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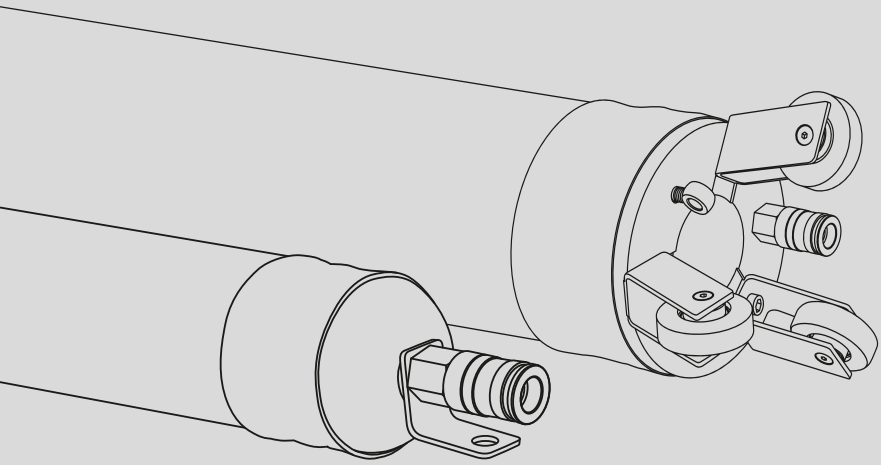
Rehabilitation Packer
Type RFA / RFF

» OPERATING INSTRUCTIONS



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Rehabilitation Packers
Type RFA / RFF

Read and observe the operating and safety instructions before using the camera.

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1. Definitions

The following symbols are used in this operating manual:

Caution.
Safety information: Non-observance may result in damages of the product or property close to it.

Warning.
Identifies a dangerous situation. If not avoided, it may cause serious injuries or death.

Note
Additional information about the operation of the device.

2. Safety Instructions

2.1. General Information

Study and observe these operating instructions und der safety instructions to enable a safe and trouble-free operation of the Ehle-HD rehabilitation units.
In addition, observe the applicable regulations on occupational health and safety and prevention as well as the statutory regulations of the prevention of accidents and the good engineering practice. The operating instructions presented are considered part of the product and must be retained/ available for the entire service life of the product. If you hand over the product to another owner, hand over the operating instructions to the successor as well.

- Check completeness and safety of the packer and the accessories before each use.
- Select the correct packer size suitable for the tube diameter.
- Use only original Ehle-HD accessories, e.g. control valves, hoses and fittings.
- Wear the personal protection equipment specified for the operation - workwear, gloves, helmet, face protection and/or googles.
- Adjust the wheels of the carriage to the tube diameter.
- Protect the packer against chemicals.
- The packer working area around the tube shall be free of deposits, foreign objects, and contamination, e. g. pieces of broken glass or sharp objects.
- Check the correct packer position inside the tube.
- Ensure that the packer's operating pressure does not exceed the limit specified by the manufacturer (maximum 1.5 and/or 2.5 bar).

2.2. Hazards identification

Neither modifications nor alterations of packers, charging units, and charging hoses are admitted. The rehabilitation unit shall only be used with original charging units and charging hoses. If you use accessories of unknown origin, technical safety may be affected. Rehabilitation units are made of a highly elastic material. If they are expanded beyond their maximum admissible limit, they may burst. **No people shall stay in the working area during the rehabilitation works.**Ensure that nobody will stay inside the stack or in front of the tube after the packer is installed and the charging, rehabilitation and depressurizing operations are performed.

2.3. Warning.

If not inserted into tubes, rehabilitation units shall only be charged with a maximum of 0.3 bar for visual inspection. All control valves are equipped with a safety valve to limit the packer's maximum operating pressure. If the maximum operating pressure of 2.5 bar / 1.5 bar is reached, the safety valve will be activated. The opening and closing tolerance of the safety valves shall not exceed ± 10 %. Do not modify the pressure adjusted. Do not exceed the admissible inlet pressure at the control valves (see specification of the packer).

3. Intended use

These operating instructions relate to the following rehabilitation units:

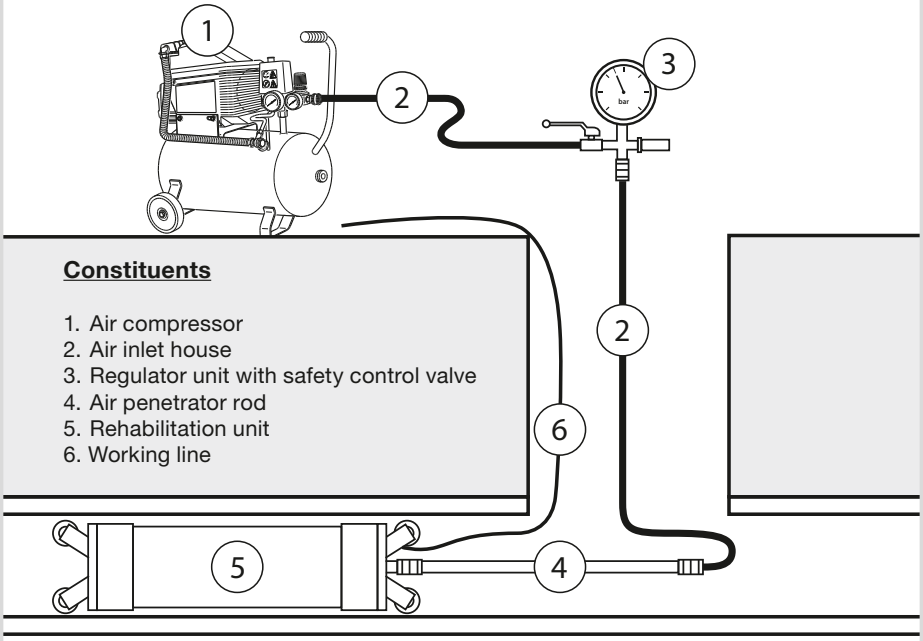
- house connection packers - RFA
- Flex Packers including carriage - RFB / RFF
- Flex Packers with bypass - RFB / RFF

The Ehle-HD rehabilitation packers and Flex Packers were designed for use in sewers rehabilitation. They are used to repair local damages of sewers and pipes.
They are suitable to repair holes and cracks using liners or laminates. We manufacture rehabilitation units up to 10 m long which are suitable for tubes between DN 50 and DN 700.All packers are prepared and checked on our premises.

Any other or additional use is considered as not intended. A use not intended of our rehabilitation units includes:

- Unprofessional use, operation or maintenance of rehabilitation units.
- Use of rehabilitation units with defective safety devices or charging units not correctly installed or not properly working.
- Non-observance of the operating instructions related to storage, operation and maintenance of our rehabilitation units.
- Insufficient maintenance of accessories which may wear out.
- Unprofessional maintenance.

4. Basic design



Constituents

1. Air compressor
2. Air inlet house
3. Regulator unit with safety control valve
4. Air penetrator rod
5. Rehabilitation unit
6. Working line

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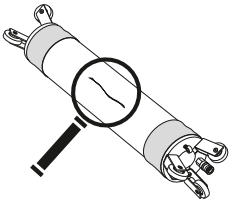
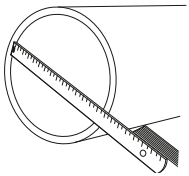
5. How to prepare for use



Check completeness and safety before each use.

- The packer skin shall not show any damages of mechanical and/or chemical attack: cracks, bubbles, delamination of fabric lining.
- The charging coupling and the wheelsets shall work properly.
- Control valve and connecting hoses shall not show any damage.



How to select the right packer size

- Each packer is designed for a specific DN range. This range is specified on the packer (see red inflation hose label).
- Measure the clear diameter of the tube before use and check if it is suitable for the packer available. **The rehabilitation unit may not be used for tubes of larger or lower diameter.**

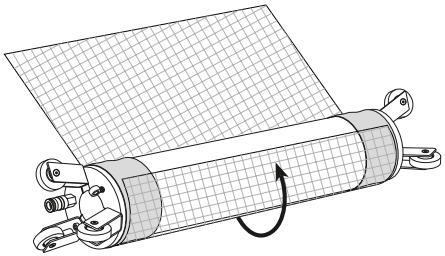
Clean the tube before use.

- Remove sludge, sand, stones, and sharp objects before you lower the packer into the sewer. Pressurized water will be required in most of the applications. The tube should be camera inspected after cleaning.

Use workwear and means of protection

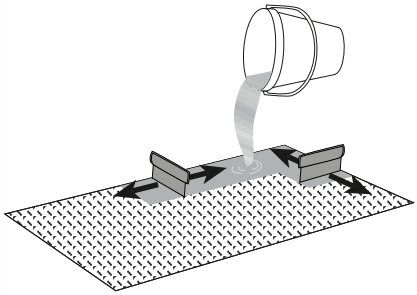
- Wear workwear, helmet, protective goggles, and gloves while working on rehabilitation units.
- **Important. Strictly observe all regulatory information and instructions related to access in sewer stack.**

6. How to operate the rehabilitation units



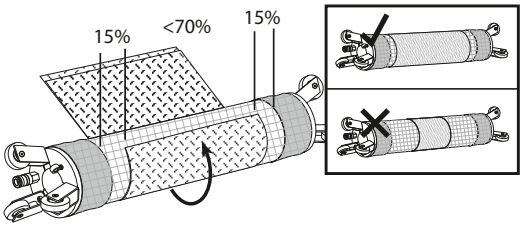
1 ***Cover the packer with PE membrane and / or other means of protection.***

Caution:
An insufficient protection of the packer skin may cause a chemical reaction and damage the rehabilitation units.



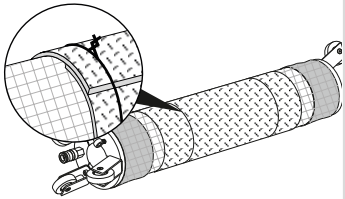
2 ***Apply resin on the glass fiber mat.***

Caution:
Always observe the guidelines of the manufacturer.



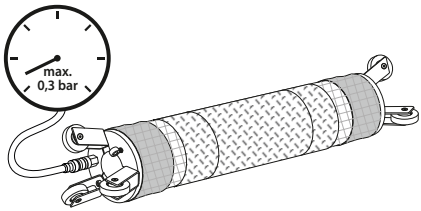
3 *Apply laminate on the packer.*

Caution:
Cover 70% of the packer if possible.
Non-observance may result in damages of the skin.



4 *Fix the laminate mat.*

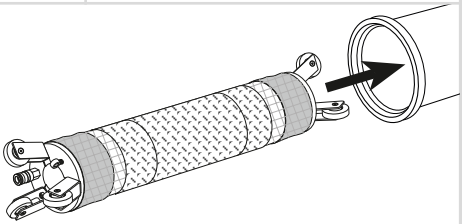
- Fix the laminate mat with rubber bands, steel wire or similar fasteners.
- Ensure that the fixation does not interfere with the packer expansion.



5 *Apply pressurized air - max. 0.3 bar.*

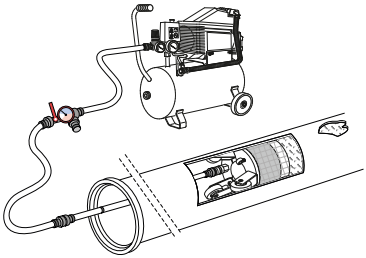
- The first charging stage ensures that the laminate cannot slip off and away.

Caution:
Never exceed the admissible maximum pressure of 0.3 bar if the rehabilitation unit is not inserted.



6 *Transport packer to the working site.*

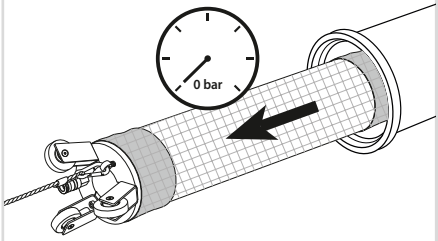
- While placing the packer ensure that the packer skin does not contact the sewer bottom. Sharp objects may damage the skin.
- Use pull rope, carriage or air penetrator rods to move the packer under TV camera control to the the working site.



7 *Apply operating pressure.*

- Charge the packer with the operating pressure required (see specification on the inflation hose).

Warning:
Staying within the danger zone is forbidden. An accident may cause serious injuries and / or may result in death.



8 *Depressurize and remove packer.*

- Wait for the cure time **(see manufacturer's specification)**, then
- allow full depressurization of the packer, and
- finally pull it out of the tube.

Use the drawbar eye provided and the working line to pull out the packer.

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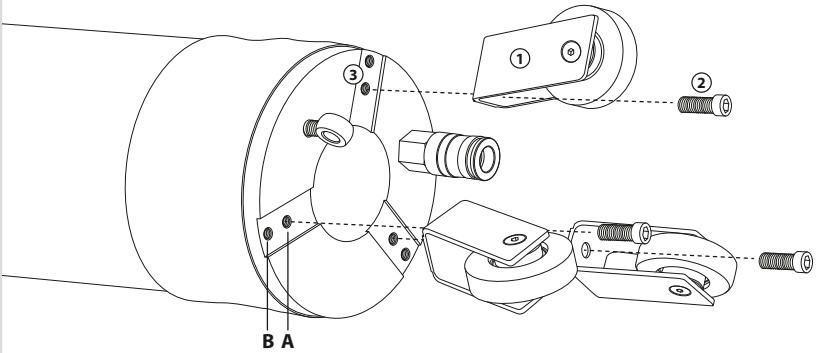
7. How to install and adjust the wheel system



How to adjust the size required

- Our packers of DN 150-250 and larger are available with a 2-staged 3-point carriage as an option.
- Use an Allen key (size 5) to install the wheel system (1) and tighten the fasteners (2) at the aluminum coupling (3).

A - Bolt hole circle of initial dimension (ex. 150 - 250)
B - Bolt hole circle of final dimension (ex. 150 - 250)

If you have to install long rehabilitation units, we recommend to use a water bed to push them forward to the working site.

8. Cleaning

- Clean after each use and allow to dry at room temperature.
- Use only warm water and soap and/or detergents or special cleaning agents suitable for the cleaning of natural rubber (observe the guidelines of the manufacturer).
- **Do not use solvents and/or aggressive cleaning agents.**

9. Functional tests

- Test the function of safety valves only without the packer. Overpressure hazard area.
- If you test the function of the safety valves installed at the packer outside of a tube or testing tube, the inflation hose may burst.
- Test the operation of the tube and test pipe stops with full operating pressure inside a sturdy tube of admissible maximum diameter only. If the tube is not strong enough, it will burst when the pressure pad is charged with full operating pressure.

10. Storage

- Store at a cool (15°C - 25°C) and dry place with limited air circulation.
- Protect rubber products against light (direct sunlight and artificial light with a high UV component). Cover the windows of the storage room accordingly.
- If you store it outside, protect it against the environment.
- Do not drag the packer over rough floors or surfaces.
- The storage room shall be free of solvents, fuels, lubricants, chemicals, acids, chlorides, iodides etc.

11. Repair Workshop

For information about repair shops in your area please call our service hotline:

Tel.: +49 (0) 34 292 / 654 20 or
email us: service@ehle-hd.com

12. Specifications - house connection packers and Flex Packers

House connection packer DN 50 - DN 70

Item number	Specification	Length	Pressure	Contact length	Dimension deflated	Bypass	Carriage	Weight
2 002 100	HA-Packer 50-70	1,000 mm	**2.5 bar**	approx. 900 - 800 mm	Ø 35 mm	--	--	0.70 kg
2 002 102	HA-Packer 50-70	1,200 mm	**2.5 bar**	approx. 1,100 - 1,000 mm	Ø 35 mm	--	--	0.75 kg
2 002 101	HA-Packer 50-70	1,500 mm	**2.5 bar**	approx. 1,400 - 1,300 mm	Ø 35 mm	--	--	0.80 kg
2 002 103	HA-Packer 50-70	2,000 mm	**2.5 bar**	approx. 1,900 - 1,800 mm	Ø 35 mm	--	--	0.90 kg
2 002 105	HA-Packer 50-70	2,500 mm	**2.5 bar**	approx. 2,400 - 2,300 mm	Ø 35 mm	--	--	1.10 kg
2 002 107	HA-Packer 50-70	3,000 mm	**2.5 bar**	approx. 2,900 - 2,800 mm	Ø 35 mm	--	--	1.20 kg

House connection packer DN 80 - DN 125

Item number	Specification	Length	Pressure	Contact length	Dimension deflated	Bypass	Carriage	Weight
2 002 121	HA-Packer 80-125	600 mm	**2.5 bar**	approx. 500 - 400 mm	Ø 65 mm	--	--	1.30 kg
2 002 122	HA-Packer 80-125	800 mm	**2.5 bar**	approx. 700 - 600 mm	Ø 65 mm	--	--	1.50 kg
2 002 123	HA-Packer 80-125	1,000 mm	**2.5 bar**	approx. 850 - 700 mm	Ø 65 mm	--	--	1.60 kg
2 002 120	HA-Packer 80-125	1,200 mm	**2.5 bar**	approx. 1,050 - 900 mm	Ø 65 mm	--	--	1.70 kg
2 002 125	HA-Packer 80-125	1,500 mm	**2.5 bar**	approx. 1,350 - 1,200 mm	Ø 65 mm	--	--	2.20 kg
2 002 127	HA-Packer 80-125	2,000 mm	**2.5 bar**	approx. 1,850 - 1,700 mm	Ø 65 mm	--	--	2.70 kg
2 002 129	HA-Packer 80-125	3,000 mm	**2.5 bar**	approx. 2,850 - 2,700 mm	Ø 65 mm	--	--	3.80 kg
2 002 131	HA-Packer 80-125	6,000 mm	**2.5 bar**	approx. 5,850 - 5,700 mm	Ø 65 mm	--	--	7.00 kg

Flex Packers DN 100 - DN 150

Item number	Specification	Length	Pressure	Contact length	Dimension deflated	Bypass	Carriage	Weight
2 002 150	Flex-Packer 100 - 150	400 mm	**2.5 bar**	approx. 300 - 200 mm	Ø 75 mm	--	--	2.30 kg
2 002 152	Flex-Packer 100 - 150	800 mm	**2.5 bar**	approx. 700 - 600 mm	Ø 75 mm	--	--	2.80 kg
2 002 156	Flex-Packer 100 - 150	1,200 mm	**2.5 bar**	approx. 1,050 - 950 mm	Ø 75 mm	--	--	3.30 kg
2 002 158	Flex-Packer 100 - 150	1,500 mm	**2.5 bar**	approx. 1,250 - 1,150 mm	Ø 75 mm	--	--	3.60 kg
2 002 160	Flex-Packer 100 - 150	2,000 mm	**2.5 bar**	approx. 1,800 - 1,700 mm	Ø 75 mm	--	--	4.20 kg
2 002 162	Flex-Packer 100 - 150	2,500 mm	**2.5 bar**	approx. 2,300 - 2,100 mm	Ø 75 mm	--	--	4.80 kg
2 002 164	Flex-Packer 100 - 150	3,000 mm	**2.5 bar**	approx. 2,800 - 2,700 mm	Ø 75 mm	--	--	5.40 kg
2 002 165	Flex-Packer 100 - 150	4,000 mm	**2.5 bar**	approx. 3,800 - 3,700 mm	Ø 75 mm	--	--	6.60 kg
2 002 166	Flex-Packer 100 - 150	5,000 mm	**2.5 bar**	approx. 4,800 - 4,700 mm	Ø 75 mm	--	--	7.80 kg

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Flex Packers DN 150 - DN 250 // DN 150 - DN 250 with bypass

Item number	Specification	Length	Pressure	Contact length	Dimension deflated	Bypass	Carriage	Weight
2 002 180	Flex-Packer 150 - 250	800 mm	**1.5 bar**	approx. 650 - 550 mm	Ø 100 mm	--	•	3.00 kg
2 002 200	Flex-Packer 150-250 D	800 mm	**1.5 bar**	approx. 650 - 550 mm	Ø 100 mm	Ø 38 mm	•	4.00 kg
2 002 182	Flex-Packer 150 - 250	1,200 mm	**1.5 bar**	approx. 1,050 - 950 mm	Ø 100 mm	--	•	3.70 kg
2 002 202	Flex-Packer 150-250 D	1,200 mm	**1.5 bar**	approx. 1,050 - 950 mm	Ø 100 mm	Ø 38 mm	•	5.10 kg
2 002 183	Flex-Packer 150 - 250	1,500 mm	**1.5 bar**	approx. 1,350 - 1,250 mm	Ø 100 mm	--	•	4.20 kg
2 002 204	Flex-Packer 150-250 D	1,500 mm	**1.5 bar**	approx. 1,350 - 1,250 mm	Ø 100 mm	Ø 38 mm	•	5.90 kg
2 002 185	Flex-Packer 150 - 250	2,000 mm	**1.5 bar**	approx. 1,850 - 1,750 mm	Ø 100 mm	--	•	5.00 kg
2 002 206	Flex-Packer 150-250 D	2,000 mm	**1.5 bar**	approx. 1,850 - 1,750 mm	Ø 100 mm	Ø 38 mm	•	7.30 kg
2 002 188	Flex-Packer 150 - 250	2,500 mm	**1.5 bar**	approx. 2,250 - 2,150 mm	Ø 100 mm	--	•	6.00 kg
2 002 208	Flex-Packer 150-250 D	2,500 mm	**1.5 bar**	approx. 2,250 - 2,150 mm	Ø 100 mm	Ø 38 mm	•	8.60 kg
2 002 189	Flex-Packer 150 - 250	3,000 mm	**1.5 bar**	approx. 2,850 - 2,750 mm	Ø 100 mm	--	•	6.70 kg
2 002 210	Flex-Packer 150-250 D	3,000 mm	**1.5 bar**	approx. 2,850 - 2,750 mm	Ø 100 mm	Ø 38 mm	•	10.0 kg
2 002 190	Flex-Packer 150 - 250	4,000 mm	**1.5 bar**	approx. 3,850 - 3,750 mm	Ø 100 mm	--	•	8.50 kg
2 002 212	Flex-Packer 150-250 D	4,000 mm	**1.5 bar**	approx. 3,850 - 3,750 mm	Ø 100 mm	Ø 38 mm	•	12.7 kg
2 002 216	Carriage- 2-staged	2 x 80 mm	**--**	--	--	--	--	1.10 kg

• Carriage available as an option

Flex Packers DN 200 - DN 300 // DN 200 - DN 300 with bypass

Item number	Specification	Length	Pressure	Contact length	Dimension deflated	Bypass	Carriage	Weight
2 002 220	Flex-Packer 200 - 300	800 mm	**1.5 bar**	approx. 650 - 550 mm	Ø 150 mm	--	•	5.20 kg
2 002 240	Flex-Packer 200 - 300 D	800 mm	**1.5 bar**	approx. 650 - 550 mm	Ø 150 mm	Ø 60 mm	•	7.50 kg
2 002 222	Flex-Packer 200 - 300	1,200 mm	**1.5 bar**	approx. 1,050 - 950 mm	Ø 150 mm	--	•	6.50 kg
2 002 242	Flex-Packer 200 - 300 D	1,200 mm	**1.5 bar**	approx. 1,050 - 950 mm	Ø 150 mm	Ø 60 mm	•	9.10 kg
2 002 224	Flex-Packer 200 - 300	1,500 mm	**1.5 bar**	approx. 1,250 - 1,150 mm	Ø 150 mm	--	•	7.40 kg
2 002 244	Flex-Packer 200 - 300 D	1,500 mm	**1.5 bar**	approx. 1,250 - 1,150 mm	Ø 150 mm	Ø 60 mm	•	10.5 kg
2 002 226	Flex-Packer 200 - 300	2,000 mm	**1.5 bar**	approx. 1,750 - 1,650 mm	Ø 150 mm	--	•	8.80 kg
2 002 246	Flex-Packer 200 - 300 D	2,000 mm	**1.5 bar**	approx. 1,750 - 1,650 mm	Ø 150 mm	Ø 60 mm	•	12.8 kg
2 002 228	Flex-Packer 200 - 300	2,500 mm	**1.5 bar**	approx. 2,250 - 2,150 mm	Ø 150 mm	--	•	10.5 kg
2 002 248	Flex-Packer 200 - 300 D	2,500 mm	**1.5 bar**	approx. 2,250 - 2,150 mm	Ø 150 mm	Ø 60 mm	•	15.2 kg
2 002 229	Flex-Packer 200 - 300	3,000 mm	**1.5 bar**	approx. 2,750 - 2,650 mm	Ø 150 mm	--	•	11.8 kg
2 002 250	Flex-Packer 200 - 300 D	3,000 mm	**1.5 bar**	approx. 2,750 - 2,650 mm	Ø 150 mm	Ø 60 mm	•	17.8 kg
2 002 231	Flex-Packer 200 - 300	4,000 mm	**1.5 bar**	approx. 3,750 - 3,650 mm	Ø 150 mm	--	•	14.8 kg
2 002 252	Flex-Packer 200 - 300 D	4,000 mm	**1.5 bar**	approx. 3,750 - 3,650 mm	Ø 150 mm	Ø 60 mm	•	22.5 kg
2 002 216	Carriage- 2-staged	2 x 80 mm	**--**	--	--	--	--	1.10 kg

• Carriage available as an option

Flex Packers DN 250 - DN 400 // DN 250 - ND 400 with bypass								
Item number	**Specification**	**Length**	**Pressure**	**Contact length**	**Dimension deflated**	**Bypass**	**Carriage**	**Weight**
2 002 260	Flex-Packer 250 - 400	1,000 mm	**1.5 bar**	approx. 700 - 550 mm	Ø 205 mm	--	•	11.0 kg
2 002 262	Flex-Packer 250 - 400	1,200 mm	**1.5 bar**	approx. 950 - 850 mm	Ø 205 mm	--	•	12.2 kg
2 003 100	Flex-Packer 250 - 400 D	1,200 mm	**1.5 bar**	approx. 950 - 850 mm	Ø 205 mm	Ø 75 mm	•	15.5 kg
2 002 264	Flex-Packer 250 - 400	1,500 mm	**1.5 bar**	approx. 1,200 - 1,100 mm	Ø 205 mm	--	•	14.2 kg
2 003 102	Flex-Packer 250 - 400 D	1,500 mm	**1.5 bar**	approx. 1,200 - 1,100 mm	Ø 205 mm	Ø 75 mm	•	18.2 kg
2 002 266	Flex-Packer 250 - 400	2,000 mm	**1.5 bar**	approx. 1,700 - 1,600 mm	Ø 205 mm	--	•	17.2 kg
2 003 104	Flex-Packer 250 - 400 D	2,000 mm	**1.5 bar**	approx. 1,700 - 1,600 mm	Ø 205 mm	Ø 75 mm	•	22.6 kg
2 002 268	Flex-Packer 250 - 400	2,500 mm	**1.5 bar**	approx. 2,200 - 2,100 mm	Ø 205 mm	--	•	20.5 kg
2 003 106	Flex-Packer 250 - 400 D	2,500 mm	**1.5 bar**	approx. 2,200 - 2,100 mm	Ø 205 mm	Ø 75 mm	•	27.0 kg
2 002 270	Flex-Packer 250 - 400	3,000 mm	**1.5 bar**	approx. 2,700 - 2,600 mm	Ø 205 mm	--	•	23.8 kg
2 003 108	Flex-Packer 250 - 400 D	3,000 mm	**1.5 bar**	approx. 2,700 - 2,600 mm	Ø 205 mm	Ø 75 mm	•	31.3 kg
2 002 272	Flex-Packer 250 - 400	4,000 mm	**1.5 bar**	approx. 3,700 - 3,600 mm	Ø 205 mm	--	•	30.2 kg
2 003 110	Flex-Packer 250 - 400 D	4,000 mm	**1.5 bar**	approx. 3,700 - 3,600 mm	Ø 205 mm	Ø 75 mm	•	40.0 kg
2 003 114	Carriage- 2-staged	2 x 80 mm	**--**	--	--	--	--	1.20 kg

• Carriage available as an option

All our rehabilitation units are made to measure.
Special sizes available at request - maximum length 10 m.

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Operating instructions - rehabilitation packers and Flex Packers type RFA /RFF - **Sept. 2018**