A guide to select the correct bell-housing and drive coupling components

DATA REQUIRED
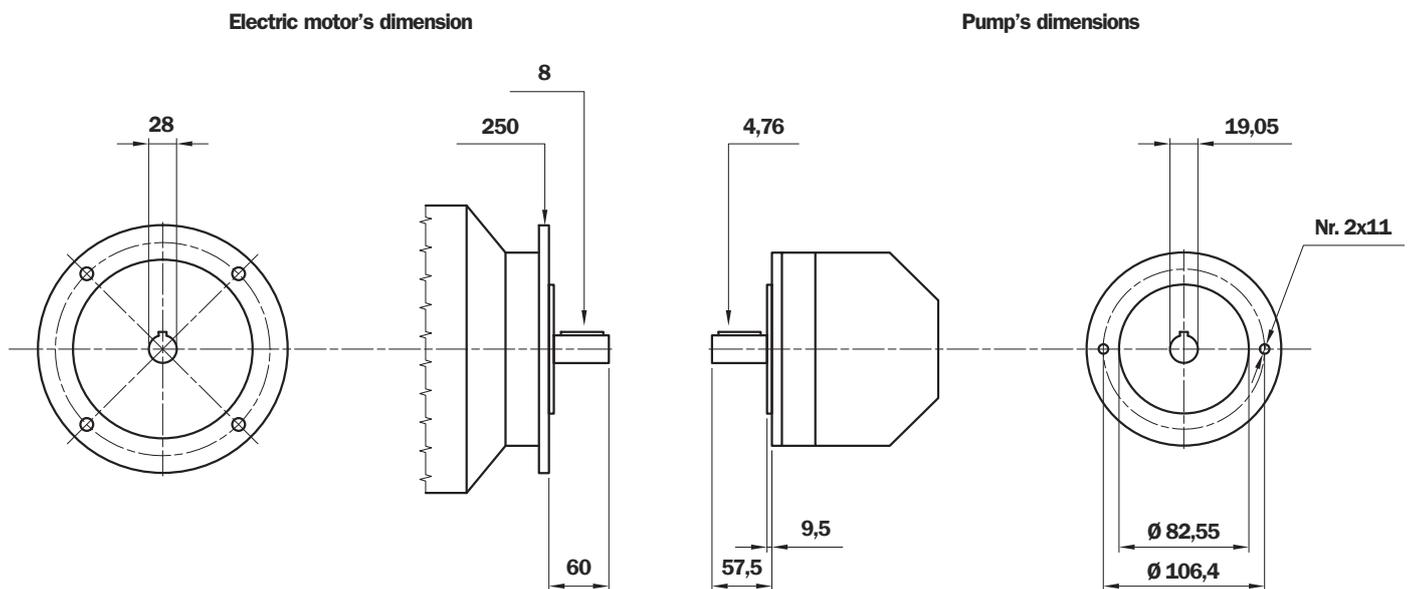
Electric motor power/motor size
Manufacturer and pump type

TO VERIFY:

1 - Pump and motor shaft dimensions (see page 67)
2 - Shaft and flange pump (see pump data sheet)

Example:
- Electric motor 2 kW - 4 poles - Motor size 110/112
- Atos pump code PFE31 - Shaft 1

Electric motor's dimension   **Pump's dimensions**

Bell-Housing's length calculation

• H= 60 + 18 + 57,5 = 135,5 mm (18= Sp spider - see page 49)

• Choose type of bell-housing (LMC - LMS)
  - For LMC see tab. 3 at page 11
  - For LMS see tab. 22 at page 32
  - For MODUL 2/3 see at page 36

Note: The length of bell-housing must be ≥ than the length calculated (135,5 mm)

Case A - solution with LMC bell-housing

Tab. 3 at page 11 - for electric motor 2 kW LMC 250
LMC 250 bell-housing with height ≥ 135,5 - LMC250AFSQ

• The bell-housing code must be completed with drilling pump code (see tab. 35 at page 47)
  For the specific case C= 82,5 - Nr. 2 holes M10: Code drilling 060

• Definitive bell-housing code **LMC250AFSQ060**

Case B - solution with LMS bell-housing

Tab. 22 at page 32 - for electric motor 2 kW LMS 250
LMS 250 bell-housing with heigh ≥ 135,5 - LMS250AFSQ

• The bell-housing code must be completed with drilling pump code (see tab. 35 at page 47)
  For the specific case C= 82,5 - Nr. 2 holes M10: Code for. 060

• Definitive bell-housing code **LMS250AFSQ060**

Choose coupling

- **Motor half-coupling** (see tab. 38 at page 50)

  - For electric motor Gr. 100/112, the half-coupling is **SGEA21M05060**

- **Spider** (see tab. 36 - 37 at page 49)

  - For SGEA21, EGE2 - EGE2RR
    (choose spider material on the base of the application, oil, temperature and cycle machine, etc.)

- **Pump half-coupling**

  - Choose the drilling code tab. 44 - 45 at page 53 for shaft 19,05 - Ch. 4,76 - code: **G01**

  - Half-coupling length = L BH lenght – THK Spider – THK Spigot
    LMC= 138 mm - 60 - 18 - 9,5= 50,5 mm
    LMS= 148 mm - 60 - 18 - 9,5= 60,5 mm

  - LMC - Choose the half-coupling's length on tab. 39 at page 50 ≤ 50,5 mm.
  - LMS - Choose the half-coupling's length on tab. 39 at page 50 ≤ 60,5 mm.
  - LMC - Availabe length for SGEA21= 50 mm
  - LMS - Availabe length for SGEA21= 60 mm
  - LMC=LMS - Code half-coupling code: **SGEA21G01050**

Software for automatic calculation available on the web site
www.mpfiltri.com - tools - software

Note: For multi pumps we recommend to use a specific support on the base of the pump's dimensions and weight.

Half-coupling SGE*** series

The half-couplings series SGE*** allow secure transmission between the electric motor and the driven side; they are able to absorb shocks and vibration, in addition to compensating radial misalignment, angular and axial.
The assembly of the couplings can be horizontal/vertical, withstanding vibration and load reversals.

The complete range of couplings are extrapolated from the on-line software, with a length equal than the shaft on which must be mounted and they are completed with grub screw for fixing located on the key.
Available for cilindrical shaft with metric and imperial dimensions as well for splined shafts as per specification DIN, ISO and SAE.

Admissible misalignment radial, angular and axial

Max admissible radial misalignment

Half coupling	R (mm)
SGE * 01	0,5
SGE * 21	1,0
SGE * 31	1,0
SGE * 40	1,0
SGE * 51	1,5
SGE * 60	1,5
SGE * 80	2,0
SGE * 90	2,0

Max admissible angular misalignment

Half coupling	β (°)
SGE * 01	
SGE * 21	
SGE * 31	
SGE * 40	1,5°
SGE * 51	
SGE * 60	
SGE * 80	
SGE * 90	

Max admissible angular misalignment

Half coupling	A (mm)
SGE * 01	2,0
SGE * 21	2,5
SGE * 31	3,0
SGE * 40	3,5
SGE * 51	3,5
SGE * 60	3,5
SGE * 80	4,0
SGE * 90	5,0

Normative ATEX 94/9/CE ⟨Ex⟩

Half-couplings SGE*** series are available to use in hazardous area.
The couplings are certified according to ATEX 94/9/CE (ATEX 95).
Category certified 2G - area 1 and 2.
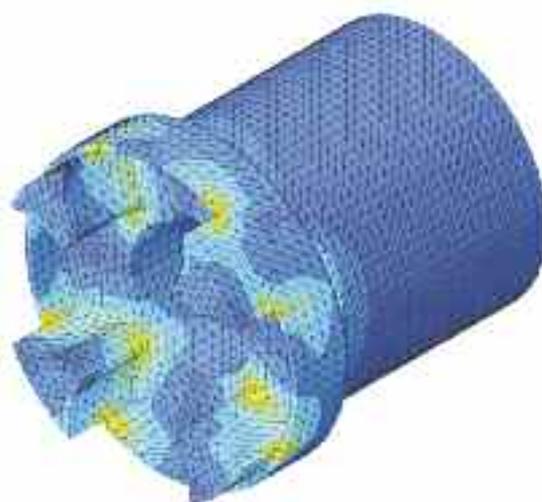Other information available on our web site "www.mpfiltri.com".

MP Filtri couplings are developed with:

CAD 3D

FEM (calculation)

Drawings 3D available on website www.mpfiltri.com at section TOOLS/2D-3D COMPONENTS

The half-couplings SGE*** series are in conformity to normative **DIN 740/2**.
The max torque to transmit is always less than the max torque that the coupling can transmit.

Examples verification of the coupling

Torque transmitted by electric motor:

Mt:	9560 x kW / rpm = Nm
Me >	Mt x S = Nm
Where:	
Mt:	Torque transmitted by electric motor
Me:	Torque transmitted by coupling (see table 14)
kW:	Power of electric motor
Rpm:	Revolutions per minute of electric motor
S:	Service factor (see table 14)

TABLE 1

Small pumps, uniform load, low operating pressures e.g. rotary action machine tools - 5/8 work cycles per hour	**1.3**
Small pumps, uniform load, high working pressures e.g. lifting equipment - 120-150 work cycles per hour	**1.5**
Pumps, non-uniform load e.g. lifting equipment - 280-300 work cycles per hour	**1.7**

Example
Electric motor, 4 pole - 4 kW
hydraulic pump, uniform load, low operating pressure

Mt:	9560 x 4 / 1500 = 25.45 Nm
Me >	25.49 x 1.3 = 33 Nm

Half-coupling SGEA21 meets the above requirement.

Select the half-coupling of the calculated size from the motor half-couplings table.

Note: When selecting the coupling, remember that for pumps with splined shaft, only cast iron couplings of the SGEG series can be used.

Determine the size of the coupling according to the type of installation and application envisaged, on the basis of the following formulas and tables:

TABLE 2

Half-coupling type		External diameter mm	Nominal torque Me - Nm	Maximum transmissible torque Me - Nm
ALUMINIUM	SGEA01	43	15	20
	SGEA21	68	160	190
	SGEA31	85	340	380
	SGEA51	109,5	550	620
CAST IRON	SGEG01	40	20	30
	SGEG30	80	400	450
	SGEG40	95	550	620
	SGEG60	120	760	850
	SGEG80	160	2200	2500
	SGEG90	200	5500	6100
STEEL	SGES40	95	550	620
	SGES60	120	760	850
	SGES80	160	2200	2500

Nominal and maximum torque values are referred to couplings assembled with standard flexible spiders of the **EGE**** series (see page 49).
Where higher torques are to be transmitted, use flexible spiders of the **EGE**RR** series (see page 49).

Noise

Noise is a particularly pervasive problem so much so that there have been statutory regulations in place now for some years, designed to limit harmful occupational exposure. Many of the machines used in industry today are equipped with oil-hydraulic systems, which happen to be a major source of noise.

### 1. Theory and definition of noise

From a health and hygiene standpoint, noise can be defined as an unpleasant and undesirable sound, or an unpleasant and annoying or intolerable auditory sensation (noise being any sound phenomena that may be accompanied by sensations of disturbance and pain). By definition, acoustic phenomena are oscillatory in character, propagated in a flexible medium and causing pressure variations at the points, and the areas adjacent to those points, through which they pass.

2. Sound

Technically considered, certain elements must be present simultaneously for acoustic phenomena to occur:

• Sound source

• Transmission medium

• Receiver

Motor and pump unit
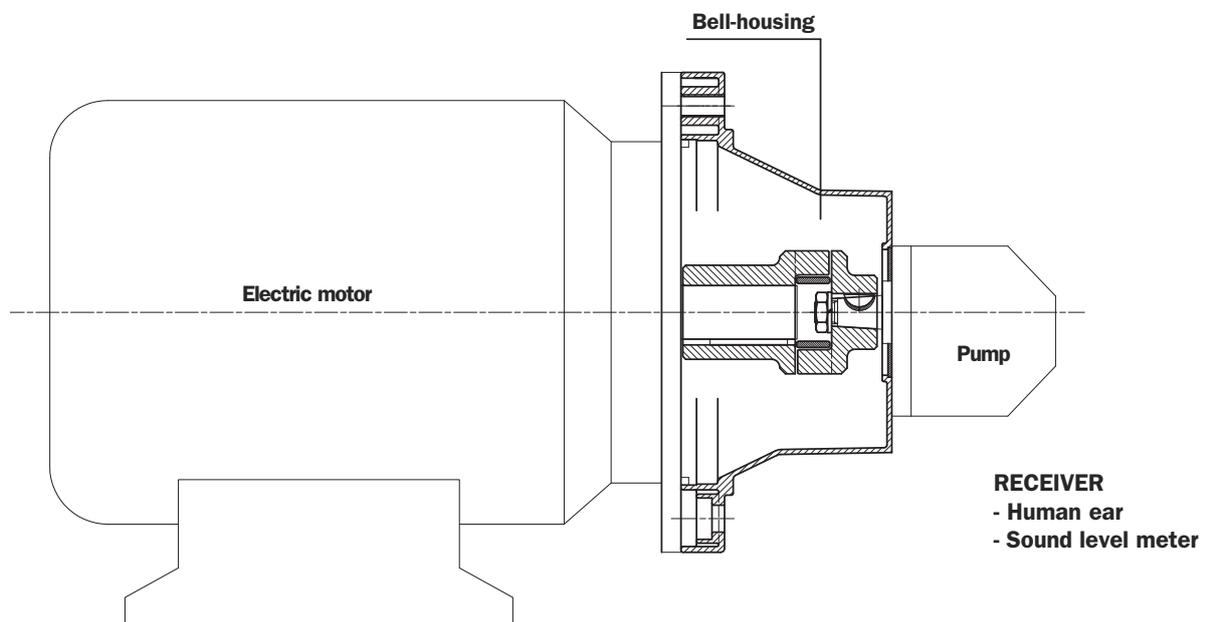
The **electric motor** and the **pump**, together with the drive coupling, are the **SOURCE OF THE NOISE**.
The **Bell-housing** is the noise transmission medium.
Depending on whether the monobloc bell-housing is a rigid or low noise type, there will be variations in the flexible properties of the transmission medium.
The acoustic phenomena are dissimilar in the two cases, given the differences in pressure variation and particle displacement.

As mentioned in the presentation, low noise bell-housing will help to attenuate the transmission of vibrations and the emission of noise generated by the system.
Self-evidently, however, the mere adoption of a low noise bell-housing will achieve little unless the motor and pump are correctly installed on the machine, or on the tank of the hydralic power unit.

• Should be followed in order to achieve best possible results and correct installation:

1. Motor and pump unit mounted horizontally on oil tank lid

- The suction pipe attached to the pump must be rigid, and fitted using a resilient bulkhead flange of the FTA series, which helps to cushion the vibrations propagated between the pipe and the tank lid. If pipes need to be bent, the radius of curvature must be at least 3 times the pipe diameter. Do not use elbow fittings, as these will significantly increase pressure losses.

- The pressure pipeline of the pump must be flexible, and long enough to include bends with the minimum radius of curvature recommended by the manufacturer for the specified operating pressure.

- The return pipeline running from the service to the filter must be flexible. Where oil is returned directly to the tank of the hydraulic power unit through a rigid pipe, it is advisable to use a resilient bulkhead flange of the FTR series, which helps to cushion the vibrations propagated between the pipe and the tank lid.

- Anti-vibration devices (resilient mounts or damping rods) must be located under the feet of the electric motor or the PDM foot brackets, depending on the mounting position of the motor.

- The lids of hydraulic oil tanks must be sturdy enough to support the load they carry.

2. Motor and pump unit mounted horizontally on machine

- As a matter of good practice, the oil tank and motor-pump unit should be mounted on a single supporting frame of strength sufficient to support the load.

- If the hydraulic system is fitted with a side-mounted filter, the suction pipeline to the pump must be flexible, and long enough to include bends with the minimum radius of curvature recommended by the manufacturer.

- If the suction filter is not side mounted, the pipeline should be rigid and installed in conjunction with a compensating coupling.

- The pressure pipeline of the pump must be flexible, and long enough to include bends with the minimum radius of curvature recommended by the manufacturer for the specified operating pressure.

- The return pipeline running from the service to the filter must be flexible. Where oil is returned directly to the tank of the hydraulic power unit through a rigid pipe, it is advisable to use a resilient bulkhead flange of the FTR series, which helps to cushion the vibrations propagated between the pipe and the tank lid.

- Anti-vibration devices (resilient mounts or damping rods) must be located under the feet of the electric motor or the PDM foot brackets, depending on the mounting position of the motor.

Note: The above guidelines are indicative only, and subordinate to the solutions adopted ultimately by design engineers.

In conclusion: For best results, in any event, the motor-and-pump unit should be incorporated into the hydraulic system in such a way that no one component is rigidly associated with another, resulting in the propagation of vibration, and consequently noise.

MODUL 3

5.5 - 7.5 kW	11 - 22	30	37 - 45	55 - 90	110 - 200	250 - 400
7.5 - 10.2 Hp	15 - 30 Hp	40.80 Hp	50.32 - 61.2 Hp	75 - 125 Hp	150 - 272 Hp	340 - 544 Hp
Size 225 - D. 450	Size 160/180 D. 350	Size 200 - D. 350	Size 225 - D.450	Size 250/280 D. 550	Size 315 - D. 660	Size 355/400 D. 800

AR*
FR1*
Ø 190
Ø 85
BMT300
BMT350
Kit of assembly KVG5 (Q.ty 1) + Kit of assembly KVG1 (Q.ty 1)

AD*
FP5
FP6
FP7
Ø 190
Ø 288
Ø 140
Ø 288
BMT350
BMT400
BMT450
Kit of assembly KVG5/7 (Q.ty 2)

MODUL 2

5.5 - 7.5 kW	11 - 22	30	37 - 45	55 - 90	110 - 200	250 - 400
7.5 - 10.2 Hp	15 - 30 Hp	40.80 Hp	50.32 - 61.2 Hp	75 - 125 Hp	150 - 272 Hp	340 - 544 Hp
Size 225 - D. 450	Size 160/180 D. 350	Size 200 - D. 350	Size 225 - D. 450	Size 250/280 D. 550	Size 315 - D. 660	Size 355/400 D. 800

FP6
FP7
(BAD800
ONLY FP7)
Ø 288
BMT550
BMT660
BAD800
Kit of assembly KVG6/7 (Q.ty 1)

Low noise bell-housings

LMS series

Bell-housings of this type, appropriately installed in hydraulic systems, are able to help bring about a significant reduction in the level of noise generated by the system.
This is achieved through the adoption of a damping element located between the base of the bell-housing and the pump mounting flange.
Thanks to their notable versatility and to the broad selection of bases and flanges available, **LMS** low noise bell-housings will cover the majority of applications within a range including electric motors from size **100**, rated **2.2 kW,** up to size **280**, rated **90 kW**

Technical specifications

LMS

Materials

- **Base module**
  Pressure diecast aluminium alloy.

- **Damping ring**
  Oil-resistant rubber, shore A hardness 87.

- **Pump flange**
  Pressure diecast aluminium alloy.

- **Foot bracket**
  Pressure diecast aluminium alloy.

Temperature

- -30°C ÷ +80°C
  For temperatures outside this range,
  contact the MP Filtri Technical and Sales Department

Compatibility with fluids

- **Base modules compatible for use with:**

  Mineral oils
  Types HH-HL-HM-HR-HV-HG, to ISO 6743/4 standard

  Water based emulsions
  Types HFAE – HFAS, to ISO 6743/4 standard

  Water glycol
  Type HFC, to ISO 6743/4 standard

 **Ask for anodized version**

Special Applications

- **Any applications not covered by the normal indications
  contained in this catalogue must be evaluated
  and approved by the MP Filtri Technical and Sales Department.**

Maximum admissible load for LMS low noise bell-housings

TABLE 21

Bell-housing	Max permissible load "F" (N)	Load application distance "S" (mm)
LMS 250	600	200
LMS 300	1000	200
LMS 350	1500	200
LMS 400	2200	200
LMS 450	4000	200
LMS 550	4000	200
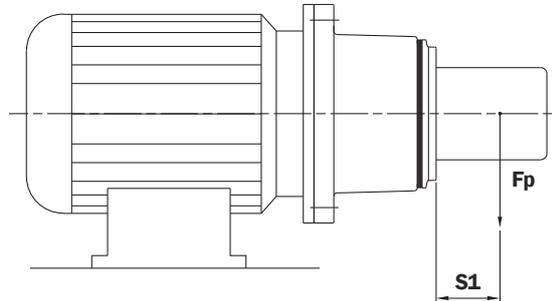
Maximum permissible load values have been calculated assuming the assembly of a pump with its centre of gravity located at a distance **S**= 200 mm from the mounting face.
If the distance "**S**" is greater than this assumed value, then calculate the new permissible load value
"**F1**" using this formula:

$$F_1 = F \times S_1 / S \ \text{(N)}$$

Examples

Low noise bell-housing: LMS250
Fp pump   600 N   F1= 600x220/200=660N > 600N (value not acceptable)
S1   220 mm

Low noise bell-housing: LMS250
Fp pump   600 N   F1= 600x190/200=570N < 600N (value acceptable)
S1   190 mm

Reduction of noise level

The level of nose emitted by a motor-pump unit depends on several factors, namely:

• Type of pump

• Nature of application

• Operating pressure

• Fittings used for connections

• Type of assembly
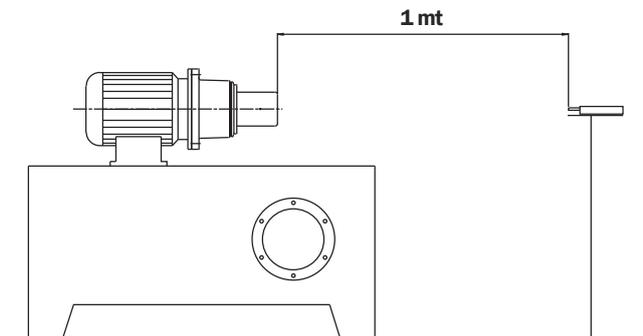
All tests were conducted in an anechoic-chamber, using certified sound level meters.
All LMS series bell-housings were tested adopting the arrangement illustrated above, comparing the noise level
with that emitted by conventional monobloc bell-housings of the same size, under the same pressure and flow rate conditions.

• **The results of the tests show that with LMS series low noise bell-housings, the noise level
  of the motor-pump unit is reduced by 5 Db (A).**

Low noise bell-housing
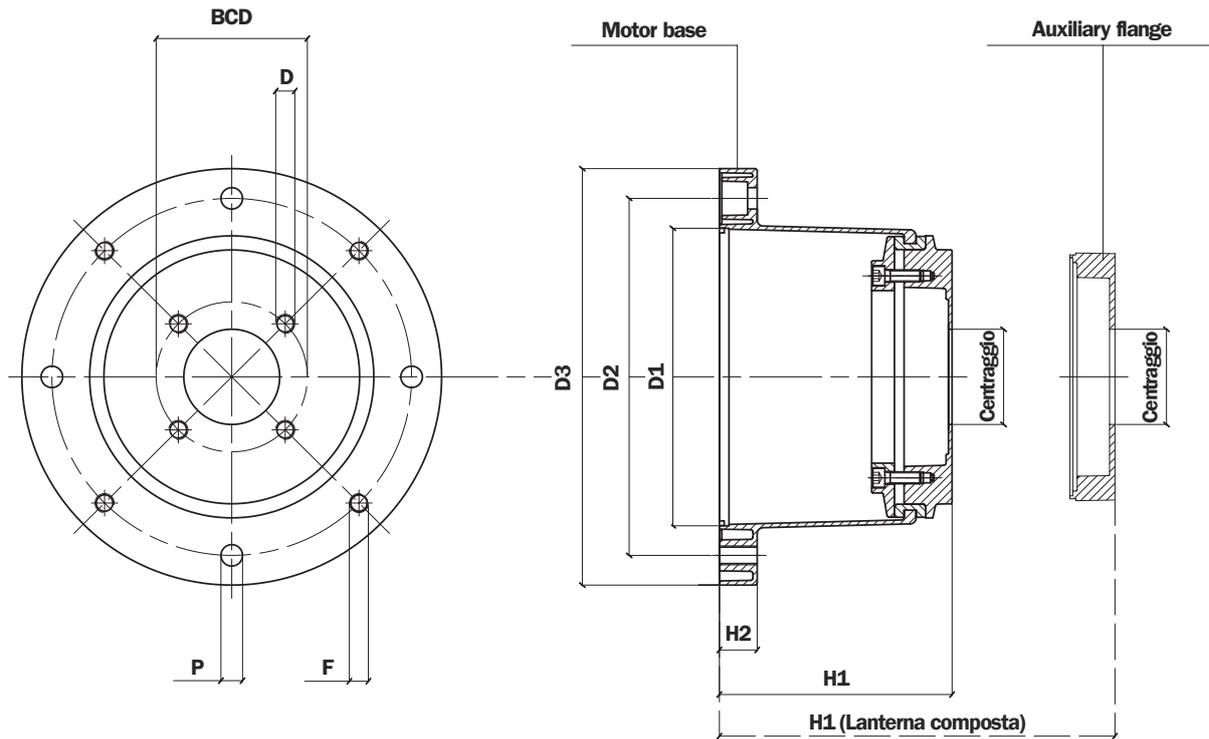
- **The auxiliary flange, if specified, is supplied already fitted to the bell-housing.**

Note: In order to ensure coaxial alignment between the motor and pump spigot centres, the bell-housing cannot be disassembled and reassembled.

Machining tolerances

D1	**F8**
Spigot hole	**H7**
H1	**± 0,15 mm**

Concentricity of D1/Spigot hole

LMS 250	**0,20 mm**
LMS 300 - LMS 660	**0,25 mm**

TABLE 22

Electric motor, 4-pole, 1500 rpm				Dimensions of LMS low noise bell-housing										
Motor size	kW	Hp	Motor shaft	Bell-housing code	Foot bracket code	D1	D2	D3	H1	H2	F.	Nr.	P	Nr.
100-112	2.2-4	3-5.5	28x60	**LMS 250**	**PDM A 250**	180	215	250		19	M12	4	14	4
132	5.5-7.5	7.5-12.5	38x80	**LMS 300**	**PDM A 300**	230	265	300		23	M12	4	14	4
160	11-15	15-20	42x110	**LMS 350**	**PDM A 350**	250	300	350		31	M16	4	18	4
180	18.5-22	25-30	48x110	**LMS 350**	**PDM A 350**	250	300	350		31	M16	4	18	4
200	30	40	55x110	**LMS 400**	/	300	350	400		31	M16	4	18	4
225	37-45	50-60	60x140	**LMS 450**	/	350	400	450		31	M16	8	-	-
250	55	75	65x140	**LMS 550**	/	450	500	550		31	M16	8	-	-
280	75-90	100-125	75x140	**LMS 550**	/	450	500	550		31	M16	8	-	-
315	110-200	150-272	80x170	**LMS 660**	/	550	600	660		42	M20	16	-	-
					For dimension see page 55				See tab. 22					

To determine dimension H1 of the bell-housing   see table 33
For dimensions of the foot bracket   see page 55
For all other dimensions   see pump manufacturer's technical literature

TABLE 23

Pump flange				Pump flange				Pump flange		
Code	H1	Weight (kg)		Code	H1	Weight (kg)		Code	H1	Weight (kg)
LMS 250AFSA***	128	3,72		LMS 250AFRA***	158	3,97		LMS400AF6A***	288	10,00
LMS 250AFSB***	148	4,10		LMS 250AFRB***	165	4,10		LMS400AF6B***	289	10,10
LMS 300AFSC***	155	4,20		LMS 250AFRC***	168	4,30		LMS400AF6C***	301	10,25
LMS 300AFSD***	168	4,45		LMS 250AFRD***	171	4,60		LMS400AF6D***	314	11,10
LMS 300AFSE***	194	6,51		LMS 250AFRE***	173	4,70		LMS400AF6E***	326	11,70
LMS 350AFSF***	204	6,80		LMS 250AFRG***	181	5,10		LMS400AF6G***	338	11,90
LMS 350AFSG***	228	7,10		LMS 250AFRH***	183	5,70		LMS400AF6H***	342	12,10
LMS 350AFSH***	204	8,51		LMS300AFRA***	178	4,50		LMS400AF6L***	357	13,00
LMS 400AFSL***	228	8,80		LMS300AFRB***	185	4,75		LMS400AF6M***	396	15,70
LMS 400AFSM***	256	9,10		LMS300AFRC***	188	4,85		LMS450AF6A***	287	14,10
LMS 400FSN***	240	11,61		LMS300AFRD***	191	4,90		LMS450AF6B***	288	14,20
LMS 450FSO***	255	12,10		LMS300AFRE***	193	5,10		LMS450AF6C***	300	15,10
LMS 550FSP***	255	15,20		LMS300AFRG***	201	5,50		LMS450AF6D***	313	16,00
LMS 550FSR***	270	15,90		LMS300AFRH***	203	5,80		LMS450AF6E***	325	16,50
LMS 550FSS***	290	19,20		LMS300AF5A***	194	5,20		LMS450AF6G***	337	17,20
LMS 660FST***	305	20,20		LMS300AF5B***	198	5,50		LMS450AF6H***	341	17,50
				LMS300AF5C***	200	5,70		LMS450AF6L***	356	17,90
				LMS300AF5D***	203	5,90		LMS450AF6M***	395	19,00
				LMS300AF5E***	213	6,20		LMS550AF6A***	302	17,20
				LMS300AF5G***	232	6,70		LMS550AF6B***	303	17,20
				LMS300AF5H***	259	7,80		LMS550AF6C***	315	18,30
				LMS350AF5A***	254	8,10		LMS550AF6D***	328	19,00
				LMS350AF5B***	258	8,30		LMS550AF6E***	340	19,50
				LMS350AF5C***	260	8,50		LMS550AF6G***	352	19,90
				LMS350AF5D***	263	8,70		LMS550AF6H***	356	20,20
				LMS350AF5E***	273	9,00		LMS550AF6L***	361	20,45
				LMS350AF5G***	292	10,10		LMS550AF6M***	400	22,50
				LMS350AF5H***	319	11,30		LMS660AF6A***	337	23,00
								LMS660AF6B***	338	23,40
								LMS660AF6C***	350	24,50
								LMS660AF6D***	363	25,30

Specified tightening torques for auxiliary flange

- FR*   15 Nm
- F5*   100 Nm
- F6*   180 Nm

Recommended tightening torques for motor/pump assembly bolts

- M6   10 Nm
- M8   15 Nm
- M10   50 Nm
- M12   84 Nm
- M14   135 Nm
- M16   205 Nm
- M18   280 Nm
- M20   400 Nm
- M22   530 Nm
- M24   690 Nm

These values are calculated to exploit the performance of the bolt at 70% of its elastic limit.

This means in practice that the shank of the bolt will be stressed typically to 60-70% of its limit of elasticity in the course of being tightened.

The values indicated are valid for hexagon head bolts to UNI 5737 and hexagon socket screws to UNI 5931, property class 8.8, tightened by degrees using a torque wrench.

If bolts or screws are tightened using impact or hammer action drivers, the applied torque should be reduced by 10%.

Comparative table

MP Filtri	OMT	Raja	KTR
Code	Code	Code	Code
LMS250A***	BS251***	R250***DF	PK+D150/190
LMS300A***	BS301***	R300***DF	PK+D150/190
LMS350A***	BS351***	R350***DF	PK+D150/190/D230/260
LMS400A***	BS400***	R400***DF	PK+D190/D230/260
LMS450A***	BS451***	R450***DF	PK+D190/230/D260/330
LMS550A***	BS551***	R450***DF	PK+D190/230/D260/330
LMS660A***	BS661***	R450***DF	PK+D190/230/D260/330

Note: The above table is guideline only.
Not all bell-housings are fully interchangeable.
For further information, contact the MP Filtri Technical and Sales Department.

Low noise bell-housing

1	2	3	4	5
☐	☐	☐	☐	☐

LMS

Example: LMS   250   A   FSA   070   FG

1 - Sizes

- 250
- 300
- 350
- 400
- 450
- 550
- 660

2 - Product revision code

- A

3 - Bell-housing

| FSA | See table 23 page 33 |
| FRA | See table 23 page 33 |

4 - Pump interface codes

| 070 | See table page 47 |

5 - Opzioni

FG	Holes rotated through 45° in relation to standard position (page 47)
DI	Drain hole + inspection hole
DP	Double set of hole
AN	Black anodized finish
SA	Clearance holes at motor interface
Pxx	Customer specification

N.B. Bell-housings with DI options are supplied complete with threaded closure plug

Note: For customization features other than those indicated on this page, contact the Technical and Sales Department