Hydran* M2
Transformer Gas Monitoring System
Installation Guide
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INTRODUCTION

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Fax: +44 28 9262 2202
Email: ge4service@ge.com
Web: www.gedigitalenergy.com/md.htm
For help and support for your Hydran* M2, please contact the GE Energy Customer Service Center. Open 24 hours a day, 365 days a year

Tel: +1 800 361 3652 (United States and Canada)
Tel: +1 514 339 2801 (worldwide)
Email: ge4service@ge.com

Safety Warnings In Six Languages

[EN] (in English) WARNINGS:

• All procedures in this manual must be strictly adhered to.
• Any deviation from these could cause irreversible damage to the transformer being monitored and/or the Hydran M2, and could lead to property damage, personal injury and/or death.
• Installation and maintenance of the Hydran M2 must be carried out by qualified personnel only. Please advise station operator prior to maintenance. Working inside the Hydran M2 may trigger unwanted alarms due to parameter changes, power shutdown, system rebooting or electrostatic discharge.
• For a maximum distance of 15 m (50 ft) from the power source, use a 2.08 mm² (14-AWG) cable and an overcurrent protection.

[FR] (in French) ATTENTION:

• Toutes les procédures dans ce manuel doivent être observées rigoureusement.
• Tout écart par rapport à celles-ci pourrait causer des dommages irréversibles au transformateur surveillé et/ou au Hydran M2, et pourrait entraîner des dommages à la propriété, des blessures corporelles et/ou la mort.
• L'installation et l'entretien du Hydran M2 doivent être effectués par du personnel qualifié seulement. Veuillez aviser l'opérateur du poste avant l'entretien. Travailler à l'intérieur du Hydran M2 peut déclencher des alarmes non voulues en raison de changements à des paramètres, d'arrêt de l'alimentation, de remise en marche du système ou de décharge électrostatique.
• Pour une distance maximale de 15 m (50 pi) de la source d'alimentation, utiliser un câble de 2,08 mm² (14-AWG) et une protection contre les surintensités.

[ES] (in Spanish) ADVERTENCIA:

• Se debe cumplir estrictamente con todos los procedimientos señalados en este manual.
• Cualquier desviación al respecto puede causar daños irreparables al transformador que está bajo monitoreo y/o al Hydran M2, asimismo puede ser causa de daños materiales, lesiones corporales y/o muerte.

• La instalación y mantenimiento del equipo Hydran M2 se reserva únicamente al personal perfectamente cualificado. Aconseje por favor a operador de la estación antes del mantenimiento. El trabajo dentro del Hydran M2 puede accionar alarmas indeseadas debido a los cambios del parámetro, parada de la energía, sistema que reanuda o descarga electrostática.

• Para una distancia máxima de 15 m (50 pies) de la fuente de alimentación, utilice un cable de 2,08 mm² (14-AWG) y una protección contra las sobrecargas de corriente.

[DE] (in German) WARNUNG:

• Alle Abläufe in diesem Handbuch müssen strengstens befolgt werden.

• Jede Abweichung davon könnte dem zu überwachenden Transformator und/oder dem Hydran M2 unwiderrufliche Schäden zufügen, und könnte zu Sachschaden, Personenverletzung und/oder Tod führen.


• Für eine maximale Entfernung von 15 m von der Spannungsquelle, verwenden Sie ein 2,08 mm² Kabel (14 AWG) und ein Überstromschutz.

[IT] (in Italian) ATTENZIONE:

• Tutte le procedure del presente manuale dovranno essere eseguite in totale conformità.

• Qualsiasi deviazione dallo stesso manuale potrebbe causare danni irreversibili al trasformatore sotto monitoraggio e/o all’ Hydran M2, e potrebbe causare danni alla proprietà, lesioni personali e/o alla morte.

• L’installazione e la manutenzione del Hydran M2 devono essere eseguite solo ed esclusivamente da personale qualificato. Avisare l’operatore della stazione prima di manutenzione. Funzionando all’interno del Hydran M2 può fare scattare degli alarmi indesiderabili e cambiamenti dei parametri, arresto dell’alimentazione, un “reboot” del sistema o scarico elettrostatico.

• A una distanza massima di 15 m dalla fonte di energia usare un cavo 2.08 mm² (14-AWG) e una protezione di sovracorrente.
[SV] (in Swedish) WARNING:

- Alla procedurer i manualen måste följas noggrant.
- Varje avvikelse från dessa procedurer kan orsaka oåterkalleliga skador på den övervakade transformatorn och/eller på Hydran M2 samt leda till egendomsförlust, personskada och/eller livsfara.
- Installation och underhåll av Hydran M2 måste utföras av behörig personal. Råd var god posterar operatören före underhåll. Funktionsdyglig insida Hydran M2 kan starta oönskade parameterändringar för larm tack vare, driver avstängning, systemomstart eller elektrostatisk urladdning.
- För ett maximalt avstånd på 15 m från kraftuttaget, använd 2,08 mm² kabel (14-AWG) och ett överströmsskydd.

Safety Symbols Description

Description of safety symbols used on the Hydran M2 device:

- Refer to the Instruction Manual to prevent injury or damage to equipment.
- Hazardous voltages may be present.
- Protective earth connection.

Description of safety messages used in this Instruction Manual:

- CAUTION A procedure, practice, or condition that could cause equipment damage or permanent loss of data, if not adhered to.
- WARNING A procedure, practice, or condition that could cause bodily injury or death, if not adhered to.
Preface

This manual provides an overview of the installation for the Hydran M2. For complete explanations on the installation process, see Chapter 4 in the Hydran M2 Instruction Manual.

The information in this manual may be used by:

- An installer
- An electrician

**WARNING**

- All procedures in this manual must be strictly adhered to. Any deviation from these may cause irreversible damage to the transformer being monitored and/or the Hydran M2, and may lead to property damage, personal injury and/or death.
- Installation and maintenance of the Hydran M2 must be carried out by qualified personnel only.

Any visible signs of damage to the shipping packages should be reported to GE Energy immediately.

Please keep all documentation (model number, manuals, etc.) for reference and warranty purposes.

A Table of Contents and a List of Figures are present at the beginning of the manual.

The *Hydran M2 Installation Guide* (this manual), the *Hydran M2 Instruction Manual* and the *Hydran M2 Host Software Manual* are located in PDF format in the *English/Manuals* folder of the Hydran M2 installation CD. Hard copies of each manual can be purchased from GE Energy.
Standard GE Energy Warranty

The products covered by this manual and manufactured by GE Energy ("Products") are warranted to be free from defects in material, workmanship and title at the time of delivery. Any components of a Product or other products manufactured by persons other than GE Energy carry only the warranty provided by the manufacturers thereof and GE Energy gives no warranty on behalf of the manufacturers of such products.

GE Energy warrants the Products until one (1) year from first use or eighteen months (18) months from delivery, whichever occurs first, except that software is warranted for ninety (90) days from delivery.

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Any failure which is the basis for a warranty claim shall not be cause for extension of the duration of the applicable Warranty Period. GE Energy shall not be responsible for removal or replacement of systems, structures or other parts of the Buyer’s facility. If a defect in Products or part thereof cannot be corrected by GE Energy’s reasonable efforts, the parties shall negotiate an equitable adjustment in price with respect to such Products or part thereof. All decontamination work necessary for the correction of defects shall be performed by the Buyer at the Buyer’s expense. The condition of any tests shall be mutually agreed upon and GE Energy shall be notified of and may be represented at all tests that may be made.

GE Energy does not warrant Products or any repaired or replacement parts against normal wear and tear, including that due to environment or operation, including excessive operation at peak capability, frequent starting, type of fuel, detrimental air inlet conditions, or erosion, corrosion or material deposits from fluids, or which have been involved in an accident. The warranties and remedies set forth herein are further conditioned upon:

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• Repair or modification pursuant to GE Energy's instructions or approval

The Buyer shall keep proper records of operation and maintenance during the applicable Warranty Period. These records shall be kept in the form of log sheets and copies shall be submitted to GE Energy upon its request in connection with a warranty claim by the Buyer. GE Energy does not warrant any products or services of others designated by the Buyer where such products or services are not normally supplied by GE Energy.

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GENERAL WARNINGS

- Mishandling of the Hydran M2 sensor (such as a perforation or scratch on the membrane or subjecting the sensor to paint or solvent) voids the warranty.

- It is recommended to read all warnings and considerations given in Chapter 1 of the *Hydran M2 Instruction Manual* before proceeding with the installation.

Figure 1: Plastic Cap Must Remain in Place Until the Sensor Is Installed on the Valve

Figure 2: Do Not Touch the Sensor’s Membrane with a Finger or an Object
Figure 3: Do Not Block the Sensor’s Breathing Hole or Puncture the Breathing Hole’s Membrane

Figure 4: Do Not Install the Hydran M2 at an Angle, Vertically or Using an Elbow

Figure 5: Do Not Install the Hydran M2 on an Elbow or a Fitting Box
Figure 6: Do Not Install the Hydran M2 on the Inlet Side of the Radiator Pump

Figure 7: Do Not Subject the Hydran M2 or Its Sensor to High-Pressure Water Streams
Figure 8: Do Not Paint the Sensor or Clean It with Any Solvent
INSTALLATION

Overview

Figure 9: Typical Installation of the Hydran M2
For a typical transformer, the four most common locations to install the Hydran M2 are shown in Figure 10. For details, refer to Table 1 overleaf.

Figure 10: Mounting Locations of the Hydran M2 on a Transformer

- If these typical locations cannot be used, contact the GE Energy Customer Service for help to determine an acceptable alternative location.
<table>
<thead>
<tr>
<th>Rating</th>
<th>Rating</th>
<th>Benefits</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| 1. Straight section of the radiator’s return pipe<sup>1</sup> | ★★★★Recommended | • Excellent convective oil flow  
• Lower operating temperatures  
• Ease of access | • None |
| 2. Filling valve (top of tank) | ★★★ Very Good | • Excellent convective oil flow | • Higher operating temperatures reduce sensor lifetime  
• Access to Hydran M2 is difficult |
| 3. Top of radiator | ★ Alternate Location | • Lower operating temperatures  
• Ease of access | |
| 4. Drain valve (bottom of tank) | ★☆ Good | • Lower operating temperatures  
• Ease of access | • Low oil flow may affect gas level readings |

Table 1: Mounting Locations of the Hydran M2 on a Transformer

---

<sup>1</sup> Ensure that the Hydran M2 is installed on the discharge side of the pump to avoid negative pressure.
Tools for installation

Supplied with the Hydran M2

3/16-in Hex Key with 9-in Blade & Cushion Grip T-Handle
1/16-in and 5-32-in standard Hex (Allen) L-Keys
Spanner wrench
Roll of PTFE tape

To be supplied by the installer

3-mm (1/8-in) Slotted Screwdriver
#2 Phillips Screwdriver
Adjustable Pliers or Wrench
Wire Stripper
Wire Cutter
Bucket and Rags
Adjustable Wrench with smooth non-marking jaws

Figure 12: Tools Required for the Installation
Mounting the Hydran M2 on a Valve

1. Remove set screw.
2. Remove clamp using spanner wrench.
3. Carefully pull out sensor.

Figure 13: Separating the Sensor from the Hydran M2

1. Rotate sensor connector anti-clockwise (approximately 1/8 turn).
2. Pull connector from sensor.

Figure 14: Disconnecting the Sensor Cable
1. Install clamp around sensor.
2. Install sensor on valve.
3. Tighten using adjustable wrench.
Bleed screw must be on top, at the “12 o’clock” position when sensor is installed horizontally.

1. Loosen bleed screw.
2. Slowly open valve.
3. Purge air from sensor (collect oil in bucket).
4. Tighten bleed screw.
5. Wipe oil from valve and sensor using rag.

Note: The clamp ring is not shown for clarity purposes.

Figure 17: The Bleed Screw Must Be on Top, at the 12 O’clock Position

Figure 18: Opening the Valve and Purging the Air from the Sensor
1. Insert the sensor cable connector into the sensor connector.
2. Rotate connector clockwise (approximately 1/8 turn).
3. Position the enclosure and push it on to the sensor; taking care not to squeeze the sensor cable between the sensor and the enclosure.
4. Install the sensor clamp and tighten it using the supplied spanner wrench.
5. Tighten set screw using 1/16-in Allen key.

Figure 19: Installing the Hydran M2 on the Sensor

Figure 20: Grounding the Hydran M2 Enclosure

Connect ground wire to ground lug using a 10-6 AWG copper wire.
Installing the Cables

1. Remove four retaining screws (using supplied Allen key), 4 lock washers and 4 flat washers.
2. Pull out cover.

**WARNING**

- ELECTRICAL SHOCK HAZARD! Turn off the electric power at the fuse box or service panel before making any electrical connections, and ensure a proper ground connection is made before connecting line voltage. Failure to do so can result in property damage, personal injury and/or death.
Note: This optional Analog input board can be installed at any of the four I/O locations.

Figure 22: Installing Cable Conduits

1. Mount the required, watertight conduits fittings: ½”-NPT, PG-13 or M20, with locknuts and sealing gaskets.
2. Mount required flexible conduits.
3. Ground all metallic conduits.
4. Ensure that the plugs of all unused openings are securely in place.

Figure 23: General Wiring of the Analog Input Terminal Block

* Only for loop-powered transmitters
Figure 24: Wiring of Self-Powered, Analog Inputs

Figure 25: Wiring of Two-Wire, Loop-Powered, Analog Inputs

Figure 26: Wiring of Three-Wire, Loop-Powered, Analog Inputs
Note: This optional Analog Output board can be installed at any of the four I/O locations.

Figure 27: General Wiring of the Analog Output Terminal Block

Figure 28: Wiring of the 4-20 mA Analog Output Terminal Block

Figure 29: Wiring of the 0-1 mA Analog Output Terminal Block
− Five (5) alarm relays
− Software configurable
− SPDT (Form C) contacts:
  1. Normally Open
  2. Common
  3. Normally closed

Figure 30: Wiring of the Alarm Relays Terminal Block

Figure 31: Wiring of the AC Power Supply Terminal Block
SOFTWARE CONFIGURATION

User Interface Overview

For more information on the Hydran M2's user interface, see Chapter 3 in the Hydran M2 Instruction Manual.

Figure 32: User Interface Overview

3 Context keys:
Purpose can change according to the screen content. Purpose is displayed on the bottom line of

4 Arrow keys:
Allow to navigate through options, parameters or digits. The Up arrow goes up or increments a digit, the Down arrow goes down or decrements a digit, etc.

Identification number of HM2 unit
Non-selected item
Selected item: Use arrow keys to select another item on the screen.

Menu, Time or option currently displayed
Context Key Messages
Scrolling Indicators

Figure 33: Display Overview
Setting the Date and Time

Press **Main Menu**

Select **Setup**

Press **Enter**

Select **Date & Time**

Press **Enter**

Select **Current Date**

Press **Change** and set date

Select **Current Time**

Press **Change** and set time
**Testing the Sensor**

Press **Main Menu**

Select **Services**

Press **Enter**

Select **Gas Sensor Test**

Press **Enter**

Press **OK**

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<tr>
<td>Gas Hourly Tr.</td>
<td>4 PPM/24 hr.</td>
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<td>Gas Daily Tr.</td>
<td>3 PPM/30 days</td>
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<th>Selections</th>
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<td>View Service Data</td>
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<td>Stabilisation Delay</td>
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Press **OK To Test**

Note: After a Sensor Test, the sensor readings will not be available for two (2) minutes.
**Setting Gas Level Alarm Parameters**

Note: Wait until the gas and moisture readings of the Hydran M2 are stable (at least 24 hours after power-up).

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<th>Select Setup</th>
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<td>Temp. Alarm</td>
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</tr>
<tr>
<td>Gas Daily Trend Alarm</td>
<td></td>
</tr>
</tbody>
</table>
Select parameter for setup.
Enter **Change** and set as required.
Set all parameters as required.

**Notes:**
- *SP* means “Set Point”.
- Press the **Down** arrow to display other parameters in the list.

<table>
<thead>
<tr>
<th>HM2 #1</th>
<th>Alarm Setup</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Gas Alarm Setup</strong></td>
</tr>
<tr>
<td></td>
<td>Alarm Hi SP</td>
</tr>
<tr>
<td></td>
<td>Alarm Hi-Hi SP</td>
</tr>
<tr>
<td></td>
<td>Alarm Delay</td>
</tr>
<tr>
<td></td>
<td>Alarm Hi Relay</td>
</tr>
</tbody>
</table>

Options:
- **Disable**
- **Main Menu**
- **Change**
Setting Moisture Level Alarm Parameters

Press Esc twice to go back to Alarm Setup.

Press Enter

Select parameter for setup.
Enter Change and set as required.

Set all parameters as required.
Setting the Network Communication Parameters

Go to **Main Menu**
Select **Setup**

Press **Enter**

Select **Comm Setup**

Press **Enter**

Select **Identification**

Press **Enter**

Change, as required:
Monitor ID
Power Station ID
Press Escape button to go back to **Comm Setup**.

Select **Comm Channel Setup**

Press Enter

Change, as required:

- **RS232 Baud Rate**
- **RS485 Baud Rate**

### Notes:

- *Each Hydran M2 unit in the local network must be set to the same Power Station ID and RS485 Baud Rate.*
- *Each Hydran M2 in the local network must be set to a unique Monitor ID.*
Setting the Optional Analog Input Parameters

Go to **Main Menu**
- Select **Setup**
- Press Enter

Select **I/O Setup**
- Press Enter

Select **Analog In Setup**
- Press Enter

Select the I/O board you need to setup
- Press Enter

---

HM2 #1 | Main Menu
---|---
Alarms
View Readings
Setup
Test
Service

HM2 #1 | Setup
---|---
Alarm Setup
Date & Time
Relay Setup
Temp. Setup
Calibration
History Setup
Comm Setup
Readings Setup

HM2 #1 | I/O Setup
---|---
Analog In Setup
Analog Out Setup
TDM Output Setup

HM2 #1 | Analog In Setup
---|---
I/O #3 (In 4-20mA)
I/O #4 (In 4-20mA)
Press **Main Menu**

Select **Configuration**

Press **Enter**

Select **Identification**

Press **Enter**

Set up all the **Identification** parameters as required.
Press Escape button to go back to Configuration.

Select Readings Setup

Press Enter

Set up all the Readings Setup parameters as required.

Notes:

- **Input Min** is the lowest possible reading for this signal; this value corresponds to 4 mA.

- **Input Max** is the highest possible reading for this signal; this value corresponds to 20 mA.

- Repeat the above procedure for each analog input that is installed.
Setting the Optional Analog Output Parameters

Go to **Main Menu**
Select Setup

- Press Enter

Select I/O Setup

- Press Enter

Select Analog Out Setup

- Press Enter

Select the I/O board you need to setup

- Press Enter

To next page
Select **Configuration**

Press **Enter**

Set up all the **Configuration** parameters as required.

### Notes:
- **Input Min** is the lowest possible reading for this signal; this value will deliver a current output corresponding to 4 mA.
- **Input Max** is the highest possible reading for this signal; this value will deliver a current output corresponding to 20 mA.
- Repeat the above procedure for each analog output.

### Configuring the Models

If required, for configuration of the models, refer to Section C.3 of the *Multi-Host Software Manual*. 
Installing the Cover

1. Put cover back in place.
2. Insert the four (4) screws with flat washers and split lock washers. Using supplied Hex key tool, tighten the screws one by one diagonally.

![Figure 34: Installing the Cover](image)

**CAUTION**

When installing the cover, the 4 screws must be tightened correctly. A minimum torque of 50 lbf-in (5.6 N-m) is recommended. Failure to do so may result in water ingress inside the enclosure.
Commissioning

Figure 35: Wait 24 Hours

Figure 36: Compare the Gas Level Reading to a Recent DGA
COMMUNICATIONS & NETWORKING

For detailed information, refer to Chapter 5 of the *Hydran M2 Instruction Manual*.

**Forming a Local Network of Hydran M2s**

![Network Overview](image)

Daisy chain: RS-485 link, isolated, 1 triad
Maximum number of Hydran M2s: 32
Maximum total length of cables: 1,200 m (4,000 ft)

**CAUTION:** The LEDs used for the fiber optic transmitter are classified as IEC 60825-1 Accessible Emission Limit (AEL) Class 1. Class 1 devices are considered eye safe to the naked eye. Do not view directly with optical instruments.

![Local Communications with Laptop Computer](image)

DB-9 connector RS-232 Link

Laptop computer:
- Fixed baud rate
- 8 data bits
- No parity
- 1 stop bit
- No flow control

Figure 37: Network Overview (Daisy Chaining of Hydran M2s)

Figure 38: Local Communications with a Laptop Computer (for service only)
Figure 39: Grounding the RS-485 Conduits

- Cable is connected to RS-485 In terminals. Ground the conduit to the ground lug.
- Cable is connected to RS-485 Out terminals. Isolate conduit from Hydran M2.

Figure 40: General Wiring of the RS-485 Terminal Block

- Cable connected to RS-485 In terminals.
- Isolate conduit from Hydran M2.
- Ground the conduit to the ground lug.
- Cable connected to RS-485 Out terminals.
Figure 41: Wiring Details of the RS-485 between 2 or more Hydran M2s
Connecting the Hydran M2 to Hydran 201Ci Controllers

Host Computer

- Fixed baud rate (= Hydran M2 bps)
- 8 data bits
- No parity
- 1 stop bit
- No flow control
- No compression

Modem
(Internal or External)

Note: When programming a modem other than from U.S. Robotics, ensure the software being used does not reprogram the modem with default settings (no configuration string).

Telephone System
(Private or Public)

CAUTION:
The modems supplied by General Electric should be connected to an analog line only. Using a non-analog line (such as digital, PBX, Multi-line) will damage the modem.

Hydran 201Ci
Controller
with Modem

Supervisory link
RS-485, isolated, 3 pairs; maximum: 1,200 m (4,000 ft)

Select RS-485 Baud Rate and Comm Mode parameters with keypad.

Note: All Hydran M2’s within the same local network must be set to the same baud rate.

Note: If the Hydran M2’s Comm Mode command is set to Call On Alarm, you must program the modem with a telephone number to be dialed (where the Hydran M2 Host software is running).

Figure 42: Remote Communications with a Host Computer via a Modem
Figure 43: Wiring of the Supervisory Link between a Hydran M2 and a Hydran 201Ci-1 Controller

Note: The Hydran 201Ci-1 Controller can only display the gas level measured by the Hydran M2, not the moisture level.

Figure 44: Wiring of the Supervisory Link between a Hydran M2 and a Hydran 201Ci-C Controller
Figure 45: Wiring of the Supervisory Link between a Hydran M2 and a Hydran 201Ci-4 Controller

Note: The Hydran 201Ci-1 Controller can only display the gas level measured by the Hydran M2, not the moisture level.

Connecting the Hydran M2 to a D25

Figure 46: Wiring of the RS-485 Link between a Hydran M2 and a D25
## MODIFICATION RECORD

<table>
<thead>
<tr>
<th>REV.</th>
<th>DATE</th>
<th>AUTHOR</th>
<th>CHANGE DESCRIPTION</th>
</tr>
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<td>8</td>
<td>Dec 2010</td>
<td>Jean-Marie Arseneault</td>
<td>Created in Framemaker</td>
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<tr>
<td>9</td>
<td>May 2012</td>
<td>Yong Ng Tong</td>
<td>Reformatted in MS Word. Revised as per safety requirements.</td>
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