

Opto Electronic Level Switch

Amplifier Type KSR-OPTO.250X.XX

Transducer Type KSR-OPTO.X1X300XXX.06XX

Transducer Type KSR-OPTO.0032

Transducer Type KSR-OPTO.0042

INSTRUCTION MANUAL

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1. WORKING PRINCIPLE

1.1 Used symbols



WARNING!

Indicates a potentially dangerous situation in a potentially explosive atmosphere, resulting in serious injury or death, if not avoided.



Non-observance of these instructions and their contents may result in the loss of explosion protection
Observe the European Use Directive (EN 60 079-10:2011 ff)

Observe the information given in the applicable type examination certificate and the relevant country-specific regulations for installation and use in potentially explosive atmospheres (e.g. IEC 60079-14:2012, NEC, CEC). Non-observance can result in serious injury and/or damage to equipment.

For hazardous media such as oxygen, acetylene, flammable or toxic gases or liquids, and refrigeration plants, compressors, etc., in addition to all standard regulations, the appropriate existing codes or regulations must also be followed.



SAFETY HINTS

Before installation, commissioning and operation, ensure that the appropriate instrument has been selected in terms of measuring range, design and specific measuring conditions.
Serious injuries and/or damage can occur should these not be observed.

When assembling or dismantling the transducer it is absolutely to be paid attention to the fact that the container is without pressure.

Attention: Risk of injury with insufficient qualification!
Improper handling can result in considerable injury and damage to equipment. The activities described in these operating instructions may only be carried out by skilled personnel who have the qualifications described below. Keep unqualified personnel away from hazardous areas.

For hazardous media such as oxygen, acetylene, flammable or toxic gases or liquids, and refrigeration plants, compressors, etc., in addition to all standard regulations, the appropriate existing codes or regulations must also be followed.

To ensure safe working on the instrument, the operating company must ensure
- that suitable first-aid equipment is available and aid is provided whenever required

- that the operating personnel are regularly instructed in all topics regarding work safety, first aid and environmental protection and knows the operating instructions and, in particular, the safety instructions contained therein.

Residual media in dismantled instruments may result in a risk to people, the environment and the system. Take sufficient precautionary measures. Do not use this instrument in safety or Emergency Stop devices. Incorrect use of the instrument can result in injury.

Should a failure occur, aggressive media with extremely high temperature and under high pressure or vacuum may be present at the instrument.



WARNING!

Danger of death caused by electric current

Upon contact with live parts, there is a direct danger of death.

Electrical instruments may only be installed and mounted by skilled electrical personnel.

Operation using a defective power supply unit (e.g. short circuit from the mains voltage to the output voltage) may result in life-threatening voltages on the instrument!

1.2 Quality

All devices are produced within an approved QM-System under DIN EN ISO 9001.

1.3 RANGE OF APPLICATION

These devices are used for level detection. The conical tip of the sensor ensures really precise on-off performance level sensing. Its reaction is independent of various physical parameters of the liquid such as density, dielectric constant, conductivity, colour or refractive index. This allows the use for safe level switching as well as for precise level control applications. If there is any foam you even can decide whether to use the sensor for foam level or liquid level control, suppressing the influence of foam on switching.

If the sensor is supplied with a U-tip, it is able to sense changes in refractive index. So it can be used for example as an interface level switch for liquids.

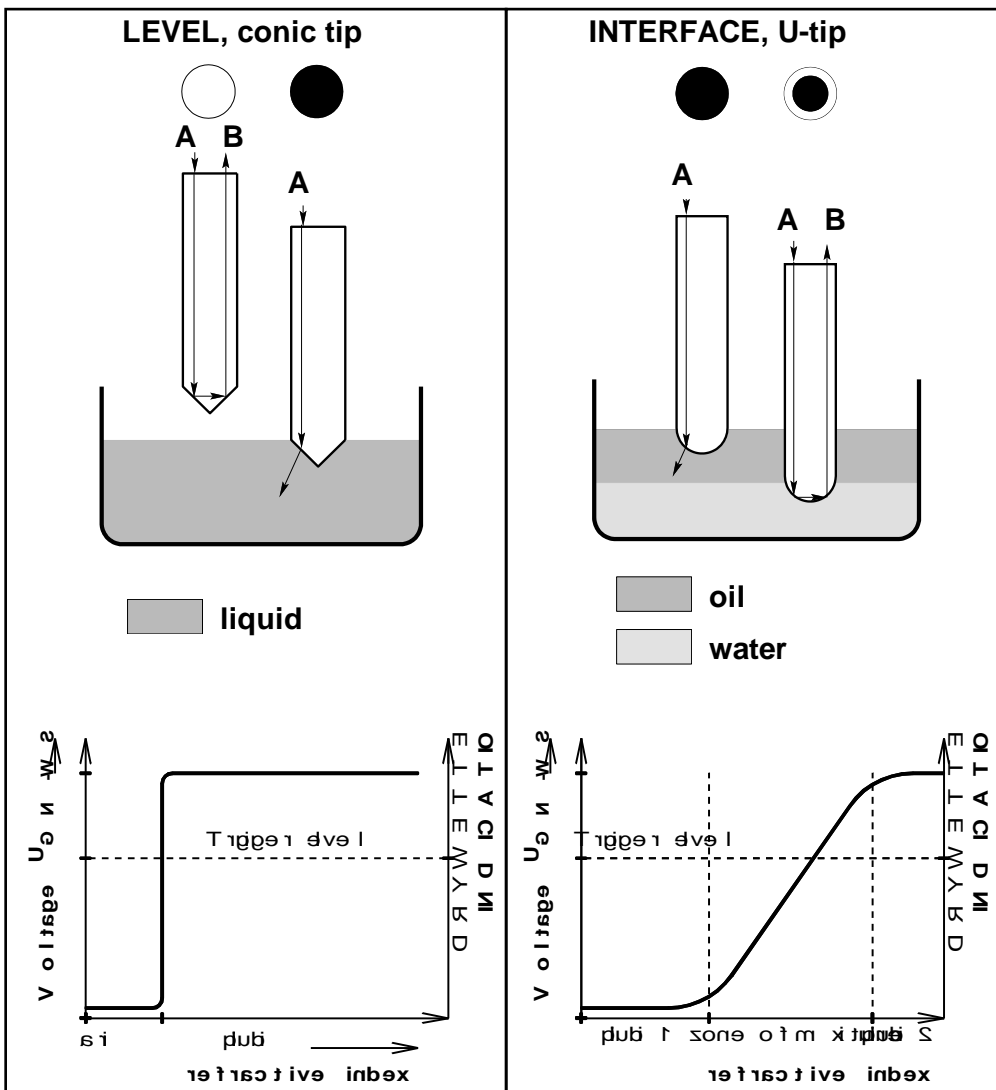


Fig. 1

1.4 Range of Application, Selection of products

Type	pressure / bar	temperature / °C
KSR-OPTO.0042	10*)	250
KSR-OPTO.0032	50	95
KSR-OPTO.X1X300XXX.06XX	250 (500)**)	400**)

*) depends on connection type **) Derating see following table

Short thread, material 1.4571:

	temperature / °C		
	50	250	400
Pressure / bar	250	195	175

Other materials on request

Long thread, material 1.4571:

	temperature / °C	
	50	400
Pressure / bar	500	416

Other materials on request

Fig. 2

All these transducers need a switch amplifier type KSR-OPTO.250X.XX for power supply and switch state signalling.

For the multi-part transducers type KSR-OPTO.21X300XXX.06XX the following certificates apply:

- Ex class Ex ib IIC T6 (to 60 °C) or T5 (to 75 °C), ZELM 06 ATEX 0299
zone 0 + zone 1



Transducer type KSR-OPTO.21X300XXX.06XX:

If medium touches parts consist of titanium, the operator has to take care that no metallic fittings can beat to the sensor parts and therefore could trigger a blow spark in the container.



Amplifier type KSR-OPTO.250X.XX:

It is not allowed to connect a hazardous live circuit and a SELV or PELV circuit on the potential-free contact sets at the same time.

1.5 Installation hints

The sensors may be installed in any direction, i. e. from top, bottom, sideways or inclined. In some special applications it is recommended to use following hints:

- High viscosity: sideways or from bottom
- Dry Running protection for pumps: If the pipes to or from the pump are installed horizontally use top mounting for fast detection of liquid
- Overfill prevention devices: Usually vertically from above

1.5.1 Transducer Type KSR-OPTO.0042, connections for glass apparatus

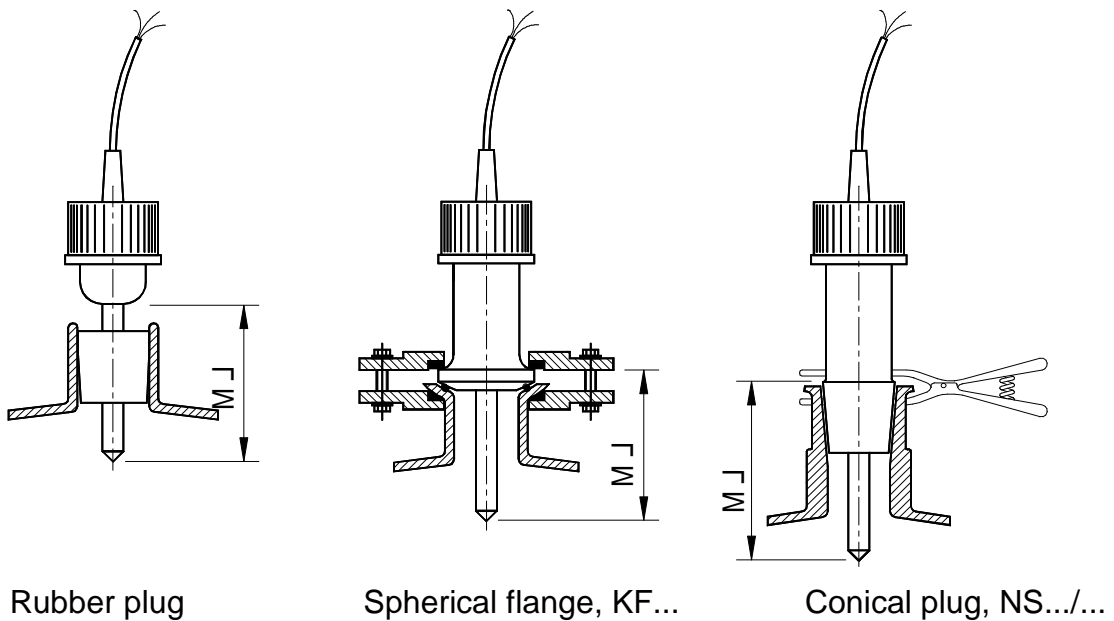
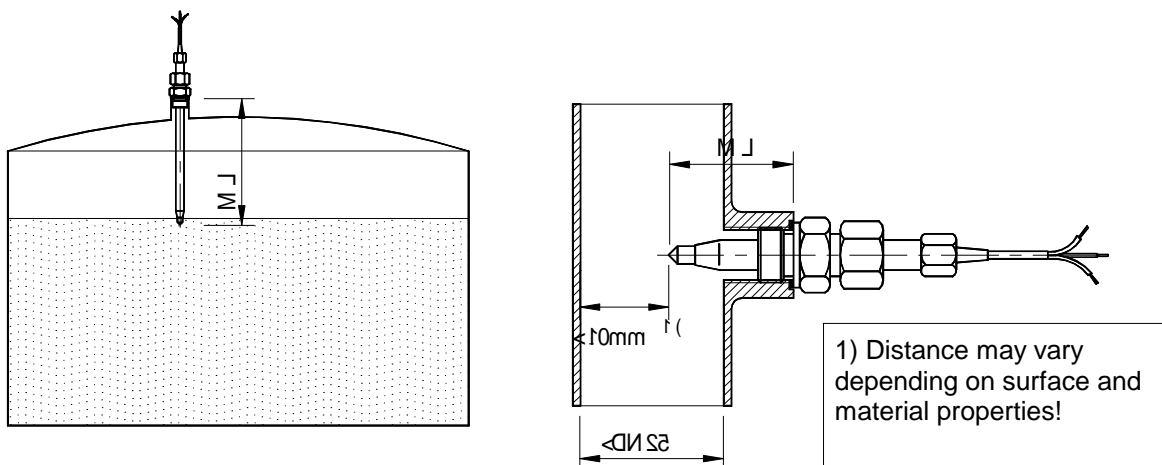


Fig. 3

1.5.2 Transducer Type KSR-OPTO.0032

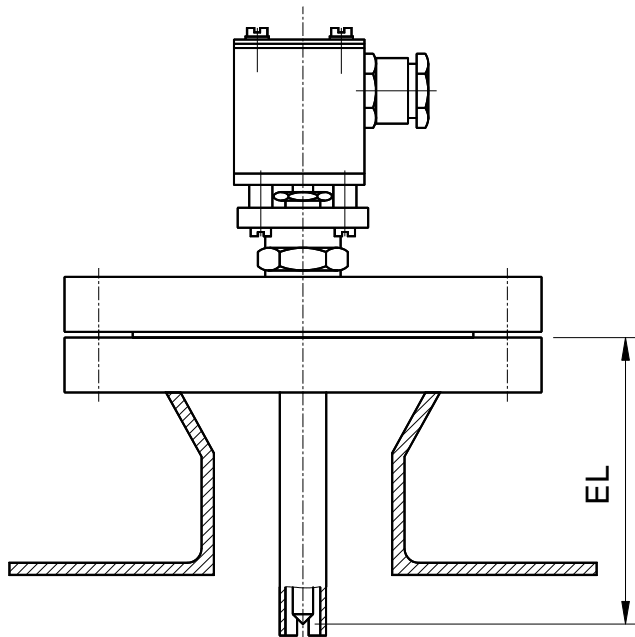


Installation from top for storage tanks
ML max. 2000 mm, if required fixing
near the sensor tip is possible

Installation sideways into pipe or
tank wall, tip has to protrude beyond
union to avoid sensing of gas bubbles

Fig. 4

1.5.3 Transducer Type KSR-OPTO.X1X300XXX.06XX

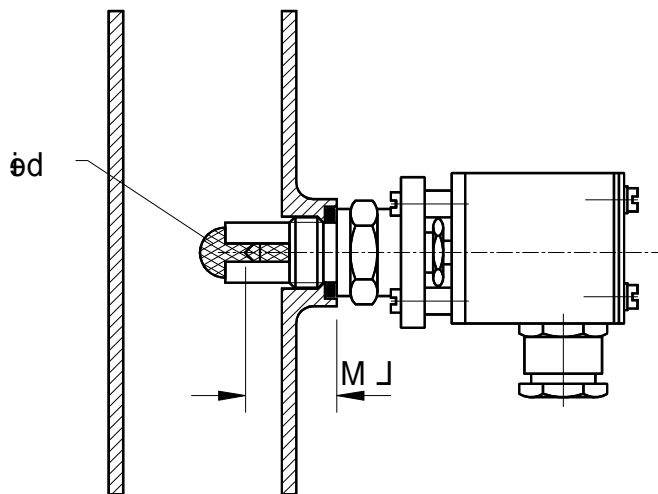


Installation of Type KSR-OPTO.X1X300XXX.0680 from top with flange connection e. g. as Overfill Prevention Device.

EL is measured between flange face and sensor tip.

Minimum flange size is DN25 PN6 or ANSI 1" 150 lbs and all face types may be used. Flange and sensor housing may be welded together especially for dangerous or toxic media. In this case there is no hexagon at the sensor housing.

Fig. 5



Installation sideways into pipe or wall of Type KSR-OPTO.X1X300XXX.0660, e. g. in a pump's suction pipe.

It may be equipped with a sieve to reject gas bubbles from the sensor tip which ensures switching only when the pipe runs empty. The Type KSR-OPTO.X1X300XXX.0660 shown here has a fixed measure ML of 25 mm..

Fig. 6

2. SELECTION TABLE

Each Unit consists of a Transducer and a Controller (Switch Amplifier). The Transducer may be of one-piece or multi-part design. Ex types are generally constructed as multi-part types. Multi-part Transducers can be equipped with a heat-sink to expand the operating temperature range.

Standard versions

Design data		Measuring length ML [mm]	Transducer multi-part: KSR-OPTO.X1X300000.06XX, one-piece: KSR-OPTO....0032, KSR-OPTO....0042	Applicable amplifier
Temp. [°C]	Pressure [bar]			
-60/+250	5	50 - 250	KSR-OPTO.111X000XX.0042	KSR-OPTO.2501.XX
-30/+95	50	18 - 49	KSR-OPTO.11X300000.0032	KSR-OPTO.2501.XX
-30/+95	50	30 - 1500	KSR-OPTO.11X300XXX.0032	KSR-OPTO.2501.XX
-65/+250	250	25	KSR-OPTO.11X300000.0660/.0661	KSR-OPTO.2501.XX
-65/+250	250	50 - 960	KSR-OPTO.11X300XXX.0680/.0681	KSR-OPTO.2501.XX
-269/+400	250	25	KSR-OPTO.11X300000.0669/.0668	KSR-OPTO.2501.XX
-269/+400	250	50 - 960	KSR-OPTO.11X300XXX.0689/.0688	KSR-OPTO.2501.XX

Ex versions

Design data		Measuring length ML [mm]	Transducer multi-part: KSR-OPTO.X1X300000.06XX, one-piece: KSR-OPTO....0032, KSR-OPTO....0042	Applicable amplifier
Temp. [°C]	Pressure [bar]			
-65/+250	250	25	KSR-OPTO.21X300000.0660/.0661	KSR-OPTO.2502.XX
-65/+250	250	50 - 960	KSR-OPTO.21X300XXX.0680/.0681	KSR-OPTO.2502.XX
-269/+400	250	25	KSR-OPTO.21X300000.0669/.0668	KSR-OPTO.2502.XX
-269/+400	250	50 - 960	KSR-OPTO.21X300XXX.0689/.0688	KSR-OPTO.2502.XX

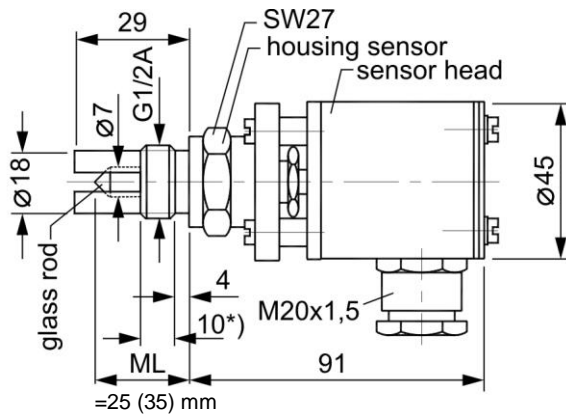
For X see selection code chapter 10.

Fig. 1

Amplifier may be constructed as 19" plug-in modules or built into a plastic housing with a clear cover.

2.1 Multi-part Transducer Type KSR-OPTO.X1X300XXX.06XX

2.1.1 Multi-part Transducer Type KSR-OPTO.X1X300XXX.0660

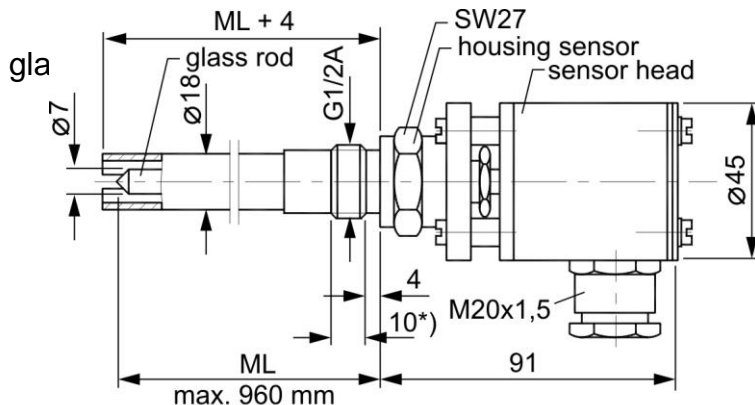


Fixed measuring length ML, no extension possible.
Protection fingers are part of the sensor housing.

*) 20 for high pressure sensor

Fig. 7

2.1.2 Multi-part Transducer Type KSR-OPTO.X1X300XXX.0680

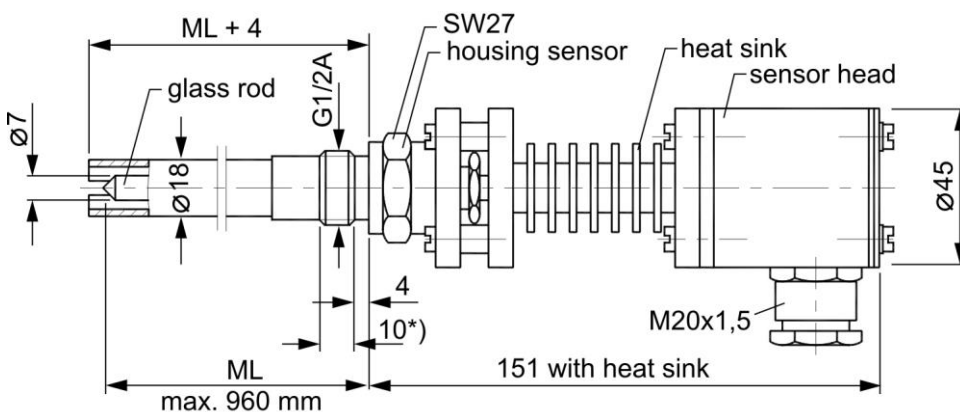


Measuring length ML from 50 to 960 mm.
Extension tube screwed into sensor housing.
Preferred lengths for ML: 50, 60, 80, 90, 100, 120, 150, 200, 300, 600 and 800 mm. Other lengths can also be supplied.

*) 20 for high pressure sensor

Fig. 8

2.1.3 Multi-part Transducer Type KSR-OPTO.X1X300XXX.0689

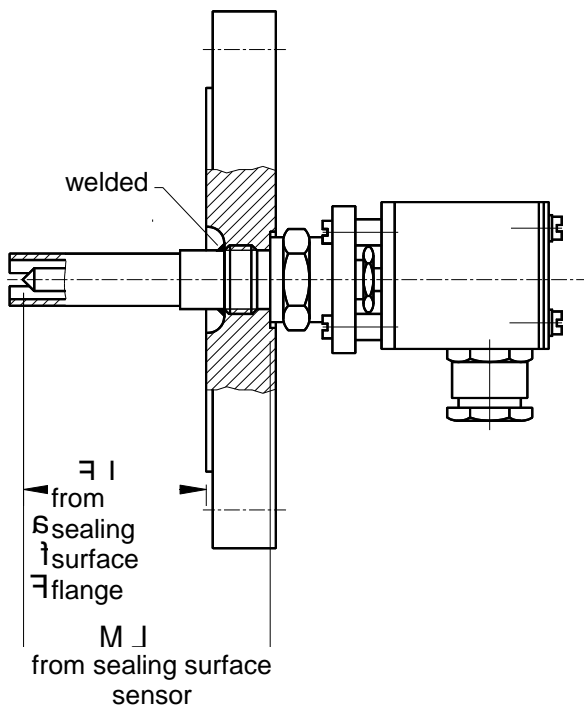


Extended temperature range with heat-sink. This may be combined with fixed ML 25 (35) mm and with extended types.

*) 20 for high pressure sensor

Fig. 9

2.1.4 Multi-part Transducer Type KSR-OPTO.X1X300XXX.06XX



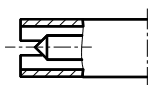
Connection with flanges from DN25 PN6
rsp. ANSI 1" 150 lbs and all types of face.

Tightness welding for dangerous or toxic
media is always combined with a sensor
housing without hexagon.
Insert length EL is calculated:

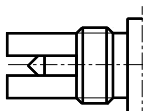
$$EL = ML - \text{flange thickness}$$

Fig. 10

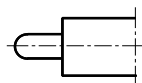
2.1.5 Construction details of Level and Interface sensors



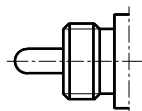
Level sensor with conical tip and **Extension tube**, measuring
length ML 50 - 960 mm
Type KSR-OPTO.X1X300XXX.068X



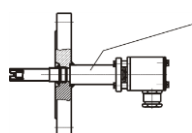
Level sensor with conical tip, measuring
length ML 25 mm
Type KSR-OPTO.X1X300XXX.066X



Interface sensor with U-tip and **Extension tube**, measuring
length ML 50 - 960 mm
Type KSR-OPTO.X1X300XXX.068X



Interface sensor with U-tip, measuring
length ML 25 mm
Type KSR-OPTO.X1X300XXX.066X



Execution with insulation elongation welded in flange

Fig. 11

2.2 One-piece Transducer Type KSR-OPTO.....0032

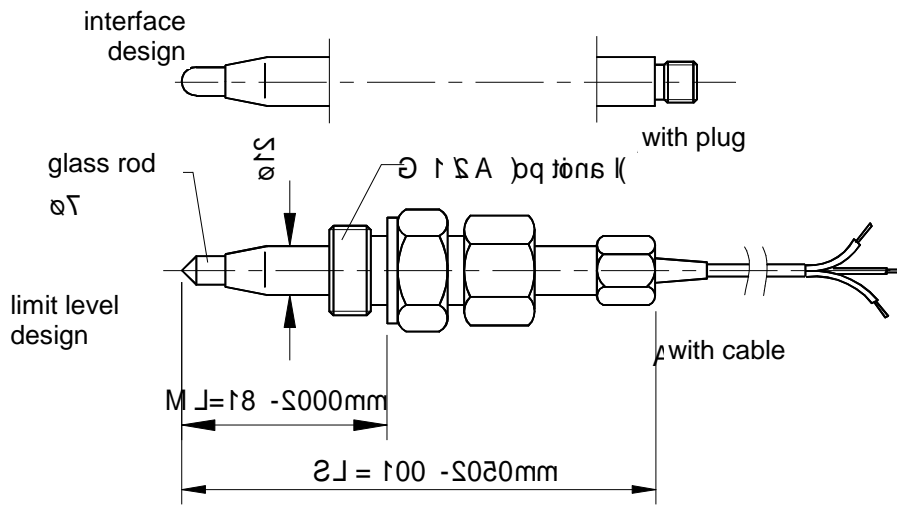
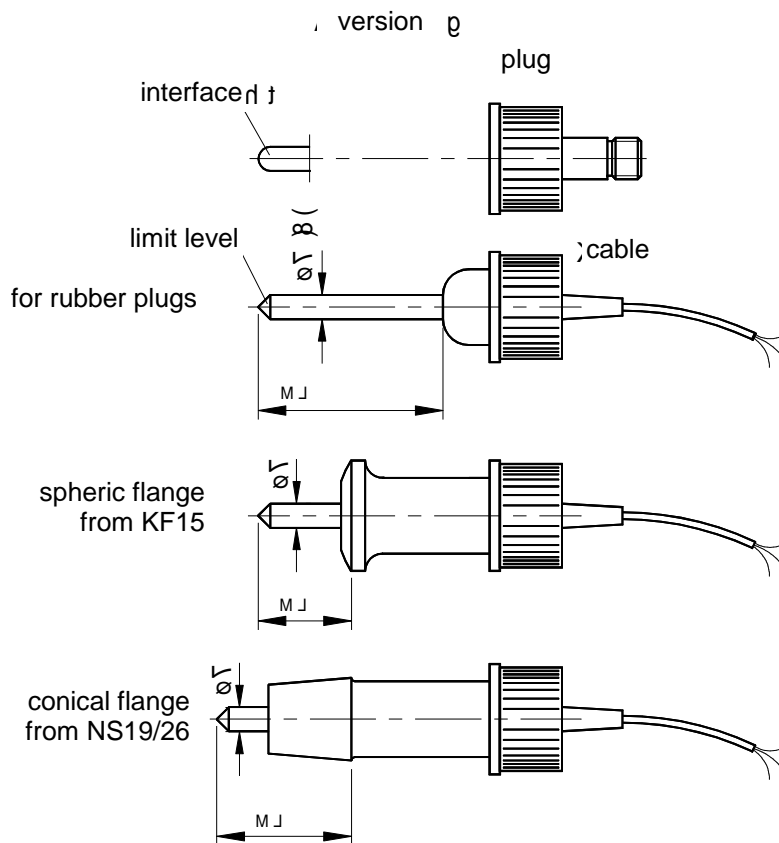


Fig. 12

2.3 One-piece Transducer Type KSR-OPTO.....0042, completely made of glass



ML max. 500 mm for all types 720.0042 $\varnothing 100\text{mm}$

Fig. 13

2.4 Amplifier 19" type KSR-OPTO.250X.X7

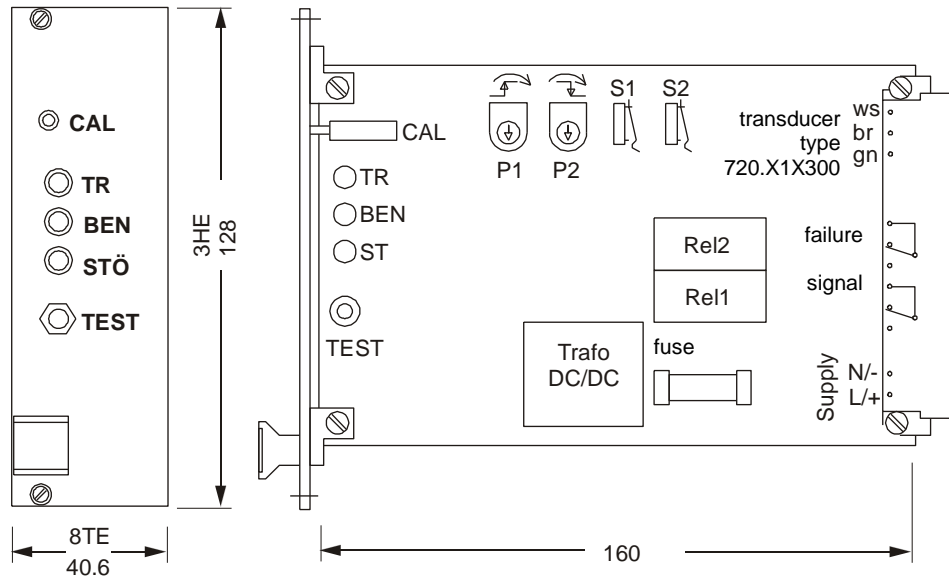


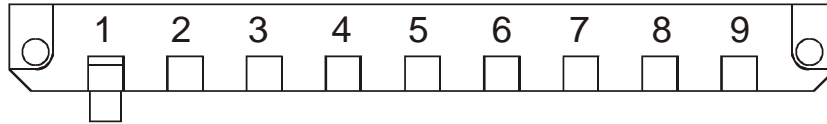
Fig. 14

For the version in an explosion proved type KSR-OPTO.2502.*7 the following points have in addition to be taken into account:

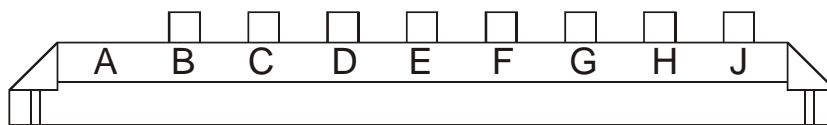
The amplifier is designed as a plug-in card for a 19" system. The plug-in card alone doesn't fulfill the ingress protection IP20 according to EN 60529:1991. It only is intended for the installation into a suitable rack which guarantees the minimum ingress protection IP20. Not used plug-in places have if necessary to be covered with blind plates. The distances and tracking distances particularly are between the individual plug-in cards as well as the intrinsic safe and not intrinsic safe circuits, the requirements on the wiring as well as the excess temperature and the dissipation power converted in the assemblies are to take into account according to EN 60079-11:2012. To avoid mistakes, the switch amplifiers are provided with an encoding system. It has to be made sure that the counter-strip is executed available and identically in the 19" rack.

The default coding has to be gathered from the following table:

Supply version	Encoder-strip rack, provided at these positions with coding pins	Encoder-strip rack, provided at these positions with one coding pin
230 VAC	B-C-D-E-F-G-H-J	1
115/120 VAC	A, C-D-E-F-G-H-J	2
24 VAC	A-B, D-E-F-G-H-J	3
24 VDC	A-B-C, E-F-G-H-J	4



Encoder-strip plug-in card

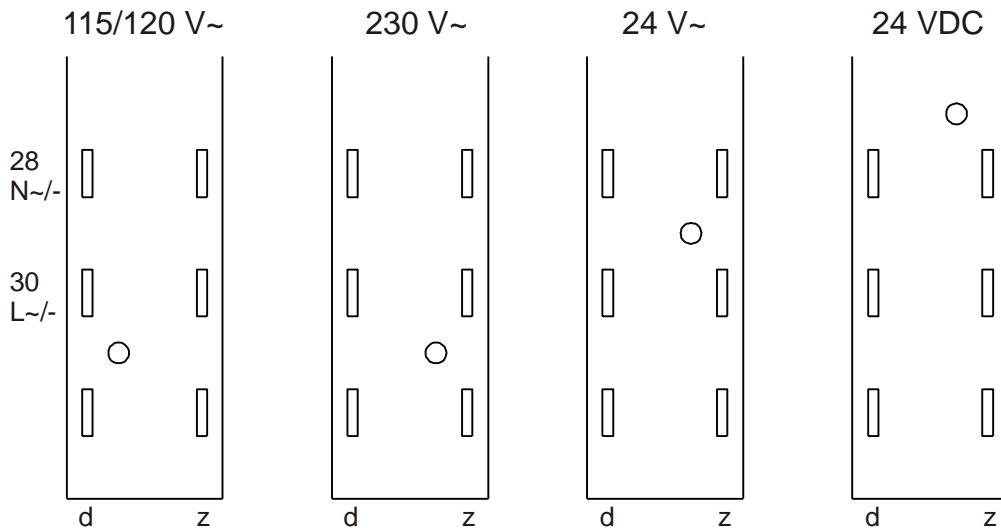


Encoder-strip rack

Example: 230 VAC supply version.

We exclusively recommend the use of suitable racks for the guarantee of the requirements to the company KSR Kuebler AG.

Alternatively the coding can take place directly in the female connector (rack side) and the associated male connector (amplifier side) after the following coding plan:



The coding pin is inserted with a tool captive in the appropriate place in the female connector and at the opposite side in the male connector is a drilling.

2.5 Amplifier in a damp-proofed housing type KSR-OPTO.250X.X1

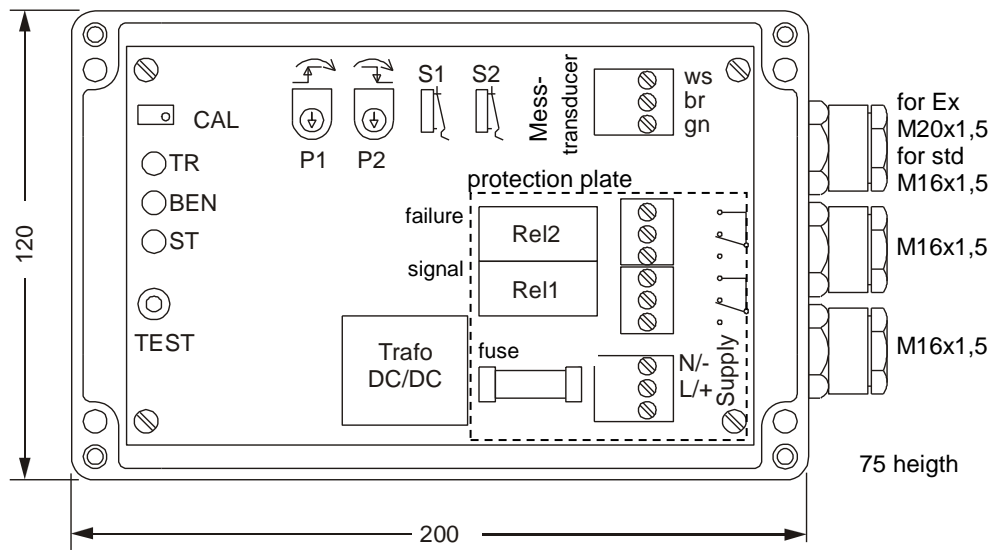
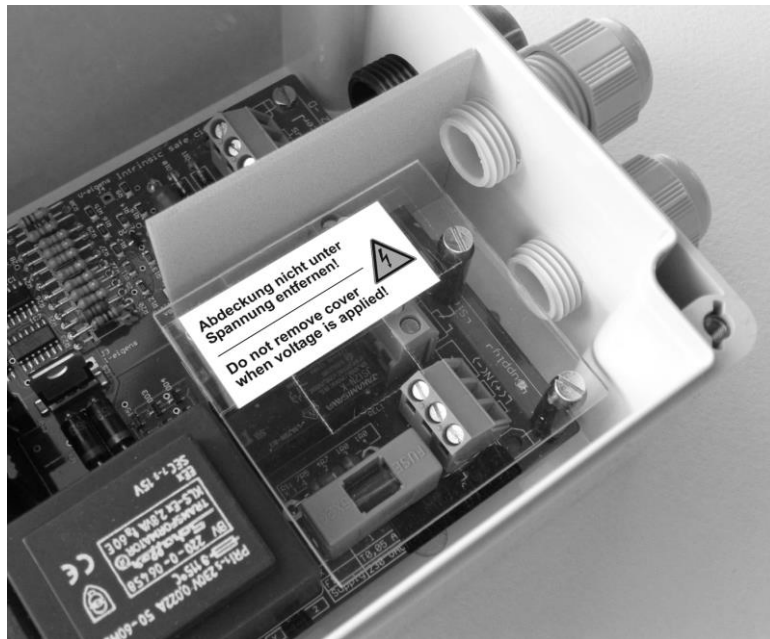


Fig. 15



Attention: please mount the cover after electrical installation! Only after this you may switch on power for supply and output circuit! Before removing cover (e. g. in case of replacing fuse) be sure that there is no power applied (supply and output circuit)!

3. PUTTING INTO OPERATION

Checking the completeness of the shipment

The completeness of the shipment has to be checked when unpacking. Provided that not agreed particularly, the device travels on the risk of the customer. Possible damages in transit can be immediately asserted under enclosing the documentation according to the legal regulations.

Intermediate Storage

If the assembly doesn't immediately take place after the delivery, the Level Gauge must be stored so much that no negative influences can have an effect. We recommend a dry storage place at temperatures below 0 degrees Celsius without additional other objects stacked on this.

Furthermore a check of the function can be carried out before the installation. The device attached provisionally and the glass tip are one and from divided to this for the test in a glass with liquid (justify if necessary in accordance with 4.2). The electrical connection only may be carried out by authorized specialist staff. The appropriate VDE regulations have to be taken into account.



Safety note operating conditions

Before further steps the customer has to check whether furthermore the operating conditions agreed on at the order are valid and the device is suitable for the scheduled purpose. This particularly applies to the features pressure, temperature and medium.

3.1 Mechanical assembly of the transducer



Safety note pressure balance

May work only after a complete pressure balance be carried out. Corresponding safety and environmental protective measures must be adhered to.

The glass tip should have a distance of at least 10 mm to an opposite wall after assembly having been carried out. This minimum distance can vary depending on geometry and surface composition of the wall.

One-piece transducer - use a -screwed pipe e. g. G12S with thread
Type KSR-OPTO.0032: G 1/2 A to screw into a union

One-piece transducer - use the appropriate glass connection
Type KSR-OPTO.0042:

Multi-part transducer - screw it directly into a 1/2" union by using a
Type KSR-OPTO.X1X300XXX.06XX: metallic seal or in case of flanges mount it onto the appropriate counterpart. Please ensure that the spanner SW27 does not stress the transducer's screw heads.



Safety note sensor head

Never try to loosen the transducer sensor head from sensor housing!



Ex hint 'Use Directive'

The operator has to pay attention to the compliance with the European Use Directive 99/92/EC, harmonized Directive EN 60079-10:2011 pp..



Ex hint for operating type KSR-OPTO.21X300XXX.06XX in zone 0

If medium touched parts consist of titanium, the operator has to take care that no metallic fittings can beat to the sensor parts and therefore could trigger a blow spark in the container. Perhaps a protection cage has to be attached outside the container around the sensor head.

Ex hint ambient temperature

*The operator has to provide that the ambient temperatures given in the manual are **not exceeded** in every installation situation of the transducer, with **Ex T6: +60 °C und T5: +75 °C**. Nor shall the lower ambient temperature at **Ex** fall below **-40 °C in any case**.*

Ex hint to the operating conditions for service with flammable measuring mixtures – which are non-explosive – and higher pressures

The operator has to provide it that the lower explosive limit is fallen below for certain with flammable measuring mixtures – which are non-explosive – and higher pressures. The formation of explosion capable atmosphere has to be prevented by stopping the evaporating of combustible liquids.



Safety note installation

The transducer should be assembled with caution and care, is particularly respected on the break risk of the glass. Measures for the protection of the transducer head have to be taken if a lateral load has to be expected. The customer has to provide the suitable choice of the seal materials and materials. The torque corresponds in the pipe line engineering for usual values. The transducer has to be installed unstressedly.



Safety note assembly

The transducer may not be charged at the side under any fuss when installing and in the built-in condition at the sensor head. Also see 7. repair. When screwing into a connection thread do not use the sensor head for turning.

3.1.1 Pressure and leakage test

Every device is subjected to a pressure examination in the work. If in the plant still a strength examination (system pressure examination) be required, pressure may not exceed the examining pressure means 1.5 times the indicated pressure on the type plate and the flange.



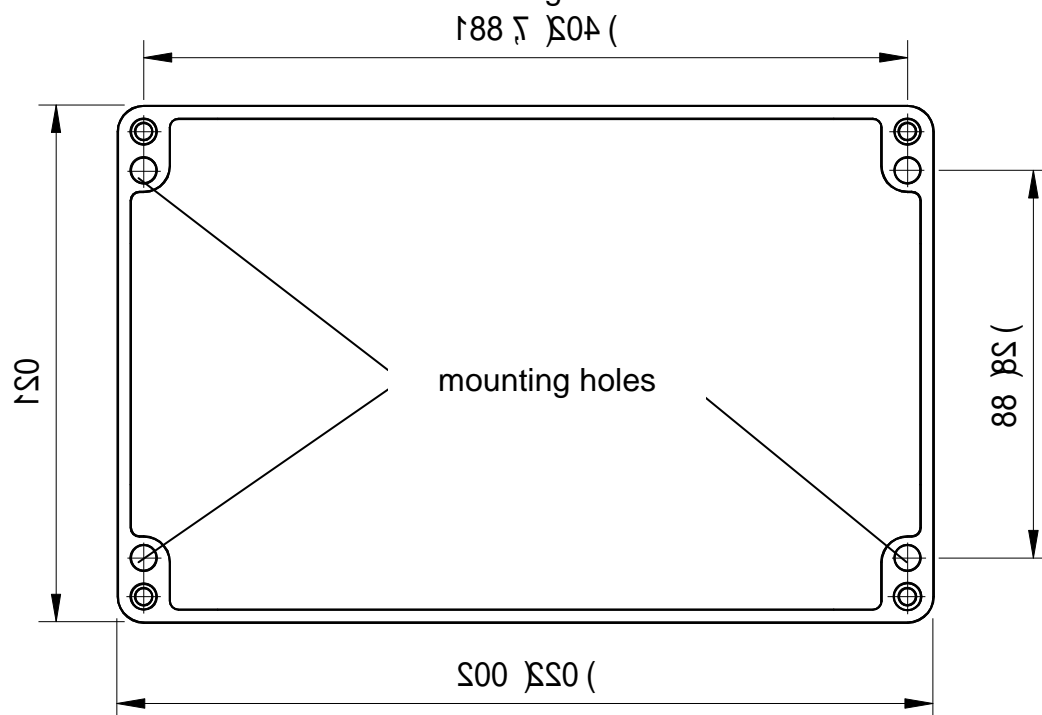
Attention: For all examinations and uses, in principle, these are Indicated on the type plate authoritatively!

3.2 Mechanical Installation of Controller

Amplifier
in Makrolon housing:

- prepare mounting holes acc. to Fig. 16
- detach the clear cover from the housing
- insert mounting screws from cover side into the mounting holes
- tighten the mounting screws

Fig. 16



3.3 Electrical connection transducer and amplifier



Safety note electrical installation

At the electrical installation the operator has to guarantee the compliance with all correct regulations.

The transducer and amplifier connections are both marked with the colors WS (white) respective 2d, BR (brown) respective 4d and GN (green) respective 6d. Connect them according to the connection plan.

The cable must not be shielded, however, should not be laid directly besides strong electrical interference sources either. Including line resistance, contact resistance goes the maximum line length and with that by the following table the maximum:

wire cross section [mm ²]	wiring distance [m]	wiring resistance [Ω]
0,5	175	6,3
0,75	300	7,2
1,0	400	7,2
1,5	600	7,2

Tab. 2

A complete resistance of 9 Ω, inclusive of contact resistances, should not be exceeded since otherwise a failure signal is carried out. A max. inductance of $L_a \leq 0,5 \text{ mH}$ and a max. capacity all over are in addition at of keep $C_a \leq 3 \mu\text{F}$ for (incl. the values of the switch amplifier).

3.3.1 Connection diagram transducer and amplifier

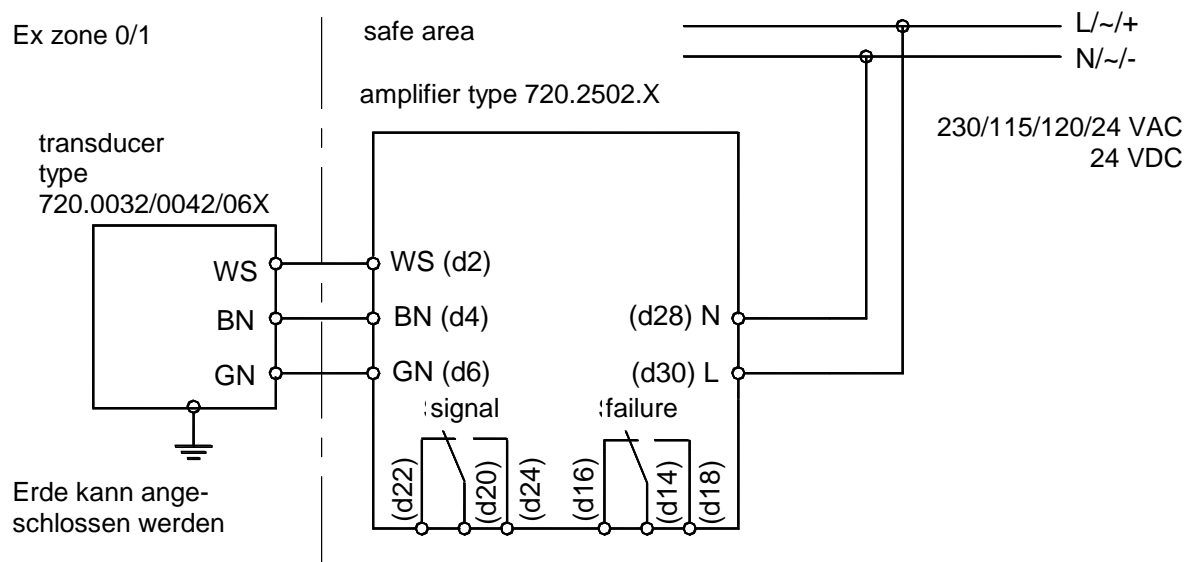


Fig. 17

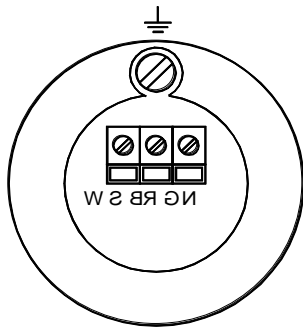
Cable marked light blue or light blue colored to the measuring transducer by the switch amplifier must all over be installed at (intrinsic safe circuit). The switch amplifier has to be installed in safe area, the sensor body may be installed in zone 1 or 2.



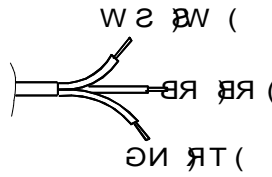
Safety note electrical installation

After electrical installation the protective cover made of acryl is to be attach again!

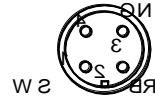
3.3.2 Electrical Connection Transducer



transducer
type
720.X1X300XXX.06XX



transducer
type 720.0032
type 720.0042
cable connection



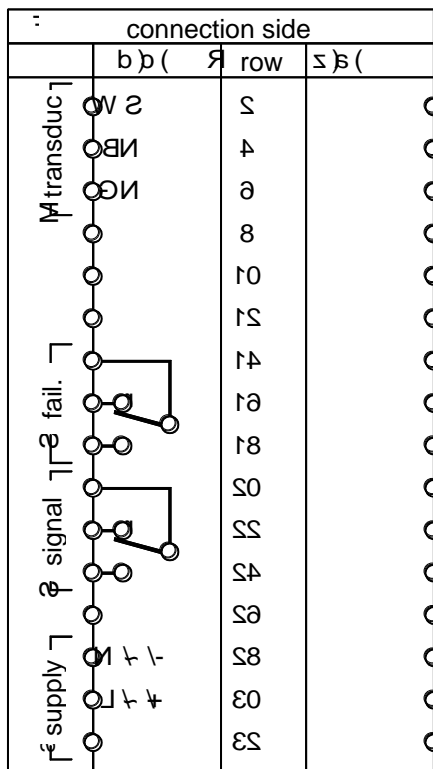
transducer
type 720.0032
type 720.0042
plug connection

Fig. 18

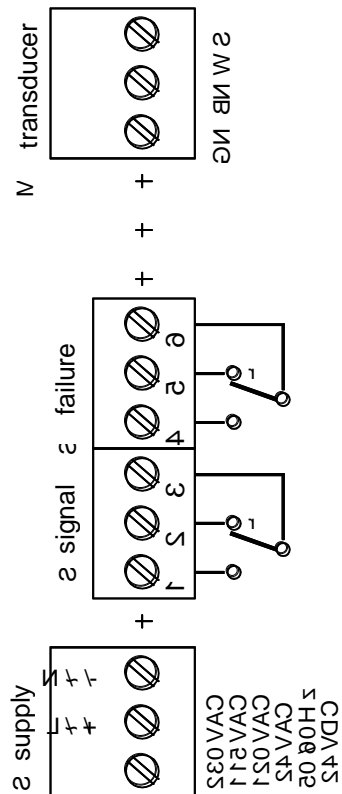
Earthing type KSR-OPTO.21X300XXX.06XX

Earth can be connected at the internal earthing screw (is not necessary for intrinsic safe) or the connection is carried out via the metallic contact of the screwing thread with the container.

3.3.3 Electrical Connection Amplifier



19" card, male plug acc. to
DIN 41612



plastic housing,
screw terminals

Fig. 19

At cards with male connector acc. to DIN 41612 D the contact row a corresponds to z of the type F and row c corresponds to d.

3.4 Connection supply

Whether the existing supply voltage agrees with the voltage version of the amplifier should be checked first. This is obvious from the marking on the circuit board.

230 V ~	KSR-OPTO.250X.1X
115/120 V ~	KSR-OPTO.250X.2X
24 V ~	KSR-OPTO.250X.3X
24 V =	KSR-OPTO.250X.4X
24 V = without isolation	KSR-OPTO.250X.7X

At the version built in a plastic housing the line terminals "supply" is marked with the operating voltage in addition and it is the connection to see directly from the imprint. The connection is carried out in accordance with fig. 17. The connections of the plug-in card are as follows:

d 28 (c28) = N (-)
d 30 (c30) = L (+)

If necessary, with 230 V AC an external circuit breaker can be installed which has at least a switching performance of 5 VA at 230 V AC. It should be well accessible. The supply cable should have at least a cross section of 0.75 mm² and be suited for 230 V AC (double isolation).

3.5 Connection relays

The signals "signal" and "failure" are provided for per a relay with change over contacts. These are potential-free and can be used for every arbitrary application. The connections can be seen directly from the imprint on the pcboard.

Connections:

failure	signal	contact
4 / d18	1 / d24	NO
5 / d16	2 / d22	NC
6 / d14	3 / d20	root

Tab. 3

3.6 Function control

After wiring been carried out and checked the supply can be switched on. One of the yellow LED's should come on now. By pressing the button "test" at closed switch S2 (time delay turned off) one of the two yellow LED shines approx. 1 s. After this the other yellow LED is flashing as long as the test button remains pressed. This shows that wiring and switch amplifiers are all right. If this should not be the case, the justage instructions chapter 4.2 first following. If this should not lead to success, see trouble shooting chapter 7.

4. OPERATION

4.1 Setting of fail-safe direction with switch S1

Switch S1 is a wire-hook switch which may be shortened by soldering or permanent opened by cutting the switch wire.

- High alarm (H): - S1 open,
 - Signal relay released if sensor tip is immersed
- Low alarm (L): - S1 closed
 - Signal relay released if sensor tip is dry
- Factory setting: - S1 open

Table operating status, switch direction S1, LED reaction, relay reaction

operating status \	S1	yellow LED wet	yellow LED dry	signal relay
immersed (sensor tip in medium with higher refractive index)	open H high alarm	flashing	off	released
	closed L low alarm	permanent on	off	energized
dry (sensor tip in medium with lower refractive index)	open H high alarm	off	permanent on	energized
	closed L low alarm	off	flashing	released

Tab. 4

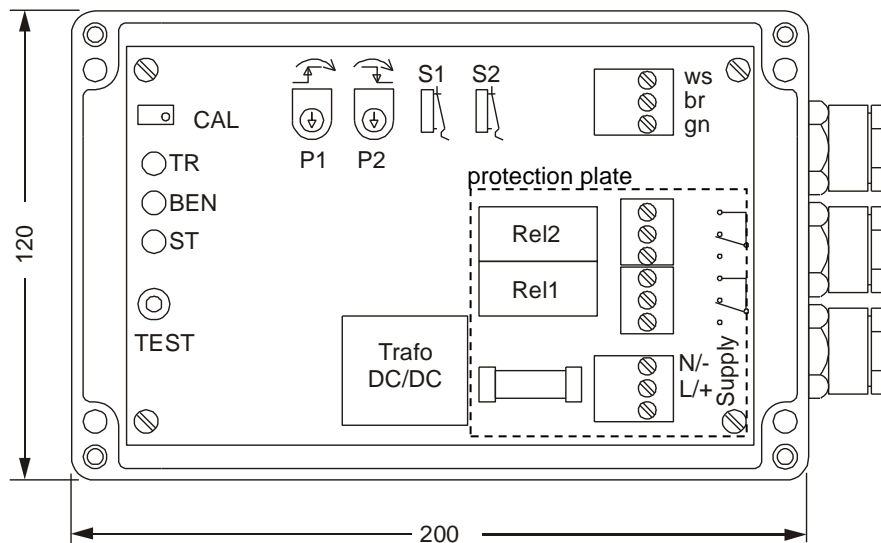


Fig. 20

4.2 Calibration with CAL

This is only required at the first putting into operation or after the wiring to compensate for all variable influences of the measuring equipment. Calibrate only when the sensor tip is in the medium with higher refractive index, e. g.:

- level limit: liquid / gas = calibrate when sensor tip is in the liquid
- interface e. g.: water / oil = calibrate when sensor tip is in oil

The photo transistor voltage can be measured between "GN" and "WS" of the transducer connection with a voltage instrument ($R_i \geq 10 \text{ M}\Omega$, measurement range 10 V=).

	voltage between GN / WS [V]	
	dry ¹⁾	immersed
level limit (conical tip)	0,2 - 1,0 ²⁾	4,5 - 6 ³⁾

- 1) do not adjust, only check this value
- 2) 0.2 V at short measuring lengths and clean conical tip, up to 1.0 V at larger measuring lengths and dirty conical tip.
- 3) adjust this value in the immersed condition only, the switching quality of the system sensor/amplifier can be influenced by variation of this value:
 - ca. 4,5 V = less drop sensitive, foam insensitive
 - ca. 5,0 V = normal low viscous, clean application, no influence of temperature- fluctuations of the medium up to ± 25 degrees Celsius
 - ca. 5,5 V = at strong temperature fluctuations of the medium up to ± 40 degrees Celsius
 - ca. 6,0 V = detektion of condensation, foam (must have stable, reproducible quality)

Tab. 5

	voltage between GN / WS [V]	
	medium with lower refractive index ¹⁾	medium with higher refractive index
interface (spheric shape)	0,2 - 3,0 ²⁾	4,5 - 6 ³⁾

- 1) do not adjust, only check this value
- 2) the tension takes off two media and at this measuring of the refractive index difference can therefore vary strongly.
- 3) adjust this value only when the sensor tip is immersed from the medium with higher refractive index. The switching quality of the system sensor/amplifier can be influenced by variation of this value.

To get a stable measuring it should be tried to adjust a difference as big as possible between these two values.

Tab. 6

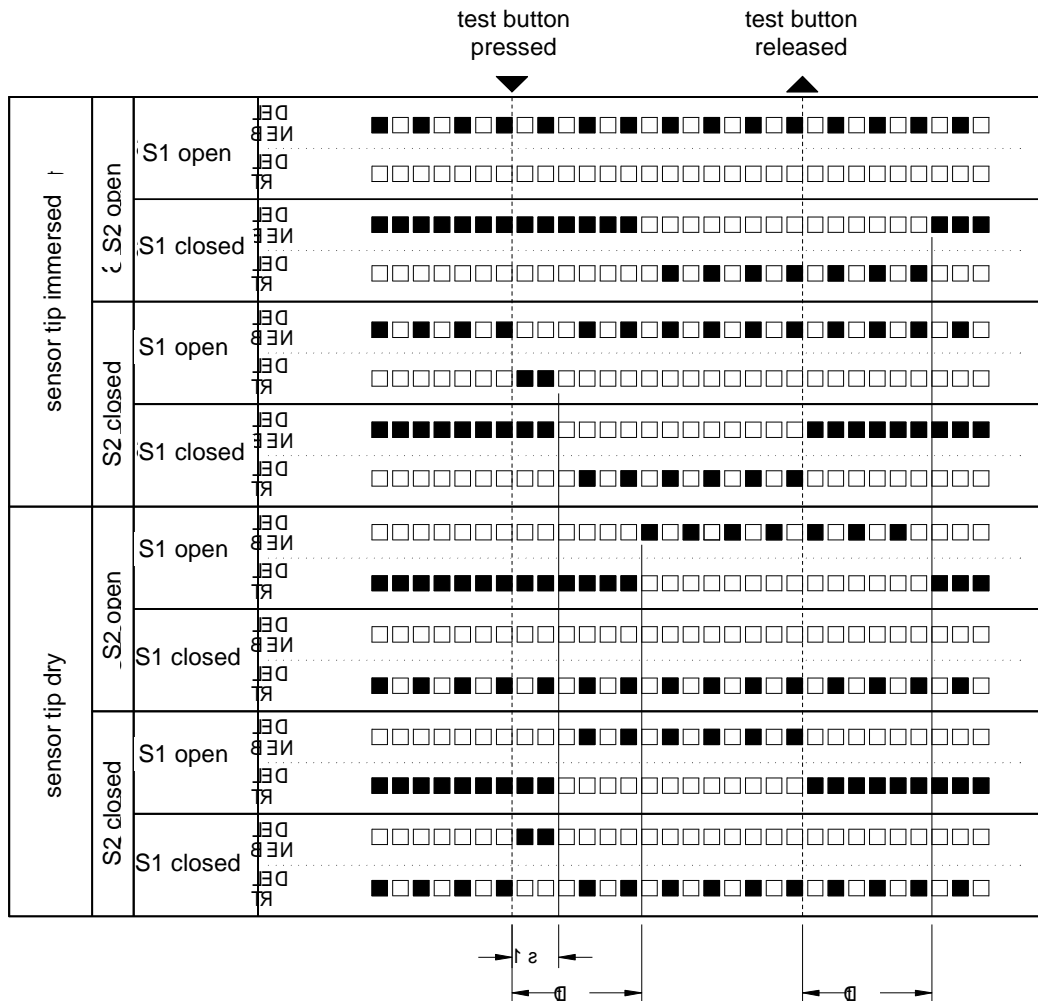
4.3 Justage of time delay

The switch S2 is a wire-hook switch and is to or switch off the delay of the signal relay which separated is adjustable for relay energize and release, e.g. at restless surface or strong fumigations or formations of bubbles in the liquid.

- No time delay: - close S2 or shorten by soldering
- With time delay: - time to energize relay ($_ \uparrow$)
with P1 as required (0-8 s) adjust
- release time ($_ \downarrow$)
with P1 as required (0-8 s) adjust
- Factory settings: - S2 open, P1 and P2 middle position (ca. 3 - 4 s)

4.4 TEST-Procedure

Test expiry when pressing the test button:



Legend: BEN = immersed TR = dry tD = delay time to adjust with P1 and P2

- = LED off
- = LED flashes
- = LED permanent on

Fig. 21

Conditions:

- P1 and P2 middle position, ca. 3 - 4 s time delay if P2 is open
- transducer correct connected and in function
- no failure present

The time delay is, with S2 open, = switched on, must sufficiently be pushed for a long time the button so that the complete test can go off. No test can go off, the alarm was already entitled taken there is with S1 open, S2 open and sensor tip immersed. The same applies S1 closed, S2 open and sensor tip dry. Failure, LED red and a yellow one flashes, can go off no test at.

The test function makes possible a checking the measuring chain switch amplifier separately and e.g. post-connected signal amplifier, signaling devices, control devices or a correction device at a connected and operating transducer and a reliable information gives about the proper function of the circuit board.

4.5 Operating characteristics relay signal

See Tab. 4.

4.6 Operating characteristics relay failure

Das Relais STÖRUNG ist im Normal-Betrieb angezogen und fällt unter folgenden Bedingungen ab (fail-safe-Verhalten):

The relay failure is energized in the normal operation and releases under the following conditions (fail safe behavior):

- the supply voltage breaks down (≥ 100 ms)
- the internal supply voltage for the intrinsic safe circuit breaks down
- short circuit (BR-WS) or interruption to IR-LED (BR)
- short circuit (GN-WS) or interruption to phototransistor (GN)

Behavior of the LED's see Tab. 4.

5. MAINTENANCE

Im Regelfall ist der Optoelektronische Grenzwertgeber wartungsfrei. Ist in der Anlage jedoch mit stärkerer Verschmutzung oder Verkrustung zu rechnen, empfiehlt es sich, eine Wartungsanweisung zu erstellen. Diese kann sich evtl. auf eine elektrische Messung der Spannungswerte an GN/WS des Messwandleranschlusses beschränken:

The optoelectronic limit switch is maintenance-free in the rule. Stronger pollution is in the plant, however, recommends himself to make a maintenance instruction. Perhaps this can confine himself to an electrical measuring of the voltage between GN and WS of the transducer:

- immersed (BEN) in the rule $5 \text{ V}^*)$
- dry (TRO) in the rule $0,2 - 1 \text{ V}^*)$

*) see Tab. 5 + 6.

If the values adjusted at the putting into operation do not adapt, the condition of the glass tip should be checked. At pollution clean. Transducer send in at broken glass for the repair at the manufacturer (**Caution! Into original packing**).

Please, use to the cleaning of the switch amplifier plastic case only a damp cloth.
Clean not dripping wet!

6. GUARANTEE

We grant a guarantee period from 24 months on our products. Condition is the proper treatment and the use as agreed according to the operation instructions. The guarantee confines itself to material and construction faults at wear and spare parts.

The manufacturer takes on the responsibility about the execution as agreed in accordance with customer details. The customer takes on the responsibility about the assembly as agreed and use.

7. RETURN-TO-MANUFACTURER

Because of legal regulations for environmental and personnel protection, devices sent to KSR Kuebler, which have been in contact with liquids can only be transported, checked and repaired if this is possible without danger for personnel and environment.

KSR Kuebler can process your return only, if a declaration according this form is returned together with the product.

If the device has been in contact/operated with toxic, acid, inflammable or water-polluting media, we have to ask you to:

- check and clean, remove or neutralize any hazardous substances in the hollow rooms of the device.
- return an acknowledgment, what the medium was and if it is dangerous.

8. Disposal

The customer/enduser is obliged to take care for the disposal within the legal regulations.

9. REPAIR

Spare parts recommended exclusively by us have to be used to the maintenance. Repairs must be coordinated in writing with us since otherwise our guarantee and responsibility goes out.

9.1 Repair Transducer

A repair of the transducer from operator side is not scheduled. If the operator liked to carry out a repair on own responsibility, he has to seek the consent of the manufacturer absolutely.



9.2 Replacing fuse of amplifier

Safety hint replacement fuse

The amplifier is to be separated safe from the net. In case of the field housing the plastic cover over the net section is to dismount. The fuse is to replace by a new one with a value printed on the board. In case of the field housing fasten the plastic cover again. Reconnect net. Pay attention to page 18!

Supply	KSR-OPTO.250X.XX
230 VAC	T 50 mA
115/120 VAC	T 100 mA

24 VAC	T 400 mA
24 VDC with Potential separation	see marking on PCB
24 VDC without Potential separation	T 400 mA

Tab. 7

9.3 Miscellaneous

Complete electronics is maintenance-free at use as agreed. If a defect should appear, the repair must be carried out at the manufacturer or of the operator with inspection control by a work expert in the case of a Ex device.



Ordering spare parts

At spare part orders absolutely exact type, series no. and commission no. the manufacturer indicate.

10. TROUBLE SHOOTING

FAILURE	POSSIBLE REASON	REMEDY
no function	Power supply been cancelled	Measure mains voltage, check fuse, check terminal screws (not soldering ends of the cable)
Flashing of the red and a yellow LED	transducer not connected Cable interrupted to the transducer Cable short-circuited to the transducer Cal. P3 adjusted too far about switching threshold	transducer connect up Connections and cables check Connections and cables check Adjusting in accordance with instructions 4.2
LED changes, signal relay changes, however no reaction of the outer circuit	Contacts of the RelaisREL 1 do not close/open	measure Relay contacts
The signal relay switches none over despite level change	P3 adjusted wrongly, (under switching point) transducer faulty (mechanical defects) (electrical defects) Glass tip facing too near at opposite surface	Justage acc. to manual 4.2 Carrying out circuit board test. Circuit board test faultless, glass top on damage or dirt approach search, clean or exchange if under change transducer see chapter 3.1.
Equipment reacts invers	S1 in a wrong position	S1 change position
Equipment reacts apparently not or too slowly to level change	S2 open, P1, P2 on the right stop, delay on	S2 close or P1, P2 turn anti-clockwise or wait until delay time has passed
Test button no reaction	S2 open, P1, P2 on the right stop, delay on	S2 close or P1, P2 on the left stop shift and leave S2 open. Pressing test button so long till the delay time has passed

Tab. 8

11. TECHNICAL DATA

11.1 Transducer

11.1.1 One-piece transducer

	Unit	KSR-OPTO.....0032	KSR-OPTO.....0042
Repeatability			
- level (conical tip)	mm	±0,5	±0,5
- refractive index (U-shape)	R.I.	±0,01	±0,01
Temperature			
- medium	°C	-30...+95 ¹⁾	-60...+250
- ambient	°C	-25...+95	-25...+95
P_{proc}	bar	0-50 ¹⁾	0-5
Measuring length			
- standard	mm	18-49	50
- maximal	mm	2050	500
Mechanical conn.			
- standard		pipe Ø12 for union G ½ A	glass plug KF, NS or acc. to customer's spec.
Material			
- sensor housing		1.4571	quartz glass
- sensor tip see Fig. 12, Fig. 13		quartz	quartz glass
- sealing		graphite	quartz glass
Weight	kg	0,1 +5g/cm elongation	0,1 +1,3g/cm elongation
Electr. connection		3 m PVC cable 3x0,14 mm ² or 4 pole plug	3 m PVC cable 3x0,14 mm ² or 4 pole plug
Cable outlet		safety against buckling	safety against buckling
Ingress protection acc. to EN 60529		IP 67	IP 67
Switch amplifier		type KSR-OPTO.2501.XX	type KSR-OPTO.2501.XX

1) special version on demand

Tab. 9

11.1.2 Multipart transducer

Standard version KSR-OPTO.11X300XXX.06XX

	unit	value
Repeatability		
- level (conical tip)	mm	±0,5
- refractive index (U-shape)	R.I.	±0,02
Operating temperature	°C	-65 ... +250 (KSR-OPTO.11X300XXX.06X0/06X1) -269 ... +400 ²⁾ (KSR-OPTO.11X300XXX.06X9/06X8)
Temperature ambient	°C	-65 ... +95
Operating pressure	bar	0-250 ¹⁾²⁾
Measuring length		
- standard/max	mm	25 / 960
Mechanical conn.		
- standard		G ½ A
- other ⁷⁾		to costumer's spec.
Material		
- sensor housing ⁸⁾		1.4571... ⁸⁾
- sensor body		~1.4301
- dissipator		~1.4301
- glass tip		cladded core glass, quartz, sapphire
Weight	kg	0,77 (KSR-OPTO.11X300XXX.06X0/06X61) +9,3g/cm elong. 1,07 (KSR-OPTO.11X300XXX.06X9/06X68) +9,3g/cm elong.
Electrical connection		screw terminals with wire protection, 2,5 mm ²
Cable outlet		M20X1,5
Ingress protect. acc. to EN 60529		IP 65
Switch amplifier		amplifier type KSR-OPTO.2501.XX

Ex version KSR-OPTO.21X300XXX.06XX

	unit	value
Repeatability		
- level (conical tip)	mm	±0,5
- refractive index (U-shape)	R.I.	±0,02
Operating temperature	°C	-65 ... +250 (KSR-OPTO.11X300XXX.06X0/06X1) -269 ... +400 ²⁾ (KSR-OPTO.11X300XXX.06X9/06X8)
Temperature ambient	°C	T6: -40 ... +60, T5: -40 ... +75
Operating pressure	bar	0-250 ¹⁾²⁾
Measuring length		
- standard/max	mm	25 / 960
Mechanical conn.		
- standard		G ½ A
- other ⁷⁾		to costumer's spec.
Material		
- sensor housing ⁸⁾		1.4571... ⁸⁾
- sensor body		~1.4301
- dissipator		~1.4301
- glass tip		cladded core glass, quartz, sapphire
Weight	kg	0,77 (KSR-OPTO.21X300XXX.06X0/06X61) +9,3g/cm elong. 1,07 (KSR-OPTO.21X300XXX.06X9/06X68) +9,3g/cm elong.
Electrical connection		screw terminals with wire protection, 2,5 mm ²
Cable outlet		M20X1,5, blue
Ingress protect. acc. to EN 60529		IP 65
Certificates		II 1/2 G Ex ib op is IIC T6/T5 ³⁾
Switch amplifier		amplifier type KSR-OPTO.2502.XX ⁶⁾

1) special designs differing (up to 500 bar)

2) Noticing derating diagram page 9

3) II 1/2 G Ex ib op is IIC T6/T5 ZELM 06 ATEX 0299

6) The certificates are valid only in connection with the switch amplifier mentioned above with the certificate no.

II (2) G [Ex ib] IIC ZELM 06 ATEX 0300

7) e. g. flanges acc. to DIN, ANSI, ..., also with leak-proof welding sensor housing/flange

8) all metallic materials in accordance with customer specification, no light metals, at titanium are to follow the special notes in chapter 3.1. Subject to alterations! **Tab. 10**

11.2 Amplifier

Standard version KSR-OPTO.2501.XX

	unit	value
Separate LED indicators for immersed (BEN)/dry (TRO)/ failure (STÖ)		yes
Functions - alarm, BEN or TRO flashes, depends on S1 - monitoring short-circuit and open-circuit to transducer, Fail-safe, LED failure flashes - test button, test of all circuit functions - time delay signal relays, energized or released		yes yes yes 0 - 8
Temperature ambient - 19" plug-in card - Plastics housing	°C °C	-25 ... +60 -40 ... +40
Power supply - AC-voltage - DC-voltage	V AC V DC	230±10 %, 24/115/120±15 % 24 ±25%
Mains frequency	Hz	48 ... 62
Power consumption	VA	5
Output - signal, relay, 1 x SPDT - failure, relay, 1 x SPDT	V/A/VA, V/A/W V/A/VA, V/A/W	250/3/100, 40/2/100 250/3/100, 40/2/100
Plastics housing - housing H x B x T - cable inlet - terminals - ingress protect. acc. to EN 60529 - weight	mm kg	200 x 120 x 75 3 x M20x1,5 screw terminals with wire protection IP 65 0,6
Cross section supply cable - Supply 230 V AC	mm ²	at least 0,75
19" plug-in card - printed circuit board - front plate - connecton male plug - weight	mm kg	160 x 100 3HE, 8TE DIN 41612 Form F (z, d) oder Form D (a, c) 0,31

Ex version KSR-OPTO.2502.XX

	unit	value
Separate LED indicators for immersed (BEN)/dry (TRO)/ failure (STÖ)		yes
Functions - alarm, BEN or TRO flashes, depends on S1 - monitoring short-circuit and open-circuit to transducer, Fail-safe, LED failure flashes - test button, test of all circuit functions - time delay signal relays, energized or released		yes yes yes 0 - 8
Temperature ambient - 19" plug-in card - Plastics housing	°C °C	-25 ... +60 -40 ... +40
Power supply - AC-voltage - DC-voltage	V AC V DC	230±10 %, 24/115/120±15 % 24 ±25%
Mains frequency	Hz	48 ... 62
Power consumption	VA	5
Output - signal, relay, 1 x SPDT - failure, relay, 1 x SPDT	V/A/VA, V/A/W V/A/VA, V/A/W	250/3/100, 40/2/100 250/3/100, 40/2/100
Plastics housing - housing H x B x T - cable inlet - terminals - ingress protect. acc. to EN 60529 - weight	mm kg	200 x 120 x 75 2 x M20x1,5 1 x M20X1,5 blue screw terminals with wire protection IP 65 0,6
Cross section supply cable - Supply 230 V AC	mm ²	at least 0,75
19" plug-in card - printed circuit board - front plate - connecton male plug - ingress protection acc. to EN 60529 - weight	mm kg	160 x 100 3HE, 8TE DIN 41612 Form F (z, d) oder Form D (a, c) with coding, use only in housing with IP 20 0,31
Certificates - Ex		II (2) G [Ex ib] IIC ZELM 06 ATEX 0300

Tab. 11

Subject to alterations!

12. SELECTION CODE

12.1 Type KSR-OPTO.0032 one-piece transducer

T_{proc} -30 bis +95 °C

P_{proc} 0 ... 50 bar

KSR-OPTO. 0032 X X X X

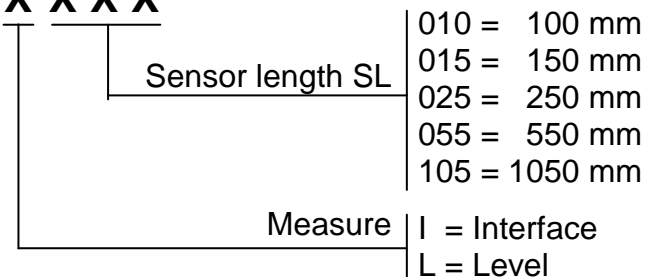


Fig. 22

Level (conical tip)

Sensor length SL [mm]	Type / Ordering-no.
100	KSR-OPTO0032L010
150	KSR-OPTO0032L015
250	KSR-OPTO0032L025
550	KSR-OPTO0032L055
1050	KSR-OPTO0032L105

Interface (U-tip)

Sensor length SL [mm]	Type / Ordering-no.
100	KSR-OPTO0032I010
150	KSR-OPTO0032I015
250	KSR-OPTO0032I025
550	KSR-OPTO0032I055
1050	KSR-OPTO0032I105

Tab. 12

12.2 Type KSR-OPTO.0042 completely made of glass, one-piece transducer

T_{proc} -60...+250 °C

P_{proc} 0...10 bar

KSR-OPTO. 00 4 2 X V A R

Measure | I = Interface
| L = Level

Selection key:

X X X X

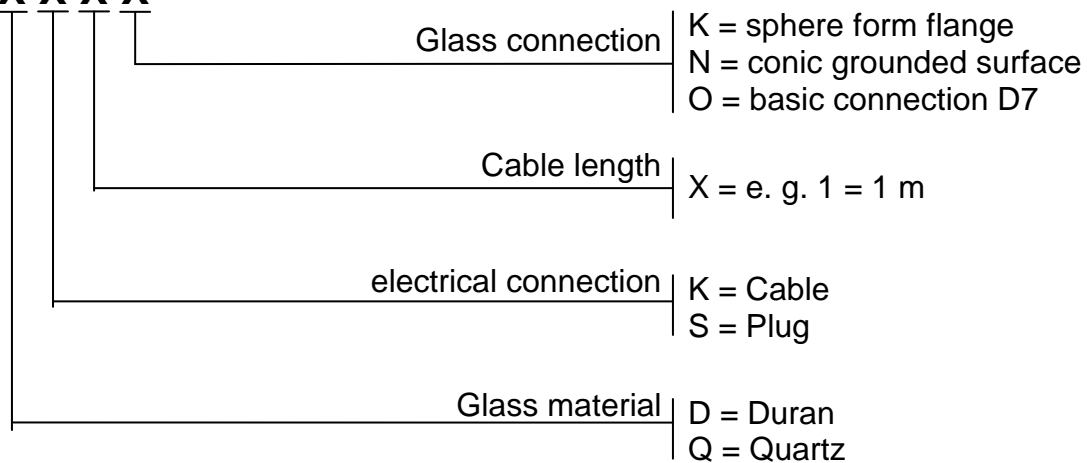


Fig. 23

Level (conical shape)

Measuring length ML [mm]	Type / Ordering-No.
50 - 250 (Duran)	KSR-OPTO0042LVAR
50 - 500 (Quartz)	KSR-OPTO0042LVAR

Interface (U-shape)

Measuring length ML [mm]	Type / Ordering-No.
50 - 250 (Duran)	KSR-OPTO0042IVAR
50 - 500 (Quartz)	KSR-OPTO0042IVAR

Tab. 13

Level (conical shape), Ex

Measuring length ML [mm]	Type
25	KSR-OPTO.211300000.0660
50	KSR-OPTO.211300005.0680
60	KSR-OPTO.211300006.0680
80	KSR-OPTO.211300008.0680
90	KSR-OPTO.211300009.0680
100	KSR-OPTO.211300010.0680
120	KSR-OPTO.211300012.0680
150	KSR-OPTO.211300015.0680
200	KSR-OPTO.211300020.0680
300	KSR-OPTO.211300030.0680
600	KSR-OPTO.211300060.0680
800	KSR-OPTO.211300080.0680

Interface (U-shape), Standard (Not Ex)

Measuring length ML [mm]	Type
25	KSR-OPTO.112300000.0660
50	KSR-OPTO.112300005.0680
60	KSR-OPTO.112300006.0680
80	KSR-OPTO.112300008.0680
90	KSR-OPTO.112300009.0680
100	KSR-OPTO.112300010.0680
120	KSR-OPTO.112300012.0680
150	KSR-OPTO.112300015.0680
200	KSR-OPTO.112300020.0680
300	KSR-OPTO.112300030.0680
600	KSR-OPTO.112300060.0680
800	KSR-OPTO.112300080.0680

Interface (U-shape), Ex

Measuring length ML [mm]	Type
25	KSR-OPTO.212300000.0660
50	KSR-OPTO.212300005.0680
60	KSR-OPTO.212300006.0680
80	KSR-OPTO.212300008.0680
90	KSR-OPTO.212300009.0680
100	KSR-OPTO.212300010.0680
120	KSR-OPTO.212300012.0680
150	KSR-OPTO.212300015.0680
200	KSR-OPTO.212300020.0680
300	KSR-OPTO.212300030.0680
600	KSR-OPTO.212300060.0680
800	KSR-OPTO.212300080.0680

Tab. 14

Material and length variable types, level, conical tip, standard

ML [mm]	Material ²⁾	Type
25	variable	KSR-OPTO.111300000.0660
XXX ¹⁾	1.4571	KSR-OPTO.111300XXX.0680
XXX ¹⁾	variabel	KSR-OPTO.111300XXX.0680

Material and length variable types, interface, U-shape, standard

ML [mm]	Material ²⁾	Type
25	variable	KSR-OPTO.112300000.0660
XXX ¹⁾	1.4571	KSR-OPTO.112300XXX.0680
XXX ¹⁾	variabel	KSR-OPTO.112300XXX.0680

Material and length variable types, level, conical tip, Ex

ML [mm]	Material ²⁾	Type
25	variable	KSR-OPTO.211300000.0660
XXX ¹⁾	1.4571	KSR-OPTO.211300XXX.0680
XXX ¹⁾	variabel	KSR-OPTO.211300XXX.0680

Material and length variable types, interface, U-shape, Ex

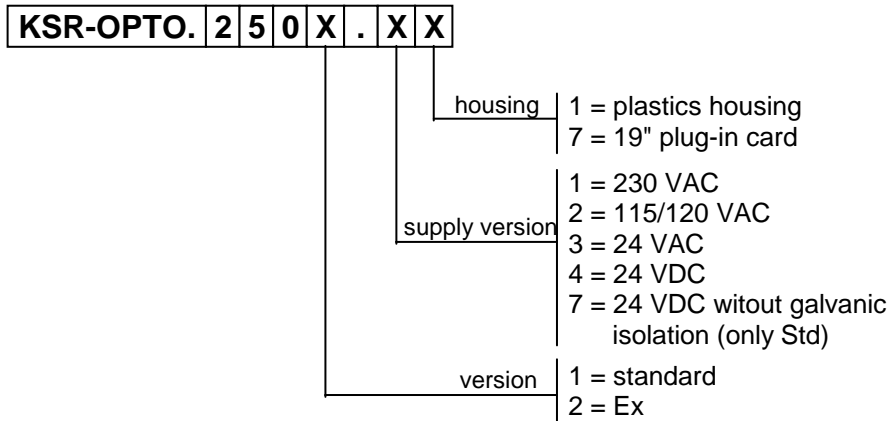
ML [mm]	Material ²⁾	Type
25	variable	KSR-OPTO.212300000.0660
XXX ¹⁾	1.4571	KSR-OPTO.212300XXX.0680
XXX ¹⁾	variabel	KSR-OPTO.212300XXX.0680

Tab. 15

¹⁾ max. 960 mm

²⁾ ATEX: all stainless austenitic steels acc. to DIN 17440 (old) and ASTM, Ni and its alloys, Copper and its alloys, Tantalum, Titanium (see also hint in this manual on page 7).

12.4 Type KSR-OPTO.250X.XX Amplifier



Attention: version 720.250Y.7X (supply version 7) is not available as explosion proofed version.

Fig. 25

Plastics housing, standard (not Ex)

Supply	Type/Ordering-no.
230 V AC	KSR-OPTO.2501.11
115/120 V AC	KSR-OPTO.2501.21
24 V AC	KSR-OPTO.2501.31
24 V DC with galvanic isolation	KSR-OPTO.2501.41
24 V DC without galvanic isolation	KSR-OPTO.2501.71

Plastics housing, Ex

Supply	Type/Ordering-no.
230 V AC	KSR-OPTO.2502.11
115/120 V AC	KSR-OPTO.2502.21
24 V AC	KSR-OPTO.2502.31
24 V DC with galvanic isolation	KSR-OPTO.2502.41

19" plug-in card, standard (not Ex)

Supply	Type/Ordering-no.
230 V AC	KSR-OPTO.2501.17
115/120 V AC	KSR-OPTO.2501.27
24 V AC	KSR-OPTO.2501.37
24 V DC with galvanic isolation	KSR-OPTO.2501.47
24 V DC without galvanic isolation	KSR-OPTO.2501.77

19" plug-in card, Ex

Supply	Type/Ordering-no.
230 V AC	KSR-OPTO.2502.17
115/120 V AC	KSR-OPTO.2502.27
24 V AC	KSR-OPTO.2502.37
24 V DC with galvanic isolation	KSR-OPTO.2502.47

Tab. 16

13 Safety Manual

Functional safety acc. to IEC 61508 / IEC 61511

Optoelectronic Limit Switch type KSR-OPTO.X1X300XXX.06XX in connection with Amplifier type KSR-OPTO.250X.XX.

13.1 General

13.1.1 Validity

This safety manual applies to Optoelectronic Limit Switch type KSR-OPTO.X1X300XXX.06XX in connection with Amplifier type KSR-OPTO.250X.XX, called "measuring system".

Application range

The measuring system can be used for the following functions which meet the specific requirements of the safety technology:

- overflow protection
- dry run protection
- detection of an individual level

The functions can be also used simultaneously.

The functions can be used in the mode of operation with low demand mode as well as in the mode of operation with high demand or continuous mode.

The measuring system is qualified in all modes to meet the requirement degree SIL1 acc. to IEC 61508-2 / IEC 61511-1.

The lifetime of the measuring system for the use in safety applications is outlined for 10 years.

In safety-related systems with an architecture 1oo2D and the requirement SIL2, the measuring system must be combined with a comparator chain, so the complete measuring system fulfills in the mode of operation with low demand mode

$$PFD = PFD_{CH1} \cdot PFD_{CH2} + CC$$

$$PFD < 10^{-2}$$

The safety-related characteristics must be calculated separately.

13.1.2 Relevant standards

IEC 61508 Part 1, 2, 4

Functional safety of electrical / electronic / programmable electronic systems

IEC 61511-1

Functional safety - safety instrumented systems for the process industry sector - Part 1: Framework, definitions, system, hardware and software requirements

13.1.3 Determination of safety-related characteristics

The failure limit values for a safety function, depending on the SIL class.

Safety integrity level	Low demand mode	High demand or continuous mode level
SIL	PFD _{avg}	PFH
1	$\geq 10^{-2}$ bis $< 10^{-1}$	$\geq 10^{-6}$ bis $< 10^{-5}$

from IEC 61508, part 1/7.6.2)

Safety integrity of the hardware:

Limitations due to the architecture for safety-related subsystems of type B

Safe failure fraction SFF	Hardware fault tolerance HFT	
	0	1(0) ¹⁾
<60 %	nicht erlaubt	SIL1
60 % bis <90 %	SIL1	SIL2

1) Acc. to IEC 61511-1, paragraph 11.4.4 the fault tolerance specified acc. to the above chart can be reduced by one for all subsystems if the following conditions are met:

- instrument has proven during operation
- the safety function needs less than SIL 4

13.2 Planning

13.2.1 Low demand mode

If the demand rate is only once a year, then the measuring system can be used as safety relevant subsystem in „low demand mode“ (see IEC 61508-4, 3.5.12).

Corresponding characteristics : PFD_{avg} (average probability of dangerous failure on demand).

It is dependent on the test interval T_{Proof} between the function tests of the protective function.

13.2.2 High demand or continuous mode

If the demand rate is more than once a year, the measuring system must be used as safety relevant subsystem in „high demand or continuous mode“ (see IEC 61508-4, 3.5.12).

Corresponding characteristics: PFH (probability of a dangerous failure per hour)

13.2.3 General

Definition of a dangerous undetected failure:

- the instrument does not react to the demand of the process

Otherwise the tolerance data in the operating instructions manual are applicable.

Make sure

that the measuring system is used as it was intended for the application (see operating instructions)

manual). The application-specific limits must be complied with and the specifications must not be exceeded (see operating instructions manual).

13.3 Set-up

13.3.1 Mounting and installation

The prevailing plant conditions influence the safety of the measuring system. Therefore note

the mounting and installation instructions of the appropriate operating instructions manual and references in this Safety manual chapter 2.3.1 mounting and installation. Therefore the assembly and installation hint are to be considered according to the operating instructions, in particular the safety references in chapters 3., 3.1 und 3.3. To absolutely avoid for a safe function are:

- Alignment of the measuring system with first start-up and exchange of the transducer or the amplifier (see manual)
- Examination of the complete function by dive in / out-dip or if not possible through pressing the test key (see manual)
- Examination on perfect condition of the glass tip (cleanly, not damaged)
 - lateral load of the measuring body avoid (possibly attach mechanical protection)
 - attach deflecting plate from glass tip with high flow rates and particles
 - if with the transducer a transport lock is attached in case of heavy flange, remove only briefly before the installation the transport lock
- include measuring system after mounting into the pressure test also
- Operation only by experienced operators

13.4 Reaction during operation and in case of failure

In case of detected failures or fault signals, the entire measuring system must be switched out of service and the process held in a safe condition by means of other measures.

13.5 Recurring function test

The recurring function test serves to reveal potential dangerous errors that are otherwise not discernible.

The function of the measuring system must be checked at adequate intervals. The operator is responsible for choosing the type of test and the intervals in the stated time frame.

The time intervals depend upon the applied PFDavg value acc. to the chart and diagram in the paragraph „Safety-related characteristics“.

The test must be carried out in a way that verifies the flawless operation of the safety functions in conjunction with all system components. This is ensured by a controlled reaching of the response height during a filling.

If the function test proves negative, the entire measuring system must be switched out of service and the process held in a safe condition by means of other measures.

13.5.1 Safety-related characteristics

SIL	Safety Integrity Level	SIL1	
HFT	Hardware Fault Tolerance	0	
SFF	Safe Failure Fraction	61,2 %	
PFD_{avg}	average Probability of dangerous Failure on Demand (for low demand mode)	$7,20 \cdot 10^{-4}$ $1,44 \cdot 10^{-3}$ $2,16 \cdot 10^{-3}$ $2,88 \cdot 10^{-3}$ $3,6 \cdot 10^{-3}$	$T_{proof} = 1 \text{ year}$ $T_{proof} = 2 \text{ years}$ $T_{proof} = 3 \text{ years}$ $T_{proof} = 4 \text{ years}$ $T_{proof} = 5 \text{ years}$
PFH [1/h]	Probability of dangerous Failure per Hour (for high demand mode or continuous mode)	$9,2 \cdot 10^{-7}$	
λ_s	Safe detected/undetected failure	180 FIT	
λ_{DD}	dangerous detected failure	110 FIT	
λ_{DU}	dangerous undetected failure	69 FIT	

¹⁾ PFD_{avg} this value correlates almost linearly to the operating time. It is only valid for the corresponding selection circuit.

²⁾ T_{proof} is the interval after which a periodically recurring complete function test (to check the safety function) must be carried out.

14. EC-TYPE_EXAMINATION CERTIFICATES



Prüf- und Zertifizierungsstelle

ZELM Ex



(1) EC-TYPE-EXAMINATION CERTIFICATE

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - Directive 94/9/EC

(3) EC-TYPE-EXAMINATION CERTIFICATE Number:

ZELM 06 ATEX 0299

(4) Equipment: **Transducer type KSR-OPTO.21*.06XX**

(5) Manufacturer: **KSR KUEBLER Niveau-Messtechnik AG**

(6) Address: **D-69439 Zwingenberg**

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Prüf- und Zertifizierungsstelle ZELM Ex, notified body No. 0820 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report ZELM Ex 0490615468.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50 014: 1997 +A1+A2

EN 50 020: 1994

EN 50 284: 1999

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.


(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this Certificate.

(12) The marking of the equipment shall include the following:



II 1/2 G EEx ib IIC T5, T6

Zertifizierungsstelle ZELM Ex


Dipl.-Ing. Harald Zelm



Braunschweig, Juli 19, 2006

Sheet 1/3

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SCHEDULE

(13)

(14) **EC-TYPE-EXAMINATION CERTIFICATE ZELM 06 ATEX 0299**

(15) Description of equipment

The transducer type KSR-OPTO.21*.06XX is used for limit value registration for tanks containing flammable or non-flammable liquids connected to the separately certified switching amplifier type KSR-OPTO.2502.XX. The equipment consists of the measuring box with intrinsically safe electronics, the fibre-optic probe and optionally an additional cooling part and/or an extension.

The transducer is allowed to be installed into the separation wall between the hazardous areas of category 1G and category 2G.

The operating conditions for service with flammable measuring mixtures - which are non-explosive - and higher pressures are to be taken from the instruction manual and operation manual respectively.

The symbol "*" resp. "XX" in the type designation stands for an 7-digits resp. 2-digits number combination, which identify permissible variants of the transducer and will be replaced by determined digits.

Electrical data

Signal circuit

type of protection Intrinsic Safety EEx ib IIC

Only for connection to supply units with intrinsically safe circuits.

maximum values:

$$U_i = 9,7 \text{ V DC}$$

$$I_i = 149 \text{ mA}$$

$$P_i = 1 \text{ W}$$

The effective internal capacitance and effective internal inductance are negligibly small.

permissible ambient temperatures dependent on the temperature class:

lower limit of ambient temperature	upper limit of ambient temperature	Temperature class
-40 °C	+60 °C	T 6
-40 °C	+75 °C	T 5

Degree of protection at least IP 65 according to EN 60529:1991

References:

The instruction manual has to be considered, in particular the references belonging the installation into the separation wall between the hazardous areas of category 1G and category 2G for the operating conditions and material performance and belonging the sufficient equipotential bonding and grounding.

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Schedule to EC-TYPE-EXAMINATION CERTIFICATE ZELM 06 ATEX 0299

- (16) Report No.
ZELM Ex 0490615468
- (17) Special conditions for safe use
not applicable
- (18) Essential Health and Safety Requirements
met by standards

Zertifizierungsstelle ZELM Ex


Dipl.-Ing. Harald Zelm



Braunschweig, Juli 19, 2006

Sheet 3/3

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1. Supplement

(Supplement according to EC-Directive 94/9 Annex III letter 6)

ZELM ex

to EC-type-examination Certificate

ZELM 06 ATEX 0299


Equipment: **Transducer type KSR-OPTO.21*.06XX**
Manufacturer: **KSR KUEBLER Niveau-Messtechnik AG**
Address: **D-69439 Zwingenberg**

Description of supplement

Within the scope of the first supplement to the EC-type-examination Certificate ZELM 06 ATEX 0299 the compliance with the actual standards was verified.

The changes relate to the type of protection and the marking.

The Transducer type KSR-OPTO.21*.06XX may be manufactured in the future according to this supplement and will be marked as follows:

 II 1/2 G Ex ib op is IIC T5, T6

The electrical data and the all other data remain unchanged and are valid for this supplement furthermore.

Report No.

ZELM Ex 0781019807

Essential Health and Safety Requirements

The essential health and safety requirements are still fulfilled by compliance with the following Standards:

EN 60079-0:2009 EN 60079-11:2007
EN 60079-26:2007 EN 60079-28:2007

Braunschweig, October 22, 2010

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Sheet 1 of 1

EC-type-examination Certificates without signature and stamp are not valid. This EC-type-examination Certificate may only be circulated without alteration. Extracts or alterations are subject to approval by the Prüf- und Zertifizierungsstelle ZELM ex. This English version is based on the German text. In the case of dispute, the German text shall prevail.

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2. Supplement

(Supplement according to EC-Directive 94/9 Annex III letter 6)

ZELM ex

to EC-type-examination Certificate

ZELM 06 ATEX 0299

Equipment: **Transducer type KSR-OPTO.21*.06XX**
 Manufacturer: **KSR KUEBLER Niveau-Messtechnik AG**
 Address: **D-69439 Zwingenberg**

Description of supplement

This 2. Supplement for the EC-type-examination Certificate concerns aggregations of the basic conditions and the change of the type and marking. The type code and marking is in future:

KSR-OPTO										.	2	1	X	3	0	0	X	X	X	.	0	6	X	X
Appl.- Cation Ex	Level	Interface	Measuring length in cm e. g. 150 mm = 015	X	X	X	6	8	Elongation	T _{Proc}		0		1		8		9						
										-65...+250 °C		-65...250 °C + insulation elong.		-269...+400 °C + insulat. elong.		-269...+400 °C								

General information about the process temperature T_{Proc} is not subject of this EC-type-examination Certificate. The manufacturer's specifications from the type plate have to be observed. The instruction manual has to be considered. From now on the Transducer type KSR-OPTO.21X300XXX.06XX can only be manufactured and marked under consideration of this 2. Supplement. The electrical data and all other data remain unchanged and valid for the future.

Report No.

ZELM Ex 0501325979

Essential Health and Safety Requirements

The essential health and safety requirements are still fulfilled by compliance with the following Standards:

EN 60079-0:2009
 EN 60079-26:2007

EN 60079-11:2007
 EN 60079-28:2007

Braunschweig, 2013-04-29

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Zertifizierungsstelle ZELM EX
 Dipl.-Ing. Harald Zelm



Sheet 1 of 1

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3. Supplement

(Supplement according to EC-Directive 94/9 Annex III letter 6)

ZELM ex

to EC-type-examination Certificate

ZELM 06 ATEX 0299

Equipment: **Transducer type KSR-OPTO.21X300XXX.06XX**
Manufacturer: **KSR KUEBLER Niveau-Messtechnik AG**
Address: **Heinrich-Kuebler-Platz 1, D-69439 Zwingenberg am Neckar**

Description of supplement

The 3. Supplement concerns the examination of the device for compliance to the current standards.

The instruction manual has to be considered. In the future the Transducer type KSR-OPTO.21X300XXX.06XX may also be manufactured under consideration of this 3. Supplement. The marking, the electrical data and all other data remain unchanged and are valid further on.

Report No.

ZELM Ex 15313191026

Essential Health and Safety Requirements

The essential health and safety requirements are still fulfilled by compliance with the following Standards:

EN 60079-0:2012 **EN 60079-11:2012**
EN 60079-26:2007 **EN 60079-28:2007**

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Braunschweig, 2014-03-07



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Prüf- und Zertifizierungsstelle
ZELM Ex



(1) **EC-TYPE-EXAMINATION CERTIFICATE**

- (2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**
(3) EC-TYPE-EXAMINATION CERTIFICATE Number:


ZELM 06 ATEX 0300

- (4) Equipment: **Switching amplifier type KSR-OPTO.2502.XX**
(5) Manufacturer: **KSR KUEBLER Niveau-Messtechnik AG**
(6) Address: **D-69439 Zwingenberg**
(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.
(8) The Prüf- und Zertifizierungsstelle ZELM Ex, notified body No. 0820 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.
The examination and test results are recorded in the confidential report ZELM Ex 0500615469.
(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014: 1997 +A1 A2

EN 50020: 1994

- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this Certificate.
(12) The marking of the equipment shall include the following:

 **II (2) G [EEx ib] IIC**

Zertifizierungsstelle **ZELM Ex**


Dipl.-Ing. Harald Zelm



Braunschweig, Juli 19, 2006

Sheet 1/3

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SCHEDULE

(13)

(14) **EC-TYPE-EXAMINATION CERTIFICATE ZELM 06 ATEX 0300**

(15) Description of equipment

The switching amplifier type KSR-OPTO.2502.XX is used for the preparation and transfer of the signals from the intrinsically safe measuring circuit into the contact circuits.

The symbol "X" in the type designation stands for permissible variants of the switching amplifier and will be replaced by determined digits.

The permissible ambient temperature range conducts from -40 °C to $+60\text{ °C}$

Electrical data

supply:

Typ KSR-OPTO.2502.1X

230 VAC $\pm 10\%$, 2,8 VA
maximum safety voltage $U_m = 253\text{ V}$
resp.

Typ KSR-OPTO.2502.2X

115/120 VAC $\pm 15\%$, 2,8 VA
maximum safety voltage $U_m = 140\text{ V}$
resp.

Typ KSR-OPTO.2502.3X

24 VAC $\pm 15\%$, 2,8 VA
maximum safety voltage $U_m = 33\text{ V}$
resp.

Typ KSR-OPTO.2502.4X

24 VDC $\pm 25\%$, 2,8 W
maximum safety voltage $U_m = 33\text{ V}$

measuring circuit

type of protection Intrinsic Safety EEx ib IIC

maximum values: $U_o = 9,6\text{ V}$
 $I_o = 149\text{ mA}$
 $P_o = 1\text{ W}$

maximum permissible external capacitance $C_o = 3\text{ }\mu\text{F}$
maximum permissible external inductance $L_o = 0,5\text{ mH}$

contact circuits

the amplifier has two contact circuits
(failure and signal)

maximum values for each contact circuit:

alternating voltage : $U_{max} = 253\text{ V}$ $I_{max} = 3\text{ A}$ ($U_m = 253\text{ V}$)

direct voltage: $U_{max} = 40\text{ V}$ $I_{max} = 2\text{ A}$ ($U_m = 125\text{ V}$)

$S_{max} = 100\text{ VA}$

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ZELM Ex



Schedule to EC-TYPE-EXAMINATION CERTIFICATE ZELM 06 ATEX 0300

The intrinsically safe measuring circuit is safely electrically isolated from all further circuits up to a peak value of the nominal voltage of 375 V.

The assignment of the terminals to the appropriate circuits is to be taken from the instruction manual according to the present version.

References:

The instruction manual has to be observed.

- (16) Report No.
ZELM Ex 0500615469
- (17) Special conditions for safe use
not applicable
- (18) Essential Health and Safety Requirements
met by standards

Zertifizierungsstelle ZELM Ex


Dipl.-Ing. Harald Zelm



Braunschweig, Juli 19, 2006

Sheet 3/3

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1. Supplement

(Supplement according to EC-Directive 94/9 Annex III letter 6)

ZELM ex

to EC-type-examination Certificate

ZELM 06 ATEX 0300

Equipment: **Switching amplifier type KSR-OPTO.2502.XX**

Manufacturer: **KSR KUEBLER Niveau-Messtechnik AG**

Address: **D-69439 Zwingenberg**


Description of supplement

Within the scope of the first supplement to the EC-type-examination Certificate ZELM 06 ATEX 0300 the internal construction of the Equipment has been slightly modified and the compliance with the actual standards has been examined.

The explosion protection concept of the equipment is not detracted because of these changes and is valid further on.

The type of protection, all other data and the special conditions are still unchanged and are also valid for this 1. supplement.

The marking of the equipment has been modified as followed.

 II (2) G [Ex ib] IIC

In the future the equipment can also be manufactured under consideration of this 1. supplement.

Report No.

ZELM Ex 0791019808

Essential Health and Safety Requirements

The essential health and safety requirements are still fulfilled by compliance with the following Standards:

EN 60079-0:2009 EN 60079-11:2007

Braunschweig, October 22, 2010

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Zertifizierungsstelle ZELM ex
Dipl.-Ing. Harald Zelm

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Sheet 1 of 1

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2. Supplement

(Supplement according to EC-Directive 94/9 Annex III letter 6)

ZELM ex

to EC-type-examination Certificate

ZELM 06 ATEX 0300

Equipment: **Switching Amplifier type KSR-OPTO.2502.XX**

Manufacturer: **KSR KUEBLER Niveau-Messtechnik AG**

Address: **D-69439 Zwingenberg**

Description of supplement

This 2. Supplement for the EC-type-examination Certificate ZELM 06 ATEX 0300 concerns aggregations of the basic conditions.

The type of protection, electrical data and all other data remain unchanged and are also valid for this 2. Supplement.

From now on the Switching Amplifier type KSR-OPTO.2502.XX can only be manufactured under consideration of this 2. Supplement.

Report No.

ZELM Ex 0511325980

Essential Health and Safety Requirements

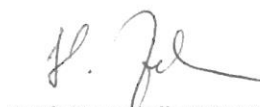
The essential health and safety requirements are still fulfilled by compliance with the following Standards:

EN 60079-0:2009 EN 60079-11:2007

Braunschweig, 2013-04-29

ZELM ex

Zertifizierungs-
stelle



Zertifizierungsstelle ZELM EX
Dipl.-Ing. Harald Zelm

**ZELM
ex**

Sheet 1 of 1

EC-type-examination Certificates without signature and stamp are not valid. This EC-type-examination Certificate may only be circulated without alteration. Extracts or alterations are subject to approval by the Prüf- und Zertifizierungsstelle ZELM EX. This English version is based on the German text. In the case of dispute, the German text shall prevail.

ZELM EX
Prüf- und Zertifizierungsstelle
Siekgraben 56 - D-38124 Braunschweig

3. Supplement

(Supplement according to EC-Directive 94/9 Annex III letter 6)

ZELM ex

to EC-type examination Certificate

ZELM 06 ATEX 0300

Equipment: **Switching Amplifier type KSR-OPTO.2502.XX**
Manufacturer: **KSR Kuebler Niveau-Messtechnik AG**
Address: **Heinrich-Kuebler-Platz 1, D-69439 Zwingenberg am Neckar**

Description of supplement

Within the scope of the 3. Supplement changes of the internal assembly of the equipment were considered, the electrical data of the supply was adjusted, the ambient temperature range was concretized and the compliance of the equipment to the current standards was checked.

The electrical data of the supply are changed. In summary, all electrical data are listed again.

Electrical data

Supply: **Type KSR-OPTO.2502.1X**
230 VAC \pm 10%, 5 VA
maximum safety voltage $U_m = 253$ V
resp.
Type KSR-OPTO.2502.2X
115/120 VAC \pm 15%, 5 VA
maximum safety voltage $U_m = 140$ V
resp.
Type KSR-OPTO.2502.3X
24 VAC \pm 15%, 5 VA
maximum safety voltage $U_m = 33$ V
resp.
Type KSR-OPTO.2502.4X
24 VDC \pm 25%, 5 W
maximum safety voltage $U_m = 33$ V

Measuring circuit: type of protection Intrinsic Safety Ex ib IIC
maximum values:

$U_o \leq$	9.6	V
$I_o \leq$	149	mA
$P_o \leq$	1	W
maximum permissible external capacitance	$C_o \leq$	3 μ F
maximum permissible external inductance	$L_o \leq$	0.5 mH

Sheet 1 of 2

EC-type-examination Certificates without signature and stamp are not valid. This EC-type-examination Certificate may only be circulated without alteration. Extracts or alterations are subject to approval by the Prüf- und Zertifizierungsstelle ZELM EX. This English version is based on the German text. In the case of dispute, the German text shall prevail.

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**3. Supplement
to EC-type examination Certificate ZELM 06 ATEX 0300**

ZELM ex

Contact circuits: the amplifier has two contact circuits
(failure and signal)
maximum values for each contact circuit:
alternating voltage: $U_{max} = 253 \text{ V}$
 $I_{max} = 3 \text{ A}$
 $U_m = 253 \text{ V}$
direct voltage: $U_{max} = 40 \text{ V}$
 $I_{max} = 2 \text{ A}$
 $U_m = 125 \text{ V}$
 $S_{max} = 100 \text{ VA}$

The intrinsically safe measuring circuit is safely electrically isolated from all further circuits up to a peak value of the nominal voltage of 375 V.

The assignment of the terminals to the appropriate circuits is to be taken from the instruction manual according to the present version.

The ambient temperature range of type KSR-OPTO.2502.X1 is as follows: $-40 \text{ °C} \leq T_{amb} \leq 40 \text{ °C}$

The ambient temperature range of type KSR-OPTO.2502.X7 is as follows: $-25 \text{ °C} \leq T_{amb} \leq 60 \text{ °C}$

The marking as well as all other data remain unchanged and are valid further on.

The Switching Amplifier type KSR-OPTO.2502.XX may be manufactured in future according to this Supplement.

Report No.

ZELM Ex 15213191027

Essential Health and Safety Requirements

The essential Health and Safety Requirements are fulfilled by compliance with the following Standards:

EN 60079-0:2012

EN 60079-11:2012

Braunschweig, 2014-03-07

ZELM ex

Zertifizierungs-
stelle

Zertifizierungsstelle ZELM ex
Dipl.-Ing. Harald Zelm



Sheet 2 of 2

EC-type-examination Certificates without signature and stamp are not valid. This EC-type-examination Certificate may only be circulated without alteration. Extracts or alterations are subject to approval by the Prüf- und Zertifizierungsstelle ZELM ex. This English version is based on the German text. In the case of dispute, the German text shall prevail.

ZELM ex
Prüf- und Zertifizierungsstelle
Siekgraben 56 · D-38124 Braunschweig



EU-Konformitätserklärung
EU Declaration of Conformity

Dokument Nr.: 1131_01
Document No.:

Wir erklären in alleiniger Verantwortung, dass die mit CE gekennzeichneten Produkte
We declare under our sole responsibility that the CE marked products

Typenbezeichnung: OLS-S ; OLS-H
Type Designation:

Beschreibung: Optoelektronischer Füllstandsschalter, Standard- und Hochdruckausführung
Description: *Optoelectronic level switch, standard and high-pressure version*

die grundlegenden Schutzanforderungen der folgenden Richtlinien erfüllen: *comply with the essential protection requirements of the directives:* Harmonisierte Normen: *Harmonized standards:*


2014/30/EU Elektromagnetische Verträglichkeit⁽¹⁾ EN 61326-1:2013
Electromagnetic Compatibility⁽¹⁾ EN 61326-2-3:2013

⁽¹⁾ Emission (Gruppe 1, Klasse A) und Störfestigkeit (industrieller Bereich).
Emission (group 1, class A) and immunity (industrial application).

Unterzeichnet für und im Namen von / *Signed for and on behalf of*

KSR Kuebler Niveau-Messtechnik AG

Zwingenberg, 2016-04-20


Thomas Gerling, Vorstand / CEO
KSR Kuebler Niveau-Messtechnik AG

KSR KUEBLER Niveau-Messtechnik AG
Heinrich-Kuebler-Platz 1
69439 Zwingenberg
Deutschland

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E-Mail: info@ksr-kuebler.com
www.ksr-kuebler.com

Amtsgericht Mannheim HRB 714806
Vorsitz des Aufsichtsrates: Dirk Fellemann
Vorstand: Thomas Gerling (Vorsitzender)
Gerichtsstand: Mosbach/Baden

EU-Konformitätserklärung EU Declaration of Conformity

Dokument Nr.: 1116_01
Document No.:

Wir erklären in alleiniger Verantwortung, dass die mit CE gekennzeichneten Produkte
We declare under our sole responsibility that the CE marked products

Typenbezeichnung: KSR-OPTO.21X300XXX.06XX
Type Designation:

Beschreibung: Messwandler
Description: Transducer

die grundlegenden Schutzanforderungen der folgenden Richtlinien erfüllen; Harmonisierte Normen:
comply with the essential protection requirements of the directives: Harmonized standards:

2014/30/EU	Elektromagnetische Verträglichkeit ⁽¹⁾ <i>Electromagnetic Compatibility⁽¹⁾</i>	EN 61326-1:2013 EN 61326-2-3:2013
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2014/34/EU	Explosionsschutz (ATEX) ⁽²⁾⁽³⁾ <i>Explosion protection (ATEX)⁽²⁾⁽³⁾</i>
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II 1/2 G Ex ib op is IIC T5, T6

EN 60079-0:2012
EN 60079-11:2012
EN 60079-26:2007
EN 60079-28:2007

- (1) Emission (Gruppe 1, Klasse A) und Störfestigkeit (industrieller Bereich)
Emission (group 1, class A) and immunity (industrial application)
- (2) EG-Baumusterprüfbescheinigung ZELM 06 ATEX 0299 von ZELM EX, Siekgraben 56, 38124 Braunschweig (Reg.-Nr. 0820).
EC type examination certificate ZELM 06 ATEX 0299 of ZELM EX, Siekgraben 56, 38124 Braunschweig (Reg.no. 0820).
- (3) Benannte Stelle: IBExU Institut für Sicherheitstechnik GmbH, Fuchsmühlenweg 7, 09599 Freiberg (Reg.-Nr. 0637).
Notified Body: IBExU Institut für Sicherheitstechnik GmbH, Fuchsmühlenweg 7, 09599 Freiberg (Reg. no. 0637).
- (4) Die Erweiterungen und technischen Änderungen der EN 60079-0:2012+A11:2013 haben keinen Einfluss auf die Konformität der Produkte.
The extensions and technical changes of the EN 60079-0:2012+A11:2013 have no impact on the conformity of the products.

Unterschrift für und im Namen von / Signed for and on behalf of

KSR Kuebler Niveau-Messtechnik AG

Zwingenberg, 2016-04-20

Thomas Gerling, Vorstand / CEO
KSR Kuebler Niveau-Messtechnik AG

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www.ksr-kuebler.com

Amtsgericht Mannheim HRB 714906
Vorsitz des Aufsichtsrates: Dirk Fellemann
Vorstand: Thomas Gerling (Vorsitzender)
Gerichtsstand: Mosbach/Baden

EU-Konformitätserklärung
EU Declaration of Conformity

Dokument Nr.: 1134_01
Document No.:

Wir erklären in alleiniger Verantwortung, dass die mit CE gekennzeichneten Produkte
We declare under our sole responsibility that the CE marked products

Typenbezeichnung: OSA-S
Type Designation:

Beschreibung: Schaltverstärker
Description: *Switching amplifier*

die grundlegenden Schutzanforderungen der folgenden Richtlinien erfüllen: *comply with the essential protection requirements of the directives:* Harmonisierte Normen: *Harmonized standards:*

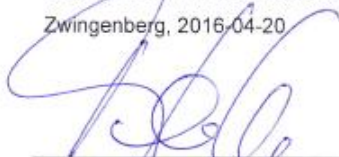
2014/30/EU	Elektromagnetische Verträglichkeit ⁽¹⁾ <i>Electromagnetic Compatibility⁽¹⁾</i>	EN 61326-1:2013 EN 61326-2-3:2013
2014/35/EU	Niederspannungsrichtlinie <i>Low Voltage Directive</i>	EN 61010-1:2010

⁽¹⁾ Emission (Gruppe 1, Klasse A) und Störfestigkeit (industrieller Bereich).
Emission (group 1, class A) and immunity (industrial application).

Unterszeichnet für und im Namen von / *Signed for and on behalf of*

KSR Kuebler Niveau-Messtechnik AG

Zwingenberg, 2016-04-20



Thomas Gerling, Vorstand / *CEO*
KSR Kuebler Niveau-Messtechnik AG

KSR KUEBLER Niveau-Messtechnik AG
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Amtsgericht Mannheim HRB 714808
Vorstand des Aufsichtsrates: Dirk Fellemann
Vorstand: Thomas Gerling (Vorsitzender)
Gerichtsstand: Mombach/Baden

EU-Konformitätserklärung EU Declaration of Conformity

Dokument Nr.: 1117_01
Document No.:


Wir erklären in alleiniger Verantwortung, dass die mit CE gekennzeichneten Produkte
We declare under our sole responsibility that the CE marked products

Typenbezeichnung: KSR-OPTO.2502.XX
Type Designation:

Beschreibung: Schaltverstärker
Description: Switching Amplifier

die grundlegenden Schutzanforderungen der folgenden Richtlinien erfüllen: Harmonisierte Normen:
comply with the essential protection requirements of the directives: Harmonized standards:

2014/30/EU	Elektromagnetische Verträglichkeit ⁽¹⁾ <i>Electromagnetic Compatibility⁽¹⁾</i>	EN 61326-1:2013 EN 61326-2-3:2013
2014/35/EU	Niederspannungsrichtlinie <i>Low Voltage Directive</i>	EN 61010-1:2010
2014/34/EU	Explosionsschutz (ATEX) ⁽²⁾⁽³⁾ <i>Explosion protection (ATEX)⁽²⁾⁽³⁾</i>	

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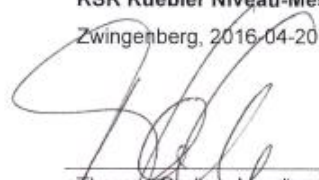
⁽²⁾⁽⁴⁾
EN 60079-0:2012
EN 60079-11:2012

- (1) Emission (Gruppe 1, Klasse A) und Störfestigkeit (industrieller Bereich)
Emission (group 1, class A) and immunity (industrial application)
- (2) EG-Baumusterprüfbescheinigung ZELM 06 ATEX 0300 von ZELM EX, Siekgraben 56, 38124 Braunschweig (Reg.-Nr. 0820).
EC type examination certificate ZELM 06 ATEX 0300 of ZELM EX, Siekgraben 56, 38124 Braunschweig (Reg. no. 0820).
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Unterzeichnet für und im Namen von / Signed for and on behalf of

KSR Kuebler Niveau-Messtechnik AG

Zwingenberg, 2016-04-20


Thomas Gerling, Vorstand / CEO
KSR Kuebler Niveau-Messtechnik AG

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Amtsgericht Mannheim HRB 714806
Vorsitz des Aufsichtsrates: Dirk Fellemann
Vorstand: Thomas Gerling (Vorsitzender)
Gerichtsstand: Mosbach/Baden



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