

This document defines the MR series manual actuators designed for the operation of 1/4 turn valves by mounting plate ISO 5211.

General features

The range of MR series manual actuators developed and manufactured by KSB-AMRI covers output torque values up to 16000 Nm. The MR series actuators, equipped with non reversible kinematics in all positions, have been designed for all applications and for the operation of any type ¼ turn valves (centred or double eccentric disc butterfly valves, ball valves,...).

Mounting plate according to ISO 5211 standard.

Equipped with an interchangeable insert, they can be easily fitted on different valve shaft (square end, flat end, key,...).

These actuators are supplied with a handwheel and a visual pointer. Factory lubricated, they do not need any maintenance.

The MR series actuators are equipped, in standard version, with adjustable mechanical travel stops:

- in the open and closed positions ($\pm 2^\circ$) for MR 25 to 200.
- in the closed position ($\pm 2,5^\circ$) for MR 400 to 1600.

For the actuators:

- MR 25 to 200: the gear casing is in JS 1030 ductile iron (previous standards: DIN: GGG40 / NF: FGS 400-15)
- MR 400 to 1600: the gear casing is in JL 1040 cast iron (previous standards: DIN: GG 25 / NF: FGL 250) or in JS 1030 ductile iron (previous standards: DIN: GGG40 / NF: FGS 400-15).

The actuator is mounted directly or by means of an adapter on ¼ turn valves mounting plates.

Protection:

They are hose and fine dust proof and are protected against accidental immersion effects (protection degree: IP 67).

Variant: suitable construction with protection degree IP 68 (30 water column meters): Consult us.

External coating:

Standard sealed version:

- Polyurethane paint (colour dark grey RAL 7016, 80 µm thickness).

Marine version:

- 2-coat system with colour dark grey epoxy paint finish RAL 7016, 150 µm total thickness.

Working temperature range:

From -20°C to $+80^\circ\text{C}$.

Production range

Type	Nominal output torque (Nm)	Nominal input torque (Nm)	Number of turn Handwheel	ISO 5211 mounting plate*	Maximal allowable dimensions for the shaft			
					Height	Driving by square	Driving by Flat	Driving by key
MR 25	250	27	7,5	F07 – F10	50	22	22	Please, consult us
MR 50	500	42	9,5	F10 – F12	60	27	27	
MR 100	1000	70	11,5	F12 or F14	70	36	36	
MR 200	2000	100	16,5	F14 or F16	80	50	46	
MR 400	4000	100	48,0	F16	80	60	55	
MR 600	6000	170	53,5	F16 – F25	95	70	75	
MR 800	8000	100	138,0	F16 – F25	95	70	75	
MR 1200	12000	292	69,0	F25 – F30	110	90	85	
MR 1600	16000	100	290,5	F25 – F30	110	90	85	

* Direct adaptation onto identical mounting plate.

Adaptation by intermediate flange onto different plate (different size or shape).

Options (refer pages 11 to 16)

- operation by cardan joint, fountain key, and chain wheel, exchangeable with the handwheel on site,
- electric limit switch box AMTROBOX,
- visual indication by a flag,
- handwheel locking by chain and padlock,
- closing anticlock wise (consult us),
- special coating for particular environments (consult us),
- associated with ISORIA butterfly valves, the MR 25 to 200 actuators meet the requirements of APSAD (French insurance) (consult us),
- input number of turn (only MR400 to 1600): Adapt construction on request for a number of turn inferior to the input (consult us).
- Remote control devices.

Specific features

Range MR 25 to 200

2 different constructions (see details on pages 5 and 6) are available according to the intended application of the product.

Standard sealed version



**Marine version
Reinforced protection and sealing
VDI / VDE attachment interface**



Application

- Non-saline industrial environment with medium corrosion level,
- No limit switch box possible.

External coating:

Polyurethane paint (colour dark grey RAL 7016, 80 µm thickness).

Application

- Marine,
- Industrial environment with high corrosion level,
- Buried version,
- Submersible version,
- Limit switch box AMTROBOX.

External coating:

Cataphoresis primary + colour dark grey epoxy paint finish RAL 7016, 150 µm total thickness.

Options: special paints.

Range MR 400 to 1600

For some applications, reduction gears are required and there is the possibility of subsequent electrical motorization on site (see page 16) or remote actuation (see page 14, Variant: electric actuation).

This construction is not possible on all types.

In that case, reduction gears are required as indicated in the table below.

For subsequent electric motorization or remote actuation Reduction gear required	Replaces reduction gear as per documents "Actuator selection"
MR 400	MR 200
	MR 400
MR 800	MR 600
	MR 800
MR 1600	MR 1200
	MR 1600

Operation

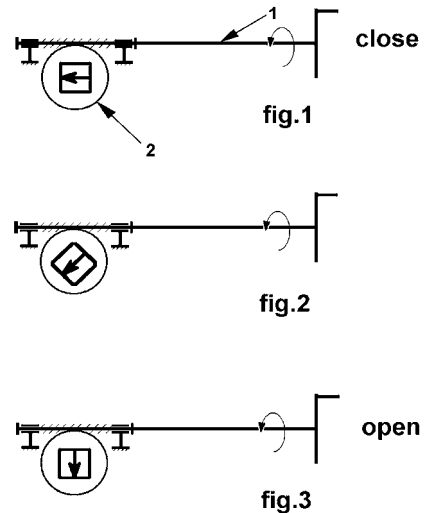
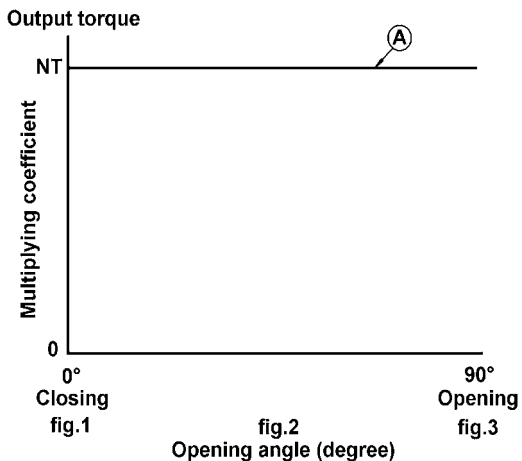
In standard version, MR actuators are designed to ensure clockwise valve closure. On request, anticlockwise arrangement is available.

MR 25 to 200: worm wheel and screw non-reversible kinematics in all positions

The worm wheel and screw kinematics allows to deliver a constant output torque.

Operation is achieved by a device (handwheel, cardan joint, fountain key, chain wheel), linked to the operating screw ① driving in rotation the worm wheel ② integral with the valve shaft.

Graph A: constant output torque



MR 400 to 1600: yoke non-reversible kinematics in all positions

The yoke kinematics allows to deliver an output torque compatible with the butterfly valves operation for a hydrodynamic torque (similar to the maximum torque).

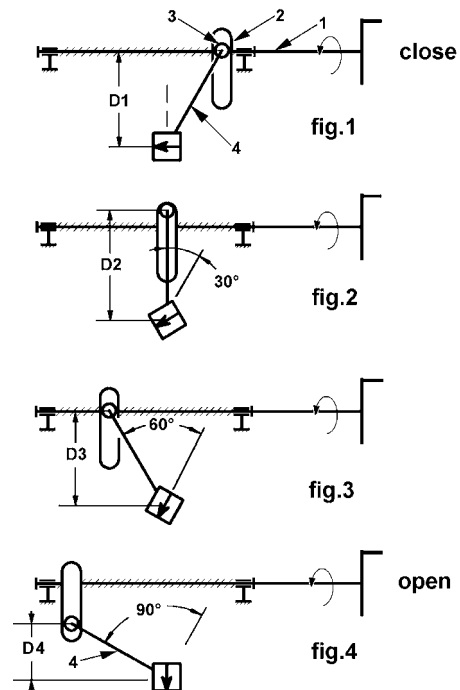
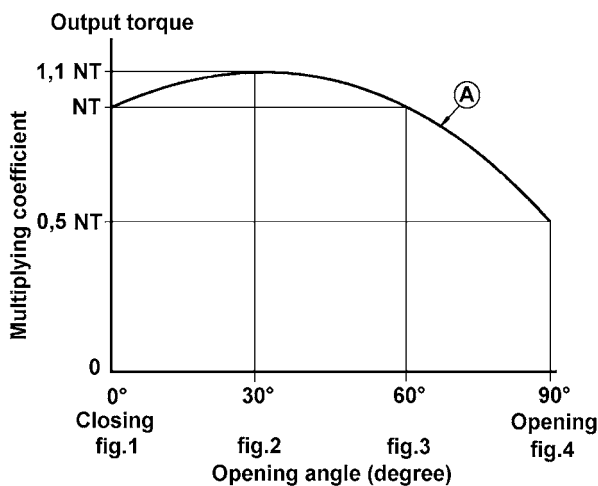
The movement transmission is carried out by the operating screw system ①, sliding operating nut ②, pressure pads ③, swingle bar ④.

Operation is achieved by a device (handwheel, cardan joint, fountain key, chain wheel), linked to the operating screw ① driving the nut in translation ②.

This movement creates sliding of the pressure pads ③ in the slot of the sliding nut ② and drives in rotation the swingle bar ④ integral with the valve shaft.

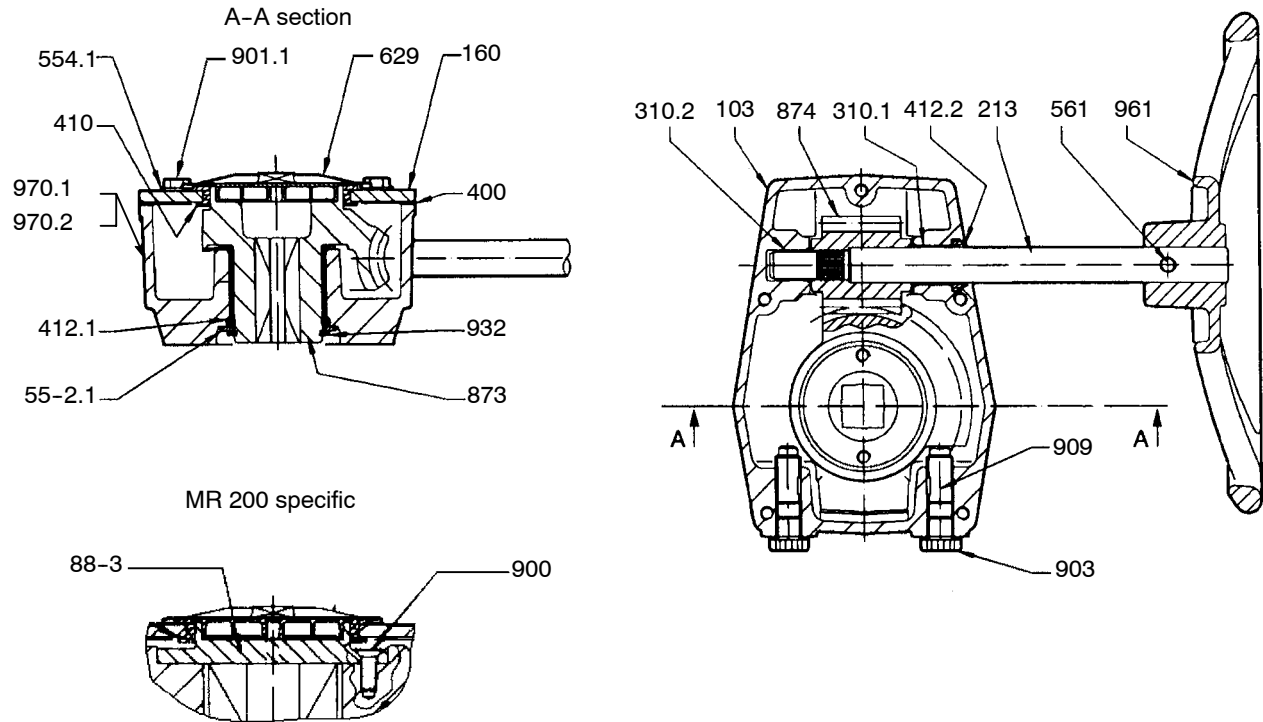
Graph of the yoke kinematics

Graph A : Output torque for constant F $C = F \times D$

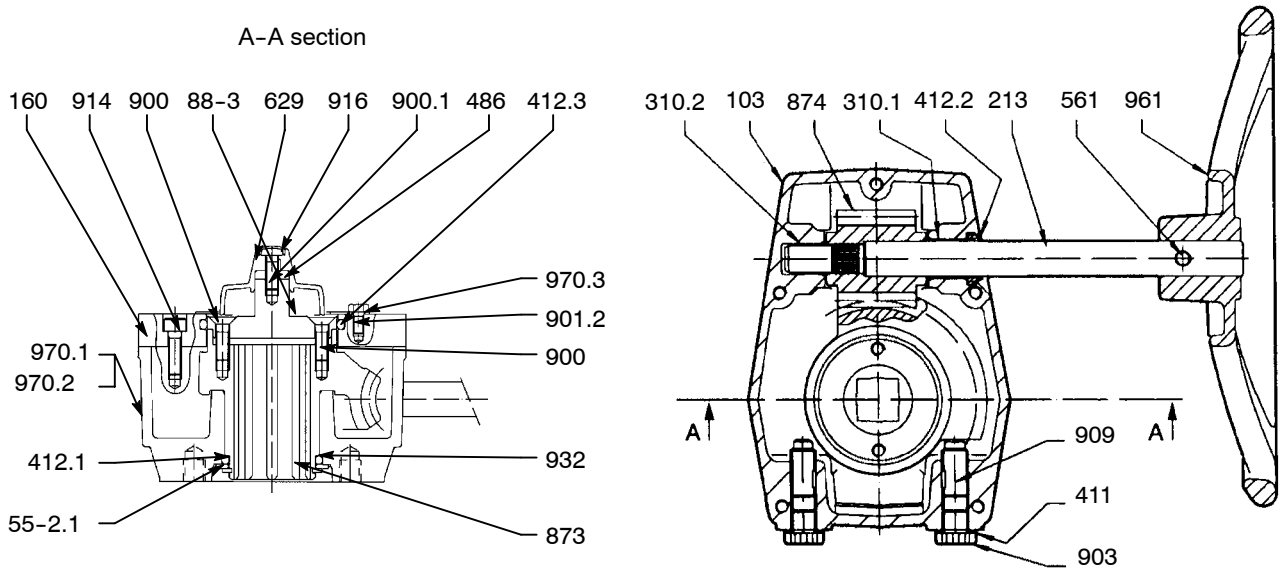


MR 25, 50, 100 and 200 actuators: Standard sealed version

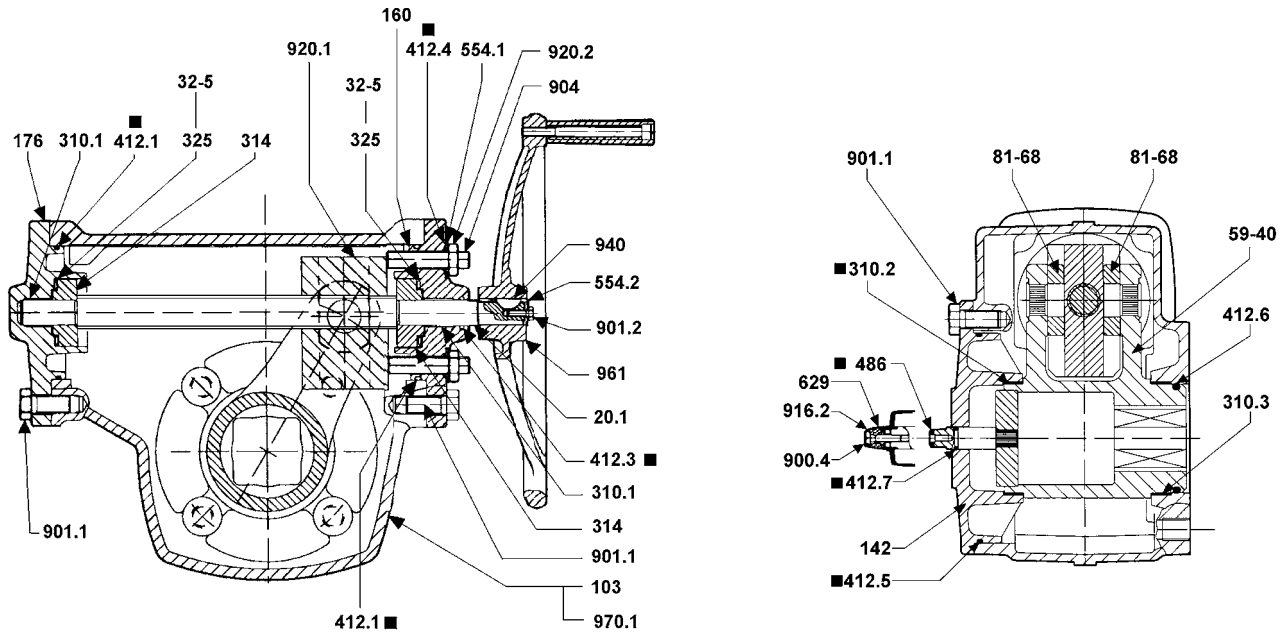
Construction – Handwheel control



Item	Designation	Materials
103	Gear casing	JS 1030 ductile iron
160	Cover	Fe 360 B steel
213	Drive shaft	Stainless steel 17.4 type
310.1	Thrust bearing	Steel + PTFE
310.2	Thrust bearing	Steel + PTFE
400	Flat gasket	Cork / Nitrile
410	Profile ring	Nitrile
411	Gasket	Compound
412.1	O-ring	Nitrile
412.2	O-ring	Nitrile
55-2.1	Friction washer	Treated steel
554.1	Plain washer	Stainless steel A4
561	Grooved pin	Stainless steel
629	Pointer	Polyamide 6.6
873	Worm wheel	JS 1030 ductile iron
874	Screw	Treated steel
88-3	Leading unit	Treated steel (MR 200 only)
900	Countersunk head screw	Treated steel (MR 200 only)
901.1	Hexagon head screw	Stainless steel A4
903	Threaded plug	Polyethylene or stainless steel A4
909	Adjusting screw	Treated steel
932	Spring retaining ring	Steel
961	Handwheel	JS 1030 ductile iron
970.1	Identity plate	Stainless steel
970.2	Assembly instructions	Stainless steel

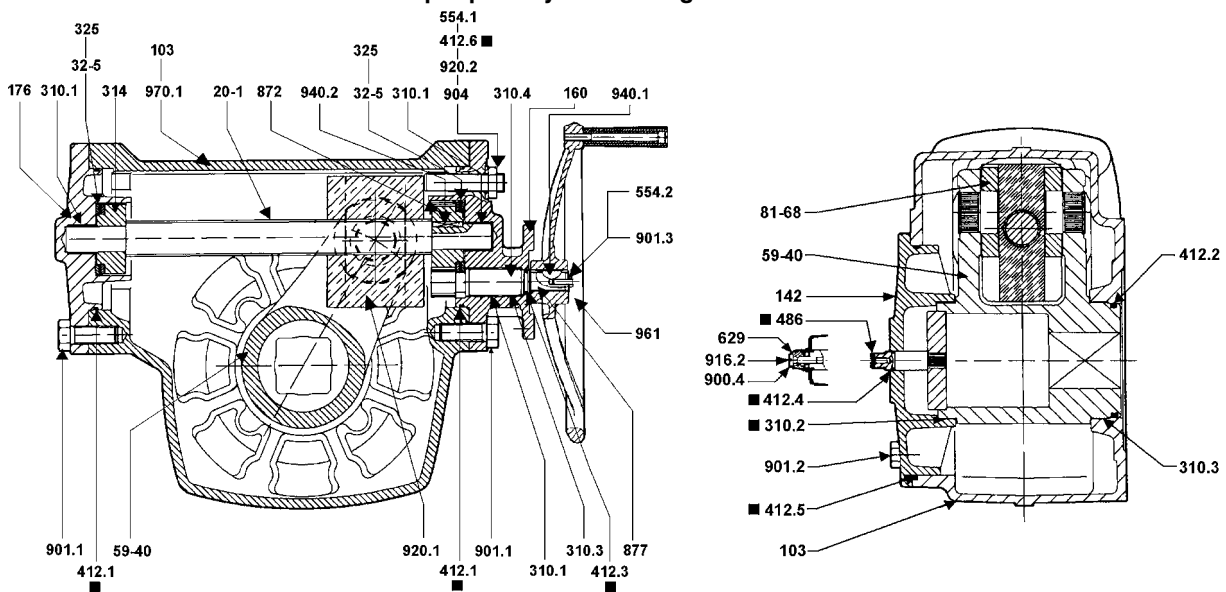
MR 25, 50, 100 and 200 actuators: Marine VDI/VDE version
Construction – Handwheel control


Item	Designation	Materials
103	Gear casing	JS 1030 ductile iron
160	Cover	Fe 360 B steel
213	Drive shaft	Stainless steel 17.4 type
310.1	Thrust bearing	Steel + PTFE
310.2	Thrust bearing	Steel + PTFE
411	Rondelle plate	Compound
412.1	O-ring	Nitrile
412.2	O-ring	Nitrile
412.3	O-ring	Nitrile
486	Ball	Stainless steel
55-2.1	Friction washer	Treated steel
561	Grooved pin	Stainless steel
629	Pointer	Polyamide 6.6
873	Worm wheel	JS 1030 ductile iron
874	Screw	Stainless steel
88-3	Leading unit	Stainless steel
900	Countersunk head screw	Stainless steel A4
900.1	Cheese head screw	Stainless steel A4
901.2	Hexagon head screw	Stainless steel A4
903	Threaded plug	Polyethylene or stainless steel A4
909	Adjusting screw	Treated steel
914	Hexagon socket head screw	Stainless steel A4
916	Plug	Polyethylene
932	Spring retaining ring	Stainless steel
961	Handwheel	JS 1030 ductile iron
970.1	Identity plate	Stainless steel
970.2	Assembly instructions	Stainless steel
970.3	Position plate	Stainless steel

MR 400, 600 and 1200 actuators
Construction – Handwheel control


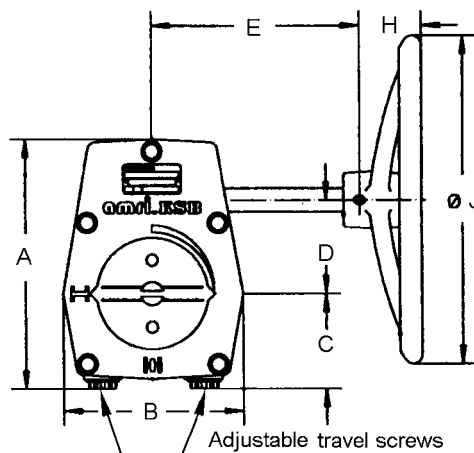
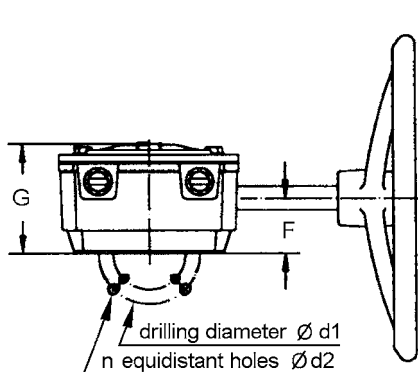
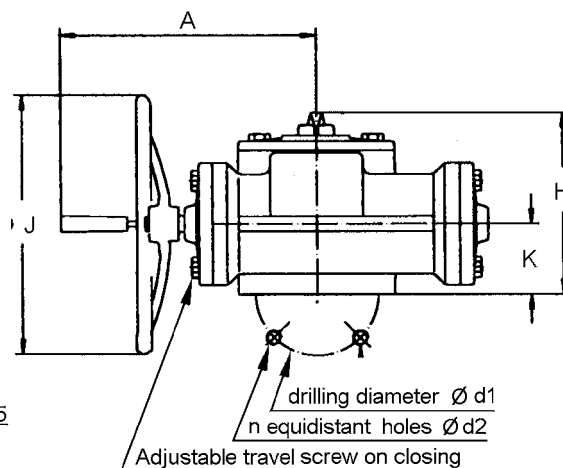
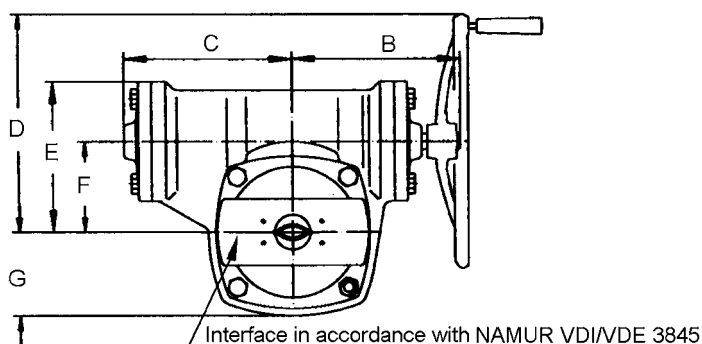
Item	Designation	Materials
103	Gear casing	JL 1040 cast iron or JS 1030 ductile iron
142	Cap	
160	Cover	
176	Bottom	
20-1	Operating screw	Phosphated / Nickel coated steel
310.1	Self-lubricating bearing	Steel + PTFE
310.2 ■	Self-lubricating bearing	Steel + PTFE
310.3	Self-lubricating bearing	Steel + PTFE
314	Thrust washer	Phosphated steel
325	Needles thrust	Treated steel
32-5	Counter plate	Treated steel
412.1 ■	O-ring	Nitrile
412.3 ■	O-ring	Nitrile
412.4 ■	O-ring	Nitrile
412.5 ■	O-ring	Nitrile
412.6	O-ring	Nitrile
412.7 ■	O-ring	Nitrile
486 ■	Ball	Stainless steel
554.1	Washer	Stainless steel A4
554.2	Washer	Stainless steel A4
59-40	Chuck + pointer shaft	JS 1030 ductile iron + Stainless steel
629	Pointer	Polyamide 6.6
81-68	Pressure pad	Nitrured steel
900.4	Screw	Stainless steel A4
901.1	Screw	Stainless steel A4
901.2	Screw	Stainless steel A4
904	Screw	Stainless steel A4
916.2	Plug	Polyamide 6.6
920.1	Operating nut	JS 1060 ductile iron
920.2	Hexagon nut	Stainless steel A4
940	Parallel key	Stainless steel
961	Handwheel	JS 1030 ductile iron for MR 400 / Steel for MR 600 and 1200
970.1	Identity plate	Adhesive polyester coated

■ Parts included in the spare parts kits

MR 800 and 1600 actuators
Construction – Handwheel control and input primary reduction gear


Item	Designation	Materials
103	Gear casing	JL 1040 cast iron or JS 1030 ductile iron
142	Cap	
160	Cover	
176	Bottom	
20-1	Operating screw	Phosphated / Nickel coated steel
310.1	Self-lubricating bearing	Steel + PTFE
310.2 ■	Self-lubricating bearing	Steel + PTFE
310.3	Self-lubricating bearing	Steel + PTFE
310.4	Bearing	Steel + PTFE
314	Thrust washer	Phosphated steel
325	Needles thrust	Treated steel
32-5	Counter plate	Treated steel
412.1 ■	O-ring	Nitrile
412.2	O-ring	Nitrile
412.3 ■	O-ring	Nitrile
412.4 ■	O-ring	Nitrile
412.5 ■	O-ring	Nitrile
412.6 ■	O-ring	Nitrile
486 ■	Ball	Stainless steel
554.1	Washer	Stainless steel A4
554.2	Washer	Stainless steel A4
59.40	Chuck + pointer shaft	JS 1030 ductile iron + stainless steel
629	Pointer	Polyamide 6.6
81.68	Pressure pad	Nitrured steel
872	Handwheel	Phosphated steel
877	Pinion	Phosphated, nickel coated and treated steel
900.4	Screw	Stainless steel A4
901.1	Screw	Stainless steel A4
901.2	Screw	Stainless steel A4
901.3	Screw	Stainless steel A4
904	Screw	Stainless steel A4
916.2	Plug	Polyamide 6.6
920.1	Operating nut	Bronze
920.2	Hexagon nut	Stainless steel A4
940.1	Woodruf key	Stainless steel
940.2	Parallel key	Steel
961	Handwheel	JS 1030 ductile iron
970.1	Identity plate	Adhesive polyester coated

■ Parts included in the spare kits

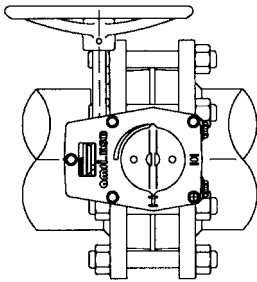
MR 25 to 1600 actuators
**Overall dimensions (mm) and weights (kg)
Operation by handwheel**
MR 25 to 200

MR 400 to 1600


Type	Operation by handwheel											ISO 5211 interface				Weight
	A	B	C	D	E	F	G		H	J	K	Ref	Ød1	Ød2	n	
							Sealed version	Marine version								
MR 25	172	124	66	64	142	38	62	92	42	225	–	F07 F10	70 102	M8 M10	4 4	7,0
MR 50	195	148	77	76	142	50	88	118	42	225	–	F10 F12	102 125	M10 M12	4 4	10,0
MR 100	218	172	88	88	190	62	100	130	43	350	–	F12	125	M12	4	15,0
MR 100	218	172	88	88	190	62	100	130	43	350	–	F14	140	M16	4	15,0
MR 200	266	240	108	117	227	73	123	153	43	350	–	F14	140	M16	4	24,0
MR 200	266	240	108	117	227	73	123	153	43	350	–	F16	165	M20	4	24,0
MR 400	332	230	229	300	208	125	115		246	350	95	F16	165	M20	4	58,0
MR 600	511	275	271	440	245	140	155		280	600	109	F16 F25	165 254	M20 M16	4 8	105,0
MR 800	394	295	271	315	245	140	155		280	350	109	F16 F25	165 254	M20 M16	4 8	110,0
MR 1200	680	320	337	580	338	180	180		336	800	131	F25 F30	254 298	M16 M20	8 8	175,0
MR 1600	446	342	337	352	338	180	180		336	350	131	F25 F30	254 298	M16 M20	8 8	183,0

Mounting on valves

MR 25 to 200

The actuator: one position only.



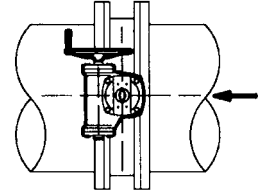
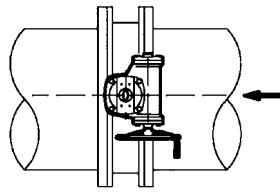
MR 400 to 1600

The actuator can be positioned at intervals of 90° (Standard arrangement = N / Position 1).

Arrangement N

Position 1

Position 2

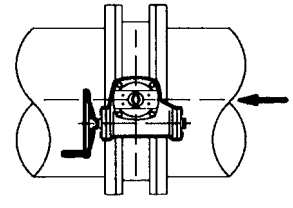
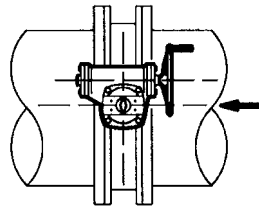


← Flow pressure direction in the valve (closed position)

Arrangement M

Position 1

Position 2



← Flow pressure direction in the valve (closed position)

These actuators are equipped with interchangeable inserts manufactured to the size and the form on different valve shaft for motorized operation (square end, flat end, key...).

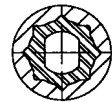
Worm wheel with driving allowed mounting of the insert at intervals of 45° for MR 25 to 200.

Chuck with square end driving allowed mounting of the insert at intervals of 90° for MR 400 to 1600.

Square end



Flat end



Key end



(Representation: Insert for MR 25 to 200)

Options

• Other available versions

Operation by cardan joint (Treated steel or stainless steel)

For remote control from a deck stand, the drive shaft is equipped with a treated steel cardan joint with a 35 mm square end.

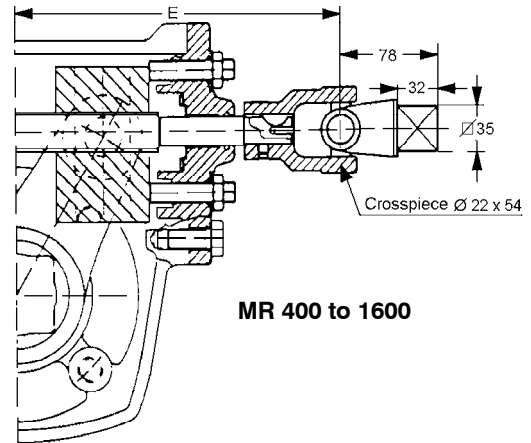
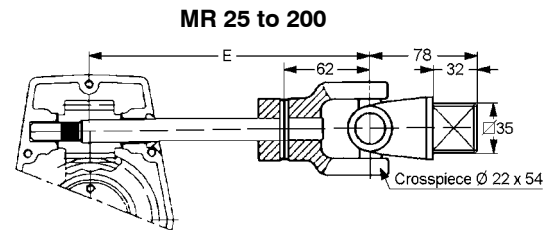
The cardan joint is coated with polyurethane paint, colour dark grey RAL 7016.

The extension rod, inside square section 35 mm, is supplied with the deck stand to the required length (maxi. 6m).

The alternative cardan joint in stainless steel is also available.

The Remote actuation via deck stand is defined page 14.

Type	E	Weight
MR 25	204	7,5
MR 50	204	10,0
MR 100	252	14,0
MR 200	290	23,0
MR 400	244	58,0
MR 600	285	105,0
MR 800	318	110,0
MR 1200	335	175,0
MR 1600	367	183,0



Operation by fountain key

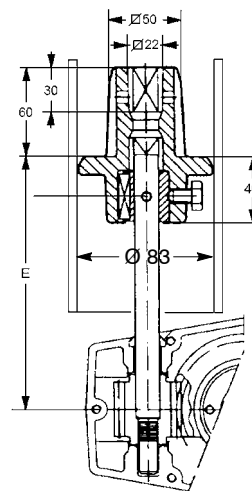
For drinking water in underground circuits, the drive shaft is fitted with a plug square 30 or 50 mm in JS 1030 ductile iron.

Actuators with plug square can be operated by:

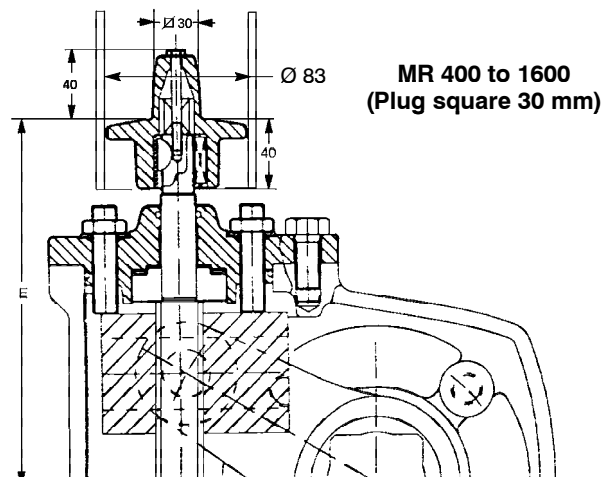
- handwheel dia. 350 mm in ductile iron (JS 1030) (only square 30 mm),
- fountain key,
- straight or cranked wrench in ductile iron (JS 1030), length 220 or 370 mm,
- extension rod, in steel, square section 22 mm, fitted at its end with a plug square 30 or 50 mm.

Note : the protective tube is not supplied by KSB-AMRI.

These Accessories for operation are defined page 15



MR 25 to 200
(Plug square 50 mm)



MR 400 to 1600
(Plug square 30 mm)

Type	Square 30		Square 50	
	E	Weight	E	Weight
MR 25	165	6,5	165	7,0
MR 50	165	9,0	165	9,5
MR 100	212	12,5	212	13,0
MR 200	250	22,0	250	23,0
MR 400	222	57,0	222	59,0
MR 600	325	103,0	330	107,0
MR 800	295	108,0	295	111,0
MR 1200	370	173,0	375	177,0
MR 1600	345	180,0	345	184,0

Options

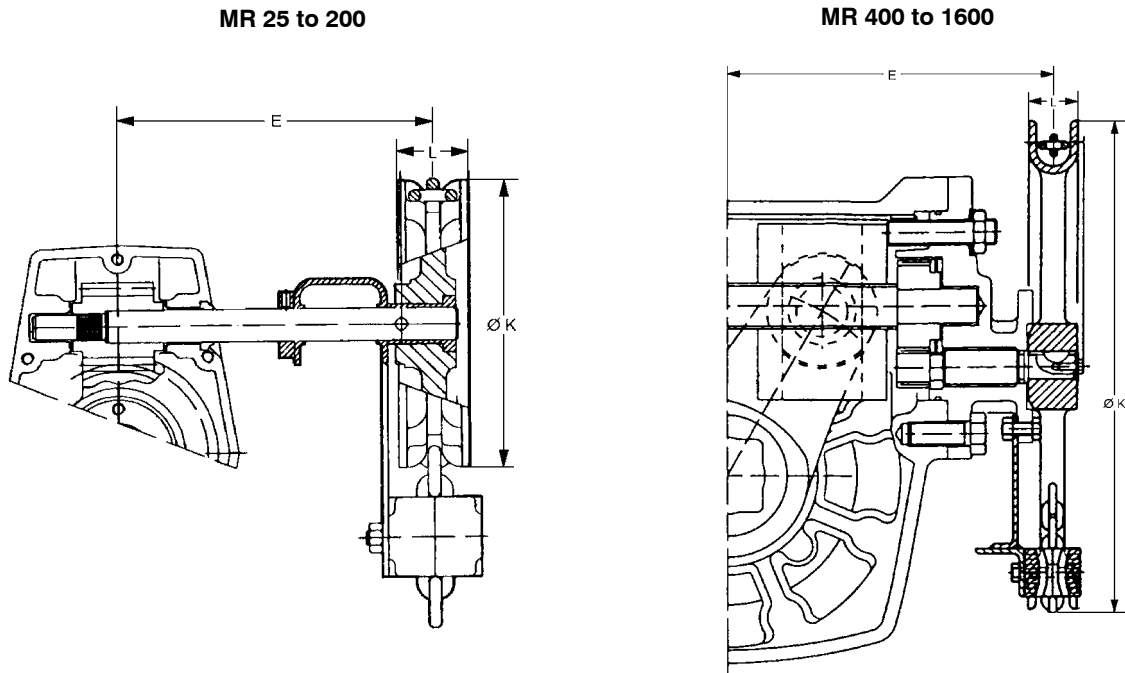
- Other available versions

Operation by chain wheel

When the pipework is at a higher level, or when the handwheel is not accessible, remote control can be made by a chain wheel fitted on the actuator shaft.

When ordering, the total length of pitched chain required should be specified (pitch 18 mm, wire dia. 6 mm, according to NF E 26-011 standard).

Chain in treated steel or in stainless steel.



* Weight of linear meter of pitched chain: 0,8 kg
Dimensions are given in mm and weights in kg.

Type	E	K	L	Weight
MR 25	160	200	37	10,5
MR 50	160	200	37	13,0
MR 100	207	300	40	19,0
MR 200	245	300	40	28,0
MR 400	202	400	40	70,0
MR 600				
MR 800	275	400	40	125,0
MR 1200				
MR 1600	325	400	40	200,0

Handwheel control with drive shaft extension: Consult us.

Options

• Other available versions

Handwheel control with extension

For some applications, the operating handwheel must be located further away from the reduction gear.

This version is obtained by means of a handwheel control extension:

- steel extension with protection by polyurethane paint RAL 7016, 80 mm thick as standard;
- drive shaft and attaching hardware of stainless steel;
- operating handwheel identical to the standard handwheel for the reduction gear.

The maximum length of the extension (dimension E) is 3 metres. Please consult us for greater lengths.

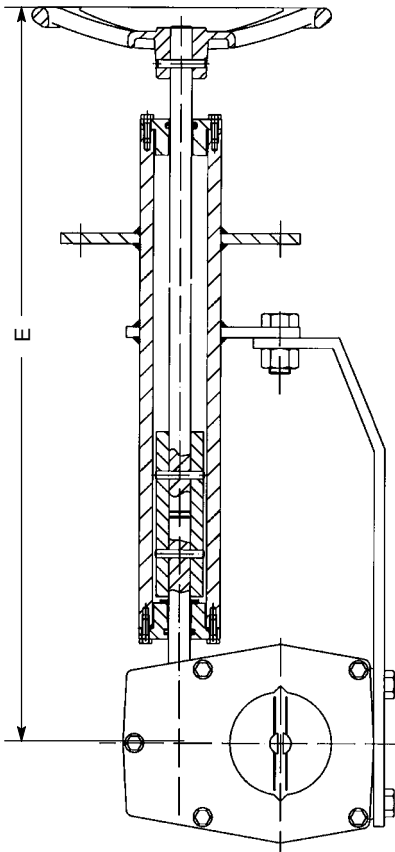
The minimum length is specified in the table below.

A support, to be installed on site by the customer, is strongly advisable in order to ensure the rigidity of the assembly.

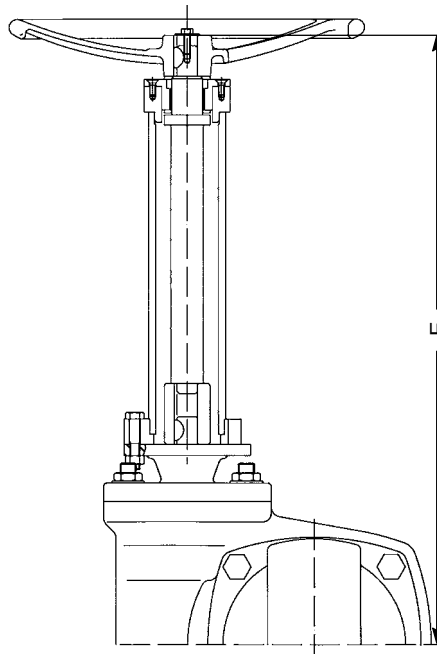
Recommended set-up for this version:

- valve fitted in horizontal position,
- MR with axis of operating shaft vertical,
- control extension with axis vertical.

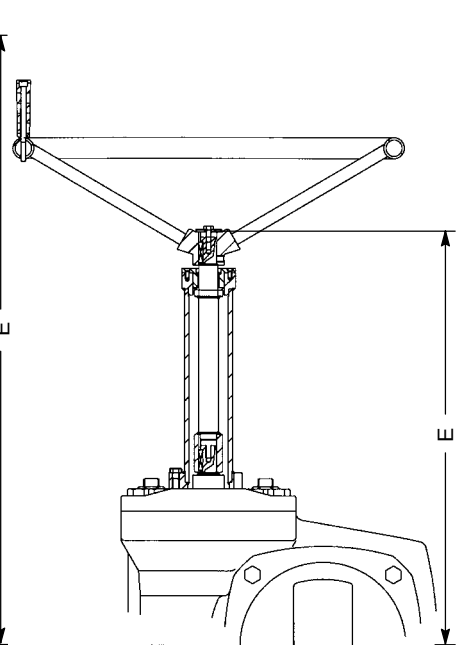
MR 25 to 200



MR 400, 800 and 1600



MR 600 to 1200



Type	E minimum mm
MR 25	500
MR 50	550
MR 100	600
MR 200	600
MR 400	500
MR 600	500
MR 800	500
MR 1200	600
MR 1600	600

Simpler solutions can be installed with the MR 25 to 200 series but this requires perfect guidance of the drive shaft on site. Please consult us.

Options

• Other available versions

Remote actuation via deck stand

In some installations it is necessary to be able to operate the valves from a different level.

In others, reasons of positioning or accessibility require the actuating device to be moved away from the valve.

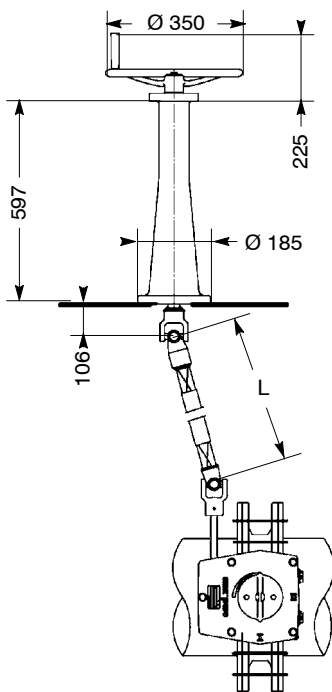
The deck stand makes it possible to remotely operate, from a platform, the valve located at a lower level.

Operation can be manual or electrical.

In such cases, the valve is equipped with a MR type manual actuator with output through cardan joint and transmission via a linkage assembly.

Misalignment between actuator output shaft and the deck stand shaft is catered for by provision of cardan joints.

However, the maximum angle between the linkage axis and the axis of the deck stand output shaft (or actuator shaft) must not exceed 30°.



Of cast construction, standard deck stands are hose and fine dust-proof (equivalent to IP 65).

- Deck stand made of nodular cast iron JS 1030,
- Handwheel made of nodular cast iron JS 1030,
- Torque-transmitting assembly made of steel,
- Cardan joint made of steel (standard) or stainless steel (option).

Dimension L must be at least equal to 150 mm and must not exceed 6 metres.

The basic deck stand model is not provided with a position indicator. This version is available as a design variant.

Protection by polyurethane coating, thickness 80 µm, anthracite grey RAL 7016.

This remote actuation feature is available for actuator types MR25, MR50, MR100, MR 200, MR400, MR800 and MR 1600. For types MR600 and MR1200 please consult us.

Variant : Electric actuation

The valve is actuated via an electric motor which replaces the handwheel.

This actuation method is only possible for types MR400, MR800 and MR1600, which can be fitted with a motor and feature a cardan joint output.

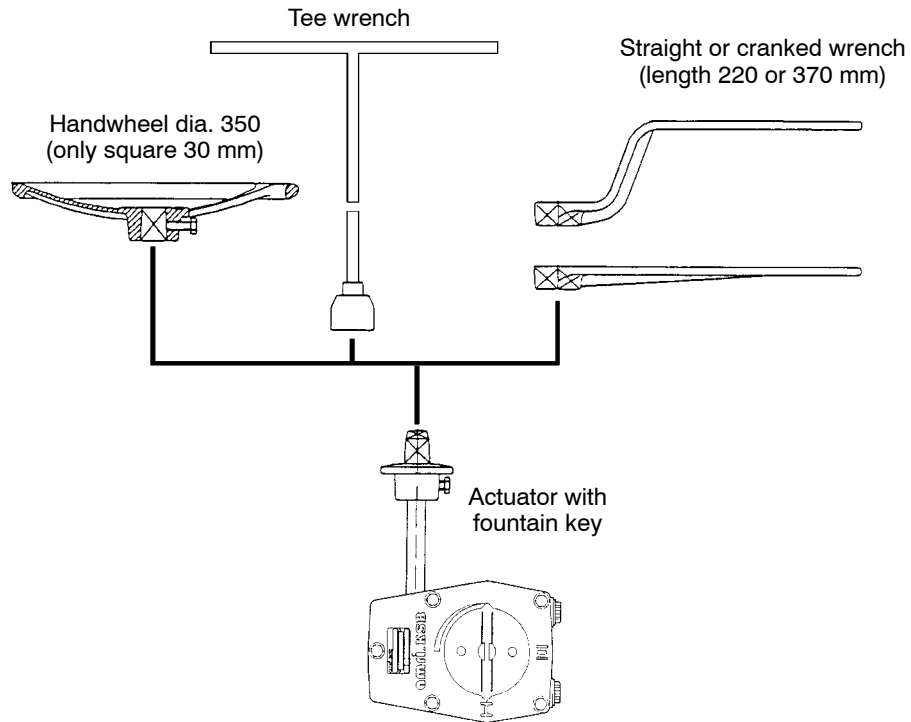
Options

- Control accessories for MR controlled by fountain key

Accessories for operation by fountain key

Fountain type actuating accessories have been designed for the operation of actuators with plug square 30 or 50 mm:

- cast iron handwheel, 350 diameter (30 square only),
- tee wrench,
- straight or cranked wrench, length 220 or 330 mm.

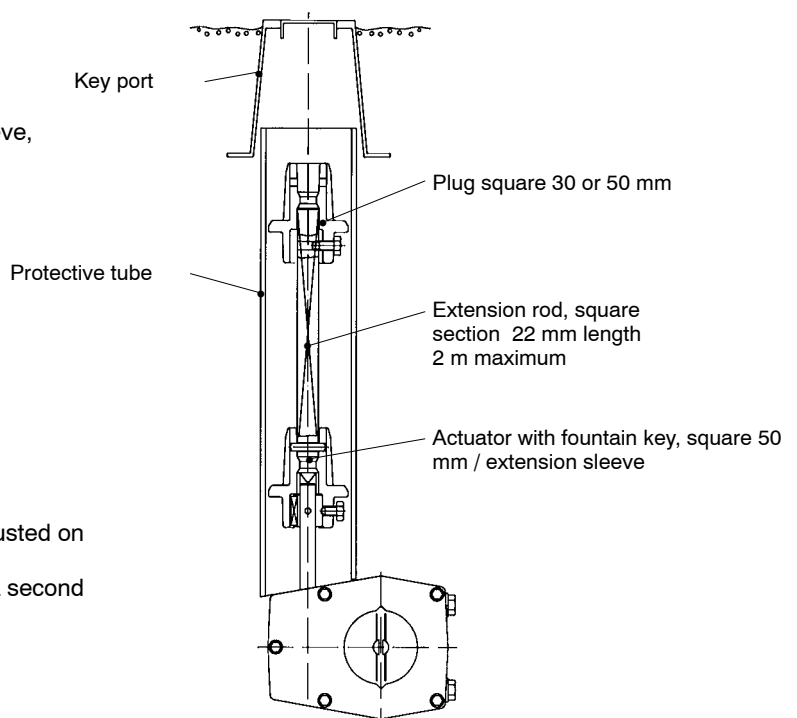


Remote actuation for buried MR version

For buried and remote applications, a control extension is available.

This extension comprises:

- MR with mandatorily, control by 50 mm fountain key providing function of extension sleeve,
- square extension rod 22 mm, standard length 2 m + 30 or 50 square fountain key,
- key port and protective PVC tube.



Note: The length of the extension rod is to be adjusted on site by sawing. Additional extension is possible by adding a second extension sleeve and a second rod.

Options

• Limit switch indication box

MR actuators can be equipped with a limit switchbox AMTROBOX.

This switchbox can house up to three switches (one switch on open position, one switch on closed position and one adjustable switch over the full travel).

The switches can be:

- standard or explosion-proof micro-switches,
- standard or inherently safe proximity detectors.

The connection is either made by cable gland or by a special connector.

In standard construction, the protection degree is IP 67.

AMTROBOX is available both in intrinsically safe and explosion-proof version

Note: MR 25 to 200 to be configured in marine version (see page 3).

MR 25 to 200



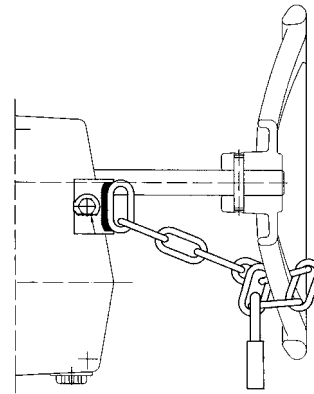
MR 400 to 1600



• Handwheel locking by chain and padlock

On request, MR actuators can be supplied with a fitting that allows handwheel locking by chain and padlock.

(Padlock not supplied by KSB-AMRI).



• Flag indication

MR 25 to 200

In fire protection systems, when the valve position needs to be seen from a distance, the standard pointer can be replaced by a flag dimension 100x100, colour: yellow RAL 1003 (other colours on request).

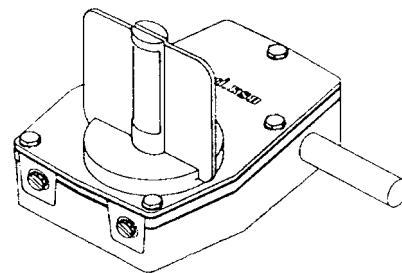
This specially designed actuator meet the requirements of APSAD (french insurance).

(MR 25 to 200 actuators associated with ISORIA butterfly valves).

MR 25 to 1600

red flag, dimensions 150 x 250 generally used for marine applications.

This flag can be adapted for the entire range.



• Motor operated actuators (MR 400, 800 and 1600 only)

It is possible, on request, to obtain an MR actuator for motorized operation by replacing the cast iron operating nut by one in bronze.

These actuators can be retrofitted for motorized operation (delivered with handwheel) or remote actuation with cardan joint output (remote actuation via deck stand with electric actuator).

