Automation

AMTROBOX R

Type Series Booklet

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Type Series Booklet AMTROBOX R

Contents

Automation

Robust Limit Switch Box

AMTROBOX R

Main applications

- Water
- Waste water
- Energy
- Industry
- Shipbuilding
- Oil and gas

Operating data

Table 1: Operating properties

Ambient characteristics	Value
Min. permissible temperature [°C]	≥ -45
Max. permissible temperature [°C]	≤ +80
Standard enclosure	IP68 to EN 60529 Submersible design (30 m, 72 h)
Electromagnetic compatibility	To European Electromagnetic Compatibility Directive 2014/30/EU
Vibrations	IEC 68-2-6 Test Fc

Design details

Design

- Open/closed position signalling via
  - Microswitches
  - Inductive proximity sensors
- Mounts directly on:
  - Quarter-turn actuators with standardised interface to VDI/VDE 3845
  - Pneumatic actuators of the ACTAIR NG and DYNACTAIR NG type series
  - HQ hydraulic actuators
  - MR gearboxes in VDI/VDE-compliant design
- Electrical connection is made via cable gland and screw terminal strip in the terminal compartment.

Variants

- Wide range of microswitches and proximity sensors:
  - Open/closed position signalling via standard microswitches or standard proximity sensors on printed circuit board: R1187
  - Open/closed position signalling via special microswitches or special proximity sensors on metal bracket: R1187
- Actual-position feedback via potentiometer or 4 - 20 mA signal
- Position indication by flag
- Submersible design (30 m)
- Heating resistor
- Intrinsically safe version Ex ia RA1188
- Field bus
- Angle sensor (optional)

Product benefits

- Robust construction for the toughest of requirements
- Switching cams for open/closed position signalling can be set without tools and facilitate commissioning.
- Cover screws provide easy access to limit switch box components
- Visual indication of valve position
- Cover gasket
- Corrosion-resistant due to cathodic E-coating and an additional coating in anthracite grey RAL 7016
- Electrical connection via metal or plastic cable gland
- Terminal strip in separately sealed housing
- Compact construction: mounts on VDI/VDE interface without a bracket
- O-rings between limit switch box and actuator
- Electrical components protected in a dedicated compartment

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Related documents

Table 2: Information/documents

Document	Reference number
Operating manual	-

This type series booklet is also to be used as a start-up guide, ref. 42 053 042.

Technical data

Technical specification

Table 3: Characteristics for environmental resistance

Environment	
Enclosure	Standard: IP68 (30 m, 72 hours); option: permanent IP68, 30 m to ABS SC180
Vibration fatigue limit	In accordance with "Test programme Lloyd's Register - vibration test 1" and IEC 60068-2-6 Test Fc. Frequency: 5 to 100 Hz. Displacement: +/- 1 mm. Acceleration: +/- 0.7 g.
Operating temperature	-20 °C to +65 °C or +70 °C (-4 °F to +149 °F or +158 °F)
Electromagnetic compatibility: - Generic standards - Test standards	 EN 61000-6-2, EN 61000-6-4 EN 55011, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6

Table 4: Technical data of housing

Housing	
Material	Lamellar graphite cast iron JL1040
Position indicator	Visual position indication by sight glass or flag
Coating	Cathodic E-coating (25 µm) + anthracite grey coating (125 µm)
Electrical connection	Cable gland M20x1.5 or M25x1.5, metal or plastic, for cable diameters of 6 to 18 mm

Open/closed position signalling by microswitches on printed circuit board - limit switch box R1187-1......

Open/closed position signalling by two microswitches: one for Open, one for Closed, changeover function. The tripping position of each microswitch can be set individually via an adjustable switching cam.

Table 5: Microswitch characteristics

Technical data of the microswitches			
Manufacturer:	Crouzet		
Material:	Housing	Polyester UL94V0	
	Pushbutton	Polyester	
	Contact	Ag/Ni, gold-plated	
	Diaphragm	Silicone	
Breaking capacity:	6 A at 24 V DC and 250 V AC		
Durability, service life:	Electrical	At I = 5 A	7 x 10^4 switching cycles
		At I = 1 A	3 x 10^5 switching cycles
		At I = 0.2 A	10^6 switching cycles
	Mechanical	2 x 10^6 switching cycles	
Vibration resistance:	IEC 60068-2-6 / 3 axes / 50 g from 10 to 500 Hz		
EMC:	EN 50081-2, EN 50082-2		
Electrical connection:	Soldered to the printed circuit board		
Enclosure:	IP 67		

Actuating torque to IEC 60947-5-1: 6000 operating cycles

Table 6: Alternating current characteristics

I (A)[1)]	Alternating current				
	24 V	48 V	110 to 127 V	220 to 240 V	380 to 440 V
AC-12	6	6	6	6	5
AC-13	2	1,5	1	1	0,5
AC-14	≤ 72 VA				
AC-15	2	1,5	1	1	0,5

Table 7: Direct current characteristics

I (A)[1)]	Direct current			
	24 V	48 V	110 to 127 V	220 to 240 V
DC-12	6	2	0,4	0,2
DC-13	3	1	0,2	0,1
DC-14	0,6	0,15	0,02	0,01

1) Max. permissible current in A

AC-12	Control of resistive loads and solid state loads with optocoupler isolation
AC-13	Control of static loads with transformer isolation
AC-14	Control of small electromagnetic loads of electromagnets (≤ 72 VA)
AC-15	Control of electromagnetic loads of electromagnets (≥ 72 VA)
DC-12	Control of resistive loads and solid state loads with optocoupler isolation
DC-13	Control of electromagnetic loads
DC-14	Control of electromagnetic loads with economy resistors in the electric circuit

This microswitch is designed for use in both low-amperage (1 mA, 4 V minimum) and medium-amperage (6 A maximum) switching circuits.

However, it must always only be used in a single type of switching circuit.

Open/closed position signalling by inductive proximity sensors on printed circuit board - limit switch box R1187-2......

Open/closed position signalling by two inductive proximity sensors: one for Open, one for Closed. The tripping position of each proximity sensor can be set individually via an adjustable switching cam.

Table 8: Sensor characteristics

Technical data of the sensors	
Manufacturer:	IFM
Material:	Housing made of polybutylene terephthalate
Power supply:	5 to 36 V DC
Max. output current:	200 mA
Min. output current:	4 mA
Max. voltage drop:	< 4.6 V
Leakage current:	< 0.8 mA
Switching frequency:	2 kHz
Operating status indication:	Yellow LED
Impact resistance:	5 g
Vibration resistance:	In accordance with "Test programme Lloyd's Register - vibration test 1" and IEC 60068-2-6 Test Fc. Frequency: 5 to 100 Hz. Displacement: +/- 1 mm. Acceleration: +/- 0.7 g.
EMC:	EN 50081-2, EN 50082-2
Electrical connection:	Soldered to the printed circuit board

Open/closed position signalling by microswitches or proximity sensors on metal bracket – limit switch box RA1187

For signalling open and closed positions the limit switch box can be equipped with various types of electrical microswitches or inductive proximity sensors on a metal bracket.

The following combinations are available:

- One microswitch or one proximity sensor for Open
- One microswitch or one proximity sensor for Closed
- One microswitch or one proximity sensor for Open and one microswitch or one proximity sensor for Closed

Table 9: Microswitch table

Brand	Type	Reference	Design / dimensions	Code
CROUZET	Electrical	83-186-069-FD0 + lever 170A R24	V4	RA 1187-A111....

Table 10: Inductive proximity sensor characteristics

Brand	Type	Reference	Design / dimensions	Code
BAUMER	PNP-NO	IFFK 10P11A11 - 3 cable terminals 4.8	V3	RA 1187-H311....
IFM EFFECTOR	PNP-NO	IS-3003-BPOG/IS 5031- 3-wire cable	V3	RA 1187-H211....
	PNP-NC	IS-3003-APOG/IS 5002- 3-wire cable	V3	RA 1187-H212....
	CC Quadronorm	IS-2002-FROG/IS 5026- 2-wire cable	V3	RA 1187-HA31....
	CC/CA	IN-2004-ABOA/IN0081 - 2-wire cable	40 x 26 x 12	RA 1187-JA31....
PEPPERL & FUCHS	CC-NO	NBN4-12GM40-ZO - 2-wire cable	M12	RA 1187-MA32....
	PNP-NC	NBB2-V3-E2-V5	V3	RA 1187-H312....
TELEMECANIQUE	CC-NO	XS512B1DAL2 - 2-wire cable	M12	RA 1187-MA31....
	CC-NO	XS518B1DAL12 - 2-wire cable	M18	RA 1187-PA31....

Technical data available on request.

Installation information

Commissioning/start-up

Warnings

Electrical cable:

- The electric cable is "CE" marked in accordance with European Directive 2004/108/EC.
- The supply voltage and values of the electrical signals must be verified prior to final connection.

The values specified in the present document must never be exceeded.

This limit switch box is electrical apparatus and, as such, may pose a hazard to persons and equipment.

Non-compliance with the specified limits values may result in damage.

AMTROBOX R limit switch boxes must neither be opened nor removed when energised.

When adjustments are made at the factory or on site, the unit consisting of the valve, actuator and limit switch box must be actuated from the fully open to the fully closed position.

This may entail the risk of injuries unless the minimum safety requirements are observed to prevent access to the gap between the valve disc and the seat.

Mounting on actuators

The limit switch box mounts on the actuator via a VDI/VDE 3845 interface.

Open the upper cover to access the four fastening screws.

The stem is actuated via the connection with the actuator pinion.

Setting the open/closed position indicator

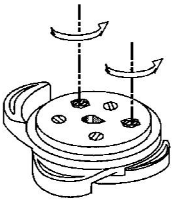
The proximity sensors or microswitches are factory-set.

No settings need to be made prior to installing the valve on site.

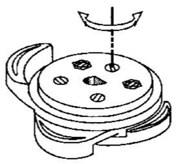
If, however, settings need to be made after maintenance has been carried out, proceed as follows:

- Undo the screws at the upper cover of AMTROBOX R with a screwdriver.
- Take the valve disc to a limit position (Open or Closed).
- Loosen the two metal screws by one turn.
- Set the tripping point of the proximity sensors or microswitches by turning the screw with the colour corresponding to that of the switching cam to be adjusted.
- Proceed likewise for the other limit position.
- Each switching cam is adjusted independently, i.e. adjustment of one switching cam does not affect the others.
- After adjustment has been completed, tighten the two metallic screws slightly to lock the adjusted position.
- Then tighten the screws at the upper housing cover with a screwdriver again.

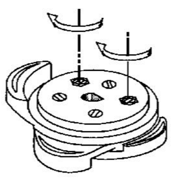
1 - Loosening the metallic screws



2 - Adjusting the switching cams



3 - Tightening the metallic screws



Setting the switching cams

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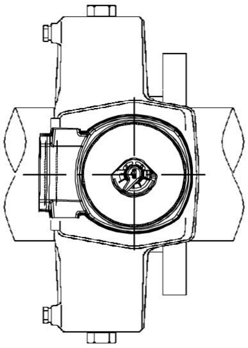
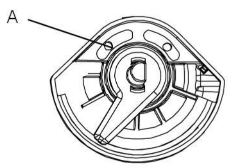
Setting the angle sensor

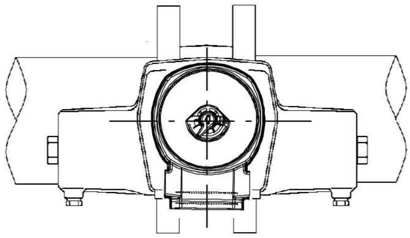
The angle sensor setting depends on the mounting type of the actuator in relation to the piping (mounting type "N" or "M"). Use a T20 Torx screwdriver to make this setting. See illustrations below.



Mounting type “N”



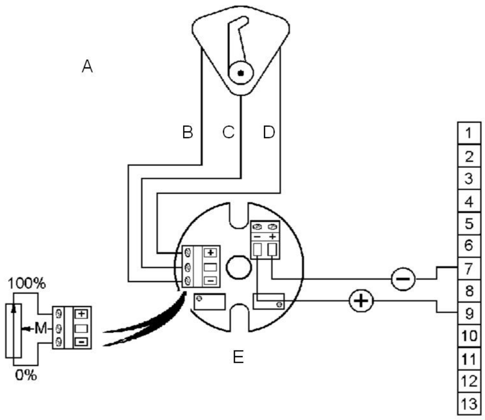
Angle sensor



Mounting type “M”

A: adjusting screw

Wiring of 4-20 mA signal - limit switch box RA1187



Internal wiring of the measurement transmitter

A: angle sensor
B: purple
C: green
D: orange
E: measurement transmitter

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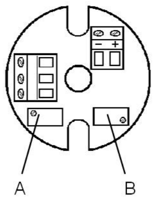
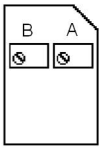
Setting the 4-20 mA signal

If AMTROBOX R is supplied mounted on the actuator, the requisite settings have been made at the factory.
No settings need to be made prior to installing the valve on site.
If, however, settings need to be made after maintenance has been carried out, proceed as follows:
- Undo the screws at the upper cover of AMTROBOX R with a screwdriver.
Two potentiometers enable two settings for zero point calibration (4 mA) and gain adjustment (20 mA).
- Tighten the screws at the upper cover again.



RA1187



R1187 / all options

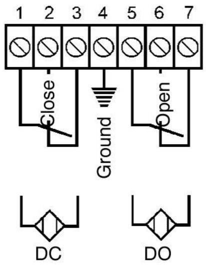
A: zero point calibration
B: gain adjustment

Electrical connection

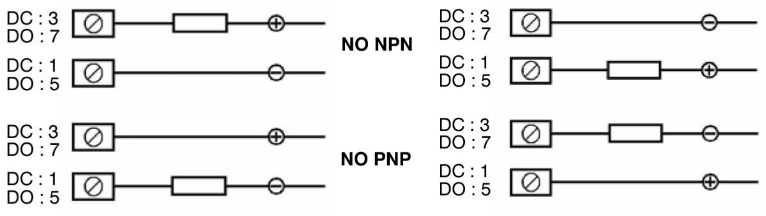
The limit switch box can be supplied with a plug or with a cable gland.
The standard model is equipped with an M20 x 1.5 or M25 x 1.5 cable gland made of metal or plastic.
Clamping capacity: cable OD 6 - 18 mm. Other values are possible.
Connection via screw terminal strip, clamping capacity 0.08 to 1.5 mm².
Undo the screws at the terminal compartment cover and remove the cover, exposing the terminal strip.
Tightness of the limit switch box depends on the care taken in selecting the cable(s) and in tightening the cable gland.
Tighten the screws to fit the terminal compartment cover again.

Terminal wiring diagrams

R1189 - microswitches or proximity sensors

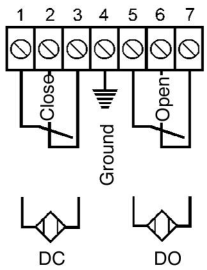


Terminal wiring diagram

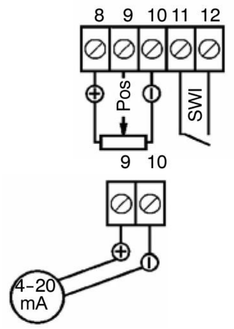


Proximity sensors to be connected by the customer.

R1187 - all options

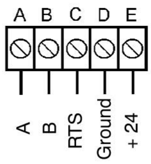


Terminal wiring diagram

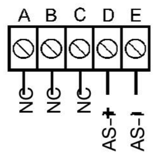


Wiring diagram for auxiliary terminals

Profibus DP

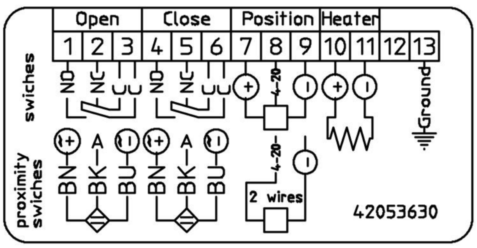


AS-i

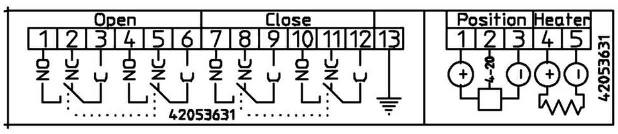


Terminal wiring diagram for Profibus DP and AS-i

RA1187



Terminal wiring diagram for microswitches: one for Open and one for Closed



Terminal wiring diagram for microswitches: two for Open and two for Closed

Installation instructions for cable gland type T3CD3

Before starting with the installation, make sure that safe working practices are adopted and the installation is carried out properly.

All staff shall be responsible for following the health and safety requirements and must be aware of the risks involved.

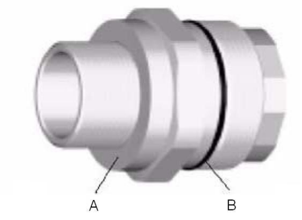
This cable gland in types of protection EEx d IIC and EEx e II, category 2 IIGD, is approved for use in zones 1, 21, 2 and 22. It can be used for braided cables, cables with single-wire armour or tape armour and for shielded cables. A flamepath is required at the inner sheath of the cable. A sealing element on the outer sheath has to protect the metal braiding.

The following instructions must be read carefully before starting installation.

This cable gland is composed of four main parts (see illustration below).

Inside the cable gland there are two loose items: the reversible armour cone and the clamping ring, which facilitate dismantling.

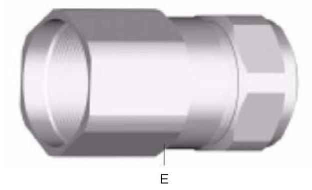
The cable gland does not need to be dismantled further than illustrated below.



Assembly A

Part 4

Part 5



Assembly B

Symbols key

A: cable gland housing

B: joint ring

C: reversible armour cone

D: reversible clamping ring for metal braiding

E: cable gland housing

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Installation instructions

1. The cable diameter must be carefully selected to match the clamping capacity of the cable gland. (See following page.)

2. Dismantle the cable gland into sub-assemblies A and B.
Please note that parts 4 and 5 are removable (see the previous illustration).

3. Determine the length of the cable insulation to be stripped (distance between the cable gland base and the terminal strip of the limit switch box). Strip back the outer sheath and (if applicable) the metal braiding over this length.
N.B.: Take care not to damage the inner sheath of the cable when cutting the metal braiding.
Expose enough of the metal braiding to establish contact with the reversible armour cone (part 4, see Fig. 2).
N.B.: The reversible armour cone can be used for different types of shielded cables (braided cables, shielded single-wire cables, cables with tape armour). The orientation of the cone depends on the type of shielding (braided or tape) and is indicated on the cone.
Marking:
- The smooth end of the cone is used for single-braided cables (W).
- The grooved end of the cone is used for double-braided and tape-armour cables (X, Y, Z).

4. Thread the cable gland housing (assembly A) onto the M20/M25 reducer, then screw this assembly into the limit switch box using a suitable spanner.

5. Guide the cable first into assembly B (from the nut end) and then into the clamping ring ⑤.

6. Fit the reversible armour cone ④ (orientation depending on the cable type), clamping the metal braiding or tape armour between the cone and the clamping ring. Then guide it into the compensating sleeve ③. Finally, guide the cable into assembly A. See Fig. 3.

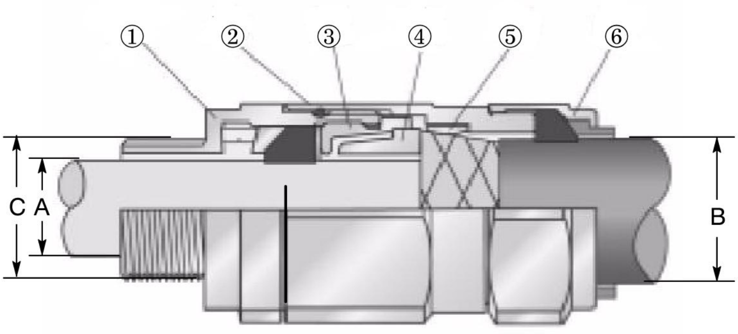
7. Screw the compensating sleeve ③ into the cable gland housing until contact is established between these two parts and cannot be undone. Contact between the braiding and the cone has to be maintained.

8. To avoid stresses on the thread of the cable gland housing, hold the cable gland with a spanner, then tighten assembly B using a second spanner until the two parts are metal-to-metal and cannot be tightened further. See Figs. 4 and 5.

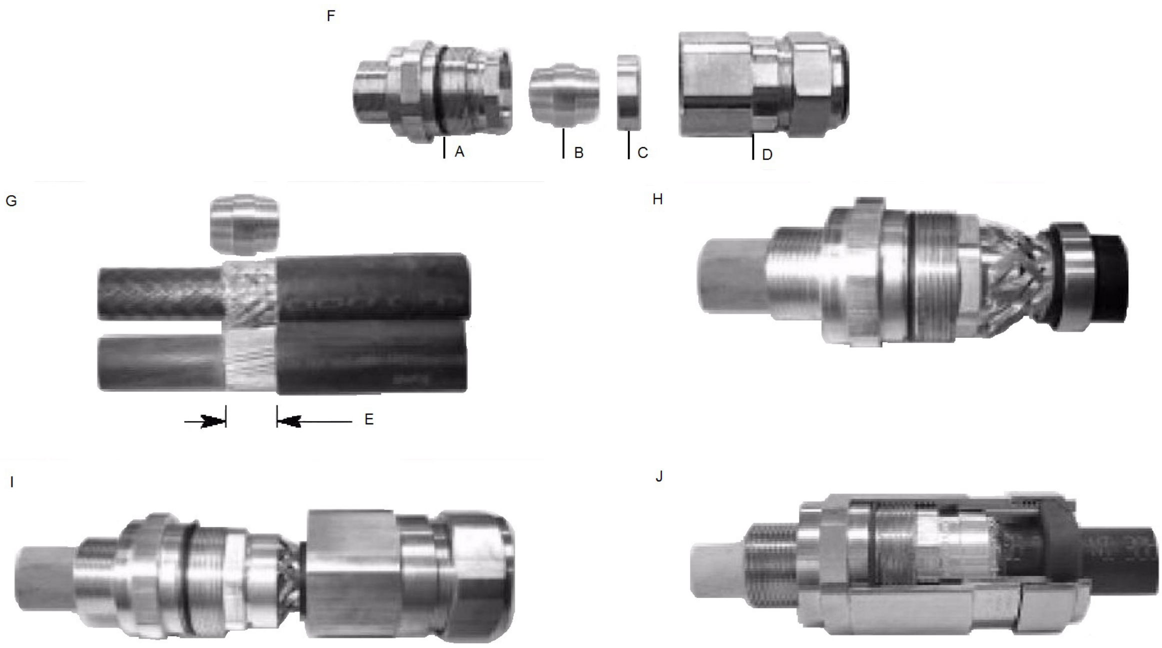
9. Establish tightness by re-tightening sealing nut 6 of assembly B. Fig. 5 shows a complete cable gland.

Removing or replacing the cable

1. If the cable has to be replaced, carry out steps 1 to 9 in reverse order, omitting step 4.
2. Unscrew assembly A from assembly B. Loosen compensating sleeve ③ until the cable can be pulled out of assembly A.
3. Prepare the new cable (see step 3 on the previous page) to replace the old cable.
4. Carry out steps 4 to 9 (see previous page).



Cable gland, type T3CDS



Steps for removing and replacing the cable

Symbols key

A: Assembly A
B: Assembly B
C: Part 4
D: Part 5
E: Length L
F: Illustration 1
G: Illustration 2
H: Illustration 3
I: Illustration 4
J: Illustration 5

Table 11: Cable gland characteristics

Cable gland	Thread diameter at entry C	Diameter A: inner sheath		Diameter B: outer sheath		Length L
	Metric	Min.	Max.	Min.	Max.	
20/16	M20	3.1	8.6	6	13.4	12

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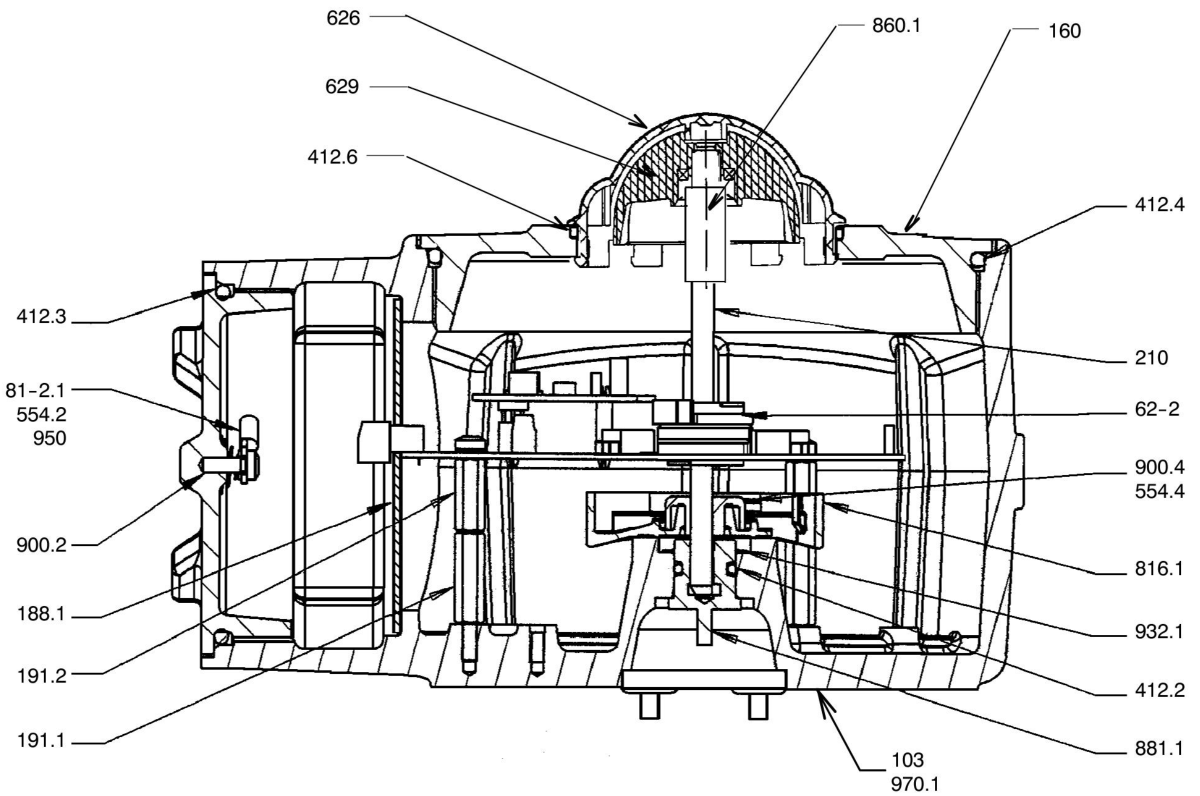
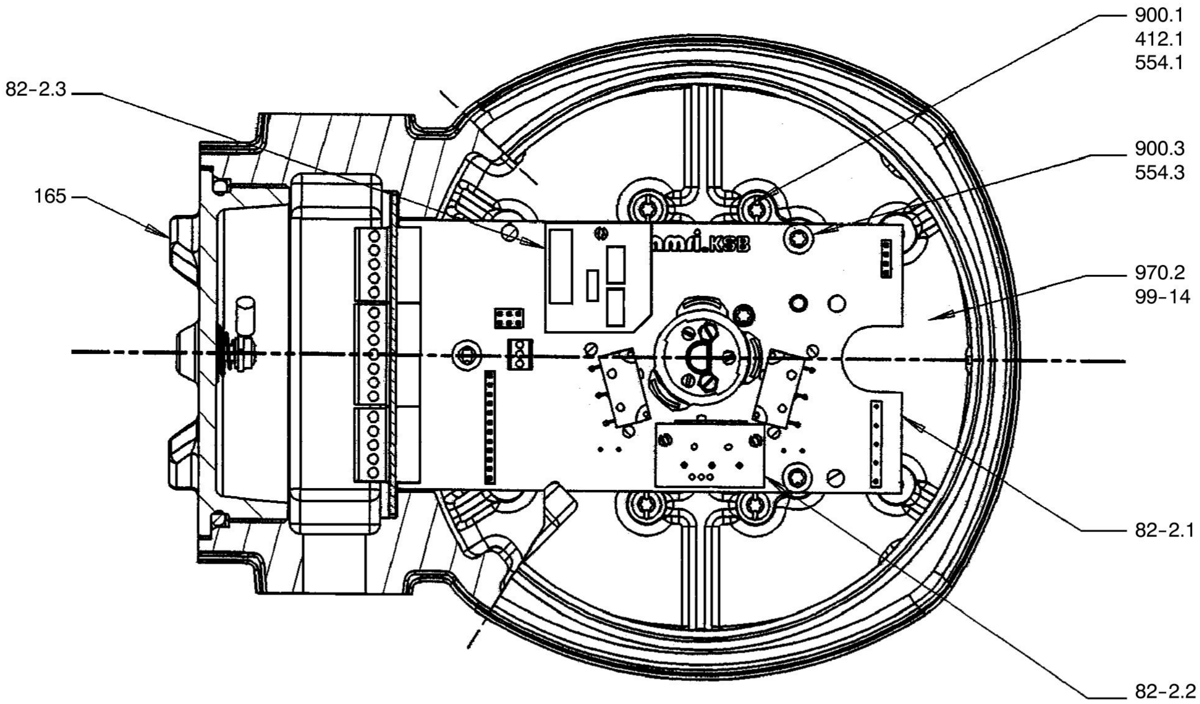
Materials





AMTROBOX R

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Table 12: List of components

Part No.	Description	Materials
103	Gear housing	Lamellar graphite cast iron JL1040
160	Upper cover	Lamellar graphite cast iron JL1040
165	Terminal compartment cover	Lamellar graphite cast iron JL1040
188.1	Mounting plate	Steel
191.1	Fastening element for printed circuit board	Nickel-plated brass
191.2	Fastening element for printed circuit board	Nickel-plated brass
210	Actuating shaft	Stainless steel, type 316L
412.1	O-ring	Nitrile
412.2	O-ring	Nitrile
412.3	O-ring	Nitrile
412.4	O-ring	Nitrile
412.7	O-ring	Nitrile
554.1	Washer, flat	Stainless steel
554.2	Washer, flat	Stainless steel
554.3	Washer, flat	Stainless steel
554.4	Serrated lock washer	Steel
62-2	Switching cams assembly	Acetal
626	Sight glass	Polycarbonate, transparent
629	Position indicator	Polyamide 6-6
81-2.1	Earth conductor assembly	Copper + PVC
816.1	Angle sensor	Acetal
82-2.1	Printed circuit board with two microswitches or two proximity sensors	
82-2.2	Printed circuit board with microswitch for intermediate position (optional)	
82-2.3	Printed circuit board for actual-position feedback	
860.1	Coupling sleeve	Stainless steel
881.1	Hub	Brass
900.1	Hexagon socket head cap screw	Stainless steel
900.2	Self-drilling screw	Stainless steel
900.3	Hexagon socket head cap screw	Stainless steel
900.4	Hexagon socket head cap screw	Steel
932.1	Circlip	Steel
950	Spring, conical	Stainless steel
970.1	Name plate	Polyester
970.2	Operating manual	Paper
99-14	Desiccant	

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Variants

Microswitch for intermediate position - R1187-1......

A third microswitch identical to the other two can be mounted on the printed circuit board; it can be used either as back-up for one of the Open/Closed microswitches or set to any valve position (between 0° and 90°).

Heating resistor - RA 1189

This option enables continuous heating of the housing interior to prevent condensation in regions where condensation is likely to occur (tropical climate, high humidity, etc).

Two different kits are available:

Table 13: Technical data of heating resistor

Voltage	Regulated temperature	Power input	Reference
12 - 24 V DC	40° C	10 W	42095198
110 - 230 V AC	50° C	10 W	42095199

The two power supply wires are connected to the non-polarised resistor via cable glands.

Actual-position feedback 0° to 90° by angle sensor

The limit switch box can be equipped with an angle sensor for actual-position feedback.

The disc position is transmitted throughout the entire range of travel by an angle sensor of 0 to 4.7 Ohm.

Using a potentiometer for transmitting a voltage signal will expose the user to electromagnetic radiation, particularly if signals are transmitted over great distances or in heavily polluted environments.

To minimise electromagnetic influences, a 4 - 20 mA signal should always be preferred (see below).

Table 14: Technical data of the angle sensor

Operating properties	Minimum	Nominal	Maximum	Units
Mechanical travel	80	90	105	Degrees
Resistance amplitude	3.58	4.03	4.7	kOhm
Maximum current	-	-	1	mA
Mechanical and electrical durability	-	-	> 5.10^6	Travel Open/Closed

Other values are possible: 1 kOhm, 2.2 kOhm and 4.7 kOhm.

Please contact KSB.

Actual-position feedback by 4 - 20 mA signal

A measurement transmitter can be used in conjunction with the angle sensor for transmitting the measured values as calibrated 4 - 20 mA signals. This will ensure good interference immunity.

The measurement transmitter is either

- active and generates the 4 - 20 mA signal. Required power supply: 24 V DC (3-wire system) - R 1187, or
- passive and changes the current intensity of the signal as a function of the valve position measured (2-wire system) – R1187 and RA1187.

Table 15: Technical data of actual-position feedback by active 4 - 20 mA signal (3-wire system) - R1187

Parameter	Minimum	Nominal	Maximum	Unit
Power supply	18	24	30	V DC
Output signal	0.6	-	21	mA
Resistance	0	-	550	Ohm
Zero point calibration (4 mA)	0.6	4	5	mA
Gain adjustment (20 mA)	12	20	21	mA
Temperature range	-20	-	+70	°C
Temperature influence (-20 to +70 °C)	-	+/- 0.12	+/- 0.28	% FS
Hysteresis and control dead band	-	+/- 0.05	+/- 0.2	% FS
Linearity	-	+/- 0.05	+/- 0.2	% FS

Table 16: Technical data of actual-position feedback by passive 4 - 20 mA signal (2-wire system) - R1187

Parameter	Minimum	Nominal	Maximum	Unit
Power supply	7.5	21.5	36	V DC
Output signal	3.6	-	28	mA
Resistance [(V_{supply} - 7.5 V)/0.2 A]	0	700	1425	Ohm
Zero point calibration (4 mA)	2	4	11	mA
Gain adjustment (20 mA)	16	20	26	mA
Temperature range	-20	-	+70	°C
Temperature influence (-20 to +70 °C)	-	+/- 0.12	+/- 0.28	% FS
Hysteresis and control dead band	-	+/- 0.05	+/- 0.2	% FS
Linearity	-	+/- 0.05	+/- 0.2	% FS

Table 17: Technical data of actual-position feedback by passive 4 - 20 mA signal (2-wire system) - RA1187

Parameter	Minimum	Nominal	Maximum	Unit
Power supply	10	24	30	V DC
Output signal	3.8	-	22	mA
Resistance	0	700	1050	Ohm
Zero point calibration (4 mA)	3.8	4	4.2	mA
Gain adjustment (20 mA)	18	20	22	mA
Temperature range	-20	-	+65	°C
Temperature influence (-20 to +70 °C)	-	+/- 0.15	-	% FS
Hysteresis and control dead band	-	+/- 0.15	-	% FS
Linearity	-	+/- 1	-	% FS

Table 18: Wiring errors of limit switch box or angle sensor

Actual-position feedback active (3-wire system)		Actual-position feedback passive (2-wire system)			
R1187		R1187		RA1187	
Wiring error		**Angle sensor error**		**Measurement transmitter response**	
Wire **+** of the sensor not connected	2.8 mA	Wire 1 (-) not connected	I output = 26 mA	Wire 1 not connected	I output = 20 mA
Wire **-** of the sensor not connected	23 mA	Wire 2 (**M**) not connected	I output = 1.7 mA	Wire 2 not connected	I output = 25 mA
Wire **M** of the sensor not connected	3.15 mA	Wire 3 (+) not connected	I output = 1.2 mA	Wire 3 not connected	I output <= 4 mA
Potentiometer not connected	2.8 mA			Potentiometer not connected	I output = 25 mA

Field bus connection - R1187

The limit switch box can be connected to a field bus.

The resulting reduction both in cable length and in the number of cable entries and connection points required enables substantial savings in severe environments.

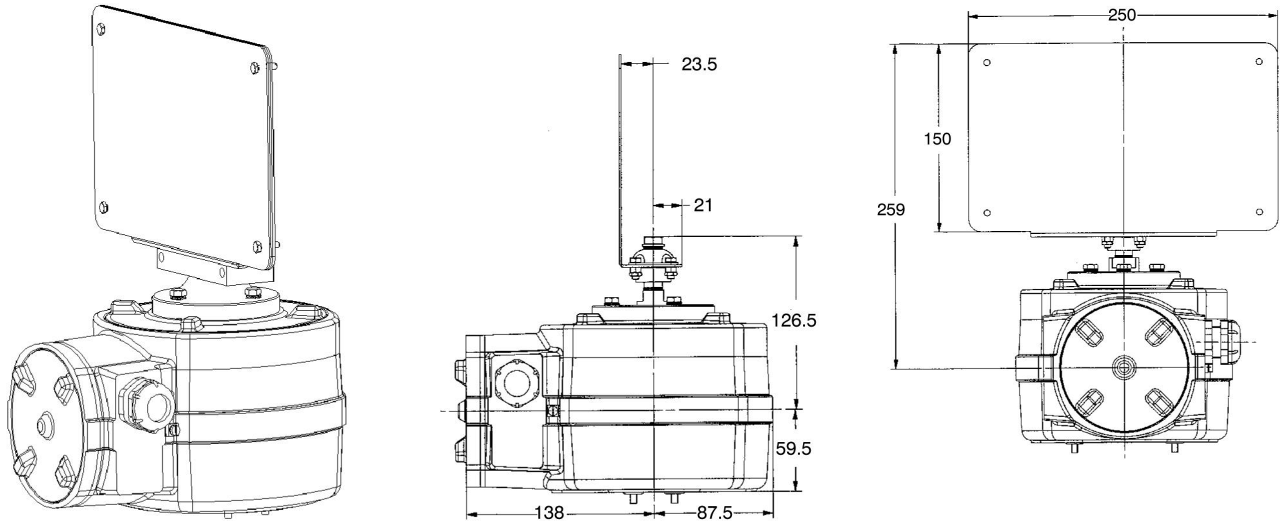
Various communication protocols (AS-i, Profibus DP) can be selected, enabling digitalisation of microswitch information.

Table 19: Technical data of field buses

Protocol	AS-i v3.0	Profibus DP		
Topology	Bus, tree or ring	Bus, tree with repeater option		
Medium	2-wire cable, power supply AS-i	Shielded 4-wire cable: twisted in pairs, power supply 24 V DC		
Network speed and length	Cycle time of 10 msec Length of 100 to 300 m with repeater	Speed (kbits/s)	Length (without repeater)	Length (with repeater)
		9,6	1200 m	10 km
Profile/version	- S-B.A.E / version 3.0	19,2	1200 m	10 km
	- S-30F / version 3.0	45,45	1200 m	10 km
		93,75	1200 m	10 km
		187,5	1000 m	6 km
		500	400 m	1 km
		1500	200 m	600 m
Max. number of stations	- S-B.A.E: 62 slaves - S-3.0: 31 slaves	32 per segment - max. 126		
Bus access	Polling	Master/slave polling: token between masters		
Addressing	EEPROM	Encoding wheel		
Power input	3 W (max.)	3 W (max.)		
Power supply	26.5 to 31.5 V DC	24 V DC + 15%		

Visual indication by flag – all limit switch boxes

AMTROBOX R limit switch boxes can optionally be equipped with a flag (melamine resin plate) indicating the valve disc's position at a distance.



Visual indication by flag

Submersible design – all Amtrobox R versions

The enclosure of the submersible design is IP68, 30 m, 72 hours to ABS SC180.
This design features a special cable gland and a cover without visual position indicator.
Cable diameter (outer sheath): 6 to 13.4 mm
Cable diameter (inner sheath): 3.1 to 8.6 mm
Metal braiding for electrical continuity and mechanical retention

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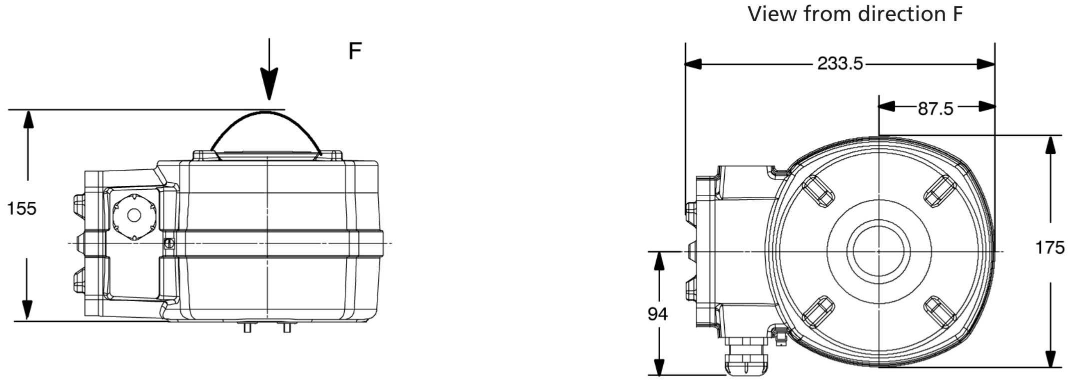
Dimensions and weights



AMTROBOX R dimensions

AMTROBOX R weight = 8.6 kg

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