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Product Information

Sigma-Aldrich® MSMINIDUO and MSCHOICETRIO Horizontal Electrophoresis Units

Catalog Numbers **EP1101 and EP1201**
Store at Room Temperature

TECHNICAL BULLETIN

Product Description

The Sigma-Aldrich® MSMINIDUO and MSCHOICETRIO Horizontal Electrophoresis units are extremely durable and injection-molded providing a leak-proof environment for complete safety and long life. These units also offer a combination of economy of gel and buffer volume with gel size and sample number versatility. All units contain removable UV transport trays and are available with one, two, and three tray options. These units feature no indentations or casting gate grooves to interfere with sample progression. Traditional tape casting may be used, should this method be preferred.

Guidelines and Restrictions

- Maximum altitude – 2,000 m (6,562 ft)
- Temperature range between 4–65 °C
- Maximum relative humidity 80% for temperatures up to 31 °C, decreasing linearly to 50% relative humidity at 40 °C.
- Not for outdoor usage

This apparatus is rated Pollution Degree 2 in accordance with IEC 664. Pollution Degree 2 states: "Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected".

Components

Units include tank, lid, and electrodes, and include the following accessories:

Table 1.

Product	Trays	Tray Dams	Combs	Loading Guides	Cables
MSMINIDUO (Catalog Number EP1101)	EP1102 EP1103	EP1104 (Pack of 2)	2 × EP1125 1 mm, 8 sample	EP1107 (Strips) EP1108 (Platform)	EP2002
MSCHOICETRIO (Catalog Number EP1201)	EP1202 EP1203 EP1204	EP1205 (Pack of 2)	2 × EP1232 1 mm, 20 sample	EP1208 (Strips) EP1209 (Platform)	EP2002

Additional components are available (see Appendix).

Refer to the packing lists as soon as the unit is received to ensure all components have been included. The unit should be checked for damage when received. Please contact Sigma-Aldrich if there are any problems or missing items.

Precautions and Disclaimer

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

Please read the entire technical bulletin before using these units

Preparation Instructions

Setting up the Horizontal Gel Tanks

A. Fitting Electrode Cables
   1. Note the position of the lid on the unit. This shows the correct polarity and the correct orientation of the cables. Black is negative and red is positive.
   2. Remove the lid from the unit.
      Note: If the lid is not removed, fitting the cables may result in loosening the gold plug and damage to the electrode.
   3. Screw the cables into the tapped holes as fully as possible, so there is no gap between the lid and the leading edge of the cable fitting.
   4. Refit the lid.

B. Fitting Loading Guides – These can be fitted to enhance visibility of the wells if desired. They can be fitted to the white vinyl platform sheet or to the unit itself.
   1. Seat the tray in the unit and note the position of the comb grooves. The samples run black to red, but the trays can be used frontward or backwards, so ensure the comb grooves closest to the black electrode are marked.
   2. Remove the tray.
   3. Peel the back off of the loading guide and carefully apply the loading guide directly to the gel platform.

The unit is now ready to be used.

Preparation of Electrophoresis Solutions

See Appendix, Table 8 for the catalog numbers of electrophoresis chemicals.

1× TAE Buffer – 40 mM Tris, pH 7.6, with 20 mM acetic acid and 1 mM EDTA.

Prepare 1 L of 50× TAE Stock Solution:
1. Dissolve 242 g of Tris base (FW = 121) in 750 mL of distilled water.
2. Add 57.1 mL of glacial acetic acid.
3. Add 100 mL of 0.5 M EDTA, pH 8.0, solution.
4. Bring volume to 1 L with distilled water.

As needed, prepare 1× TAE Buffer by diluting 50× TAE Stock Solution 50-fold with distilled water.

1× TBE Buffer – 89 mM Tris, pH 7.6, with 89 mM boric acid and 2 mM EDTA

Prepare 1 L of 10× TBE Stock Solution:
1. Dissolve 108 g of Tris base (FW = 121) in 750 mL of distilled water.
2. Add 55 g of boric acid (FW = 61.8).
3. Add 40 mL of 0.5 M EDTA, pH 8.0, solution.
4. Bring volume to 1 L with distilled water.

As needed, prepare 1× TBE Buffer by diluting 10× TBE Stock Solution 10-fold with distilled water.

10× Sample Loading Dye Buffer – 50% glycerol, 0.25% bromophenol blue, and 0.25% xylene cyanole FF in 1× TAE or 1× TBE Buffer.

Note: The same 1× Buffer (TAE or TBE) should be used to prepare the 10× Sample Loading Dye Buffer, Agarose Solution, and electrophoresis running buffer.

Prepare only 1–10 mL of the 10× Sample Loading Dye Buffer, depending on the number of samples.

Ethidium Bromide Solution – Add 10 mg of ethidium bromide to 1 mL of distilled water. Prepare the Staining Solution (0.5 μg/mL) by diluting the Ethidium Bromide Solution with water.

Storage/Stability

The units may be stored at room temperature and operated in the temperature range of 4–65 °C.

Procedures

See Appendix, Table 8 for the catalog numbers of electrophoresis chemicals.

Preparation of Agarose Solution

1. For a standard 0.7% agarose gel, add 0.7 grams of agarose to 100 mL of 1× TAE or 1× TBE Buffer. The same 1× buffer (TAE or TBE) should be used in the tank, serving as the electrophoresis running buffer. Table 2 shows the volume of agarose solution required to prepare the agarose gel for each unit tray size.

Table 2.
Gel Volumes for 0.5 mm Thick Gel

MSMINIDUO		**MSCHOICETRIO**	
Tray	Gel Volume	Tray	Gel Volume
7 × 7 cm	25 mL	15 × 7 cm	52.5 mL
7 × 10 cm	35 mL	15 × 10 cm	75 mL
		15 × 15 cm	112.5 mL

2. Add the agarose powder to a beaker/flask.
3. Add the appropriate volume of 1× TAE or 1× TBE Buffer from Table 2.
4. Dissolve the agarose powder by heating the mixture either on a magnetic hot plate with a stirring bar or in a microwave oven. If using the microwave method, the microwave should be set to ~400 W or at a medium setting, and the beaker/flask swirled every minute. The solution should be heated until all the agarose has dissolved, otherwise this will interfere with sample migration.
   Note: To prevent evaporation during heating, the beaker/flask should be covered with Parafilm® "M".
5. The Agarose Solution must be cooled to between 50–60 °C before pouring.

Gel Casting

The MSMINIDUO and MSCHOICETRIO units allow for three different methods of gel casting:

- Tray Dams (provided with unit, see Table 1)
- Flexicaster (Appendix, see Table 7)
- Laboratory tape (Appendix, see Table 7)

1. Casting using Tray Dams
   a. Fit the tray dams over each end of the gel tray and place onto a level surface. The dams should be fitted so there is no gap between the sides of the tray and the groove in the dams. This will ensure there is no possibility of gel leakage.
   b. Place the comb(s) in the grooves. Each gel tray has more than one comb grove so multiple combs can be used. Using multiple combs increases the number of samples available per gel, but decreases run length and care must be taken to ensure samples from the first wells do not migrate into the lanes of the second comb wells.
   c. Pour in the Agarose Solution carefully so as not to generate bubbles. Any bubbles that do occur can be smoothed to the edge of the gel and dispersed using a pipette tip.
   d. Allow the Agarose Solution to set, ensuring the gel remains undisturbed.
   e. Carefully remove the tray dams and gel comb, and transfer the gel including the gel tray to the main tank.

2. Casting using the Flexicaster
   a. Tray dams and gel comb(s) should be placed into position prior to the assembled gel tray being placed into the Flexicaster
   b. Level the Flexicaster base by adjusting the feet so the bubble is centered.
   c. Insert the desired length gel tray into the Flexicaster such that one end of the gel tray is pushed up and seals against the silicone mat of the permanent end of the Flexicaster.
   d. Position the movable end of the Flexicaster so the silicone mat is pushed against the other end of the tray.
   e. Turn the cam so the silicone mat tightly seals against the side of the tray. Pour in the Agarose Solution carefully so as not to generate bubbles. Any bubbles that do occur can be smoothed to the edge of the gel and dispersed using a pipette tip.
   f. Allow the Agarose Solution to set, ensuring the gel remains undisturbed.
   g. Carefully remove the tray dams and gel comb, and transfer the gel including the gel tray to the main tank.

3. Casting using Traditional Laboratory Tape
   a. Autoclave or plastic backed, general laboratory tape should be used. A length 5 cm longer than the width of each end of the tray should be cut. One length should be placed over one end of the tray and stuck 1 cm in from the gel tray edge. This should then be folded and the edges sealed securely. Repeat for the other end and place onto a level surface for gel casting.
   b. Place the comb(s) in the grooves. Each gel tray has more than one comb grove so multiple combs can be used. Using multiple combs increases the number of samples available per gel, but decreases run length and care must be taken to ensure samples from the first wells do not migrate into the lanes of the second comb wells.
   c. Pour in the Agarose Solution carefully so as not to generate bubbles. Any bubbles that do occur can be smoothed to the edge of the gel and dispersed using a pipette tip.
   d. Allow the Agarose Solution to set, ensuring the gel remains undisturbed.
   e. Carefully remove the tray dams and gel comb, and transfer the gel including the gel tray to the main tank.

Running the Gel

1. Mix the sample to be loaded with 10× Sample Loading Dye Buffer. Usually 3 µL of 10× Sample Loading Dye Buffer is adequate, but less may be used with sample volumes of <10 µL.
2. Fill the unit with 1× buffer until the gel is just covered with buffer. This will give the fastest resolution times. For enhanced quality of sample resolution, fill the unit to 5 mm above the gel. Note: Use the same 1× buffer (TAE or TBE) as used to prepare the 10× Sample Loading Dye Buffer.
3. Load the samples into the wells using pipettes. Multichannel pipettes can be used for loading samples with MC compatible combs (see Appendix).
4. Carefully place the lid on the tank and connect to a power supply.
5. Typically gels are run between 90–150 V. However, maximum voltages are indicated on the serial badge of each unit. It should be noted higher voltages generally give faster resolution times, but poorer quality of sample resolution.

Gel Staining and Viewing

The gel trays for both the MSMINIDUO and MSCHOICETRIO allow for staining to be performed without removing the gel from the gel tray, if this is preferred.

1. Transfer the gel to a vessel containing the appropriate volume of Staining Solution (0.5 µg/ml of ethidium bromide in water) for 15–30 minutes. The entire gel should be covered.
2. Destain the gel for 10–30 minutes in distilled water again ensuring the gel is completely immersed.
3. Rinse the gel twice for a couple of seconds with distilled water.
4. Transfer the gel to a UV transilluminator.
5. The samples will often appear as brighter, clearer bands when photographed or viewed using a gel documentation system. However, if the gel bands are too faint then the staining procedure should be adjusted so there is less destaining. If there is too much background then the staining procedure should be adjusted so there is more destaining.

Care and Maintenance of Equipment

1. Cleaning Horizontal Units – Units are best cleaned using warm water and a mild detergent. Water at **temperatures >60 °C can cause damage to the unit and components.**

   The tank should be thoroughly rinsed with warm water or distilled water to prevent build up of salts, but care should be taken not to damage the enclosed electrode, and vigorous cleaning is not necessary or advised. Air drying is preferable before use.

   - The units should only be cleaned with the following: Warm water with a mild concentration of soap or other mild detergent.
   - Compatible detergents include dishwashing liquid, hexane, and aliphatic hydrocarbons.

   The units should not be left in detergents for more than 30 minutes.

   The units should **never come in contact with the following** cleaning agents, these **will cause irreversible and accumulative damage:** acetone, phenol, chloroform, carbon tetrachloride, methanol, ethanol, isopropanol, or alkali.

2. RNase Decontamination – This can be performed using the following procedure:
   a. Clean the units with a mild detergent as described in the Care and Maintenance of Equipment Procedure.
   b. Wash with 3% hydrogen peroxide (H_2O_2) solution for 10 minutes.
   c. Rinse with 0.1% DEPC (diethyl pyrocarbonate) treated distilled water (see Appendix, Table 8).

References

1. Sambrook, et al., Molecular Cloning, A Laboratory Manual, Second Edition, Cold Spring Harbor Laboratory Press, 1989.
2. Current Protocols in Molecular Biology, Greene Publishing Associates and Wiley-Interscience, 1989.

Appendix
Gel Combs

Table 3.
0.75 mm Thick Combs

MSMINIDUO		MSCHOICETRIO	
Number of Samples	**Catalog Number**	**Number of Samples**	**Catalog Number**
1	EP1113	1	EP1214
2	EP1114	2	EP1215
4	EP1115	4	EP1216
8	EP1116 (MC) EP1117	10	EP1217 EP1221 (MC)
10	EP1118	12	EP1218
12	EP1119 (MC)	14	EP1222 (MC)
16	EP1120	16	EP1223 (MC)
		18	EP1224 (MC)
		20	EP1219
		28	EP1225 (MC)
		30	EP1226 (MC)
		35	EP1220

MC denotes multichannel pipette compatible.

Table 4.
1 mm Thick Combs

MSMINIDUO		MSCHOICETRIO	
Number of Samples	**Catalog Number**	**Number of Samples**	**Catalog Number**
1	EP1121	1	EP1227
2	EP1122	2	EP1228
4	EP1123	4	EP1229
8	EP1124 (MC) EP1125	10	EP1230 EP1234 (MC)
10	EP1126	12	EP1231
12	EP1127 (MC)	14	EP1235 (MC)
16	EP1128	16	EP1236
		18	EP1237 (MC)
		20	EP1232
		28	EP1238 (MC)
		30	EP1239 (MC)
		35	EP1233

MC denotes multichannel pipette compatible.

Table 5.
1.5 mm Thick Combs

MSMINIDUO		MSCHOICETRIO	
Number of Samples	**Catalog Number**	**Number of Samples**	**Catalog Number**
1	EP1129	1	EP1240
2	EP1130	2	EP1241
4	EP1131	4	EP1242
8	EP1132 (MC) EP1133	10	EP1243 EP1248 (MC)
10	EP1134	12	EP1244
12	EP1135 (MC)	14	EP1249 (MC)
16	EP1136	16	EP1250 (MC)
		18	EP1251 (MC)
		20	EP1245
		28	EP1252 (MC)
		30	EP1247 (MC)
		35	EP1246

MC denotes multichannel pipette compatible.

Table 6.
2 mm Thick combs

MSMINIDUO		MSCHOICETRIO	
Number of Samples	**Catalog Number**	**Number of Samples**	**Catalog Number**
1	EP1137	1	EP1253
2	EP1138	2	EP1254
4	EP1139	4	EP1255
8	EP1140 (MC) EP1141	10	EP1256 EP1261 (MC)
10	EP1142	12	EP1257
12	EP1143 (MC)	14	EP1262 (MC)
16	EP1144	16	EP1258 (MC)
		18	EP1263 (MC)
		20	EP1259
		28	EP1264 (MC)
		30	EP1260
		35	EP1265

MC denotes multichannel pipette compatible.

Additional Equipment and Electrophoresis Chemicals

Parafilm laboratory film, general purpose laboratory tape, gel combs, gel scoops, gel trays, UV transilluminators, beaker/flask, power supplies, and electrophoresis chemicals

Table 7.
Additional Equipment

Product Description	Catalog Number
Sigma Label Tape, White	L8394
Parafilm "M" roll size 2 in. × 250 ft	P7543
Parafilm "M" roll size 4 in. × 125 ft	P7793
Parafilm "M" roll size 4 in. × 250 ft	P7668
Gel Staining Tray	T0567
MSMINIDUO Mini Flexicaster	EP1111
MSMINIDUO UV Gel Scoop	EP1112
MSCHOICETRIO Choice Flexicaster	EP1212
MSCHOICETRIO UV Gel Scoop	EP1213
Transilluminator UV/White light AC input 115 V, 60 Hz	Z363820
Transilluminator, UV AC input 220 V, 50 Hz	Z363677
Power supply 250 V AC input 110 V US 3-pin plug	PS2501
Power supply 250 V AC input 220 V EU 2-pin plug	PS2502

Table 8.
Electrophoresis Chemicals

Product Description	Catalog Number
Agarose, for routine use	A9539
Agarose, low melting point, Molecular Biology Reagent Grade; DNase, RNase, NICKase - none detected	A9414
Agarose, high resolution; DNase, RNase, NICKase - none detected	A4718
Water, Molecular Biology Reagent Grade	W4502
Diethyl pyrocarbonate (DEPC)	40718
Hydrogen Peroxide Solution, 30% (w/v) in H_20, meets USP testing specifications	H3410
Ethidium Bromide, 10 mg/mL, for molecular biology, aqueous solution	E1510
Ethidium Bromide, 500 μg/mL, for molecular biology, aqueous solution	E1385
Ethidium Bromide, for molecular biology, powder	E7637
Tris Acetate-EDTA Buffer, Working Solution	T6025
Tris Acetate-EDTA Buffer, 10× Concentrate	T4948
Tris Borate-EDTA Buffer, Working Solution	T9525
Tris Borate-EDTA Buffer, 10× Concentrate	T4415
Glycerol >99%, for electrophoresis	G8773
Bromophenol Blue, sodium salt, for electrophoresis	B5525
Xylene cyanole FF, for molecular biology	X4126
Gel Loading Solution, Type I, for non-denaturing polyacrylamide and agarose gel electrophoresis	G7654