the user. It must instead be replaced with an equivalent certified product.

#### 2 OVERVIEW

The propane fuel monitoring kit includes 2 items:

- 1) One Rochester Hall Effect module provided with a 6 foot cable.
- 2) An IS barrier compatible with the Hall Effect module.

The entity parameters of the Hall Effect sensor are:

	Hall Effect sensor	IS barrier requirements
V <sub>max</sub>	6VDC	14VDC
I <sub>max</sub>	8mA	200mA
C <sub>i</sub>	2.0nF	C <sub>A</sub> >C <sub>i</sub> +C <sub>CABLE</sub>
L <sub>i</sub>	4.8uF	L <sub>A</sub> >L <sub>i</sub> +L <sub>CABLE</sub>

The entity parameters of the provided IS barrier are:

$$V_{oc}(U_0) = 10V$$

$$I_{sc}(I_0) = 200mA$$

$$C_A = 3\mu F$$

$$L_A = 0.91mH$$

#### 3 CABLE LENGTH

In order to satisfy the requirements on C<sub>A</sub> and L<sub>A</sub>, the cable between the Hall Effect module and the IS Barrier must not exceed a given length. For the MTL7760ac and typical cables, the cable inductance will be the length limiting parameter. Although the MTL7760ac parameters would allow a cable length of up to 1200m (about 4000 feet), it is always preferable to reduce the length as much as possible to prevent induced voltage from lightning.

#### 4 INSTALLATION



**IMPORTANT:** The IS barrier must be installed in a NEMA enclosure located outside the hazardous area around the propane container.

Although the IS barrier could be installed outdoors with the proper enclosure, we recommend to install it indoors to extend the total temperature range of the system down to -40°C.

It must be remembered that the installation of intrinsically safe systems must comply with national and regional regulations. THIS EQUIPMENT SHOULD ONLY BE INSTALLED BY QUALIFIED PERSONNEL. GRAVE CONSEQUENCES CAN RESULT FROM A DEFICIENT INSTALLATION.

Connecting the Hall Effect module to your DAVICOM should be carried out according to the installation drawing of figure 1.

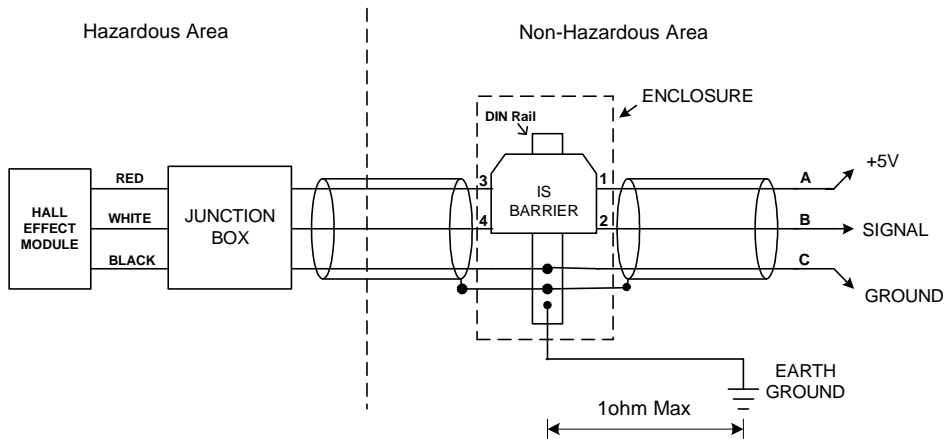


Figure 1 Installation drawing

#### 4.1 HALL EFFECT SENSOR INSTALLATION

Follow the installation procedure « Install R3D » provided by Rochester Gauges Inc. This procedure is reproduced in Appendix A for convenience.

Note that the colors of the wires are not right on this drawing. The white wire should be red, the brown one should be black and the green one should be white in our case.

**Note:** If your tank is not equipped with a sensor-ready dial, you can probably retrofit it with an R3D dial. Contact Davicom or Rochester Gauges to determine the replacement dial model and to obtain replacing instructions as well.

#### 4.2 Intrinsic Safety Barrier Installation

The MTL7760ac barrier must be mounted directly onto a DIN-rail. Install or remove the barrier as follows:

- a) Hook the hazardous-side end of the mounting/earthing clamp over the hazardous-side flange of the DIN-rail (figure 2).
- b) Push the safe-area end of the barrier firmly down by hand until it clicks into place.
- c) Check that the barrier is securely clamped into place (see notes below).
- d) To remove a barrier (figure 3), use the tip of a screwdriver (with a blade width of 4 to 5mm, minimum shaft length 60mm) to ease the metal clip at the base on the safe-area end outwards until the barrier is freed and can be removed easily by unhooking the hazardous-side end.

#### Notes

1: Make sure the barrier is properly clamped onto the rail to ensure the essential earth connection. In a row

of barriers, one end of an improperly mounted barrier will stick up slightly.

2: Once an MTL7700 Series barrier is fitted, its mounting/earthing foot grips the DIN-rail strongly in order to maintain positional stability and create a high-integrity earth bond. The unit should not be forced along the rail. If it is necessary to reposition a barrier, detach it from the DIN-rail and re-attach it in the correct location. Where minor repositioning is needed, relieve the pressure on the spring of the mounting foot with a screwdriver and ease the unit into place.

#### 5. EARTHING THE SYSTEM

A barrier installation must be earthed properly for correct and safe operation. Care must be taken that individual barriers are correctly mounted so that the earth connection with the DIN-rail is secure. An installation must, in turn, be connected to a suitable plant high integrity earth. This should be done by connecting suitable conductors to a DIN-rail earth terminal. It is also usually advisable to make sure that the DIN-rail is isolated from any possible enclosure earths by separating it from the mounting surface with isolating spacers.



**IMPORTANT: The correct method of providing the IS earth connection from one or many MTL7700ac barriers is from DIN-rail earth terminals. NEVER make the plant IS earth connection to the earth screen on any individual barrier.**

DIN-rail earth terminals are provided with two screw-clamp terminals, to one of which a copper conductor to plant earth should be connected. This should have a resistance no greater than 1Ω. Although to increase safety and reduce interference, a resistance as close to 0.1Ω as possible is preferable. The cross-sectional area of the conductor should be as least 4mm<sup>2</sup> (12 AWG).

It is advisable to mount one DIN-rail earth terminal at each end of a DIN-rail to provide redundancy by connecting both DIN-rail earth terminals to the plant earth. This makes it possible to introduce a multimeter into one of the loops to measure loop resistance without breaking the earth connection – a test which should be done periodically. In these circumstances, resistance for each cable loop should not exceed  $2\Omega$ . The IS plant earth conductors should be clearly identified to warn against unauthorised interference. The same thing is true for the +5V, SIGNAL and GROUND conductors.

**WARNING**



**Do not use earth foot terminal as an IS earth termination. Make IS earth connection(s) using a DIN-rail earth terminal.**

**Note:** In the case of more complex installations like those involving many barriers, you can refer to the instruction manual INM7700 “MTL7700 Series Shunt-diode safety barriers” from the MTL Instrument Group.

**6. CONNECTION TO THE DAVICOM**



**IMPORTANT: Make sure that the installation is completed and checked before connecting the propane monitoring outputs to your DAVICOM inputs.**

First, connect the DAVICOM case to the plant earth using the chassis grounding screw on its rear panel. The resistance of this ground connection should be low. Then connect the outputs marked SIGNAL (B wire) and GROUND (C wire) to one of the analog inputs of the DAVICOM. Finally, connect the A wire to one +5V terminal provided by the DAVICOM.

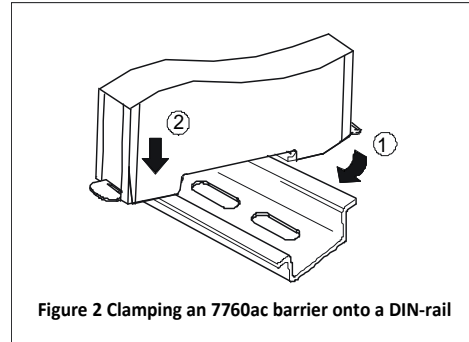


Figure 2 Clamping an 7760ac barrier onto a DIN-rail

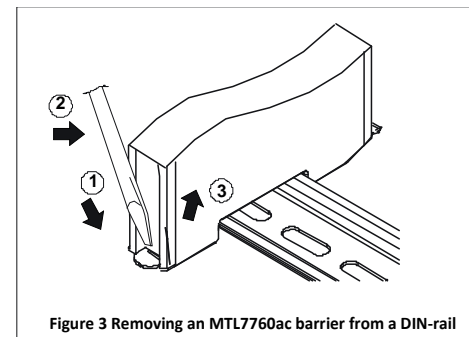
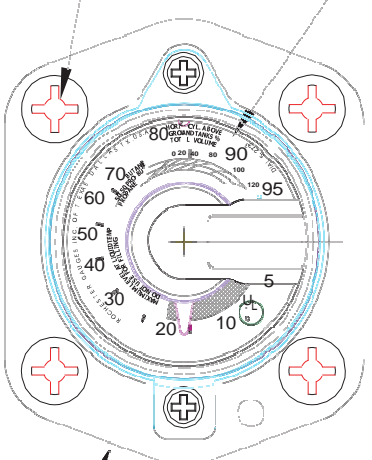


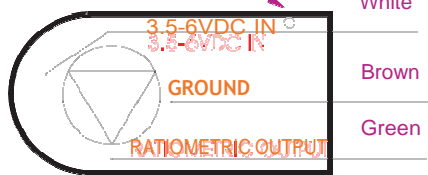


Figure 3 Removing an MTL7760ac barrier from a DIN-rail

## Appendix A Installation procedure of the Hall Effect Module

<p>MATERIAL</p>	<p>DRAWING NUMBER Install R3D p14/22</p>																																												
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>WARNING: DO NOT LOOSEN OR REMOVE GAUGE MOUNTING SCREWS</b></p>  <p>GAUGE TYPICAL</p> </div> <div style="width: 45%;"> <p><b>REMOTE READY DIAL, TYPICAL</b> CAUTION: SEE 115-794 "REPLACING DIALS" IF DIAL MUST BE REPLACED.</p>  <p>1 REMOVE PLUG</p> </div> </div> <div style="margin-top: 20px;">  <p>2 FIT MODULE</p> </div> <div style="margin-top: 20px;"> <p><b>FUNCTIONAL SPECIFICATIONS/VOLTAGE OUTPUT MODULE</b></p> <p>CONFORMITY: 3-1/2% @ 5 VDC WHEN ATTACHED TO REMOTE READY DIAL          OPERATING TEMPERATURE: -40C TO 80C          RESOLUTION INFINITE          OPERATING VOLTAGE: 3.5 TO 6.0 VDC          OPERATING CURRENT: 4.5MA TYPICAL          OUTPUT: RATIOMETRIC, 5-80% OF INPUT VOLTAGE @ 5-80% VOLUME          OUTPUT CURRENT: 1MA</p> </div> <div style="margin-top: 20px;"> <p><b>HALL MODULE INSTALLATION PROCEDURE</b></p> <p>The following procedure details how to install a Hall Effect transmitter module onto a Rochester Gauges Remote Ready dial.</p> <ol style="list-style-type: none"> <li>1. Remove shipping plug from dial.</li> <li>2. Remove all dirt and debris from cavity under shipping plug. NOTE: Failure to clean cavity properly may result in failure of transmitter module to seat properly and cause reduced accuracy.</li> <li>3. slide module into slot on dial from edge of dial. Do not attempt to install module vertically.</li> <li>4. Apply thumb pressure in area provided and push module toward center of dial until it snaps into place. CAUTION: Attempts to remove transmitter from dial may result in damage to transmitter, dial, or both. Do not pull the module by the cable.</li> <li>5. Installation is now complete.</li> </ol> <p><b>WARNING: Do not remove gauge mounting screws or bolts. Do not unscrew gauge heads that are screwed into tank. Tank may contain high pressure and flammable gas. A hazard of fire or explosion may exist if gauge mounting screws, bolts or gauge heads are loosened or removed.</b></p> </div> <div style="margin-top: 20px;">  </div>																																													
<table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <tr> <td style="width: 15%;">D</td> <td style="width: 25%;">CONFORMITY 3-1/2% WAS CONFORMITY 4%</td> <td style="width: 10%;">15437</td> <td style="width: 10%;">8/14</td> <td style="width: 10%;">C</td> <td style="width: 20%;">Modify for European Market</td> <td style="width: 10%;">JN/RGI</td> <td style="width: 10%;">28 Jan</td> <td></td> <td></td> <td></td> </tr> <tr> <td>LET</td> <td>REVISIONS</td> <td>E.R.#</td> <td>DATE</td> <td>LET</td> <td>REVISIONS</td> <td>E.R.#</td> <td>DATE</td> <td>LET</td> <td>REVISIONS</td> <td>E.R.# DATE</td> </tr> <tr> <td>TOLERANCES NOT SHOWN</td> <td>.DD .010</td> <td>.DDD .005</td> <td>ANGLES 1</td> <td>MATL: COMMERCIAL TOLERANCES</td> <td>DO NOT SCALE DRAWING</td> <td>SUPERSEDE S NEW</td> <td>DRAWN JN</td> <td>CHK.</td> <td>E.R.# 15437</td> <td>USED ON "REMOTE READY" GAUGES</td> </tr> <tr> <td> ROCHESTER GAUGES, INC., DALLAS, TEXAS, U.S.A.</td> <td style="text-align: center;">OF TEXAS</td> <td>SCALE N/A</td> <td>DATE 28 Jan 04</td> <td>PART NAME</td> <td colspan="2">HALL MODULE INSTALLATION INSTRUCTIONS DATA SHEET</td> <td colspan="4">DRAWING NUMBER DS-1349. BE</td> </tr> </table>		D	CONFORMITY 3-1/2% WAS CONFORMITY 4%	15437	8/14	C	Modify for European Market	JN/RGI	28 Jan				LET	REVISIONS	E.R.#	DATE	LET	REVISIONS	E.R.#	DATE	LET	REVISIONS	E.R.# DATE	TOLERANCES NOT SHOWN	.DD .010	.DDD .005	ANGLES 1	MATL: COMMERCIAL TOLERANCES	DO NOT SCALE DRAWING	SUPERSEDE S NEW	DRAWN JN	CHK.	E.R.# 15437	USED ON "REMOTE READY" GAUGES	ROCHESTER GAUGES, INC., DALLAS, TEXAS, U.S.A.	OF TEXAS	SCALE N/A	DATE 28 Jan 04	PART NAME	HALL MODULE INSTALLATION INSTRUCTIONS DATA SHEET		DRAWING NUMBER DS-1349. BE			
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