

MMK MML

Multi-Stage Turbine Pumps



PT TORISHIMA GUNA INDONESIA

APPLICATIONS

Used for general water supply duties and in industry as a boiler feed pump and condensate pump, and also in power water, fire-fighting and district heating installation for pumping of clean water.

CONSTRUCTION

Horizontal, radially split ring section pump, single flow, multistage. The casings are sealed by flat gaskets and held together by tie bolts. The stage casing and the tie bolts are encased in a steel cladding. The pump feet are arranged either below the pump or at centre line according to the number of stages and temperature.

BEARINGS

The bearings are located in two bearing housing which are adjusted at both sides of the pump. MMK pumps are fitted with a cylindrical rolled bearing at the suction end and with a deep groove ball bearing at the discharge end. On construction with heavy bearing housing matched angular contact ball bearings are fitted at the discharge end. On construction with heavy bearing housing matched angular contact ball bearings are fitted at the discharge side in X-arrangement.

On MML pump model, cylindrical rolled bearing are fitted on both ends.

BALANCING DEVICE

MMK Pumps are fitted with deep groove ball bearings or angular contact ball bearings which absorb the residual thrust by provision of balance holes drilled in the back shrouds of the impellers.

On MML Pumps the unbalanced axial thrust of the rotating assembly is absorbed by a hydraulic balancing device, consisting of balance disc and balance disc seat.

SHAFT SEAL

The shaft is fitted with renewable protecting sleeves in the region of the shaft seal. The uncooled packing stuffing box can be used for operating temperatures up to 105°C, above this figure, a cooled packing stuffing box is used, in which a supply of cooling water ensures that the temperature is kept within of stuffing boxes or mechanical seals can be fitted as required.

NOZZLE ORIENTATION

For arrangement "feet below the casing" the suction nozzle or the discharge nozzle re radial, pointing to the right or left hand side; to the top from 2 stages onwards. Arrangement "feet in centreline" only possible for casings of chrome steel or cast steel. In the case nozzle orientation only top, from 2 stages onwards.

FLANGES

Standard Construction :

Suction Flange : JIS10 kgf/cm²

Discharge Flange : JIS20 kgf/cm²

Special constructions of flanges according to ANSI, BS and other standards are available on request.

DRIVE

The drive is by direct couple electric motor, using a flexible coupling. The suction end is the drive end, and the direction of rotation is clockwise. The stub shaft is fitted at the discharge end (*in this case the direction of rotation in anti clockwise*) or the pump can be fitted with a stub shaft at each end.

MATERIALS

The following materials are used for standard material combinations;

Suction, Discharge and Stuffing Box Casing	: FC250, BC6, SC450, FCD400
Stage Casing	: FC250, BC6, SC450, FCD400
Impellers and Diffusers	: FC250, BC6, SCS14, NiFC
Casing Wear Ring	: FC200, BC6, 2.5 NiFC
Shaft Protecting Sleeve	: FC200, BC6, SUS420J2
Balancing Disc / Balance Disc Seat	: FC250, 13%Cr, 18%Cr
Shaft	: S45C, SUS420J2
Tie Bolts	: S45C, SCM435

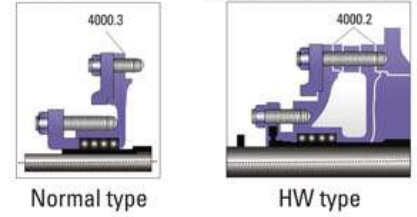


SECTIONAL DRAWINGS AND LIST OF COMPONENTS

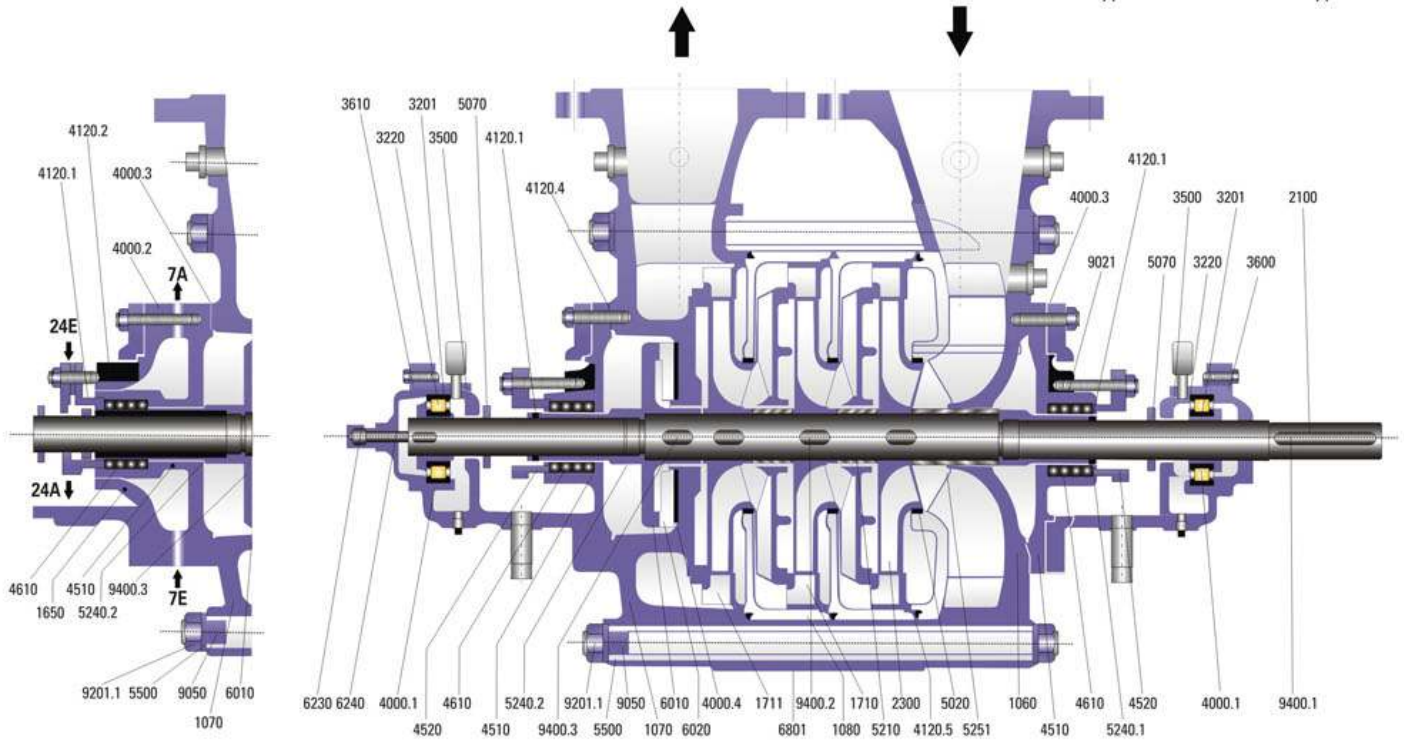
MML

Cross section of stuffing box
Cooled soft packed stuffing box (HW)
 $105^{\circ}\text{C} < t < 140^{\circ}\text{C}$

Cross section of stuffing box for MML 40, 50, 65



Cross section with uncooled soft packed stuffing box (N)
 $T < 105^{\circ}\text{C}$, for MML 80, 100, 125



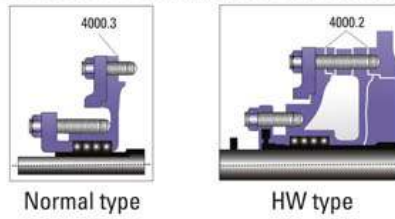
* Typical Drawing Only

PART NO.	DESIGNATION	PART NO.	DESIGNATION	PART NO.	DESIGNATION	PART NO.	DESIGNATION
1060	Suction Casing	3610	Bearing End Cover	5020	Casing Wearing Ring	6801	Cladding
1070	Discharge Casing	4000.1	Flat Gasket	5070	Deflector	9021	Gland Bolt
1080	Stage Casing	4000.2	Flat Gasket	5210	Stage sleeve	9050	Tie Bolt
1650	Cooling Cover	4000.3	Flat Gasket	5240.1	Packing Sleeve	9201.1	Hexagonal Nut
1710	Diffuser	4000.4	Flat Gasket	5240.2	Packing Sleeve	9400.1	Key
1711	Diffuser, Last Stage	4120.1	O-ring	5251	Spacer Sleeve	9400.2	Key
2100	Shaft	4120.2	O-ring	5500	Washer	9400.3	Key
2300	Impeller	4120.5	O-ring	6010	Balance Disc	7E	Cooling Water Inlet
3201	Clamping Sleeve	4510	Stuffing Box Housing	6020	Balance Disc Seat	7A	Cooling Water Outlet
3220	Cylindrical Roller Bearing	4520	Stuffing Box Gland	6230	Rotor Position Indicator	24E	Quenching Inlet
3500	Bearing Hosing	4610	Stuffing Box Packing	6240	Pivot for Indicator	24A	Quenching Outlet
3600	Bearing Cover						

SECTIONAL DRAWINGS AND LIST OF COMPONENTS

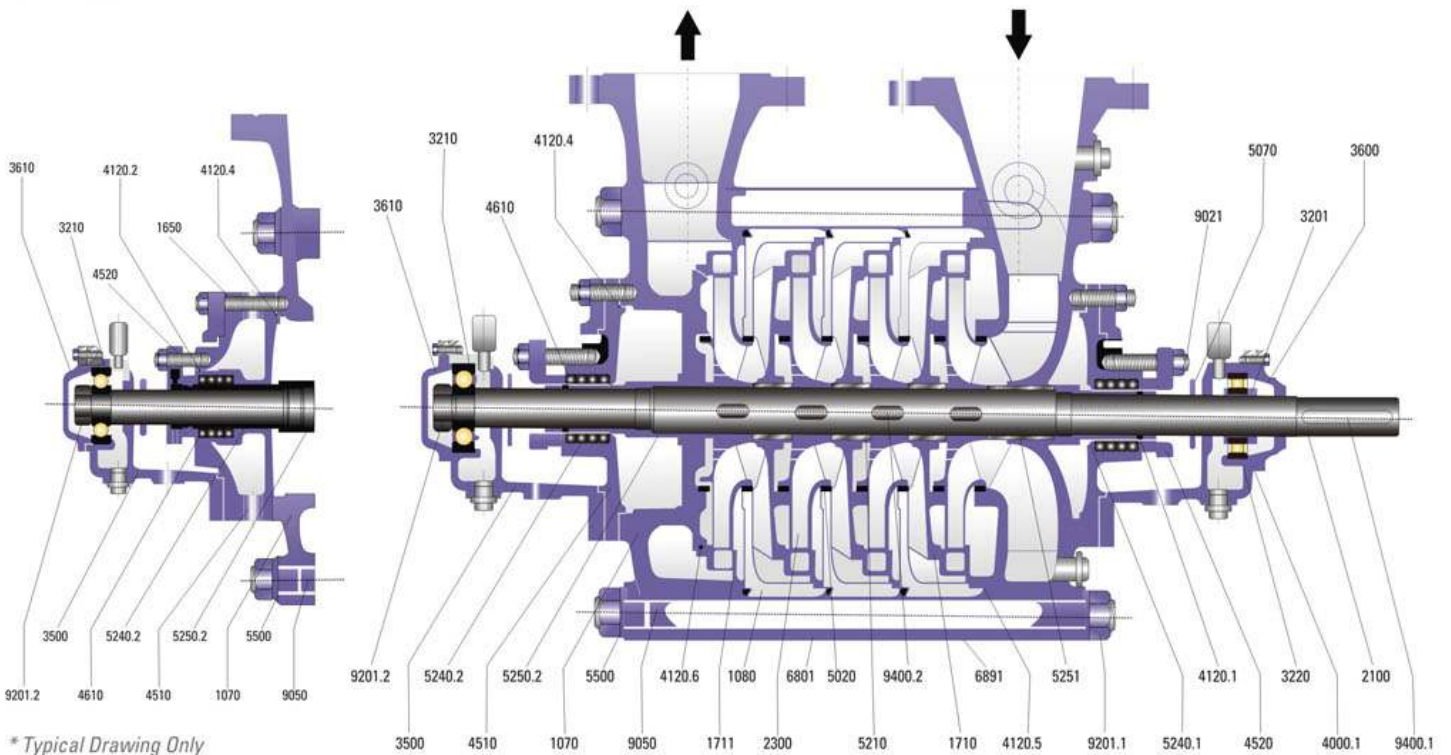
MMK

Cross section of stuffing box for MMK 40, 50, 65



Cross section of stuffing box
Cooled soft packed stuffing box (HW)
 $105^{\circ}\text{C} < t < 140^{\circ}\text{C}$

Cross section with uncooled soft packed stuffing box (N)
 $T < 105^{\circ}\text{C}$, for MMK 80, 100, 125



* Typical Drawing Only

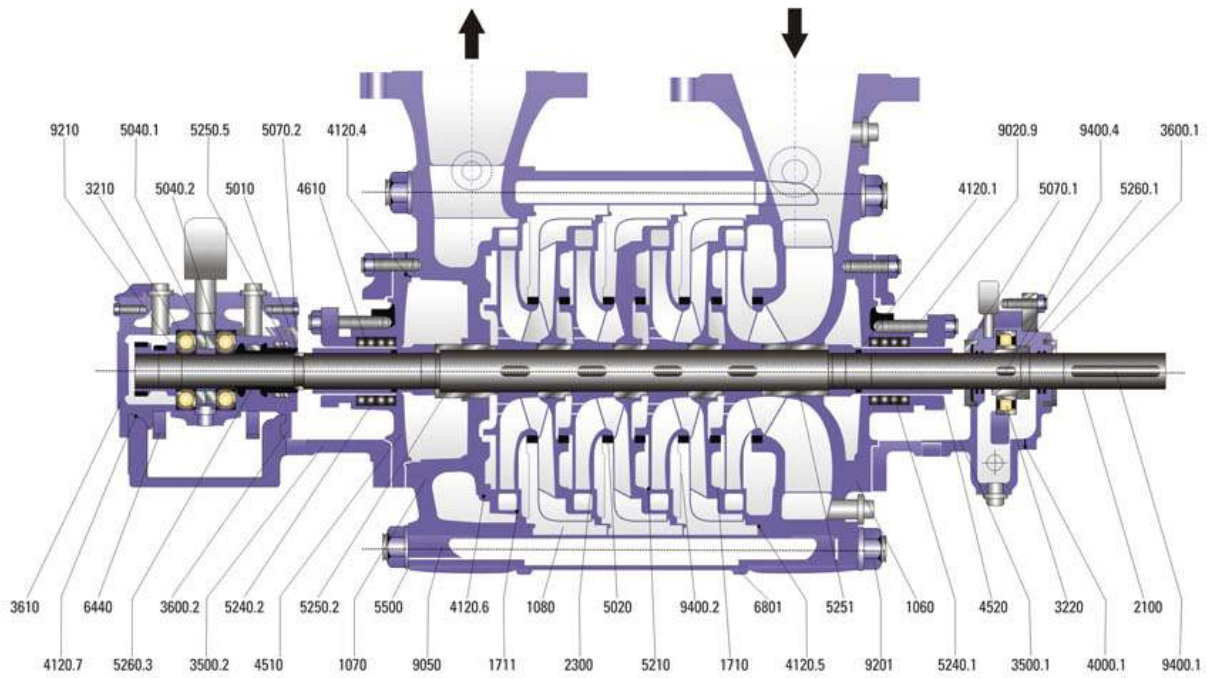
PART NO.	DESIGNATION	PART NO.	DESIGNATION	PART NO.	DESIGNATION	PART NO.	DESIGNATION
1070	Discharge Casing	3500	Bearing Bracket	4510	Stuffing Box	6801	Gladding
1060	Suction Casing	3600	Bearing Cover	4520	Gland	6891	Strapping Band
1080	Stage Casing	3610	Bearing End Cover	4610	Gland Packing	9021	Gland Bolt
1650	Jacket	4000.1	Flat Gasket	5020	Casing Wearing	9050	Tie Bolt
1710	Diffuser	4000.2	Flat Gasket	5070	Deflector	9201.1	Fine Hex-Nut
1711	Last Diffuser	4000.3	Flat Gasket	5210	Stage Sleeve	9201.2	Fine Hex-Nut
2100	Shaft	4120.1	O-ring	5240.1	Packing Sleeve	9400.1	Key
2300	Impeller	4120.2	O-ring	5240.2	Packing Sleeve	9400.2	Key
3201	Clamping Sleeve	4120.4	O-ring	5250.2	Distance Sleeve		
3210	Ball Bearing	4120.5	O-ring	5251	Suction Sleeve		
3220	Roller Bearing	4120.6	O-ring	5500	Washer		

SECTIONAL DRAWING AND LIST OF COMPONENTS

MMK

DOUBLE BEARINGS

Cross section with uncooled soft packed stuffing box (N)
 $T < 105^{\circ}\text{C}$, for MMK 80, 100, 125

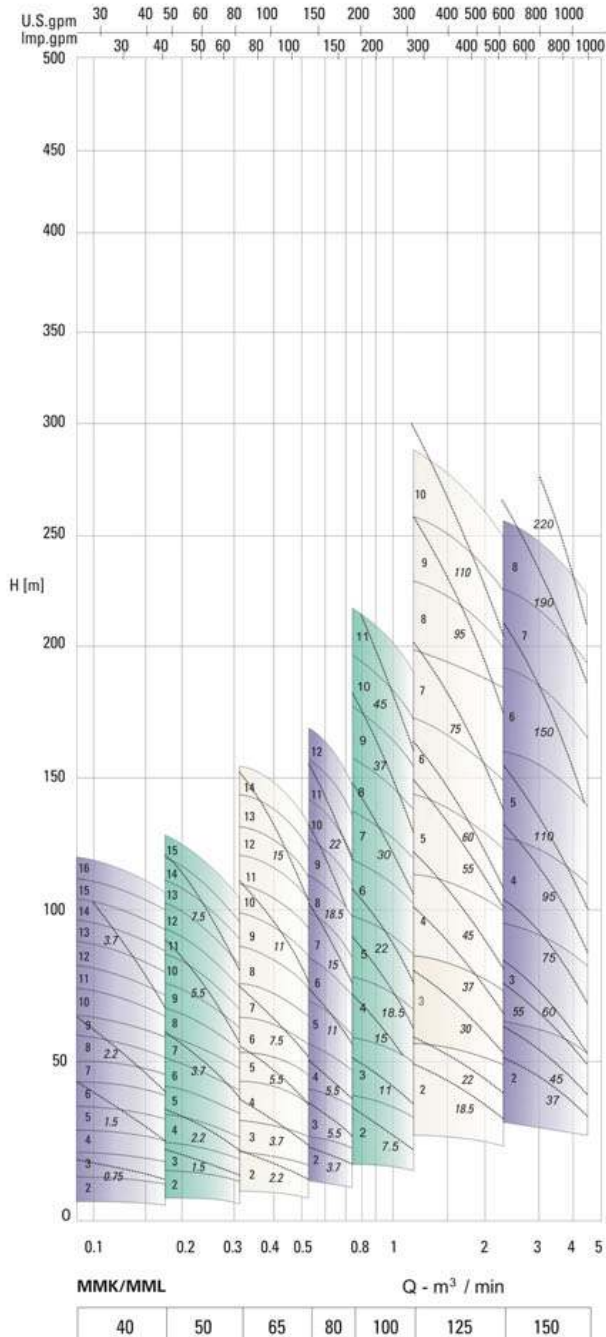


** Typical Drawing Only*

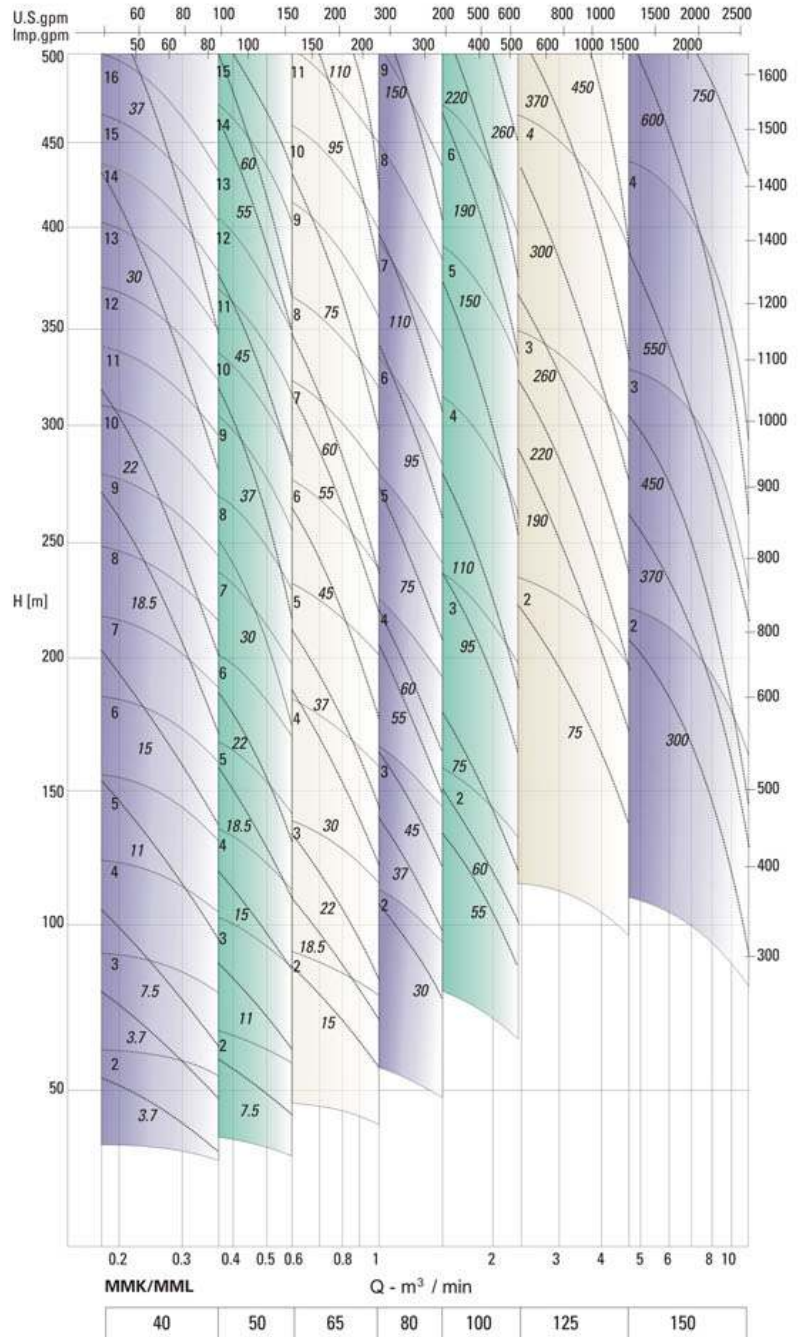
PART NO.	PART NAME	MATERIAL	PC	PART NO.	PART NAME	MATERIAL	PC
1060	Suction Casing		1	5020	Casing Wearing Ring		
1070	Discharge Casing		1	5040.1	Spacer Ring	FC200	1
1080	Stage Casing			5040.2	Spacer Ring	FC200	1
1710	Diffuser			5070.1	Deflector	SUS316	2
1711	Diffuser, Last Stage		1	5070.2	Deflector	SUS316	1
2100	Shaft		1	5210	Interstage Sleeve		
2300	Impeller			5240.1	Packing Sleeve		1
3210	Ball Bearing	No. 73	1	5240.2	Packing Sleeve		1
3220	Roller Bearing	NU C3	1	5250.2	Spacer Sleeve		1
3500.1	Bearing Bracket	FC200	1	5250.5	Spacer Sleeve	FC200	1
3500.2	Bearing Bracket	FC200	1	5251	Suction Sleeve		1
3600.1	Bearing Cover	FC200	1	5260.1	Bearing Bushing	S45C	1
3600.2	Bearing Cover	FC200	1	5260.3	Bearing Bushing	FC200	1
3610	Bearing End Cover	FC200	1	5500	Washer	SS400	16
4000.1	Gasket	TOMBO 1995	1	6440	Oil Ring	SS400	2
4120.1	O-Ring	NBR70	2	6801	Cladding	SPCC	1
4120.4	O-Ring	NBR70	2	9020.9	Stud Bolt	SUS316	4
4120.5	O-Ring	NBR70		9050	Tie Bolt	S45C	8
4120.6	O-Ring	NBR70	1	9201	Hexagonal Nut	SS400	16
4120.7	O-Ring	NBR70	2	9210	Shaft Nut	S45C	1
4510	Stuffing Box Housing		2	9400.1	Key	S45C	1
4520	Gland		2	9400.2	Key		
4610	Gland Packing	VALQUA 7202	8	9400.4	Key	S45C	1
5010	Split Ring	SUS420J2	1				

SELECTION CHART

50Hz-4P (1500 r.p.m.)



50Hz-2P (3000 r.p.m.)



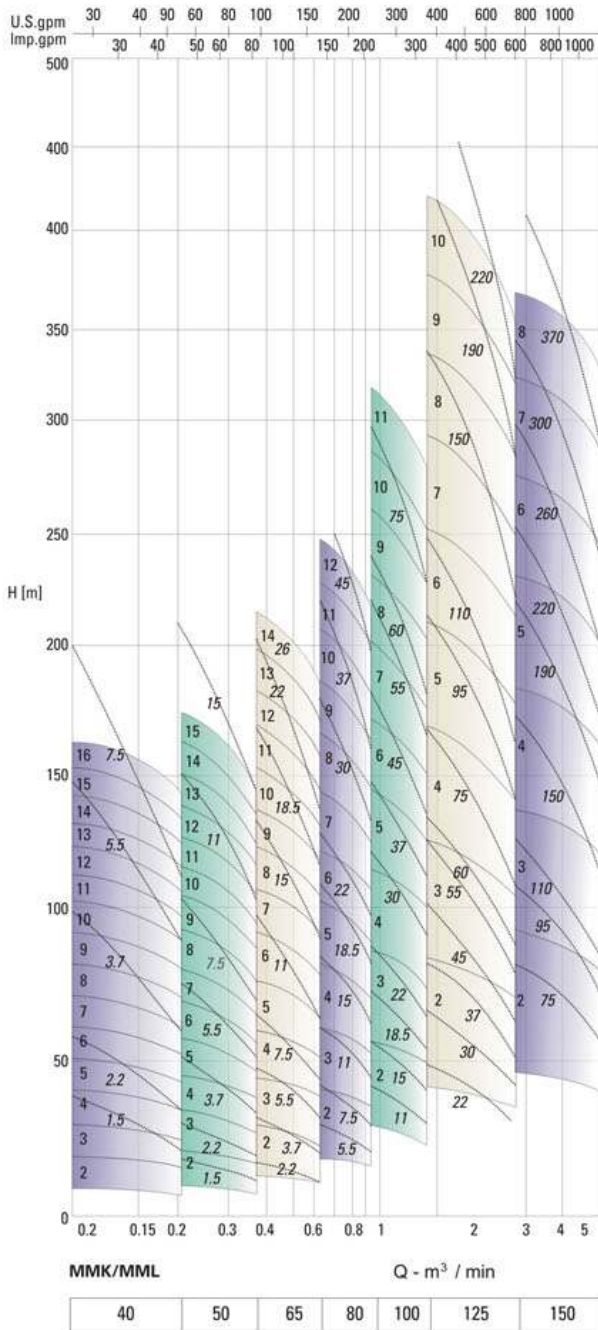
On MML Pumps, the minimum delivery pressure should not be allowed to drop below 13 bar on account of the balancing device (*possible damage to the balancing device*).

- (—————) Number of Stage
- (- - - - -) Motor Ratings

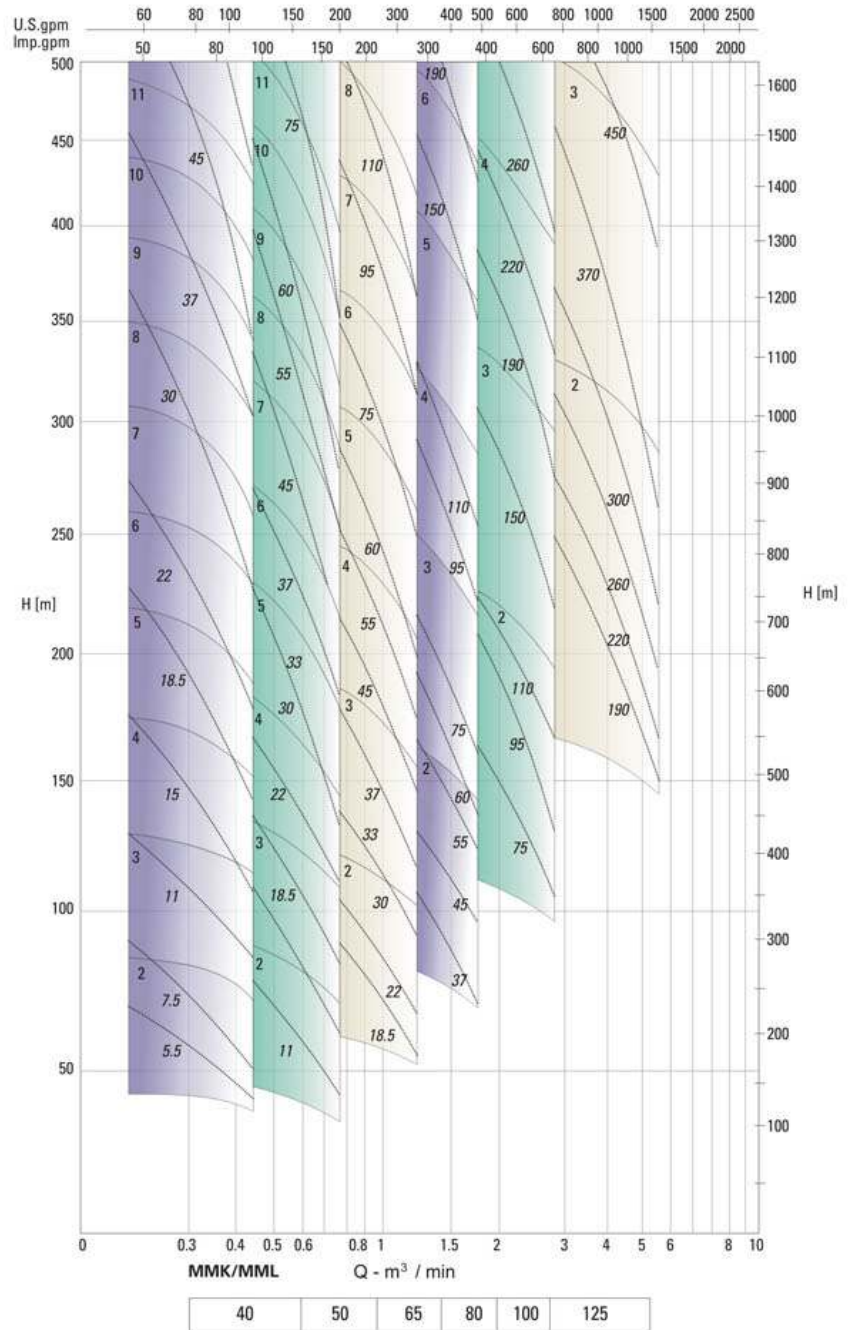
SELECTION CHART



60Hz-4P (1800 r.p.m.)



60Hz-2P (3600 r.p.m.)



On MML Pumps, the minimum delivery pressure should not be allowed to drop below 13 bar on account of the balancing device (possible damage to the balancing device).

- (—————) Number of Stage
- (- - - - -) Motor Ratings