

QAA – 132

Operating Manual for Heat Tracing System

ELSR-MA and ELSR-WA

eltherm Canada Inc.

1440 Graham's Lane, Unit 5
Burlington Ontario L7S 1W3
Canada

Phone: +1 (289) 812-6631
Fax: +1 (844) 325-6750
E-Mail: info@eltherm.ca
Internet: www.eltherm.ca

Heat Tracing System ELSR-MA and -WA

Application

The Heat Tracing System ELSR-... is suitable for industrial use on piping, vessels, instrumentation and related equipment in non-classified (ordinary) areas, in wet areas, in pressurized wet areas (ELSR-MA-...-BF) and in areas where combustible gasses or dust may be present (ELSR-WA-...).

Due to the self-regulating behaviour of the system, ELSR-... can be operated within the associated T-Class without additional temperature limitation. All electrical connections must be made to a suitable junction box approved for use in the above listed areas. The use of applicable eltherm power connection and termination kits is required.

System Components

The Heat Tracing System ELSR-... comprises the following components:

- Trace heater ELSR-MA-... or -WA...
- End Termination Kit EL-ECN-Ex
- End Termination Kit EL-ECM
- End Termination Kit EL-ECMF
- End Termination Kit EL-ECW
- Power Termination Kit Ex ELVB-SREx-20 BR HT
- Power Termination Kit Ex ELVB-SREx- $\frac{3}{4}$ BR HT
- Power Termination Kit Ex ELVB-SREx- $\frac{1}{2}$ BR HT
- Power Termination Kit ELVB-SRAM- $\frac{3}{4}$ ST
- Power Termination Kit ELVB-SRAW- $\frac{3}{4}$ ST

Rating of Trace Heater ELSR

ELSR-MA-...: -WS (variant -MA...-BF: -PS, max. 20 bar / 290 PSI)

ELSR-WA-...: -WS

Trace Heater Sets

Accessories	ELSR-WA (-WS)	ELSR-WA Ex Class I Zone 1; Class I Div 2	ELSR-WA Class II, III Div 1	ELSR-MA (-WS)	ELSR-MA-...-BF (-PS; end cap not to be immersed when pipe carries potable water)
End Termination Kit EL-ECN-Ex (with Silicone End Cap EL-ECN, transparent; fits ELSR-N as well as ELSR-W)	+	+	+	-	-
End Termination Kit EL-ECW (with Silicone End Cap EL-ECW, transparent; unclassified areas only!)	+	-	-	-	-
End Termination Kit EL-ECM (with Silicone End Cap EL-ECM, transparent)	-	-	-	+	-
End Termination Kit EL-ECMF (with Silicone End Cap EL-ECMF, transparent)	-	-	-	+	+
Power Termination Kit Ex ELVB-SREx-20 BR HT (with gland Peppers A8F 20R M20 as tested by FM)	+	+	+	-	-
Power Termination Kit Ex ELVB-SREx-½ BR HT (with gland Peppers A8F 20R ½"; thread variation to gland described above)	+	+	+	-	-
Power Termination Kit Ex ELVB-SREx-¾ BR HT (with gland Peppers A8F 20R ¾"; thread variation to gland described above)	+	+	+	-	-
Power Termination Kit ELVB-SRAM-¾ ST (with gland Thomas & Betts 2237)	-	-	-	+	+
Power Termination Kit ELVB-SRAW-¾ ST (with gland Thomas & Betts 2238; unclassified areas only!)	+	-	-	-	-

Table 1: possible combinations of Trace Heater and Kit ("+" approved, "-" not permitted)

Marking of Heat Tracing System ELSR-...

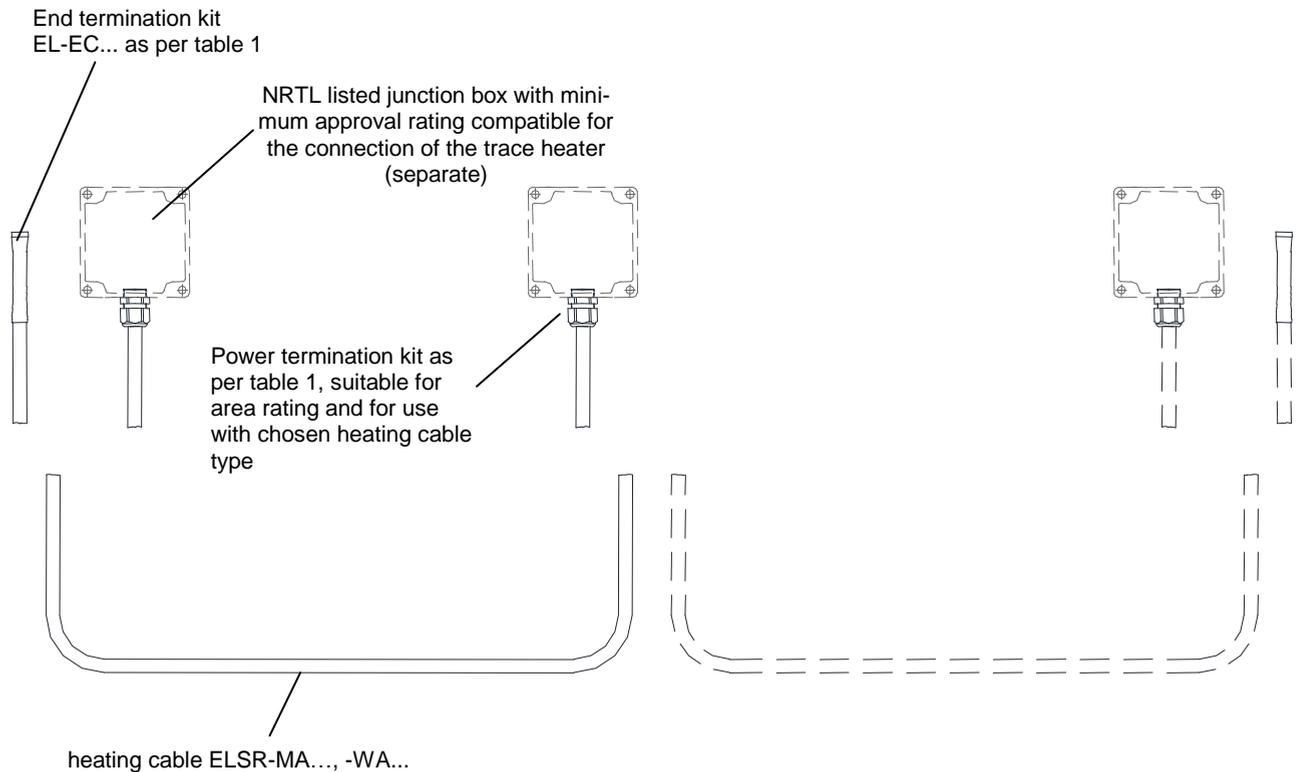
Trace heaters ELSR-... are marked as follows:

eltherm GmbH <type> <power> W/ft @ <temperature> Parallel-<application marking> Trace Heater 40 A <voltage> VAC <min. installation temp> <= Ta <= <max. exposure temp.> <pressure rating (-PS only)><lot-No.><hazardous area marking><continuous length marking> c<FM>us

Example ELSR-WA-55-2-BO:

eltherm GmbH ELSR-WA-55-2-BO 3 W/ft @ 55°C (131°F) Parallel-WS Trace Heater 40A 240VAC -45°C (-49°F) <= Ta <= 90°C (194°F) B1346 Class I Zone 1 A/Ex e II / Class I Div 2 Group A,B,C,D Class II Div 1 Group E,F,G Class III Div 1 0158m c<FM>us

Possible Cable Sets



Applicable temperature range

The minimum start up temperature for Heating Cable ELSR-MA... and -WA... is -30°C (-22°F);

The minimum installation temperature is

product	°C	°F
ELSR-MA-...AO, ...BO	-45	-49
ELSR-MA-...BF	-25	-13
ELSR-WA-...AO, ...BO	-45	-49
EL-ECM... (except -ECMF) / -ECW...	-45	-49
EL-ECMF	-25	-13
ELVB-SRA...	-45	-49
ELVB-SREx... HT	-60	-76

Table 2: minimum installation temperatures

The maximum operating temperature for heating cable ELSR-MA and integral components (termination kit EL-ECM, -ECMF) is 60°C (energized and de-energized).

The maximum operating temperature for heating cable ELSR-WA and integral components (termination kit EL-ECW, -ECN-Ex) is 80°C (energized) and 90°C (de-energized).

Restrictions on permissible thickness and material of thermal insulation

Flexible (soft) materials: no restrictions

Rigid materials: groove to be provided to accommodate heating cable

Maximum length of heating circuit

Circuit length ELSR-MA-... under consideration of 240VAC (-MA-...-2) and 120VAC (-MA-...-1), MCB type QO (100% utilisation), voltage drop max. 10%, single cable fed from 1 end

Start up temp. (°C)	CB capacity (A)	Circuit length (ft) for					
		MA-3-1	MA-5-1	MA-3-2	MA-5-2	MA-3-1-BF (immersed)	MA-3-2-BF (immersed)
10	10	186	105	415	320	147	241
	15	186	152	389	324	167	283
	20	186	152	415	346	167	302
	25	186	152	415	346	167	302
0	10	158	88	379	273	123	202
	15	171	132	355	300	153	264
	20	171	139	379	320	153	282
	25	171	139	379	320	153	282
-10	10	136	75	325	239		
	15	157	113	327	280		
	20	157	129	349	299		
	25	157	129	349	299		
-30	10	107	59	283	210		
	15	138	88	306	263		
	20	138	113	326	281		
	25	138	113	326	281		

Circuit length ELSR-WA- under consideration of 240VAC (-WA-...-2) and 120VAC (-WA-...-1),
MCB type QO (100% utilisation), voltage drop max. 10%, single cable fed from 1 end

Start up temp. (°C)	CB capacity (A)	Circuit length (ft) for			
		ELSR-WA-55-1	ELSR-WA-65-1	ELSR-WA-55-2	ELSR-WA-65-2
10	10	144	97	231	149
	15	219	145	348	226
	20	246	194	430	302
	25	246	198	430	348
	30	246	198	430	348
0	10	131	87	207	136
	15	197	133	312	203
	20	233	176	405	272
	25	233	189	405	326
	30	233	189	405	326
-10	10	118	81	187	123
	15	180	121	279	184
	20	221	160	372	247
	25	221	180	384	310
	30	221	180	384	312
-30	10	102	68	158	105
	15	153	103	237	160
	20	202	139	315	212
	25	203	167	353	263
	30	203	167	353	286

Location of temperature sensors

1. Temperature controllers

Temperature sensors may be used either as ambient sensing devices or attached directly to the equipment/device that is to be heated.

In case of ambient sensing, place the sensor in the coldest expected spot of the area where the heated equipment is located. This is typically a shaded place (e.g. on the northern side of buildings) on low ground. However, ambient sensing is recommended only for frost protection applications and when the permissible temperature band of the equipment to be heated and its contents is considerably wide (approx. 50K / 122°F). Please consult the eltherm project department if further assistance is required.

In cases where sensors are directly attached to the heated equipment/device, two different applications need to be considered:

a) heated pipes

Place the sensor on the anticipated coldest section of the pipe. Avoid direct contact between sensor and heating cable. Branched piping systems may require more than one heating circuit (with a sensor each) or implementation of the “dead leg” technique depending on the flow pattern of the piping system. If help is required, please consult the eltherm project department for further assistance.

b) heated vessels

Place the heating on surfaces that always have contact to the contents of the vessel (typically the bottom of the vessel and/or lower section). Then place the temperature sensor in the heated area. Avoid direct contact between sensor and heating cable. Large vessels may require more than one heating circuit, especially when they need to be heated up to various levels. If help is required, please consult the eltherm project department for further assistance.

Be aware of the fact that temperature sensors mounted on the surface of the heated equipment never provide readings of the exact temperatures of the medium inside the device that is being heated. Therefore, temperature settings may need to be determined in an empirical way when exact temperatures are crucial for the process.

2. Temperature limiters

Due to the self limiting behaviour of ELSR-... heating cable, temperature limiters are not required for most applications. However, when temperature limiters are used, the associated sensors are to be installed in the anticipated hottest areas of the equipment that is to be heated. Avoid direct contact between sensor and heating cable. A temperature offset between the equipment and heating cable sheath needs to be considered for the temperature settings. Please consult the eltherm project department if further assistance is required.

Further documents

In addition to this manual, the following documents apply:

- Data sheet heating cable ELSR-MA, -WA
- Documents provided with the kits listed under “System Components”

Installation of the Heat Tracing System ELSR-...

1. Receipt of Goods

After receipt of goods, check the heating cable and all supplied accessories and compare with the data on the delivery note to ensure that the correct material was supplied.

Verify the integrity of the electrical insulation as described under “5. Test and Commissioning”. If the heating cable is to be stored for installation at a later date, it is recommended that the exposed wires and braid are trimmed and that the end is sealed against possible ingress of water.

2. Storage

The goods have to be stored in a dry environment at an ambient temperature of $-20 \dots +60^{\circ}\text{C}$ ($-4^{\circ}\text{F} \dots +140^{\circ}\text{F}$). If a dry storage is impossible, the heating cable must be closed with an end termination set. This is also necessary if a heating circuit cannot be finished at the end of a shift.

3. Protective Measures

- the use of a ground fault protection device (30mA, or 30mA above the inherent fault current level of the installation) for each heating circuit is mandatory.
- the metallic braid or screen of the heating cable has to be connected to the potential earth (ground).
- de-energize all circuits prior to installation or maintenance of heating components
- all work has to be carried out in compliance with all effective codes and regulations

4. Installation Instructions

- remove any sharp objects on the surface to be heated and on areas where the trace heater is pulled through
- clean and degrease the surface
- the installation of a heating circuit has to be carried out using original eltherm accessories according to eltherm installation instructions. Maintain minimum bend radius of 25mm with all cables.
- to fasten the heating cable to a pipe, self adhesive glass tape or pre-punched (stainless) steel fastening strips are recommended. plastic cable ties suitable for the desired operating temperatures may also be used

Attention: Do not use adhesive tape with emollients (i.e. PVC)!

Overlapping or contacting of the heating cable during installation is acceptable, due to the self-regulating characteristics of the product.

- the heating cable should be fully covered (the entire length) with aluminum foil in order to prevent insulation material from slipping between the cable and surface to be heated. If the insulation is covered with metal cladding, an insulation entry kit has to be used to avoid mechanical damage of the heating cable.
- the connection and end termination of a heating circuit shall be carried out using suitable eltherm power and end termination kits as outlined in table 1. Required air gaps and creeping distances need to be observed (see eltherm termination instructions).

Attention: To avoid short circuit, do not connect the two bus wires of the heating cable to each other. Under all circumstances observe the termination and maintenance instructions for the connection and termination of the heating cables.

- Power connection shall only be made using an NRTL listed junction box with minimum approval rating compatible for the connection of the trace heater
- make sure to attach the heating cable – especially the area adjacent to the power connection and / or to the cable entry of the junction box - properly and avoid pulling stress and tension of the electrical connections.
- upon completion of the installation, the heating circuit needs to be marked by fitting an appropriate label to the associated junction box or to the heating cable close to the junction box. The label shall be weatherproof and bear relevant information of all used components
- identification: electrically heated parts have to be identified in reasonable distances with warning labels “Electrical Heating” on the thermal insulation (approx. 5 m / 15ft distance between each label on pipelines or at least 1 warning label per pipe-branch respectively).

5. Test and Commissioning

After completion of a heating circuit and prior to the installation of the thermal insulation, the following steps shall be taken:

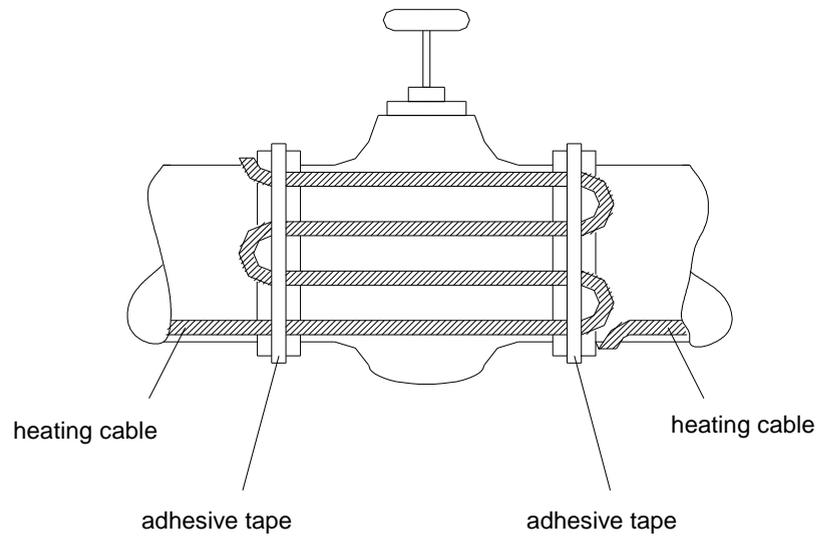
- perform visual inspection of the heating cable for possible mechanical damage or improper installation.
- perform insulation resistance test
- measure the insulation resistance of each heating circuit between each single bus wire and the metal braid or screen. To do this, expose braid and bus wires as shown in the termination instructions of the power termination kits, then connect both bus wires to the same pole of the tester and the braid to the other pole.
- test voltage: min 500 VDC, preferably 2500 VDC; duration 1 min
- regardless of heating circuit length, the insulation resistance must not be lower than 20 MΩ (the measured values are to be noted and recorded). In case of a lower insulation resistance, the source of defect has to be determined and eliminated.
- check the operation of the heating circuit (only in connection with the required temperature controller and/or limiter)
- in case of damage, replace or repair heating cable immediately. With short heating circuits, the heating cable may be replaced completely. With longer heating circuits, the defective portion may be removed by cutting out the damaged part and replacing it with a new piece of heating cable according to the termination instructions.
- repeat the tests after the thermal insulation has been applied.

6. Operation and Maintenance:

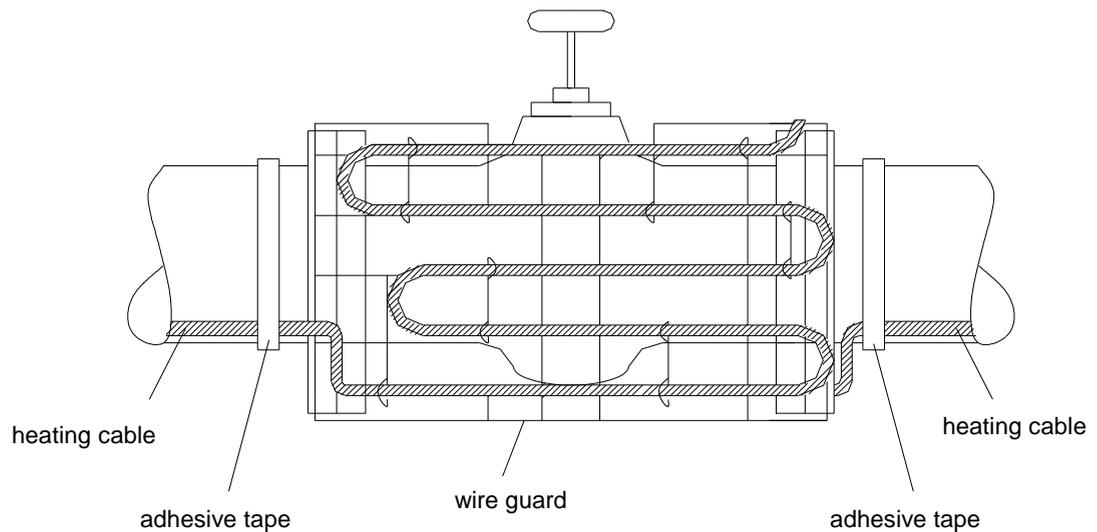
- follow local codes and regulations for the use of electrical heating cables
- the permissible operating specifications stated in the data sheets (i.e. voltage, amperage, exposure temp., operating temp., IP rating) are to be followed accordingly
- the permissible temperatures provided in section “Applicable temperature range” must not be exceeded
- the use of temperature controllers may be desired (e.g. to conserve energy) or required (e.g. to maintain accurate temperature control). Contact eltherm project engineering department for assistance.
- if heating cable ELSR-WA is used in temperature class T6, its surface temperature needs to be limited by controlled or stabilized design in compliance with applicable standards
- self regulating heating cables are generally maintenance free. However, it is recommended that the heating cables be checked by qualified personnel in regular intervals for damage and insulation resistance.
- disconnect any power supply to the heating system prior to opening of any controllers, junction boxes and terminations. Access is only permitted when heating system is de-energized.
- protect installed heating cable against damage which may occur during repair work on heated components
- after completion of the repair, test heating circuit.
- do NOT operate damaged heating circuits.
- check temperature control units and control devices annually by trained workers or authorized personnel.



Installation of heating cables on valves

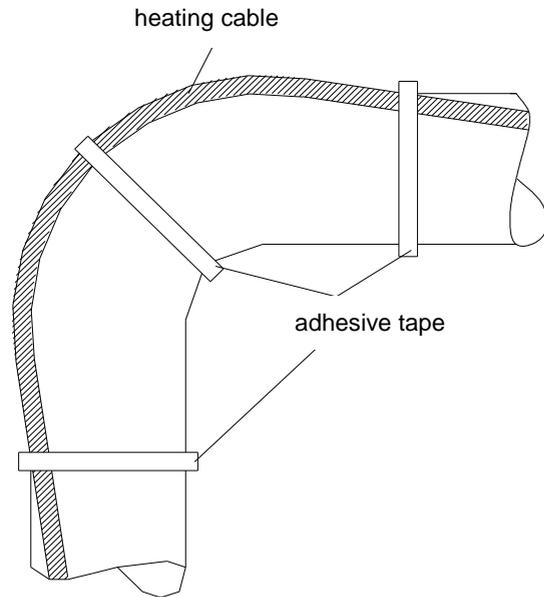


Installation of heating cables on valves by means of a wire guard for a quick disassembly and re-assembly of the heating during maintenance work at the valve.

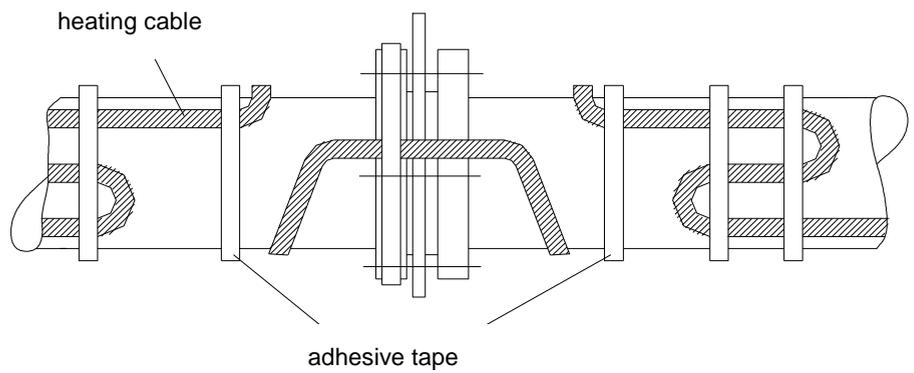
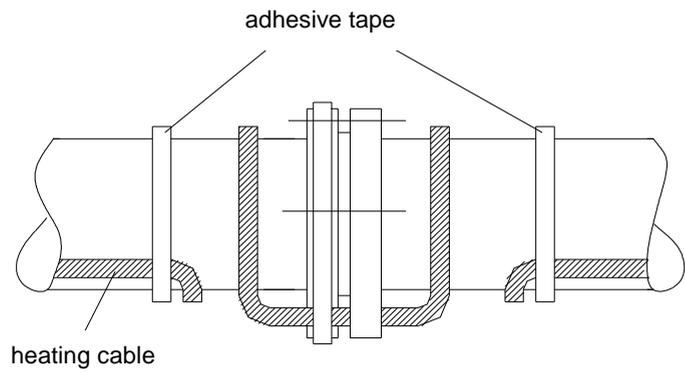




Installation on elbows

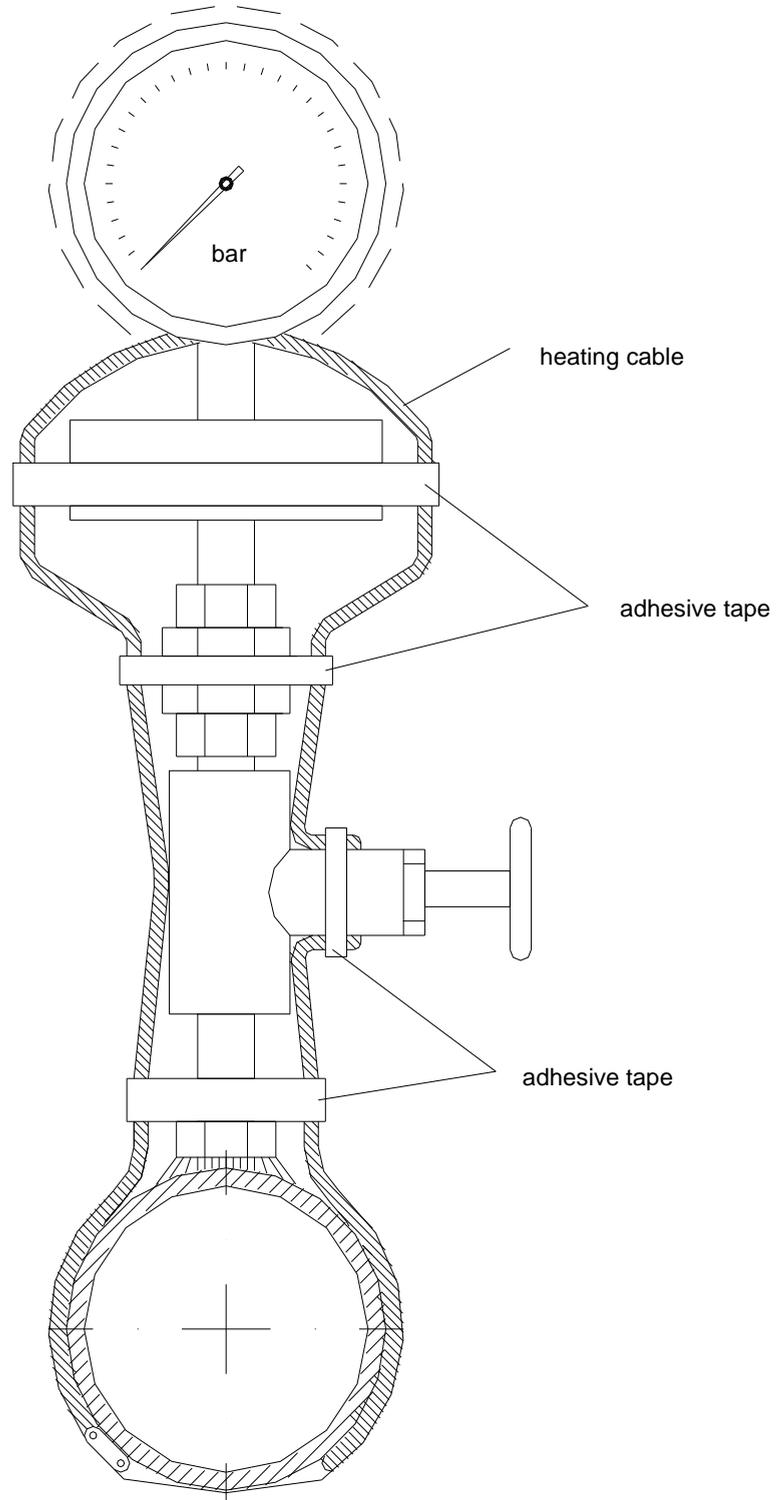


Installation on flanges



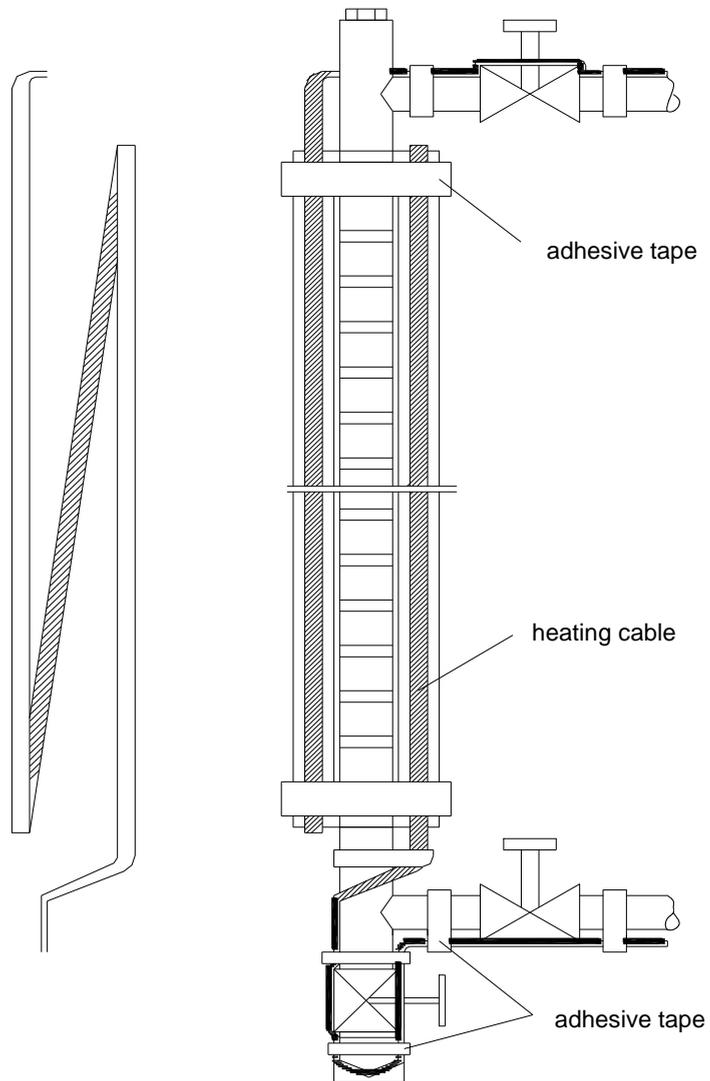


Installation of heating cable on fittings & valves



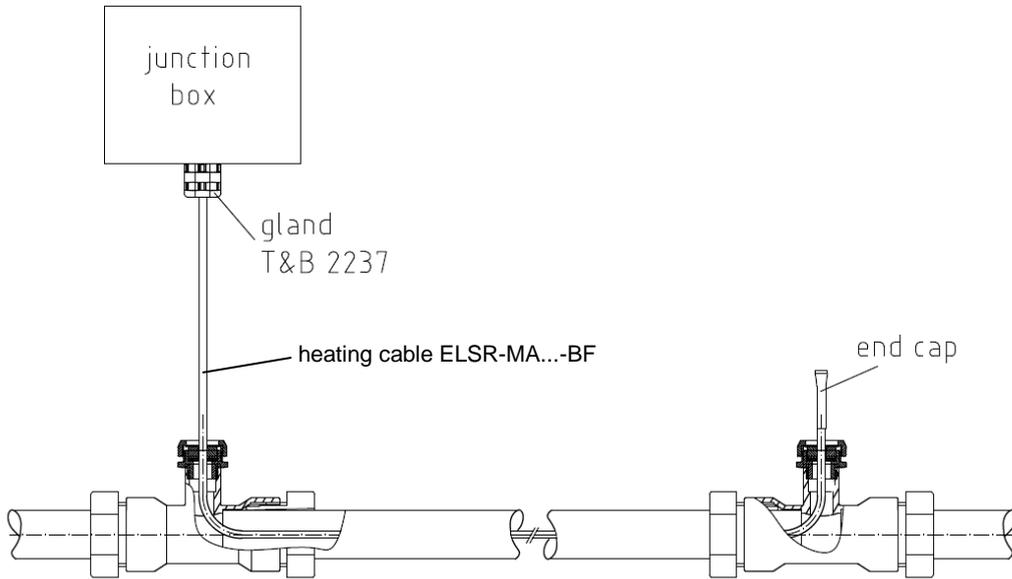


Installation of heating cables on level indicators



Remark: Attach heating cable with self-adhesive aluminum tape.

Insertion of ELSR-MA...-BF in potable water pipe



If no potable water requirements apply, end cap may be inserted downstream in pipe.