1. Instructions for using the driver

Battery type

Always fit a 9 volt alkaline battery. These batteries can easily be identified by the international marking code 6LR61. They are available from most retail outlets that sell batteries. A recommended battery of this type is the Duracell MN1604.

Be careful when selecting a battery as some brands may not fit properly, if possible try the battery in the battery compartment first. Never try to force a battery into the driver which is too large as this may damage the battery contacts.

Batteries of the zinc-carbon type, marked 6F22 or 6R61 (for example a PP3) are not recommended. These batteries perform poorly and need to be replaced more often.

Battery fitting

To fit the battery, at the back of the driver slide the cover off and then push the battery into its compartment (see diagram below). The label in the battery compartment shows the correct fitting.

![Diagram of battery fitting](image)

The driver will not work if the battery is accidentally fitted the wrong way round, but no harm will be done.

Slide the cover back on until it latches shut.

The alarm will sound for about 15 seconds after the battery is fitted.
What the controls do

Rate setting controls

The two rate controls set the rate (speed) at which the syringe plunger will be pushed in. This is the distance, in mm, that the plunger will move in one hour. The control on the left is for units of ten, and the control on right is for units of one, enabling values from 00 to 99 mm to be set.

![Rate Setting Controls Image]

The number that is set appears in the window next to each control. The controls can be turned with the key supplied, or with a small screwdriver.

START/TEST button

Pressing and holding this button down tests the safety system. Releasing the button starts the driver.

![START/TEST Button Image]

Actuator release button

Pressing and holding this button down releases the actuator so that it can be moved backwards or forwards by hand.
Selecting a syringe

Most of the small sterile plastic syringes available, from 2 ml up to 35 ml capacity can be used. Syringes with a luer lock nozzle are best because they offer more security against accidental disconnection of the infusion line.

Choose a syringe brand and size that fits properly onto the driver. The adjustable strap must fit round it to hold it firmly, the finger grip and the plunger push-button must fit in the retaining slots in the case and actuator.

With some of the larger size syringes it may not be possible to fill them to their full capacity but they can still be used as long as they fit correctly.
Setting the rate

Warning:
Completely prime the administration set, and also remove all air from both the administration set and the syringe before measuring the mm of fluid length, otherwise the rate calculation will be incorrect.

1. Fill the syringe with the required volume of medication.

2. Connect and fill the infusion line. Make sure the connection is secure and all the air is expelled.

3. Measure the distance, in millimetres (mm), from the empty (0) line on the syringe scale up to the line the plunger piston (see diagram below). There is a mm scale on the front of the driver.

4. Divide the distance measured in mm in 3. above, by the time in hours the medication in the syringe is required to be administered. The answer is the rate to be set in the rate windows.

Distance in mm ÷ Time in hours = Rate in mm per 1 h
(an example is given on page 5).
Example:
If a syringe is to be used to administer 8 ml of medication over a 12 hour period, then with the syringe filled to the 8 ml line the plunger travel measures 48 mm.

\[
48 \text{ mm} \div 12 \text{ hours} = 4 \text{ mm per 1 h}
\]

Set the rate switches to 04

Warning:
Remember that you have to set the rate in millimetres not millilitres (MILLIMETRES not MILLILITRES). The correct desired rate is essential to prevent serious injury or death to the patient.

Each switch must be moved until all of the number can be seen in the window.

In this example, every hour the syringe plunger will move forwards 4 mm, administering about 0.67 ml of the medication and after 12 hours the syringe will be empty and 8 ml will have been delivered.

Remember that for rates up to 9 the left-hand 'tens' number must be set at 0.

If the result of the division is not a whole number select the nearest whole number for the rate.
Notes on setting up your Syringe Drivers

An alternative method may be used to set up the MS16A or MS26 Syringe Driver, if a specific policy has been devised as part of your hospital/community protocol.

The alternative method involves first measuring the volume in the syringe, then priming the line.

Warning:
If you measure first, then prime the line, the infusion will finish early.
You should therefore only use this method when your hospital has devised this protocol for a specific clinical area.

Fitting the syringe

1. Place the syringe on top of the driver, with its barrel in the shallow V-shaped recess. The finger grip on the syringe barrel must be in the slot in the case.

2. Move the actuator up to the syringe plunger, by pressing and holding in the button on the side, and sliding it along. The push-button on the plunger of the syringe must be fitted in the slot in the actuator. Be careful not to push the plunger forwards.
3. Put the rubber securing strap over the syringe barrel and pull it tight. Hook and then press it into the groove in the side of the case.

Warning:
The driver must only be used with the syringe rubber securing strap fixed firmly in place, thus preventing an uncontrolled infusion to the patient that could result in serious injury or death.

If the selected syringe does not fit, try another brand with the same capacity.

Warning:
The rate setting used may need to be recalculated and changed so that the dose is administered in the required time, thus preventing serious injury or death to the patient.

Fitting the clear cover
The clear cover is supplied to protect the driver and the syringe. If the driver is to be put into a holster then this cover must be used.

1. Slide the driver into one of the open ends of the cover, with the front facing the side of the cover that is provided with the cutout hole. Always ensure that the driver is inserted into the cover the correct way round.
2. Push the driver into the cover until the **START** button lines up with the hole. The peg on the inside back of the cover goes into the hole in the middle of the back of the driver, this holds the cover in place.

![Diagram of MS16A Syringe Driver](image)

The **START** button can be pressed through the hole in the cover when needed.

3. If the driver is to be carried then the holster can be used. Keeping the syringe nozzle uppermost, slide the driver complete with its cover into the holster. Fasten the tape across the top to hold everything in. Make sure the infusion line is not trapped anywhere.

![Diagram of MS16A Syringe Driver](image)
Starting the driver

Before starting an infusion, going through the following checklist will help to make sure that everything has been set up correctly:

- the correct brand and size of syringe is fitted
- the syringe is fitted securely
- the syringe is filled with the correct volume
- the rate setting is correct. Check the numbers showing in the windows
- if required, the cover is fitted correctly.

Everything should now be ready to start an infusion and to check that both the safety system and the alarm is working.

1. Press and hold down the **START** button. The motor will run and stop after 4 seconds. Then the alarm will sound. The alarm will continue for about 15 seconds if the **START** button is not released.

**Warning:**

Do not use the driver if the motor does not stop and/or the alarm does not sound after holding pressed the **START** button for 4 seconds. Remove the driver from use and refer it to Marcal Medical.

2. Releasing the **START** button starts the driver and the indicator lamp will begin to flash once a second.

*Tip: If the lamp does not flash try replacing the battery.*

![Fluid Length and Infusion Time Chart]

**Caution:**
The patient will receive a small amount of medication as the syringe plunger is pushed forwards during the safety check. If this is undesirable the final patient connection can be left until the **START** button has been released.
Checks during the infusion

It is recommended that procedures are established for regular checks on the progress of the infusion. Patients, relatives or other carers, as well as medical staff, should be made aware of a few simple checks that can be made. These are to confirm the following:

- the volume is being delivered as expected
- the rate that is set is the correct and required value
- the indicator lamp is flashing
- the driver is in good condition.

Also that they know what to do and who to contact in an emergency.

Stopping the driver

When the syringe is empty the driver will stop automatically and the alarm will sound for about 15 seconds.

There is no off switch to stop the driver before the syringe is empty. To stop the driver, do either of the following:

- move the rate switches to 00.
  The indicator lamp will still flash
  or,

- remove the battery.

Warning:
Never take a syringe that is not empty off the driver if it is still connected to the patient. The infusion line must first be clamped or disconnected to prevent serious injury or death to the patient.
Alarms

The driver will give an audible alarm lasting about 15 seconds when any of the following take place:

- when a battery is inserted
- when the START/TEST button is pressed for longer than 4 seconds
- when the syringe is empty
- when the driver has stopped. This might be caused by a blocked or trapped infusion line.

The indicator lamp will stop flashing:

- when the driver has stopped and switched off
- when the battery needs replacing.

Accessories

The following accessories are supplied with the driver:

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover 0105-0529</td>
<td>A clear rigid plastic cover to put over the driver and syringe to protect them.</td>
</tr>
<tr>
<td>Holster 0105-0027</td>
<td>A washable soft fabric holster for carrying the driver and cover during an infusion.</td>
</tr>
<tr>
<td>Rate adjusting key 0113-0023</td>
<td>Tool to turn the slotted rate switches.</td>
</tr>
</tbody>
</table>

The following optional accessories can be ordered:

<table>
<thead>
<tr>
<th>Accessory</th>
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</thead>
<tbody>
<tr>
<td>Base 0105-0108</td>
<td>This provides a secure base to stand the driver on.</td>
</tr>
<tr>
<td>Instruction Manual 0105-0629</td>
<td>Extra copies of this Manual can be ordered by quoting this number.</td>
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