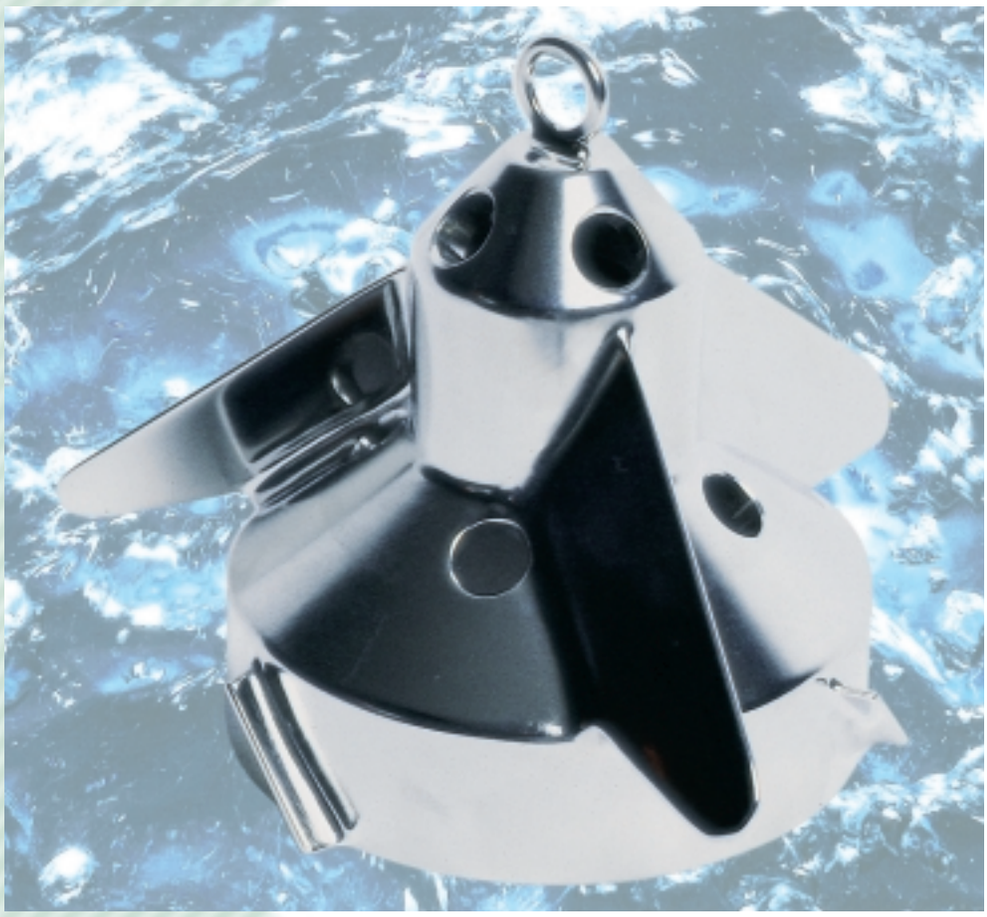
MAVADRIVE®

Bottom and top entry
magnetic agitators



MAVAG
Process Technology
Business area mixing technology

Scherrer Group

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Process plants

Mixing

Magnetic agitators,
Sterile agitators,
S.s. vessels

Process engineering

Manufacturing, Installation,
Commissioning

Qualification,
Validation

MAVAG
MIXING TECHNOLOGY

Besides our well known agitators for hygienic or sterile applications with mechanical seals we offer a wide range of agitators with magnetic drives.
MAVADRIVE® agitators absolutely prevent any contact between in-tank and outside atmosphere by means of the containment shell instead of a shaft seal.
Main advantages:
- no emissions
- no product contamination
- no seal problems
- less maintenance

MAVAG is the patent-holder for a number of innovative design features. As **MAVADRIVE®** agitators are designed for cleaning in place (CIP) and steamsterilisation in place (SIP) they are frequently used in hygienic and sterile processes.

Ask for our reference list.

MAVAG PROCESS ENGINEERING

Our process know how and long term experience make sure that your agitation task will be solved to your full satisfaction:

- Homogenize
  to achieve short mixing time and high mixing quality
- Suspend
  keep solids in suspension, to your specified extent
- Heat transfer
  improve the heat transfer including an optimized vessel design
- Disperse
  improve the mass transfer between two phases
- Gas distribution
  a minimized gas bubble size together with a perfect gas distribution give a better process efficiency.

We take responsibility for scale-up. Test work together with our customers is the basis for tailor-made design.

Perfect welding in our workshop

Materials surface to your specification (grinding, electropolishing etc.)

Testing of materials

QUALITY ASSURANCE

MAVAG's well respected quality is maintained by our quality assurance system. Some important aspects are:

- regular procedures within our organisation
- further vocational training
- qualified subsuppliers
- test of purchased goods
- **MAVAG**'s well equipped workshop

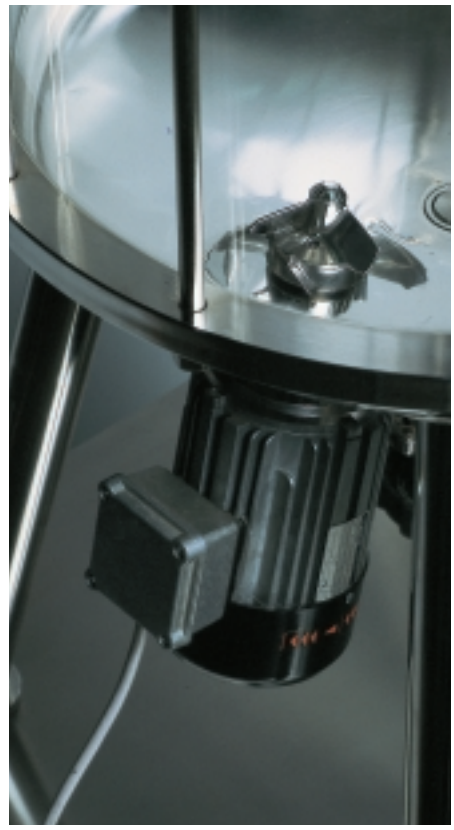
VALIDATION

Often process plants where **MAVADRIVE®** agitators are installed have to be validated prior to startup of production. An independent research institut has proved that our agitators can be validated without any limitation.
MAVAG assists the customer through provision of all the documents and test reports needed (DQ, IQ, OQ as well as PQ-documentation). In addition, we can equip our agitators with speed control, temperature control etc. to monitor the production process.

APPLICATIONS

MAVADRIVE® agitators are especially used in branches such as

- pharmaceutical industry
- bio technology
- beverage industry
- food industry
- chemistry
- high pressure technics



Pilot unit for scal up

TECHNICAL INFORMATION

MAVADRIVE® agitators can be mounted on top of the vessel. Other applications require bottom entry or side entry design. All of them use **MAVAG**'s magnetic coupling which basically consists of the driving magnetic rotor on the outside, the driven magnetic rotor on the inside and, between both of them, the containment shell.
The shell forms part of the vessel. It eliminates any possibility of leaks as there is no shaft penetrating the vessel wall.

From the sterile point of view the containment shell is to be welded to the vessel. Nevertheless, there are more ways to fix the shell to the vessel wall.

Thanks to improved magnetic materials the torque that can be transmitted has been significantly increased in the last years.

MAVAG provides magnetic drives with a torque of up to 170 Nm as per standard. Higher torques can be specially accomodated.
Normally, the temperature should not exceed 200 °C but special design allows for up to 300 °C.

DESIGN FEATURES

MAVADRIVE® agitators are designed by means of modern CAD work stations. The design

- follows GMP regulations
- enables CIP cleaning procedures
- allows for SIP sterilization

Drive connection by bayonet socket, stainless steel operating board

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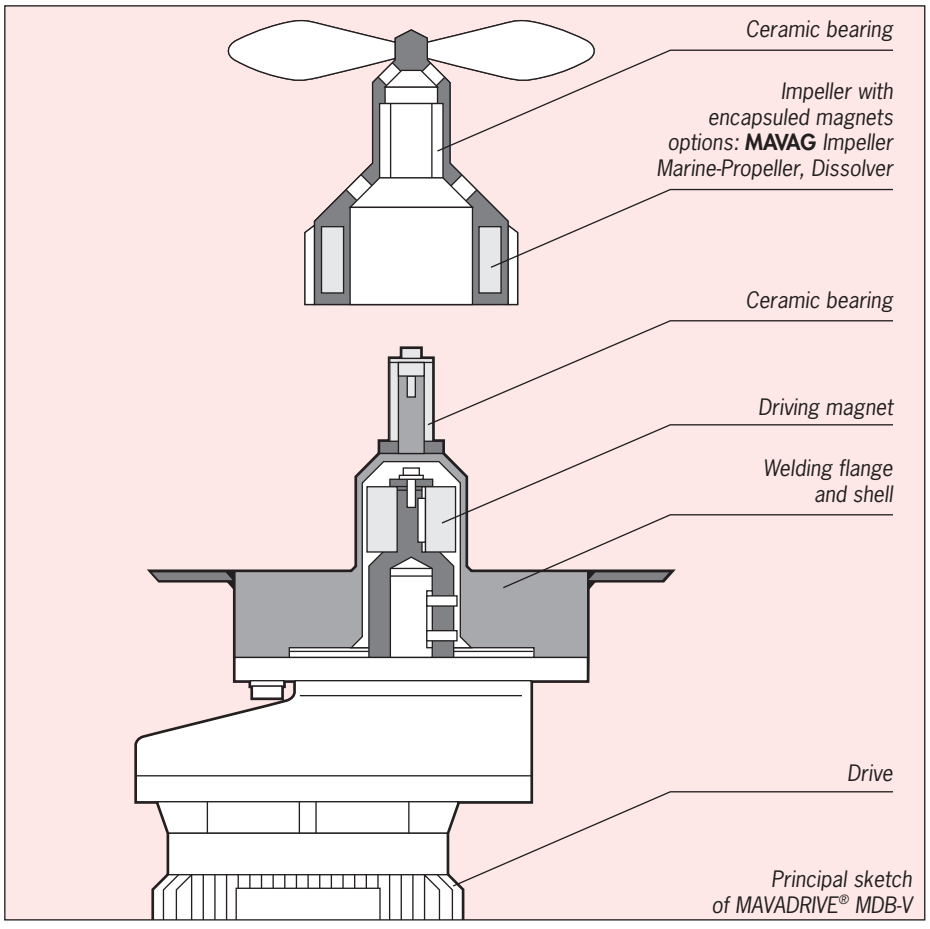
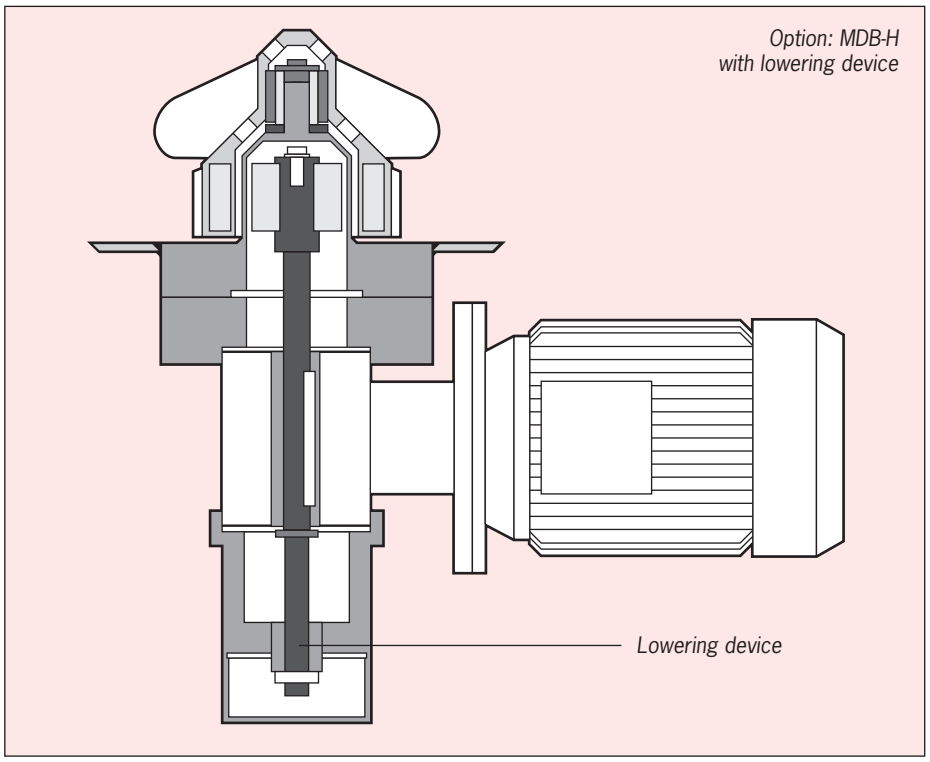
DRIVES

Typical drive options are
- vertical design, i.e. motors (direct drive) or helical geared motors
- horizontal design, i.e. helical-bevel geared motors
- pneumatic drives

Electric motors can be installed
- as AC- or DC-motors
- with explosion proof design
- with speed control by means of mechanical speed variation or frequency converter
- with soft start up
- with control panel
- with further accessories to your requirements



Principal sketch of MAVADRIVE® MDB-V



MAVADRIVE® TYPE MDB FOR BOTTOM ENTRY

Our MDB-type agitators are well designed for bottom mounting. As the magnetic coupling avoids sealing problems all the advantages of a bottom mounted agitator can be taken into account:

- no agitator influence on the vessel top (weight, forces, space etc)
- less agitator weight (no shaft)
- lower center of gravity of the vessel
- easy demounting of the drive
- mixing of very small volumes

SPECIAL FEATURES

- the patent covered **MAVAG** double acting impeller design which allows for hydrodynamic compensation of the impeller thrust. We therefore manage to have almost no wear at the bearing which is made of high tech ceramics.
- multi stage impellers are possible
- speed control by means of a new and innovative sensor design
- utilization of a lowering device for the driving magnetic rotor, depending on the torque.
- several options to connect the flange of the containment shell with the vessel (welded design preferred, but also flanges to national standards, bayonet socket etc.)
- easy to clean (CIP)
- **MAVADRIVE®** type MDB can be validated.

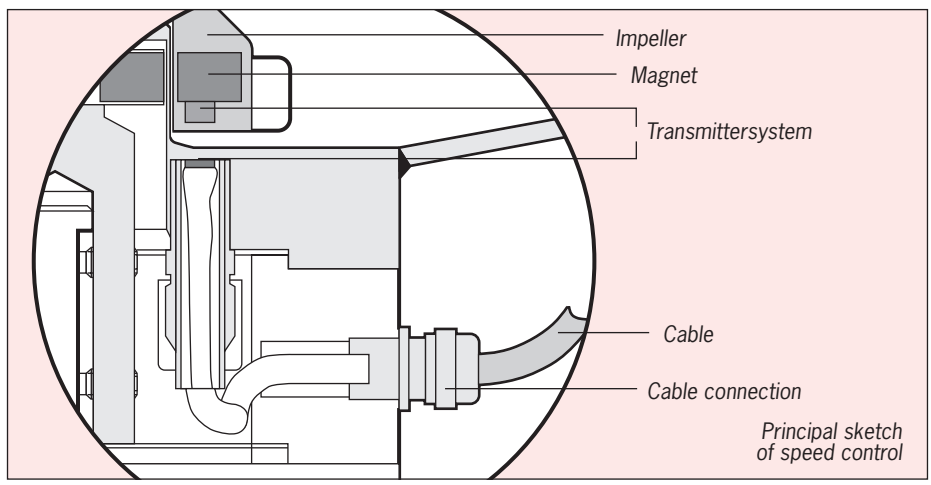
DESIGN OPTIONS

- type MDB - H
  with helical-bevel geared motor, for less height
- type MDB - V
  with vertical mounted drives

TYPE OF IMPELLERS

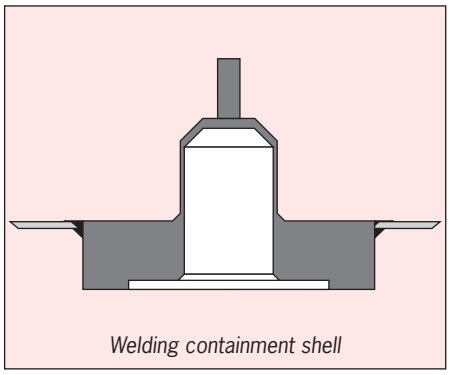
Usually, **MAVAG**'s double acting impellers with low diameter ratios (< 0.5) and higher speeds are chosen, especially

- **MAVAG** impeller
- Marine type propeller
- Rushton turbine
- Tooth disc

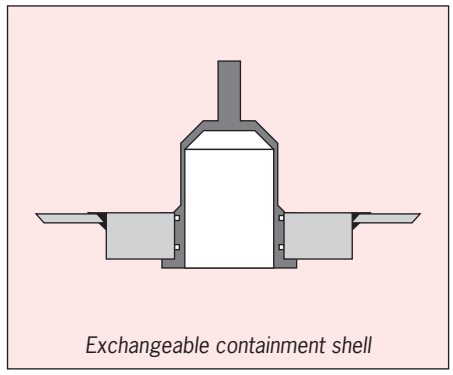


Principal sketch of speed control

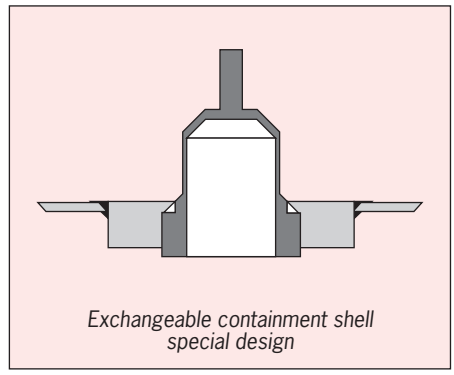
MAVAG-*Impeller (double acting impeller)*



Welding containment shell



Exchangeable containment shell



Exchangeable containment shell special design

MAVADRIVE® TYPE MDA FOR TOP MOUNTING

MDA agitators are designed for mounting on top of a vessel. Main aspect to consider is the kind of shaft bearing:

TYPE MDA - E

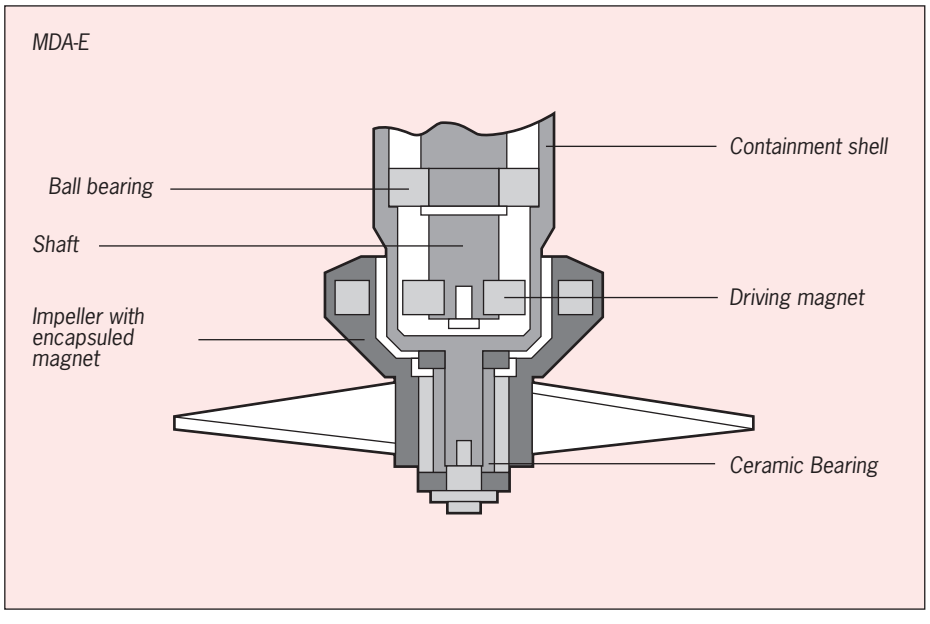
The containment shell is shaped like a tube. The ceramic bearing and the impeller including the driven magnetic rotor are all mounted at the end of the tube. Inside the tube runs the shaft under atmospheric conditions, with the driving magnetic rotor at its end.

Advantages:
- Standard instead of ceramic ball bearings can be used for the shaft.
- The impeller slide bearing is made from hightech ceramic which is almost free of wear.

Impeller for MDA- E

Impeller with higher speeds will be preferred, especially
- marine type propeller
- Rushton turbine
- tooth disc
- pitch blade turbine

MAVADRIVE® *Type MDA-E*



TYPE MDA - I

For longer shafts and multi stage impeller designs.
Here the magnetic coupling is situated outside of the vessel and inside a housing. The shaft bearings which are on the tank side of the coupling can be designed for dry running and then are made from high tech ceramic material.
Tailor made design using our proven components is available on request.

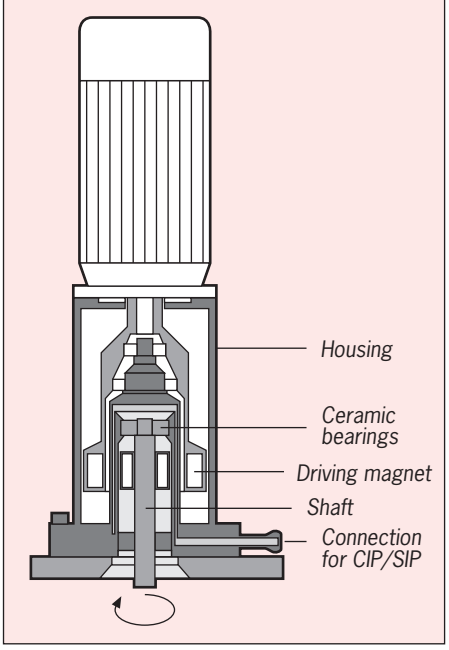
Impellers for MDA - I
As the design of MDA - I agitators inside the tank is similar to agitators with standard drive systems almost any kind of impeller can be taken.
Nevertheless we prefer to choose impellers which create a low torque.

Impellers are available
- acc. to **MAVAG** - design
- acc. to DIN 28 131
- acc. to your specification

SPECIAL FEATURES

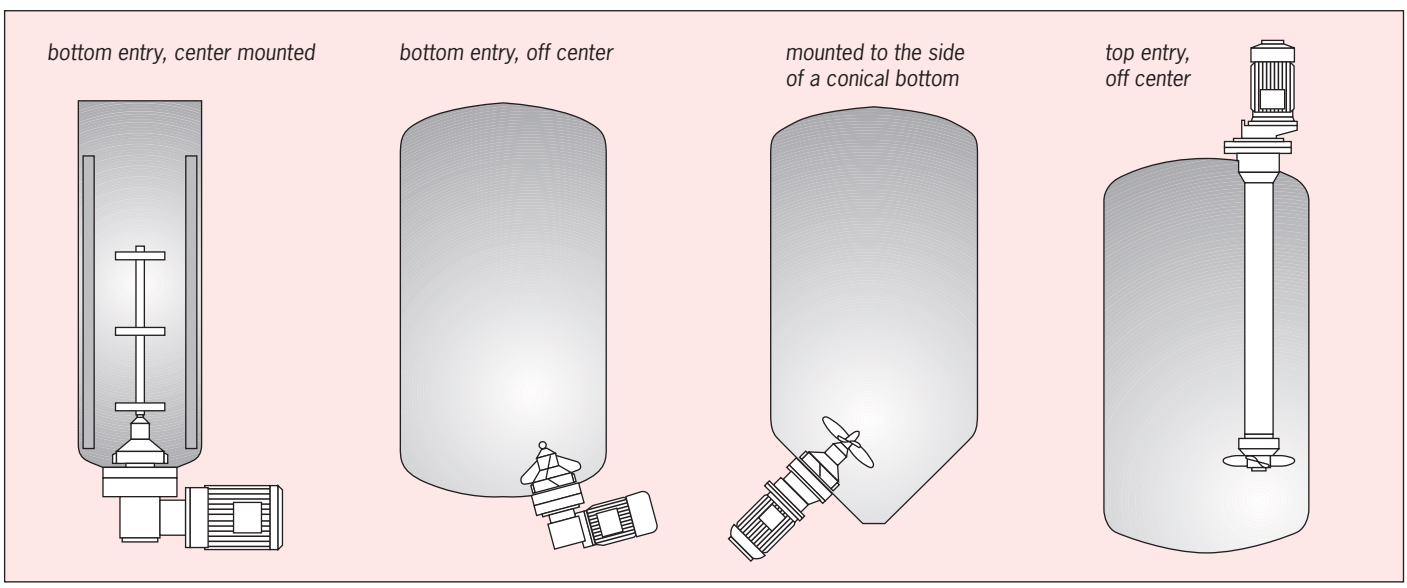
- designed for CIP and SIP. The special design of the MDA - I containment shell allows CIP/SIP also for this part of the agitator
- speed and temperature can be monitored
- lowering device for the driven magnetic rotor/impeller (MDA - E)

MDA-I: Principal drawing



MAVADRIVE® *Type MDA-300-I*

Typical agitator mounting



MAVAG PROCESS ENGINEERING

We offer a wide range of machinery, systems and plants for sophisticated processes. Our strength is based on the fact that we carry out turn-key projects as well as key components and service. So the scope of supply will always be exactly to your requirements.

With the help of our process know-how and the experience of our engineers we can start the job doing the basic engineering. We then serve our customers not just until commissioning is done.

Sometimes validation, always after-sales-service are the next steps towards a good partnership between you and us.

The advantages for you:

- one responsible partner to speak to
- effective project handling
- safety and reliability due to many years of experience

What can we do to serve you?

Speak to our business area:

MAVAG sterile technology

MAVAG bio technology

MAVAG filtration technology

MAVAG mixing technology

MDV 98.07.od

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