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|-----|------------|-------------------|----------|-----------|----------|----------|
| AB  |            |                   |          |           |          |          |
| AA  |            |                   |          |           |          |          |
| --  | 24-07-2019 | Issued for Review | Blasyk   | Knappmann | BAC      | Lupinski |
| REV | DATE       | DESCRIPTION       | PREPARED | CHECKED   | REVIEWED | APPROVED |

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SUBCONTRACTOR






**MITSUBISHI HITACHI POWER SYSTEMS  
 EUROPE**

**PTOLEMAIS UNIT V, 660 MW POWER PLANT**

Contract DMKT : 11 09 50 52

|  |   |
|--|---|
| <b>DOC. TITLE</b>                          | Subcontractor Document<br>Number<br>N-100170-M-O06-GM03-00001 |
| <b>User Manual<br/>Shut-off gate valve</b> |   |




|                 |                       |         |               |
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### REVISION SUMMARY SHEET

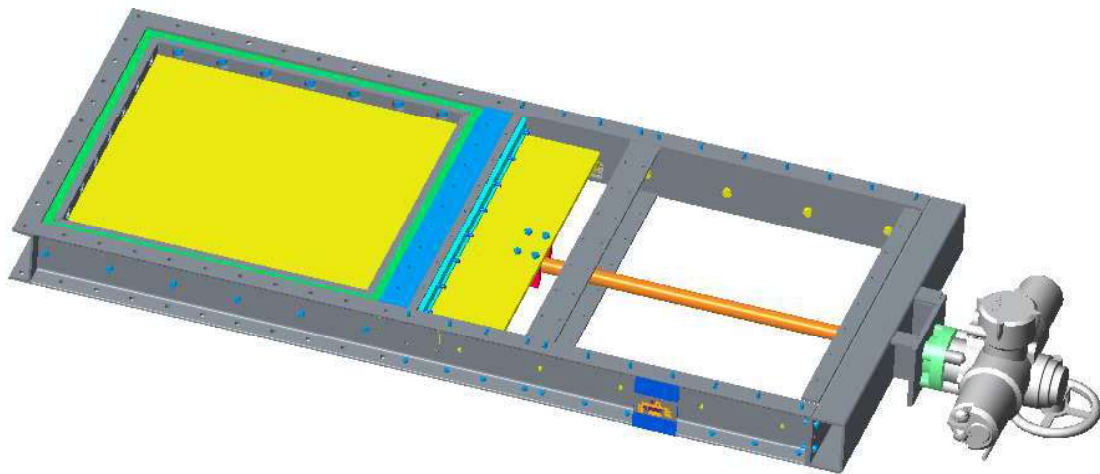
| Rev. | Date | Reason for change | Related Correspondence Ref. No. | Explanation/ List of Changes |
|------|------|-------------------|---------------------------------|------------------------------|
|      |      | Comments          |                                 |                              |
|      |      | Internal Needs    |                                 |                              |
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## User Manual

### Shut-off gate valve






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## 1. Introduction

This document contains the plant specification, information on processes (for detailed information see operation manual N-100170-M-O19-GM02-00001) and specific descriptions of individual units and their maintenance.

The document does not claim to be complete in that it does not list all possible instructions and operations when operating the plant. It is not intended as a replacement for the essential training of operating personnel.

The manufacturer/supplier accepts no liability for damage caused by improper use, incorrect operation, deliberate damage, corrosion or erosion.

Correct use means that the plant is under constant expert supervision and rapid communication is possible between the control room and all the main local sections of the plant.

Safety norms or devices must never be fully or partially bypassed. In the event of such emergency operation, the supplier cannot assume responsibility for the resulting risks and consequences.

In addition to the operating instructions, the relevant national statutory and/or official requirements for operation of the plant apply.

The following regulations also apply to plants installed outside of Germany:

- The standard general national regulations for the operation of steam boilers
- The standard national regulations for the operation of firing systems
- The standard national accident prevention regulations

The supplier reserves the right to amend or supplement the document if new operational experience so requires.

It is in the interest of the operator to handle this document with care. In particular, it is important not to remove any individual pages.

The operator is requested to inform the supplier of important new performance data in order to ensure that the master document can be amended or corrected accordingly. The master document is located at:

Mitsubishi Hitachi Power Systems Europe GmbH




Department: Firing Components

Schifferstraße 80

47059 Duisburg

Tel.: +49 203 8038 0

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## 2. Identification

### Type designation and marking of the machines

The Shut-off gate valve, designed by Mitsubishi Hitachi Power Systems Europe GmbH (MHPSE), type AS-1TGUO, for the Mill Feeding System 5 0HFB of the Ptolemais Power Plant (Com.-No.: N-100170-M-O06) have the following machine numbers:




| KKS             | Type     | machine-no. |
|-----------------|----------|-------------|
| • 5 0HFB10AA051 | AS-1TGUO | 1947        |
| • 5 0HFB20AA051 | AS-1TGUO | 1948        |
| • 5 0HFB30AA051 | AS-1TGUO | 1949        |
| • 5 0HFB40AA051 | AS-1TGUO | 1950        |
| • 5 0HFB50AA051 | AS-1TGUO | 1951        |
| • 5 0HFB60AA051 | AS-1TGUO | 1952        |
| • 5 0HFB70AA051 | AS-1TGUO | 1953        |
| • 5 0HFB80AA051 | AS-1TGUO | 1954        |

### Declaration of conformity

The mill feeding system has been designed and manufactured in compliance with the requirements of the EC machinery directive 2006/42/EC.

The declaration of conformity is specified in the Technical Documentation.

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### 3. Technical Data




#### Shut-off gate valve

|                                      |    |   |
|--------------------------------------|----|---|
| design:                              | -  | one piece,<br>shut-off gate valve<br>AS 1150 x 1150 |
| machinery-no.                        | -  | 1947-1954   |
| dimensions:                          |    |   |
| length                               | mm | approx. 3385  |
| width                                | mm | approx. 1300  |
| height of the gate valve housing     | mm | 200   |
| gate valve cross-section             | mm | 800 x 1000  |
| weight gate valve including actuator | kg | 875   |

#### Actuator

|                          |             |          |
|--------------------------|-------------|----------|
| manufacturer             |             | Rotork   |
| type                     |             | IQ35 F16 |
| speed of the driven side | min-1       | 72       |
| travel speed – open      | revolutions | 47,9     |
| travel speed – closed    | revolutions | 47,9     |
| set torque - open        | Nm          | 250      |
| set torque - closed      | Nm          | 250      |
| operating voltage        | V           | 400      |
| frequency                | Hz          | 50       |
| standard rating          | kW          | 3        |
| type of protection       |             | IP 68    |
| weight                   | kg          | 69,3     |

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## 4. General information on the operation, maintenance, inspection and repair of the Shut-off gate valve

### Symbols used



**Hazard**

The symbol indicates a potentially threatening hazard. Non-observance of this symbol may result in serious damage to health or even life-threatening injuries.



**Caution**

The symbol indicates a potentially hazardous situation. Non-observance of this symbol could result in less serious damage to health.






**Danger of falling objects**

The symbol indicates a potentially threatening hazard. Non-observance of the accident prevention regulations may result in serious damage to health or even life-threatening injuries.

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**Keep hands clear**

The symbol indicates a potentially hazardous situation. Non-observance of this symbol could result in less serious damage to health. Warning of injury to hands

## General Instructions

To prevent hazards, the product standards that have been harmonized on the basis of the application, the specific EU directives, the user manual and all generally applicable standards apply for the operation, maintenance and repair of the Shut-off gate valve. The Shut-off gate valve must be operated and maintained only by reliable, professionally trained personnel who have been instructed accordingly.

It may only be used in perfect working order and for its designated use, having due regard for safety, an awareness of hazards and in due compliance with the following operating instructions. Faults that could compromise safety must be eliminated immediately.

The plant may only be operated for the designated use. The manufacturer accepts no liability for damage resulting from non-designated use.

Designated use includes observance of the respective operating instructions and compliance with the inspection and maintenance requirements. This includes the more detailed operating instructions for the individual units. This manufacturer documentation forms part of the overall documentation.

Modifications to the plant that might compromise safety must not be made without the manufacturer's approval; this includes the installation and adjustment of safety devices and valves, as well as welding on pressure parts or components subject to static and dynamic stress.

No additional welds may be carried out on the Shut-off gate valve and its components without consultation with and the approval of MHPSE since the resulting heat could cause consequential damage. Warranty claims against MHPSE on this basis will be rejected.




Safety devices, such as electric interlock chains, must never be fully or partially bypassed. Work on electrical equipment must be carried out by a qualified electrician.

Modifications to programmable control systems are prohibited.

The location and use of fire extinguishers and the fire alarm and firefighting equipment should be noted.

The plant is built according to the state of the art and generally accepted safety rules.

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Knowledge of the basic safety information and regulations is relevant to safe and smooth plant operation. All personnel working in this area must follow the safety instructions.

Personal protective equipment must be worn.

### Directives taken into consideration

The plant is built according to the state of the art and generally accepted safety rules.

With regard to safety, three specific EU directives were reviewed for their relevance to the Shut-off gate valve:

- Pressure Equipment Directive (PED)
- Machinery Directive (MD 2006/42/EC) for mechanical hazards
- ATEX Directive for explosion hazards.

### EU Pressure Equipment Directive (PED)

The PED is not relevant to the Shut-off gate valve, because the criterion medium pressure  $p > 0.5$  bar is not met.

### EU Explosion Protection Directive (ATEX, 94/4/EC)

This Directive is not relevant for the mill feeding system, as the criteria "flammable mixture" and "ignition energy / temperature" cannot occur at the same time due to the operating parameters and design (EN 12952-9).




### EU Machinery Directive (2006/42/EC)

This directive is relevant to the Shut-off gate valve, because the criteria "assembly of linked parts or components, at least one of which moves" and "joined together for a specific application" are relevant.

### Other important reference standards and documents:

- EN ISO 14121 and EN ISO 12100 Safety of Machinery
- EN 12952-9 Requirements for firing systems for pulverized solid fuels (Replaces TRD 413 and CEN/TC 266)
- EN 1011-1 to 8 Welding
- EN 13155 Cranes
- EN 50110-1 and 2 Operation of electrical installations
- DIN EN 50156-1 Electrical equipment for firing systems
- DIN 4420-1 to 4 Working and protective scaffolds
- DIN EN 12810-1 und 2 Working and protective scaffolds
- VGB M 213H Coal pulverizing plants

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- VGB R 200 Design and operation of power plant firing systems
- VGB M 112 und VGB R 112 Fire protection in power plants
- Federal Ministry of Justice accident prevention regulations §15
- Operator's accident prevention regulations

### Further information on operating the Shut-off gate valve

Essential requirements for operating and maintaining plants/machines are listed below. Non-compliance may result in injury and damage.

- Designated inside the components of the mill feeding system is Explosion Protection Zone 21 (see N-100200-S-UHA-IC23-00001-00004). All those safety steps required for this zone are to be adhered to at all times.
- There are no metallic foreign bodies in the machine that could impair the function of the shut-off gate valve and cause damage
- The use of appropriate magnetic separators upstream of the coal bunker prevents metallic parts from entering the shut-off gate valve with the coal.
- To prevent coal dust deposits and fire, there must be no foreign bodies, such as cotton waste, firing cables and welding wires, on the housing of the shut-off gate valve.
- All access openings, doors and hand holes on the mill feeding system and mill are closed.
- Before switching on/starting the plant, ensure that no-one is potentially at risk by the operation of the machine/plant.




Any changes, including changes to operating characteristics, must be reported to the responsible plant section without delay. If necessary, the plant must be shut down immediately. The on/off procedures and control indicators specified in the operating instructions must be observed.



#### Caution

Operation with bypassed/defective limit monitors is prohibited. The manufacturer assumes no liability for damage caused by exceeding the limit values.

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All monitoring instruments, pipelines and bolt/screw connections must be checked both for correct and secure installation and for correct function according to the technical data and properly adjusted in accordance with the manufacturer's specifications.

### Information on accessing the Shut-off gate valve for maintenance and repair

Essential requirements for operating and maintaining plants/machines are listed below. Non-compliance may result in injury and damage.

- Only access in accordance with customer specifications and when the coal feeding system has been deactivated at the control desk.
- Always access the coal feeding system with another person.
- Drive motors for the mill, coal feeder and classifier cannot be switched on and have also been enabled.
- With scavenging air dumper closed.
- With shut-off gates closed: primary air side, coal dust line side, raw coal side (if present), evaporation side, water side.
- With pulverizer cooled and cleaned (mill and coal feeder).
- When welding, ensure that the equipotential bonding is directly adjacent to the device protecting the roller bearings against current passage.
- Welding, torch cutting and grinding work to the plant may only be performed with express approval, e.g. there are no fire or explosion hazards.
- Before welding, torch cutting or grinding, remove dust and combustible materials from the plant and its surroundings and ensure adequate ventilation (explosion hazard).
- All work must be documented in accordance with customer specifications.
- The setting, maintenance and inspection work and dates specified in the operating instructions must be carried out on schedule by specialist personnel and documented.
- Machinery and equipment on which inspection, maintenance and repair work are carried out must be switched off – if specified. If work on live parts is necessary, a second person must be present to operate the emergency stop or mains switch with voltage tripping mechanism in an emergency. Working areas must be cordoned off with a red and white safety chain and a warning sign. Electrical work must be carried out with insulated tools.

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**Caution**

Only lubricants may be used according to the specification from our lubricant list.

## 5. Functioning description



**Caution!**

- Starts without prior warning
- Vibrations may occur
- Area only accessible to authorized personnel
- Take heed of rotating parts
- Service, maintenance and repair work may only be carried out with a special permit
- Only with protective clothing
- Always access the Mill Feeding System with another person

The shut-off gate valve is an isolation unit for gaseous and pulverized materials. (It is not a control gate valve) It is only intended for horizontal installation.

In normal operation the shut-off gate valve is opened.

In opened condition the disk rest in the rear gate valve housing on support rollers.

The disk penetration is sealed towards the outside by a graphited gland packing. Laterally the gland openings are hermetically closed by covers.




At the gland side the stem rest in a two-hole flange bearing housing with adjustable grooved ball bearings.

At the drive side the stem trunnion is radially received by the plug bushing of the drive. Axial forces are supported in the drive.

The electro-mechanical drive causes the stem movement and thus the actuation of the gate valve through the stem nut.

When the gate valve is closed, the disk is pressed on the sealing faces by the pressure face in the gate cross section and by the segments in the rear gate valve housing.

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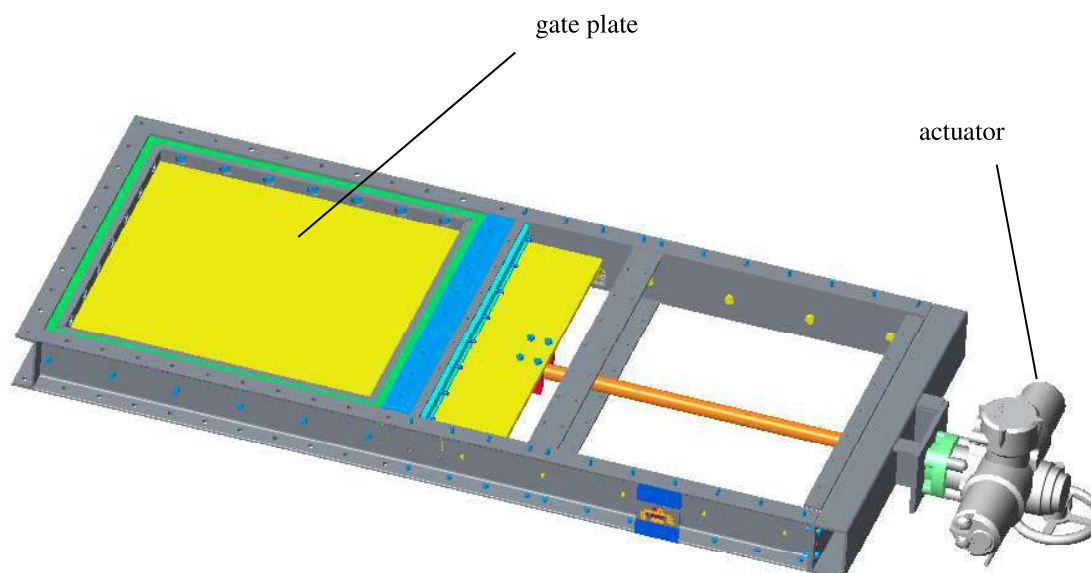
Travel-dependent limit switches installed in the drive switch off. Additional torque-dependent limit switches cut off when the set torques are exceeded and protect against mechanical overloading.

In the event of failure of current supply the gate valve can also be actuated manually by the hand wheel at the actuator.

CLOCKWISE ROTATION - shut-off gate valve CLOSED

ANTICLOCKWISE ROTATION - shut-off gate valve OPEN

## 6. Description of deliverables






**Illustration 1 – Shut-off gate valve**

The Shut-off gate valve 5 0HFB10-80 AA051 with its main components

- Housing
- Gate plate
- Actuator

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## 7. Maintenance and inspections

### General

To achieve high operational safety and good availability, scheduled servicing of the shut-off gate valve and its parts and scheduled maintenance involving the repair and/or replacement of parts should be carried out when the system has been shut down.

All inspection work must be documented in a work report.




As a rule, it is therefore recommended that maintenance work involving the repair and replacement of parts is not left until it is absolutely necessary but that preventive maintenance is carried out on a continuous basis in order to prevent unplanned shut-off gate valve shutdowns.



### Caution!

- Area only accessible for authorised personnel
- Service, maintenance and repair work may only be carried out with special permit
- Works have to be carried out only by trained and skilled personnel
- Works have to be carried out with at least a second person
- Coal dust deposits have to be removed immediately (cleaning), when the layer thickness is 1 mm or more. (Guide: as soon as foot prints are visible on dust covered surfaces). The indicated personal protection equipment has to be worn.
- When working on electrical components it has to be ensured that they are de-energized
- It is prohibited to fight fire at electrical installation with water

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## Work instruction for a Shut-off gate valve inspection

- The following is a list of what needs to be kept to for maintaining the operating and maintenance states of equipment/machinery.
- 
- **To avoid personal injuries or machine damages the following precautions have to be kept.**
- 
- Only access in accordance with customer specifications and when the belt conveyor, the mill and the shut-off gate valves have been deactivated at the control desk.
- The indicated personal protection equipment including a fall protection device has to be worn.
- Always access the shut-off gate valve with another person.
- Only access when the shut-off gate valve was cleaned out before.
- Drive motors for the mill, belt conveyor and the shut-off gate valve cannot be switched on and have also been enabled.
- Working on inside components is only permitted when the shut-off gate valve is dismantled.
- When welding, ensure that the equipotential bonding is directly adjacent to the device protecting the roller bearings against current passage.  
Welding, torch cutting and grinding work to the plant may only be performed with express approval, e.g. there are no fire or explosion hazards.  
Before welding, torch cutting or grinding, remove dust and combustible materials from the plant and its surroundings and ensure adequate ventilation (explosion hazard).
- All work must be documented in accordance with customer specifications.
- The setting, maintenance and inspection work and dates specified in the operating instructions must be carried out on schedule by specialist personnel and documented.
- Machinery and equipment on which inspection, maintenance and repair work are carried out must be switched off – if specified.  
If work on live parts is necessary, a second person must be present to operate the emergency stop or mains switch with voltage tripping mechanism in an

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emergency. Working areas must be cordoned off with a red and white safety chain and a warning sign. Electrical work must be carried out with insulated tools.

- It has to be ensured once the work is over that all components – and especially the protection guard – are properly fitted.
- It has to be ensured that all access openings of the mill feeding system became secured again against unintentional opening after maintenance and/or repair work.
- With the work over, the component needs to be released for the operation – something which is to be logged.  
(given that no further work is to be undertaken).

## Lubrication

See document about lubrication and maintenance procedure attached to this manual (N-100170-M-O19-ID27-00001).

(Lubricant change-over or the procedure following lubrication is to be logged)

### Pointer:

Intervals, lubricant quantities and references to the components of the mill feeding system are to be allowed for – see lubricant instructions of the individual components.




For optimum lubrication of the bearings, additional lubrication is to be undertaken when plant operations are started.



### Caution

Only lubricants may be used according to the specification from our lubricant list

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## Adjustment work

### Storage and assembly

When storing and undertaking assembly, ensure that the shut-off gate valve is stored and transported so as to exclude any weathering/decomposition.

The gate plate is to be greased for both transport and assembly purposes. It is thus protected from corrosion.

Line the flange surfaces with the sealing cord and precisely bolt the shut-off gate valve with the counter flange.

The shut-off gate valve needs to be mounted in a stress-relieved manner to allow the gate plate to properly open and close.



#### Caution

Do not fasten the screws one-sidedly!

The position limit switches are set in keeping with the gate valve path.

The limit switches need to be readjusted should this setting be changed during transportation, following assembly of the shut-off gate valve or after wiring work.

Individual adjustments can be made to the torques. The settings are indicated on the actuator nameplate.

In this connection, the information in the operating manual for actuators is to be followed.

The gland packing is to be retightened following commissioning and given any leaks of the shut-off gate valve.

### Electrical connection




Wiring for the actuator including the switching and signalling mechanism is to be undertaken in keeping with the terminal diagram in the connection area.

The canned motor (DV squirrel cage) is star-connection wired at the factory.

To protect the winding from damage from a non-allowed increase in temperature, the canned motor generally has a thermal protector. Three series connected temperature controllers are installed in the winding head of the motor which break the control circuit before the max. winding temperature is exceeded.

Make sure that the sealing is flawless when closing the compact connectors. Screw closure plugs into any non-used cable entry holes.

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## Commissioning

The shut-off gate valve can be placed into service once all the electrical engineering, mechanical and functional steps have been prepared - and with attention paid to the safety instructions.

During each and every start-up, an eye must be kept on the power input of the drive motor of the shut-off gate valve. If the power input is much higher than is usually the case, the plant is to be immediately immobilized and the reason for it both established and then removed.

## Maintenance and inspection operations

The shut-off gate valve components are to be visually examined and checked for wear as follows. This assists the operator in appraising the plant and in acquiring spare parts in good time.

## Maintenance works

See document about lubrication and maintenance procedure attached to this manual (N-100170-M-O19-ID27-00001).

## 8. Replacement and repair

1. General
2. Changing the wear parts




### General



#### Caution

- Machinery and equipment on which repair work are carried out must be switched off.
  - Drive motor for belt conveyor cannot be switched on and have also been enabled.
  - Only with appropriate clearance is maintenance, upkeep or repair work to be done.
  - The information accessing shut-off gate valve for maintenance and repair must be considered.
- 

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Only trained and qualified service personnel are to dismantle and fit wear and spare parts at the shut-off gate valve. Works have to be carried out with at least a second person

We recommend consulting an assembly inspector from the manufacturing plant when carrying out this work.

If necessary, parts of the shut-off gate valve are to be transported around the machine by crane.

Equipment, cables and chains must be provided.

## Replacement of spare parts

Only skilled personnel are to carry out the work, suitable equipment must be used and a second person, at least, must be present.

Proper rigging of the working area must be seen to.

## Spares recommendations / spare parts

It is advisable to keep a stock of the main spare parts not available at short notice in suitable quantities, as shown on the spares list, or to order them early.

### Recommendation/information:




Please note that fitting spare parts that are not original MHPSE parts may affect the correct functioning and efficiency of the plant. They may also affect the scope of the contractual warranty.

Therefore we recommend that you only purchase original MHPSE parts in order to guarantee full functioning and efficiency.

- Plant : Ptolemais
- Com. no. : N-100170
- Machine no. : (as per nameplate)

See document spare and wear part list attached to this manual (N-100170-M-O19-IK07-00001).

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## 9. Technical data for installation, operation and maintenance

1. Weights
2. Tightening torque

### Weights




| Designation                  | Weight kg/Unit |
|------------------------------|----------------|
| Shut-off gate valve complete | 1013           |
| Gate plate                   | 276            |
| Actuator                     | 69             |

### Tightening torques

Unless otherwise specified in drawings and/or charts, the pre-tensioning forces and tightening torque specified in the relevant literature apply.

| Dimensions | Material | Tightening torque (Nm) |
|------------|----------|------------------------|
| M 6        | 8.8      | 10                     |
| M 8        | 8.8      | 25                     |
| M 10       | 8.8      | 45                     |
| M 12       | 8.8      | 85                     |
| M 14       | 8.8      | 130                    |
| M 16       | 8.8      | 210                    |
| M 18       | 8.8      | 285                    |
| M 20       | 8.8      | 425                    |
| M 22       | 8.8      | 550                    |
| M 24       | 8.8      | 690                    |

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## 10. Functional tests, checks after successful installation, repairs, inspections and lengthy shutdowns

Components of the shut-off gate valve are not to be cleaned out with water.

1. Check the interior of the coal feeding system for foreign materials
2. Check the internal parts of the coal feeding system.
3. Coal feeding system openings closed, for example:
4. Housing doors at the conveyors

All settings and the notification of operational readiness must be documented!

## 11. Attachments

### Denomination

### Drawing-no.

Dimensional sheet, shut-off gate valve  
 Lubrication and maintenance procedure  
 Spare and wear part list

N-100170-M-O06-IG04-00001  
 N-100170-M-O19-ID27-00001  
 N-100170-M-O19-IK07-00001

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[Web: schiebel-actuators.com](http://schiebel-actuators.com)

## Actuator Gate valve

|                      |  |
|----------------------|--|
| <b>Type</b>          | <b>Actuator type AB with integrated Smartcon control unit - 170171</b> |
| <b>Serial number</b> | <b>170171</b>  |
| <b>Motortype</b>     | <b>AB18 Am 60 DER DEL 2WEL CSC.V<br/>1.2 mW4 RP4AF H</b>               |
| <b>Actuator type</b> | <b>AB18 Am 60</b>  |
| <b>Design power</b>  | <b>2850 rpm</b>  |
| <b>Design power</b>  | <b>3 KW</b>  |

## KKS No.

5 0HFB10 AA051  
5 0HFB20 AA051  
5 0HFB30 AA051  
5 0HFB40 AA051  
5 0HFB50 AA051  
5 0HFB60 AA051  
5 0HFB70 AA051  
5 0HFB80 AA051