Mara® *Switch* MSW

Marabu

Screen printing ink for membrane switches made of polycarbonate and coated polyester foils

Satin gloss, good opacity, fast drying, flexible ink film, can be embossed, low odour

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Field of Application

Substrates

Mara® *Switch* MSW was especially developed for the following substrates:

- polycarbonate foils (PC)
- coated polyester foils

Mara® *Switch* MSW is also suited for the following substrates:

- ABS/SAN
- Polystyrene PS
- rigid PVC
- self-adhesive PVC foil
- PMMA
- PETG (limited)

Since all the print substrates mentioned may be different in printability even within an individual type, preliminary trials are essential to determine the suitability for the intended use.

Field of use

Maraswitch MSW is a solvent-based, fast drying, and block resistant screen printing ink. It is excellently suited for the printing of decals, front panels/ membrane switches, high-quality flat key pads, as well as for further operational control panels. MSW is therefore best suited for multi-layered ink films with subsequent application of adhesive and stamping of the foil. The "Automotive" colour shades are especially suited for the making of speedometers.

Characteristics

Mara® *Switch* MSW is an ink with low odour and satin gloss, and it shows good block-resistance. It can be used on fast running presses such as flat bed or fully automatic cylinder machines with a printing speed of up to 1400 prints/h but is also suited for manual or semi-automatic machines.
Mara® *Switch* MSW excels particularly with its outstanding printability and mesh opening.

Recommendation

The ink should be stirred homogeneously before printing and if necessary during production.

Drying

Physically fast drying, can be overprinted within 5-10 min at 20 °C ambient temperature and stackable after 20-30 sec at 60 °C in a tunnel dryer. The times mentioned vary according to substrate, ink film thickness, drying conditions and auxiliaries used, e. g. the use of retarder.

Fade resistance

All pigments used for the MSW shades (exception: 934 Carmine Red) have a very high fade resistance (blue wool scale 7-8) and are therefore suited for a medium-term outdoor use. The pigments used are resistant to plasticizers and solvents.

Stress resistance

After proper and thorough drying, the printed ink film exhibits outstanding adhesion as well as rub, scratch, and block resistance. Post-processing procedures like stamping, forming, or die-cutting in the ink film are also possible.

MSW is compatible with all common adhesives. After appropriate processing and a 72 h time period, very high peel-off values > 15 N are achieved. It is essential, however, that virtually all of the solvent residues have been eliminated from the printed ink film prior to the application of adhesive. This can be done by an additional oven-baking of 30 min at 60-80 °C.

Membrane switches manufactured in this way will display resistances of more than 2 millions of actuations according to DIN 42115.

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Range

Basic Shades

920	Lemon
922	Light Yellow
924	Medium Yellow
926	Orange
930	Vermilion
932	Scarlet Red
934	Carmine Red
936	Magenta
940	Brown
950	Violet
952	Ultramarine Blue
954	Medium Blue
956	Brilliant Blue
960	Blue Green
962	Grass Green
970	White
980	Black

High Opaque Shades

122	High Opaque Light Yellow
130	High Opaque Vermilion
152	High Opaque Ultramarine Blue
162	High Opaque Grass Green
170	Opaque White
171	Opaque White
180	Opaque Black
181	Opaque Black, non-conductive

Press-Ready Metallics

191	Silver
197	Medium Silver

Further Products

182	Block-out Silver
904	Special Binder
910	Overprint Varnish

Automotive

172	Opaque White
188	Deep Black
291	High Gloss Silver
971	White

Attention: The colour shade 934 Carmine Red has an inferior fade resistance compared to the other basic shades and is thus more sensitive to direct solar radiation.

MSW 171 Opaque White is more opaque than MSW 970 and universally used for full-area applications.

MSW 170 Opaque White has a higher opacity than MSW 171. Owing to the high pigment content the flexibility is quite limited. For a higher flexibility approx. 10-20% of MSW 910 can be added to MSW 170/171, decreasing the opacity at the same time.
MSW 181 is a high-opaque black which is characterized by significant high electrical resistance values. This product is designed for applications requiring electrical resistance values > 10^{12} Ohm in order to provide insulation to the installed electronics. This is mainly relevant for the decoration of front panels, or for special membrane switches.

The flexible MSW 182 Block-out Silver is also high-opaque and used as a full-area printed blocking layer, impervious to light.

The press-ready silver MSW 197 has a medium-coarse pigmentation and can be used for further gold or coloured metallic effects by mixing it with basic shades.

The **Automotive** colour shades are especially suited for the making of speedometers. They fulfil all requirements for serial production, have good deformation properties, and their density is adapted to this specific application. The colour shades MSW 172, 188 and 971 are more matt than the other MSW shades.

Density values of the "Automotive" black and white shades (mesh 120-34):

172	0,3 - 0,45
188	4,2 - 4,5
971	0,2 - 0,3

All shades are intermixable. Mixing with other ink types or auxiliaries must be avoided in order to maintain the special characteristics of this ink.

All basic shades are included in our Marabu-ColorFormulator (MCF). They build the basis for the calculation of individual colour matching formulas, as well as for shades of the common colour reference systems HKS®, PANTONE®, and RAL®. All formulas are stored in the Marabu-ColorManager software.

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Combination possibilities
MSW is compatible with the other Marabu ink systems for membrane switches: Mara® *Switch* MSW and Mara® *Star* SR can be mixed. MSW can also be combined with the UV-curable Ultra *Switch* UVSW if the bottom layer is printed with UVSW, followed by an overprint with MSW. Especially in combination with UVSW, we recommend to print the blocking layer with MSW 171 (Opaque White) or 182 (Block-out Silver). This gives you the flexibility to choose or combine UV-curable and solvent-based inks according to the respective requirements.

Metallics

Metallic Pastes

S 291	High Gloss Silver	10-20%
S 292	High Gloss Rich Pale Gold	10-20%
S 293	High Gloss Rich Gold	10-20%

Metallic Powders

S 181	Aluminium	17%
S 182	Rich Pale Gold	25%
S 183	Rich Gold	25%
S 184	Pale Gold	25%
S 186	Copper	33%
S 190	Aluminium, rub-resistant	12.5%

These metallics are added to MSW 910 in the recommended amount, whereas the addition may be individually adjusted to the respective application. We recommend preparing a mixture which can be processed within a maximum of 8 h since metallic mixtures usually cannot be stored. Due to their chemical structure, the processing time of mixtures with Pale Gold S 184 and Copper S 186 is even reduced to 4 h.
Owing to the smaller pigment size of Metallic Pastes it is possible to work with finer fabrics like 140-31 to 150-31. Owing to the larger pigment size of Metallic Powders we recommend the use of a coarser fabric like 100-40.
Shades made of Metallic Powders are always subject to an increased dry abrasion which can only be reduced by overvarnishing. All metallic shades are displayed in the Marabu "Screen Printing Metallics" colour chart.

Auxiliaries

UKV 2	Thinner	10-20%
VP	Retarder Paste	5-10%
ES	Printing Modifier	0.5-1%
SV 5	Retarder, fast	0-5%
SV 10	Retarder, slow	0-5%
UR 3	Cleaner (flp. 42°C)	
UR 4	Cleaner (flp. 52°C)	
UR 5	Cleaner (flp. 72°C)	

Thinner is added to the ink to adjust the printing viscosity. For slow printing sequences and fine motifs, it may be necessary to add retarder to the thinner. For an additional thinning of the ink containing retarder, only pure thinner should be used.

Printing Modifier ES contains silicone and can be used to rectify flow problems on critical substrates. If an excessive amount is added, flow problems are increased and adhesion may be reduced, especially when overprinting. The use of ES may reduce the degree of gloss.

The cleaners UR 3 and UR 4 are recommended for manual cleaning of the working equipment. Cleaner UR 5 is recommended for manual or automatic cleaning of the working equipment.

Printing Parameters

All types of commercially available polyester fabrics and solvent-resistant stencils can be used. Typical qualities are 77-120 threads/ cm.

Shelf Life

Shelf life depends very much on the formula/ reactivity of the ink system as well as the storage temperature. The shelf life for an unopened ink container if stored in a dark room at a temperature of 15 - 25 °C is:

- 1 year for MSW 172/188/291/971
- 2 years for MSW 180/181
- 3 years for all other MSW standard shades

Under different conditions, particularly higher storage temperatures, the shelf life is reduced.

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In such cases, the warranty given by Marabu expires.

Note

Our technical advice whether spoken, written, or through test trials corresponds to our current knowledge to inform about our products and their use. This is not meant as an assurance for certain properties of the products nor their suitability for each application.
You are, therefore, obliged to conduct your own tests with our supplied products to confirm their suitability for the desired process or purpose. The foregoing information is based on our experience and should not be used for specification purposes. All characteristics described in this Technical Data Sheet refer exclusively to the standard products listed under "Range", provided that they are processed in accordance with their intended use and only when used with the recommended auxiliaries. The selection and testing of the ink for specific applications is exclusively your responsibility. Should, however, any liability claims arise, they shall be limited to the value of the goods delivered by us and utilised by you with respect to any and all damages not caused intentionally or by gross negligence.

Labelling
For Mara® *Switch* MSW and its auxiliaries, there are current Material Safety Data Sheets available according to EC regulation 1907/2006, informing in detail about all relevant safety data including labelling according to EC regulation 1272/2008 (CLP regulation). Such health and safety data may also be derived from the respective label.

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