

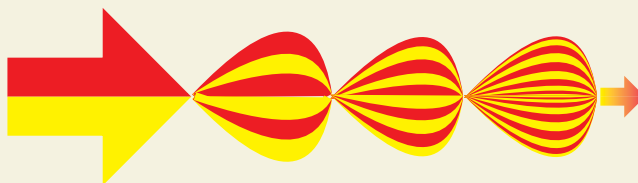
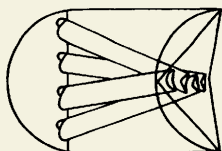
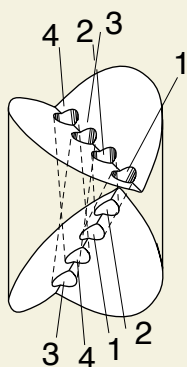


What it does

The MOTIONLESS ISOMIX NOZZLE incorporates the ISG (Interfacial Surface Generator) Motionless Inline Mixing elements. 4, 5 or 6 Stainless Steel elements are inserted in a special Nozzle recess. These elements offer mathematically predictable layer generation resulting in superior melt mixing. Less dry colouring or colour concentrate is required to obtain uniform dispersion. In addition, a more homogenous melt results. Quick pay-back is realized in savings of colour concentrate and/or dry colouring and faster cycling due to lower average melt temperature.

Mixing Principle

The MOTIONLESS ISOMIX consists of a series of mixing elements enclosed in a specially machined PMS Nozzle Body. There are no moving parts and elements can easily be removed for cleaning. Element ends are shaped such that adjacent elements form a tetrahedral chamber. Four (4) holes bored in each element are at oblique angles so that material near the periphery on the inlet side of the element emerges near the centre on the outlet side. Because of this unique concept, the average 5-element assembly will provide 1,024 (6 elements = 4,096) generated layers in the mixing process at point of ejection. This concept is considerably advanced over the older style nozzle mixers incorporating a series of blending devices (more appropriate for low pressure applications).



4 individual Flow Streams are forced together, mixed and then split through a further 4 streams in the next element, then the streams are mixed again and so forth, through each element in the assembly, creating a homogenous melt with minimum pressure reduction.

Dramatic improvement in part colour homogeneity

ISOMIX NOZZLES dramatically improve the colour dispersion and reduce waste and part rejection..



ADVANTAGES

Advantages are numerous; however, those most pertinent to the average injection moulder include considerable savings on cost of dry colouring and/or colour concentrate and faster cycle times. Savings in dry colouring and colour concentrates average 10% to 20% in screw type machine applications. Faster cycling results from a thermally more homogenous melt stream and faster screw recovery time (much of the mixing requirement is attended to by nozzle, requiring less mixing by the screw).

3 sizes for small, medium or large machines:

Elements	Machine size	Through put
A & B	5 or 6	Small machines
C & D	5 or 6	Medium machines
E & F	5 or 6	Large machines

Through put calculations based on low viscosity material.



Forced radial mixing is one of the fundamental reasons for the superior performance of the ISOMIX MOTIONLESS MIX NOZZLE. Figures on the left show that outer streams 1 & 4 emerge on the inside, whereas inner streams 2 & 3 migrate to the outside. The process is repeated as material flows into a tetrahedral cross section between elements resulting in positive cross blending of any temperature and colour gradients in the polymer melt stream.

Applications:

Type	number of elements	element dia (mm)	nozzle dia	flow cross section	Equivalent orifice	Application
Style A	5	16	38	26	5.8	For small or medium size machines working at less than capacity on common materials. Best with colour concentrate or compound
Style B	6	16	38	26	5.8	For small or medium size machines moulding dry colour or where there is ample injection pressure reserve and maximum dispersion required.
Style C	5	21	38	43	7.4	For medium and large machines moulding colour concentrate or compound. There is relatively little pressure drop with this size.
Style D	6	21	38	43	7.4	For medium and large machines moulding dry colour or where maximum dispersion is required.
Style E*	5	25	45	64	9.0	For the most demanding applications such as large shots and rapid cycling. Where only minimal pressure drop can be tolerated.
Style F*	6	25	45	64	9.0	For the most demanding applications: maximum mixing and minimum pressure drop.

* Oversize 1 3/4" body nozzle requires KN style tip



Number of layers generated in mix nozzle, using different numbers of elements in flow stream

number of elements	1	2	3	4	5	6
number of layers generated	4	16	64	256	1024	4096

PRICE PROMISE

We will not be beaten on price for similar product with the same quality and specification



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Dimensions & ordering Data

The minimum length of a motionless-MIX Nozzle is dependent on:

1. THE LENGTH OF MIXING ELEMENTS.
2. THE REAR OPENING DIAMETER AND ENTRY ANGLE.
3. NOZZLE TIP LENGTH.

The following information will help you with your selection, however we suggest that you call our technical sales line.

Please be prepared with information on:

- Thread size
- Min. & max. length of nozzle
- Rear Opening
- Tip radius and orifice required.

L1 = Tip Length 19mm standard (28 for style E KN tip)

$$L3 = \frac{X - 12.7 \times \cot A}{2} + 13$$

For an indication of minimum overall length, simply calculate L3, select and add element length L2 and add tip length, L1.

For example:

A nozzle with a rear opening of 19 (X)

Entry angle of 10 degrees (A)

Element type "C"

Tip length 19

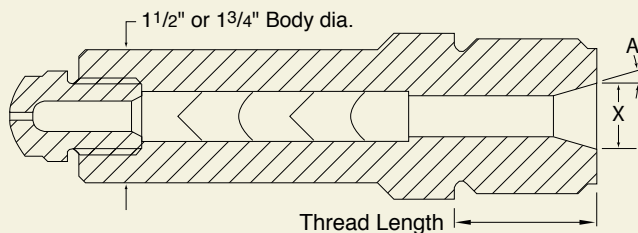
$$L1 = 19$$

$$L2 = 103$$

$$L3 = \left(\frac{(19 - 12.7) \times 5.671}{2} \right) + 13 = 30.56$$

$$\text{Nozzle Length} = 19 + 103 + 30.56 = 153$$

The required minimum length of nozzle assembly is 153mm



Typical rear opening angles and respective cotangents are:

Degrees	Cotangent
10	5.671
15	3.732
30	1.732

Style	Length of elements	L2
A	66.7	85.7
B	82.6	101.6
C	84.89	103.1
D	104.1	122.1
E	107.2	129.4
F	132.6	154.8

Options & Spares

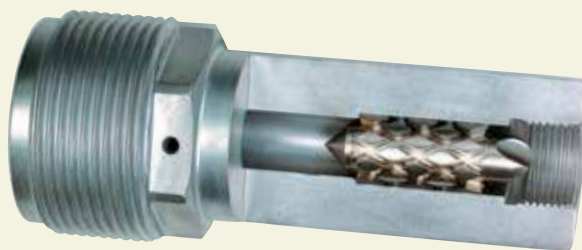
1. Thermocouple hole on hex flat (included)
2. Thermocouple
3. Nozzle Heaterband
4. Optional/Replacement tips
5. Replacement ISOMIX MOTIONLESS-Mix Elements (full set)

Style	flow X-section	no of elements	diameter	Part no
Style A	26sq mm	5	16mm	ISOMXA
Style B	26sq mm	6	16mm	ISOMXB
Style C	46sq mm	5	21mm	ISOMXC
Style D	43sq mm	6	21mm	ISOMXD
Style E	64sq mm	5	25mm	ISOMXE
Style F	64sq mm	6	25mm	ISOMXF

When ordering, please state radius and orifice. To complete part number, add Radius and Orifice Suffixes as shown below.

Radius sizes: 									
Orifice (mm)	1.5	2.5	3	4	5	6	8	9.5	
Part no suffix:	I	J	K	L	M	N	O	P	
note: 1.5 & 2.5mm orifice only available in GP tip									

Pineapple Mixing Nozzle



PINEAPPLE IS EASILY
REMOVED FOR CLEANING



Recess is machined into nozzle in our workshop. Elements slide into nozzle recess. Standard nozzle tip is used.

The Pineapple Mixer

The Pineapple Principle of colour mixing has been used for many years in the Extrusion Industry, and we believe that We are now able to offer this proven technology to Injection Moulders in the UK. Ideal for small machines with minor mixing problems.

The Pineapple mixer may be fitted to any of our removable tip nozzles but, due to the small physical nature of the mixer itself, it is ideally suited to the smaller moulding machine where the overall size of a mixer may have been prohibitive in the past.

Pineapple Mixer (mixing element)

Description	Part no
19dia x 54mm long	PNA1

Helix Mixing Nozzle

- 100% free flow mixing
- Fast blending
- Easy to clean
- Economical
- Consistent colour mixing
- Minimum flow restriction
- Allows use of less colourant
- Minimum pressure drop



Recess is machined into nozzle in our workshop. Elements slide into nozzle recess. Standard nozzle tip is used.



NB Not recommended for heavily glass filled materials.

The Helix In-line colour mixing method provides excellent colour mixing with minimal pressure drop.

For maximum colour mixing, we recommend the seven flute reversing helix. In shorter nozzles where it is not possible to accommodate all 7 elements, the five flute reversing helix can be used.

Helix Mixer (part numbers for mixing elements)

Description	Part no
5 elements 89mm long	HLX5
7 elements 127mm long	HLX7

When ordering, simply identify the thread and rear opening of your nozzle, add the elements shown and we will machine a recess in the nozzle to accept the elements. A standard nozzle tip is used.

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High Performance KSM Mixer



The **KSM** mixing nozzle is designed to give a high level of melt homogenisation using a wide range of materials. The mixer allows parts to be made to tighter tolerances virtually eliminating spots, streaks and clouds of colorant. Reject rates are reduced and significant savings in material are possible.

The **KSM** mixing nozzle offers an economically priced solution which can often pay for itself in a matter of weeks.

The **KSM** mixer shows excellent self cleaning behaviour minimising colour change over times.

Why fit a KSM Mixer?

Companies spend huge amounts of time and effort in making their moulding process run as efficiently as possible. However in order to overcome many moulding problems they are forced into de-optimising their process to ensure part quality. This de-optimisation can take the form of running with higher back pressures, higher melt temperatures, longer cycle times and higher masterbatch levels. All of which ultimately lead to more expensive parts.

By fitting a **KSM** mixer, the process can be brought back under control and the process optimised to achieve reduced costs and maximise profitability.

Many companies fit **KSM** mixers to their process even when running natural or compounded materials to help maintain control of their process.

The Promix range of static mixers is widely recognised as the most efficient mixing nozzles available.

A six element Promix mixer will increase the mixing performance of the moulding machine by a factor of 12.



Standard mixing units consist of 4 to 6 elements. As the flow passes through each element, the melt stream is forced to mix, then separate, then mix again and so on. The flow quickly becomes homogenous as shown below. Working from left to right, individual streams of white and blue polymer are injected into a nozzle; after the first element, some mixing has taken place. The mixing process continues through subsequent elements and finally the melt stream is fully mixed at the end of the series of elements.

Benefits of the KSM Static Mixing Nozzle

- The specially arranged grooves and notches guarantee quick and easy assembly of the mixer
- The mixing section consists of a total of 16 individual elements but depending on your individual requirements these can be adjusted easily by 1 element.
- The KSM mixing parts are available in a range of bore diameters: 17, 22 and 30 mm (25, 30 and 40mm outer dia).
- The mixing nozzle can be used to produce packaging and a range of technical parts
- The system has proven self-cleaning properties
- It gives easy access to all wetted surfaces of the KSM parts allowing for simple inspection and additional cleaning if required
- The faces of each KSM part and the sealing face of the end parts are ground to guarantee a proper seal
- The use of very strong steel together with the unique type of construction creates a practically indestructible KSM part with minimum material thickness (basic operating procedures must be followed)

Nozzle is designed to fit directly to your machine- designed to accept regular heater bands or increased heat in the tip area can be obtained through coiled heaters if required.



Nozzle shown with adaptor to suit your machine and assembled with heater band.

High Performance KSM Mixer



The KSM mixing nozzle - Better mixing with fewer rejects and big savings in materials



Moulding produced using a standard open nozzle with a 2% master batch additive, note the patchiness of the colour dispersion and the unplasticised particles contained within the moulding.

The difference



Same product, same 2% master batch additive but processed through a Nickerson Static Mixing Nozzle. The darker colour is the result of a good homogenous mix resulting in a uniform distribution of the colourant with no unplasticized particles.

How the Static Mixing Nozzle quickly pays for itself



A thermally homogeneous melt flows uniformly through the channels of a die

Reduced streaks and clouds of colourants, parts without spots

Reduced cycle times

Improved melt flow

Narrower tolerances, improved fitting to dimensions

Reduced reject rate

Enlarged application range, also with older presses

Improved part quality even using recycled material

See next page for ordering information

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High Performance KSM Mixer



Nozzles designed to fit directly to your machine or via an adaptor for large applications.



Easy-clean elements may be dismantled and cleaned individually.

Better mixing produces better quality moulded parts. Mixing is achieved by continuously splitting the flow into layers that expand over the entire flow channel. The mixing test shown using blue and white coloured epoxy resins demonstrates clearly the outstanding mixing performance of the KSM mixing elements.

Static KSM mixing elements are installed into a purpose-built nozzle. During the injection process, the KSM mixing elements mix the entire melt flow continuously in a radial direction. Differences in the polymer mass due to temperature, viscosity or MFI (Melt Flow Index) will be eliminated and colourants will be distributed uniformly. The result is a highly homogeneous melt, essential for the production of defect-free high quality moulded parts.

High quality robust cast elements manufactured from premium grade steels.

Each KSM mixing element contains several specially arranged bars set into a ring, which mix the melt flow. The bars of the KSM elements are designed to provide the most efficient mixing and optimum melt flow with no hang up areas.

The specially arranged recesses and pins guarantees the correct alignment of the assembly. It can also resist extremely high loads and is practically indestructible. In a standard set up, the mixing nozzle KSM contains 16 KSM mixing elements. KSM mixing elements are available with a flow channel diameter of 17, 22 and 30mm.

Very short Payback Periods:
See how quickly you get could your money back:

Process Information

Mixer Size	KSM30
Nozzle Price (example)	£1,600
Shot Weight	2250g
Total Cycle time	72 Seconds

Colour information

Colour cost	£4.0/kg
Original % used	2.5%
Original colorant cost per shot	22.5g
New % used	1.875
New colorant cost per shot	16.9g

Savings achieved (reduced colorant)

Per shot	5.6p
Per Day	£67.50

Payback Calculation

Cost of Nozzle (example)	£1,600
Payback per day	£67.5
Payback Period	24 days



The ultimate mixing solution
But don't just take our word for it...



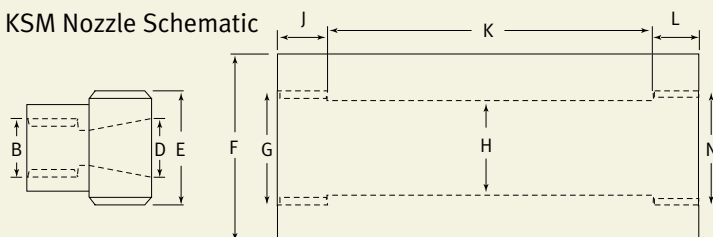
When ordering, please state radius and orifice. To complete part number, add Radius and Orifice Suffixes as shown below.

Radius sizes:		35mm (8)		3/4" (19mm) (7)		15mm (6)		1/2" Radius (12.7mm) (5)	
Orifice (mm)	1.5	2.5	3	4	5	6	8	9.5	
Part no suffix:	I	J	K	L	M	N	O	P	
note: 1.5 & 2.5mm orifice only available in GP tip									

**Advantages:**

- Highest level of mixing available from a mixing nozzle.
- Can be used with virtually all materials.
- Reduced colorant usage by up to 40%.
- Lower melt temperatures (up to 30°C).
- Reduced colour change-over times (typically by 50%).
- Reduced splash marks in PA parts.
- Improved regrind processing, allowing higher regrind ratio
- Improved even filling of multi cavity tools.
- Reduced "silver streaking" in talc filled PP mouldings.
- Reduced Acetaldehyde levels when processing PET.
- Sealing faces machined to guarantee correct seating
- Precision cast from high wear material.

KSM Nozzle Schematic



Dimension	KSM17L4	KSM17L6	KSM22L4	KSM22L6	KSM30L4	KSM30L6
A	35	35	35	35	50	50
B	7/8 x 14 UNF	7/8 x 14 UNF	7/8 x 14 UNF	7/8 x 14 UNF	1 1/4 x 12	1 1/4 x 12
C	16	16	16	16	20	20
D	17	17	22	22	31.5	31.5
E	M40x2	M40x2	M40x2	M40x2	M55x3	M55x3
F	60	60	60	60	80	80
G	M40x2	M40x2	M40x2	M40x2	M55x3	M55x3
H	25	25	30	30	40	40
J	20	20	20	20	25	25
K	88	132	110.4	165.6	154.4	231.6
L	20	20	20	20	25	25
M	25	25	25	25	35	35
N	M40x2	M40x2	M40x2	M40x2	M55x3	M55x3
P	55	55	55	55	80	80

Material EN 24 hardened & Tempered to 48 HRC +/-2

High Performance KSM Mixer**Choosing the optimum mixer nozzle size**

The following sizing chart is for medium viscosity materials and for medium injection speeds. If you would like to use the mixers with stiffer materials or very fast injection rates please select the next larger mixer size.

Choosing the right mixer

max. flow rate [g/s]		screw Ø [mm]	Mixer type
high viscosity (MFI < 5)	low viscosity (MFI > 5)		
41 - 120	71 - 160	40 - 80	KSM 17/4
121 - 240	161 - 360	60 - 100	KSM 22/4
241 - 600	361 - 900	80 - 120	KSM 30/4

Dimensions (elements only)

Standard mixing nozzles contain 4 or 6 elements.

element bore	element O.D	no of elements	assembly length	Part no
17	25	4	88	KSM17L4
17	25	6	132	KSM17L6
22	30	4	110	KSM22L4
22	30	6	166	KSM22L6
30	40	4	154	KSM30L4
30	40	6	232	KSM30L6

Complete assembly

Complete assembly (with Nozzle)	Part no
Nozzle with KSM17L4 (4 elements)	KSM17L4Z
Nozzle with KSM17L6 (6 elements)	KSM17L6Z
Nozzle with KSM22L4 (4 elements)	KSM22L4Z
Nozzle with KSM22L6 (6 elements)	KSM22L6Z
Nozzle with KSM30L4 (4 elements)	KSM30L4Z
Nozzle with KSM30L6 (6 elements)	KSM30L6Z

KSM mixer is not recommended for applications containing abrasive fillers (i.e. glass fibers)

Call for more information on how the Promix range of mixers can be used to maximise your profitability and improve your product quality.

Promix Mixing Nozzles

The Promix range of static mixers is widely recognised as the most efficient mixing nozzles available. Promix mixers will increase the mixing performance of the moulding machine by a factor of 12. Promix mixing nozzles can be designed specifically for your application... call to arrange a field engineer visit.

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