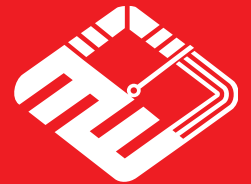


Model Overview

Limit switch
contact assemblies



Contents

Following you will find a model overview of our limit switch contact assemblies of **catalogue heading 9**.

Defintions, application and functions for the particular models of limit switch contact assemblies are described in this model overview, generally and in detail. You will get more detailed information concerning the selection, switching functions and minimum spans, operating conditions, Ex-protection, technical data, options and others.

Further information can also be found in DIN 16 085.

Furthermore **heading 9** comprises electrical additional accessory as pressure transmitters and digital displays, detailed documentation concerning this is available upon request.

Details as dimensional drawings, electrical connections as well as information concerning the order code and options can be found on the data sheets of the corresponding instrument model with the final number .90.

Information on accessory as relays and more can be found on the next pages and the data sheets that are stated there.

➔ Limit switch contact assemblies general information	p. 3 – 4
➔ Switching functions and minimum spans	p. 5
➔ Limit switch contact assemblies in detail	p. 6 – 11

The complete catalogue with annual updates is also available as CD-ROM.



Catalogue Headings

Heading	1 Bourdon tube pressure gauges
Heading	2 Bourdon tube test gauges
Heading	3 Diaphragm pressure gauges (horizontal)
Heading	4 Diaphragm pressure gauges (vertical)
Heading	5 Duplex- and differential pressure gauges
Heading	6 Capsule gauges for low pressure
Heading	7 Chemical seals
Heading	8 Temperature measuring instruments
Heading	9 - Limit switch contact assemblies - Pressure transmitters and digital displays
Heading	10 Pressure gauge test equipment
Heading	11 Accessory

Model overviews and data sheets can be found on the internet on <http://armaturenbau.com> resp. <http://manotherm.com>

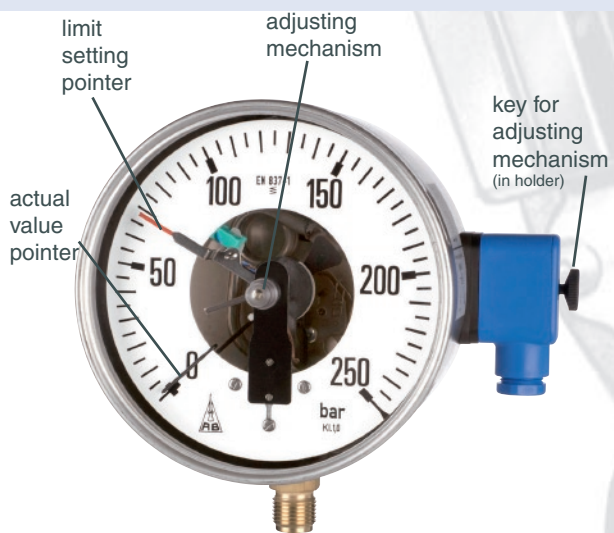
Zertifikate

	GOST-type certification Russia
	GOST-R for customs purposes Russia
	GOST- type certification Ukraine
	GOST- type certification Kazakhstan



Application

Limit switch contact assemblies are for the opening or closing of electrical circuitries or pneumatic switching circuits.



Function

The limit switch contact assemblies are constructed in the manner that the **actual value pointer** can work on over and above the **limit setting pointer** after the limit value signalling. The limit setting pointers can be adjusted over the whole scale range. Please regard the information and recommendations below „Adjustment ranges of the contacts“ (page 4).

The limit setting pointer is set to the value at which the switching operation should happen, externally by the **removable key**. For limit switch contact assemblies of NCS 63 with reed contact an adjustment usually happens manually after removal of the bayonet ring. For the e-Gauge® the reference values are being programmed.

For limit switch contact assemblies with 1 and 2 contacts determinations according to DIN 16 085 (pressure gauges) and DIN 16 196 (thermometers) are valid.

Furthermore we also deliver limit switch contact assemblies with 3 or 4 contacts. Adjustments regarding adjustment ranges, switching hysteresis and adjustment one above the other are required in this case.

Information on this and deliverable limit switch contact assemblies can be found on data sheets with the final number .90 or can be requested.

Limit switch contact assemblies

We differ the following **models**:

	Model
1. Direct (electromechanical)	
1.1 Standard contact	S
1.2 Magnetic contact	M
1.3 Micro switch	MS
2. Indirect (contactless)	
2.1 Electronic contact	E
2.2 Inductive contact	I
2.3 Pneumatic contact	P
2.4 Reed contact	R
2.5 e-Gauge	eG

Definitions

Contact load

Allowed maximum values of the electrical load of a contact.

Switching pressure

The switching pressure is the pressure of the medium at the point of time of activating the switching function. (reference: DIN 16 085)

Switching point

The switching point is the scale value at which the switching function is being activated.

Switching direction (direction of action of the switching function)

The switching direction is marked by the movement of the actual value pointer at which the switching operation proceeds
 -> clockwise switching direction at rising pressure and
 -> anticlockwise switching direction, at falling pressure

Switching function

We have defined 3 switching functions

Making contact (code number 1)	At clockwise pointer-movement the connected circuitry is being closed when exceeding the preset limit value.
Breaking contact (code number 2)	At clockwise pointer movement the connected circuitry is being opened when exceeding the preset value.
Change-over contact (code number 3)	When exceeding the preset limit value a circuitry is being opened and another circuitry is being closed at the same time (resp. directly one after the other).

see „switching functions“ on page 5

Switching accuracy (accuracy of the switching operation)

The switching accuracy indicates the deviation of the switching pressure of the preset limit value in the defined switching direction. According to DIN 16 085 it may not exceed the 1.5-fold of the error limits of the pressure measuring instrument.

Switching difference

The switching difference is the difference between the switching points of two limit values.
 The minimum span between two switching points is the minimum possible switching difference.

Switching pressure reversal error (switching hysteresis)

„The switching pressure reversal error is the span up to the point of time of the activating of the switching function of a contact at rising or falling pressure, but unchanged reference value of the switching pressure.“
 (reference: DIN 16 085)

Information concerning the selection

Mounting options of limit switch contact assemblies

Pressure gauge-/ thermometer model	Nominal case size
• Bourdon tube pressure gauges	63, 100, 160, 96x96, 144x144
• Differential pressure gauges	100, 160
• Diaphragm pressure gauges	100, 160
• Capsule gauges for low pressure	100 (only e-Gauge)
• Gas-actuated thermometer	100, 160, 96x96, 144x144

Adjustment ranges of the contacts

Standards DIN 16 085 (pressure gauges) and DIN 16 196 (thermometers) are valid in connection with instrument norms EN 831-1/-3 (pressure gauges) resp. EN 13 190 (thermometers). As further forces occur at pressure gauges / thermometers with limit switch contact assemblies, the range in which limit switch contact assemblies should work optimal and should be adjusted ex works, according to the standards that we have defined as follows:

Limit switch contact assemblies with 1 contact

adjustment ranges:

S/E/I/P-contact	10 - 90 % (—)
M-contact	15 - 85 % (---)



Limit switch contact assemblies with 2 contacts

S/E/I/P-contacts
adjustment range
both limit values 10-90 %



Limit switch contact assemblies with 2 contacts

M-contacts

adjustment ranges

1. contact	15-70 % (—)
2. contact	30-85 % (—)



Beyond the named ranges larger switching inaccuracies and larger or minor switching pressure reversal errors have to be faced. For magnetic contacts it is very problematic, because if the magnetic forces are decreased at the adjustment, the defined maximum contact load can not be fully used.

For magnetic contacts it is generally not possible to combine a maximum contact load with a minimum skipping behaviour (minor magnetic force).

Switching difference

The switching difference between two switch points has to be larger than the switching pressure reversal error and for magnetic contacts additionally larger than the skipping behaviour, so that a secure differentiation of the switch points is possible.

In practice we recommend

Limit switch contact assemblies	Switching function	Switching difference
S, E, I, P	11, 22	> switching pressure reversal error
	12, 21	≥ 2% of the span
M	11, 22	≥ 6% of the span
	12, 21	≥ 12% of the span

Minimum span

Please also regard the minimum spans for the particular instrument models (see page 5) that depend amongst others on the directive force of the measuring unit.

Information in an order

For an optimal function of the instruments with limit switch contact assemblies you should specify additionally to the ordering code:

- the switching pressure/s

- the switching range/s, in which the contact/s are being adjusted, if it is beyond the adjustment ranges that are defined by us

- if an anticlockwise switching direction is requested

Detailed instructions concerning the ordering information can be found on the data sheets of the particular instrument model with the ending .90.

Special solutions

If your operating conditions are beyond these limits, please do not hesitate to contact us and we will work on an individual solution that is adjusted to your conditions.

Special pressure gauges with limit switch contact assemblies

Model:
Case:
Ring:

RChE
stainless steel
snap-in window
(turnable)

Special equipment:

construction type according to EN 562 tested, 1x inductive contact, I1 according to EN ICE 60 497-5-6 connection 1/4" NPT 1231-9.2

Data sheet:

Model:
Case:
Ring:

RChg, RChgOe, RChgN
stainless steel
crimped-on ring,
stainless steel

Special equipment:

Gas density monitor for SF6-gas, gives alarm, if leakage occurs. The instruments are being adjusted for the particular case of application to calibration pressure, switch points and ambient temperature. 1902

Data sheet:

Model:

RCh100/160 with e-Gauge®
RChG100/160 with e-Gauge®

Case:
Ring:


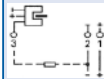
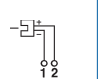
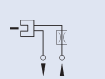
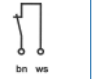

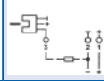
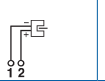
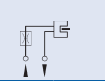
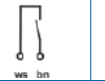



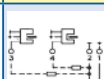
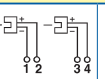
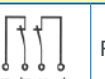


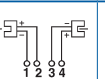



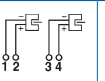
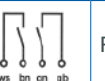


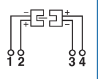
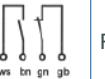
stainless steel
bayonet ring, stainless steel

Special equipment:

The e-Gauge® operates absolutely contactless and makes a „normal“ indicating instrument with NCS 100/160 to a multifunctional instrument with 2 digital switching outputs and an analogue output signal of 4-20 mA. 1201.93

Data sheet:

Switching functions (for clockwise pointer movement, that means direction of action of the switching function is rising pressure for pressure gauges):

1 contact	standard / magnetic S, M	electronic / E	inductive I	pneumatic P	Reed R	micro switch MS	e-Gauge eG	
breaking contact	 S2 M2	 E2	 I2	 P2	 R2	-		
making contact	 S1 M1	 E1	 I1	 P1	 R1	-		
single change-over	standard- / magnetic S, M					micro switch MS		
	 S3 M3					 MS3		
2 contacts ¹⁾	standard- / magnetic S, M	electronic E	inductive I	pneumatic P	Reed R	micro switch MS	e-Gauge eG	
1. and 2. breaking contact	 S22 M22	 E22	 I22		s.u. ²⁾	 R22	-	eG22
1. breaking cont. 2. making cont.	 S21 M21	 E21	 I21		P21	 R21	-	eG21
1. and 2. making contact	 S11 M11	 E11	 I11		s.u. ³⁾	 R11	-	eG11
1. making cont. 2. breaking cont.	 S12 M12	 E12	 I12		P12	 R12	-	eG12

¹⁾ order of the clockwise contacts

²⁾ available by plugging the hose bridges of P21

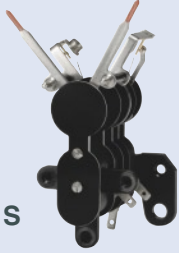

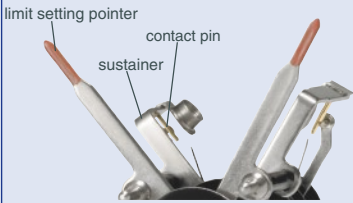
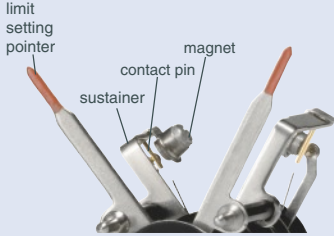
³⁾ available by plugging the hose bridges of P12



ws = white / bn = brown / gb = yellow / gn = green

Minimum spans

Model limit switch contact assembly	measuring instrument	meas. unit	number of the contacts				
			1	2	3	4	
S (standard contact)	bourdon tube pressure gauges	NCS 63	bar	upon request	upon request	—	—
		NCS 100, 96 ²⁾	bar	1.0	1.6	2.5	upon request
	differential pressure gauges ¹⁾	NCS 160, 144 ²⁾	bar	1.0	1.6	2.5	2.5
		DiRZ...160	bar	1.0	1.6	upon request	—
	diaphragm pressure gauges	NCS 100, flange-Ø 160	mbar	60	100	160	160
		NCS 100, flange-Ø 100	bar	0.6	0.6	0.6	0.6
		NCS 160, flange-Ø 160	mbar	60	100	160	160
thermometers	NCS 160, flange-Ø 100	bar	0.6	0.6	0.6	0.6	
NCS 100, 160	°C	no minimum span for standard pressure ranges					
M (magnetic contact)	bourdon tube pressure gauges	NCS 63	bar	2.5	4.0	—	—
		NCS 100, 96 ²⁾	bar	1.6	2.5	4	upon request
	differential pressure gauges ¹⁾	NCS 160, 144 ²⁾	bar	1.6	2.5	4	4
		DiRZ...160	bar	1.6	4.0	upon request	—
	diaphragm pressure gauges	NCS 100, flange-Ø 160	mbar	100	160	250	250
		NCS 100, flange-Ø 100	bar	0.6	0.6	2.5	2.5
		NCS 160, flange-Ø 160	mbar	100	160	250	250
thermometers	NCS 160, flange-Ø 100	bar	0.6	0.6	2.5	2.5	
NCS 100, 160	°C	no minimum span for standard pressure ranges					
E (electronic contact)	bourdon tube pressure gauges	NCS 63	bar	2.5	4.0	—	—
		NCS 100, 96 ²⁾	bar	1.0	1.6	2.5	upon request
	differential pressure gauges ¹⁾	NCS 160, 144 ²⁾	bar	1.0	1.6	2.5	upon request
		DiRZ...160	bar	1.0	1.6	upon request	—
	diaphragm pressure gauges	flange-Ø 160	mbar	60	60	60	upon request
flange-Ø 100	bar	0.6	0.6	0.6	upon request		
thermometers	NCS 100, 160	°C	no minimum span for standard pressure ranges				
I (inductive contact)	bourdon tube pressure gauges	NCS 63	bar	2.5	4.0	—	—
		NCS 100, 96 ²⁾	bar	1.0	1.6	2.5	upon request
	differential pressure gauges ¹⁾	NCS 160, 144 ²⁾	bar	1.0	1.6	2.5	upon request
		DiRZ...160	bar	1.0	1.6	upon request	—
	diaphragm pressure gauges	flange-Ø 160	mbar	60	60	60	upon request
flange-Ø 100	bar	0.6	0.6	0.6	upon request		
thermometers	NCS 100, 160	°C	no minimum span for standard pressure ranges				
P (pneumatic contact)	bourdon tube pressure gauges	NCS 100, 96 ²⁾	bar	1.0	—	—	—
		NCS 160, 144 ²⁾	bar	1.0	1.6	—	—
	diaphragm pressure gauges	NCS 100, flange-Ø 160	mbar	60	—	—	—
		NCS 100, flange-Ø 100	bar	0.6	—	—	—
		NCS 160, flange-Ø 160	mbar	60	60	—	—
NCS 160, flange-Ø 100	bar	0.6	0.6	—	—		
R (Reed contact)	bourdon tube pressure gauges	RSCh 63, RCha 63	bar	2.5	2.5	—	—
MS (Mikroschalter)	bourdon tube pressure gauges	NCS 100	bar	2.5	upon request	—	—
eG (e-Gauge)	bourdon tube pressure gauges	RCh / RChG 100	bar	0.6	0.6	—	—
	capsules	KPCh / KPChG 100/160	mbar	100	100	—	—
	thermometers	TBISCh / TBIGelCh 100/160	°C	no minimum span for standard pressure ranges			

¹⁾ differential pressure gauges with diaphragm upon request



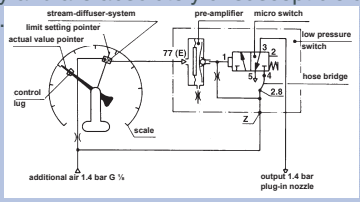
	Limit switch contact assembly S	Limit switch contact assembly M
Function  <p>S</p>  <p>M</p>	<ul style="list-style-type: none"> For limit switch contact assemblies with standard contacts the construction for limit value signalling consists of an adjustable limit setting pointer, connected with the sustainer that holds a contact pin and the wiper that is moved by the actual value pointer. The switching operation happens when the actual value pointer and the limit setting pointer are exactly one above the other. The contact pins get in contact or are being separated. The torque which is effective on the actual value pointer is low, so that the contacts switch exactly at the preset reference value. 	<ul style="list-style-type: none"> For limit switch contact assemblies with magnetic contacts there is, compared to limit switch contact assemblies with standard contacts, a screwable permanent magnet, which is protected by locking varnish, installed at the sustainer of the limit setting pointer. The permanent magnet reinforces the contact pressure and prevents the contacts from deflagrating by arc load influences. The contact making accelerates when approaching the contacts, respectively is being decelerated when separating the contacts. This skipping behaviour could amount 2 to 5 % of the span, depending on the directive force of the measuring element and the adjusted magnetic force. 
Application / operating conditions	<p>Standard contacts are suitable if,</p> <ul style="list-style-type: none"> the instrument is being installed vibration-free and no pulsations do occur, as otherwise accidental switchings could happen. the contact pins are not being contaminated or do not oxidise, e.g. by aggressive atmosphere. <p>Technical data see page 8</p>	<p>Magnetic contact are applicable almost everywhere, as they are widely unsusceptible against vibrations.</p> <ul style="list-style-type: none"> Breaking capacity, switching safety and contact load are explicitly higher than for standard contacts. <p>Technical data see page 8</p>
Installation in case-Ø (NCS)	63, 100, 160, 96x96, and 144x144	63, 100, 160, 96x96, and 144x144
Case filling	<ul style="list-style-type: none"> Limit switch contact assemblies with standard contacts can only be applied with instruments without case filling. 	<ul style="list-style-type: none"> Limit switch contact assemblies with magnetic contacts are, using a multifunctional relay of the type series MSR (see below) only suitable to a limited extend.
Relay	<p>Impulse-controlled multifunctional relays of the type series MSR</p> <ul style="list-style-type: none"> increase the switching safety and make a higher frequency of operation possible, that is at risk of external influences as e.g. aggressive atmosphere, pollution or oxidation of the contact pins minimise the contact load reduce accidental switchings by vibration / pulsation by an integrated delayed release of 450 ms. <p>• details see data sheet 9521</p>	<p>Impulse-controlled multifunctional relays of the type series MSR</p> <ul style="list-style-type: none"> should be used for instruments with case filling. They minimise the risk of oil contamination by the arc load. increase the switching safety and make a higher frequency of operation possible, that is at risk of external influences as e.g. aggressive atmosphere, pollution or oxidation of the contact pins. minimise the contact load reduce accidental switchings by vibration / pulsation by an integrated delayed release of 450 ms. <p>• details see date sheet 9521</p>
Ex-protection	–	–



	Limit switch contact assemblies E	Limit switch contact assemblies I
<p>Function</p>  <p>E</p>  <p>I</p>	<ul style="list-style-type: none"> • For limit switch contact assemblies with electronic contacts the construction for limit value signalling consists of a proximity switch with integrated switch amplifiers (PNP-output) and a control lug. • The proximity switch is mounted on a sustainer that is connected to the reference value, while the control lug is being moved by the actual value pointer. • If the control lug dips into the proximity switch, the contact is being closed. If the control lug drops out, the contact is being opened. • The switching operation takes place when the control lug is positioned in the middle of the proximity switch. • The torque which is effective on the actual value pointer with the control lug is low, so that the switching operation happens exactly at the preset reference value. 	<ul style="list-style-type: none"> • For limit switch contact assemblies with inductive contacts the construction for limit value signalling consists of a proximity switch (displacement transducer according to DIN EN 60 947-5-6 (NAMUR)), a control lug and a relay in downstreamed switch amplifier (application in potentially explosive areas) or a multifunctional relay of the type series MSR-I (application in potentially explosive areas). Switch amplifiers resp. multifunctional relays do not belong to the delivery scope of an instrument with inductive contact. • The displacement transducer is mounted to a sustainer which is connected to a limit setting pointer, while the control lug is being moved by the actual value pointer. • Basically the proximity switch is a transistor-oscillator whose oscillator coils are arranged to both sides of the proximity switch. • If the control lug dips into the proximity switch, the relay in the downstreamed switch amplifier releases and the contact is being opened. If the control lug drops out, the relay operates and the contact is being closed. • The torque which is effective on the actual value pointer with the control lug is low, so that the switching operation happens exactly at the preset reference value.
<p>Application / operating conditions</p>	<p>Electronic contacts are suitable for every industrial application.</p> <ul style="list-style-type: none"> • They are less susceptible against accidental switchings by vibration / pulsation than standard contacts. • They are wear resistant (contactless switching) and corrosion-free (all electrical components are moulded waterproof in a plastic case in cast resin). • As the proximity switch is a 3-wire proximity switch with PNP-switching input, an SPS, an optocoupler and other electrical evaluation units with slight voltages and currents can be activated directly. <p>Technical data see page 9</p>	<p>Inductive contacts in connection with our multifunctional relays of the type series MSR-I are suitable for every industrial application.</p> <ul style="list-style-type: none"> • They are wear resistant (contactless switching) and corrosion-free (all electrical components are moulded waterproof in a plastic case in cast resin). • Proximity switches up to SIL 2 are applicable according to IEC 61 508. <p>Technical data see page 9</p>
<p>Installation in case-Ø (NCS)</p>	<p>63, 100, 160, 96x96, and 144x144</p>	<p>63, 100, 160, 96x96, and 144x144</p>
<p>Case filling</p>	<p>Limit switch contact assemblies with electronic contacts can be applied for instruments with case filling.</p>	<p>Limit switch contact assemblies with inductive contacts can be applied for instruments with case filling.</p>
<p>Relay</p>	<p>–</p>	<p>Impulse-controlled multifunctional relays of the type series MSR-I</p> <ul style="list-style-type: none"> • are applied in plants where no Ex-protection is required • reduce accidental switchings / pulsation by an integrated switching delay of 450 ms <p>• details see data sheet 9531</p>
<p>Ex-protection</p>	<p>–</p>	<ul style="list-style-type: none"> • When using our switch amplifiers KF.-SR2-.. the equipment corresponds to the type of protection intrinsic safety i. It has the classification II2G EExia IIC T6 and is approved for the application in potentially explosive areas. • The switch amplifiers have to be installed beyond the potentially explosive area. • CE-Type Examination Certificates of the Federal Technical Institute (Phyikalisch Technische Bundesanstalt = PTB) on the intrinsic safety of the used proximity switches are available. • The allowed lead between limit switch contact assembly and downstream unit is in consideration of the intrinsic safety according to PTB approximately 3 km. • CE-Type Examination Certificates can be found on the internet on www.armaturenbau.com respectively www.manotherm.com in the download area or upon request. • Details (switch amplifiers) see data sheet 9532

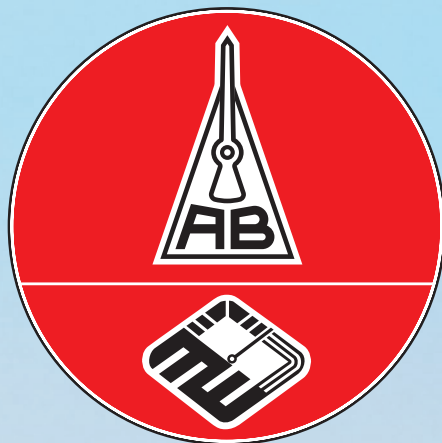
Limit switch contact assemblies in detail

	Limit switch contact assemblies S	Limit switch contact assemblies M
Technical data		without case filling with case filling
Electrical	Rated insulation voltage: 250 V	250 V
	Rated operational voltage: 230 V AC (mains)	230 V AC (mains)
	Rated operational current: max. 0.6 A	max. 0.6 A max. 90 mA
	Making- / breaking current: max. 0.7 A	max. 1.0 A
	Breaking capacity: 10 W / 18 VA	30 W / 50 VA 20 W / 20 VA
Measurement technique	Switch. pressure reversal error: ≤ accuracy class	accuracy classes plus 2 - 5 % of the span
	Switching accuracy: ≤1.5 x accuracy class	≤1.5 x accuracy class
	Ambient temperature: -20 °C...+70 °C	-20 °C...+70 °C
Contact material	silver-nickel, 10μ gold-plated (AG80NI20Au10μ)	silver-nickel, 10μ gold-plated (AG80NI20Au10μ)
Recommended contact load for instruments without case filling for ohmic and inductive load		
Voltage according to DIN IEC 60 038		
DC AC	DC AC cosφ>0.7	DC AC cosφ>0.7
220 V 230 V	40 mA 45 mA 25 mA	100 mA 120 mA 65 mA
110 V 110 V	80 mA 90 mA 45 mA	200 mA 240 mA 130 mA
48 V 48 V	120 mA 170 mA 70 mA	300 mA 450 mA 200 mA
24 V ⁴⁾ 24 V	200 mA 350 mA 100 mA	400 mA 600 mA 250 mA
Minimum values for contact load for instruments without case filling for ohmic load		
Rated operational voltage U _{eff} min.	24 V	24 V
Breaking capacity (DC, AC)	0.4 W	0.4 W
CE-marking	Measuring instruments with limit switch contact assemblies with standard contacts are basically marked with the CE-sign for electromagnetic compatibility and the low voltage directives.	Measuring instruments with limit switch contact assemblies with magnetic contacts are basically marked with the CE-sign for electromagnetic compatibility and the low voltage directives.
Options	<ul style="list-style-type: none"> • More than 2 contacts, see data sheet of the corresponding instrument model with the final number .90. There you will find information concerning the „one above the other adjustment“ of the limit setting pointers • Separated circuitries • Double change-over contact S 33 • Wire break control (parallelly connected resistance for each contact) 	<ul style="list-style-type: none"> • More than 2 contacts, see data sheet of the corresponding instrument model with the final number .90. There you will find information concerning the „one above the other adjustment“ of the limit setting pointers • Separated circuitries • Double change-over contact M 33 • Wire break control control (parallelly connected resistance for each contact)

	Limit switch contact assemblies E	Limit switch contact assemblies I
Technical data		
Electrical	Rated operational voltage: 10...30 V DC Breaking capacity: ≤ 100 mA	Rated operational voltage:: 5...25 V DC Breaking capacity: 8 V DC Current consumption: max. 3 mA
Measurement technique	Switching pressure reversal error: ≤ accuracy class Switching accuracy: ≤1.5 x accuracy class Ambient temperature: -25 °C...+ 70 °C	Switching pressure reversal error: ≤ accuracy class Switching accuracy: ≤1.5 x accuracy class Ambient temperature: -20 °C...+ 70 °C -SN-/S1N version (see options): -40 °C...+100 °C
CE-marking	Measuring instrument with limit switch contact assemblies with electronic contacts are basically marked with the CE-sign for electromagnetic compatibility.	Measuring instruments with limit switch contact assemblies with inductive contacts are basically marked with the CE-sign for the ATEX-standard.
Options	<ul style="list-style-type: none"> • More than 2 contacts, see data sheet of the corresponding instrument model with the final number .90. There you will find information concerning the „one above the other adjustment“ of the limit setting pointers • PNP switching output as 2-wire connection. 	<ul style="list-style-type: none"> • More than 2 contacts, see data sheet of the corresponding instrument model with the final number .90. There you will find information concerning the „one above the other adjustment“ of the limit setting pointers • NCS 160 with 2 contacts in intervall switching, absolutely reactionless function, especially suitable for test gauges class 0.6. For this construction type the control lug is on the actual value pointer. When using the switch amplifier that has especially been developed for this limit switch contact assembly KFA6-SR2-Ex2.W.IR it is granted that even when exceeding the preset minimum- resp. maximum limit values the particular switching function is being preserved. So the control lug can exceed the preset reference value, evacuate the proximity switch and dip into it once again when declining without changing of the switching condition. Also a power failure effects no change. After recovery of the power supply the last given switching condition is restored. • Safety version (SN) applicable in connection with switch amplifier instruments in safety engineering (see Technical Information Sheet T03-000-041) for development of monitoring control (<i>safety switching</i>). If an error occurs, if at the proximity switch or at the switch amplifier, the initial condition is mandatory „0“. The conception of these safety switches has been tested and approved by the TÜV (Technical Inspection Authority) for important switchings according to the safety-related requirements. The electrical characteristic values correspond to DIN EN 60 947-5-6 (NAMUR). • Safety version with contrary direction of action (S1N)

	Limit switch contact assemblies P	Limit switch contact assemblies R
Function  <p>P</p>  <p>Reed contact</p>	<ul style="list-style-type: none"> For limit switch contact assemblies with pneumatic contacts the construction for limit value signalling consists of a stream-diffuser-system, a control lug and a pneumatic low pressure switch (PP-transformer). The stream-diffuser system consists of a sustainer which is connected to the limit setting pointer while the control lug is being moved by the actual value pointer. In this system a reduced, permanently streaming air flow is being conducted from the jet nozzle into the diffuser. The low pressure signal (>25 mbar) that is being adjusted by the diffuser, is being conducted to the pre-amplifier of the low pressure switch. This effects that the micro switch connects the hose connections and produces an actuated output-signal of 1.4 bar at the output. <p>When the actual value pointer reaches the limit setting pointer, the control panel, which is being taken by the actual value pointer, interrupts the air flow in a stream-diffuser-system.</p> <p>By failure of the low pressure signal at the pre-amplifier, now the switching is being released. The micro switch moves backwards into initial position and vents the connection.</p>	<ul style="list-style-type: none"> The reed contact is a fast bistable special switch that can be applied for switching of low-level signals in the mV- resp. µA-range. It consists of 2 contact studs made of ferromagnetic material which are remelted hermetically dense in a glass tube under inert atmosphere and are mounted turnable on a conductor plate behind the dial. <p>When approaching a sufficiently strong magnetic field at the actual value pointer, both contact studs make use of a reversal polarity and activate the contact with this.</p> <ul style="list-style-type: none"> A permanent magnet behind the glass tube makes sure that the switching function is preserved when the actual value pointer moves on. <ul style="list-style-type: none"> Manual adjustment of the reference values after removal of the bayonet ring. For case configurations Fr and rFr external by removable key.
Application / operating conditions	<ul style="list-style-type: none"> Pneumatic contacts stand out due to high switching accuracy and are absolutely unsusceptible against vibrations. 	<p>Compared to electromechanical contacts (S, M) reed contacts have the following advantages</p> <ul style="list-style-type: none"> Contactless switching at reliable contact making Small dimensions
Installation in case-Ø (NCS)	100, 160, 96x96, und 144x144	63
Case filling	<ul style="list-style-type: none"> Limit switch contact assemblies with pneumatic contacts do not work in liquid-filled instruments (air flow). 	<ul style="list-style-type: none"> Limit switch contact assemblies with reed contacts can only be applied for instruments without case filling
Ex-protection	Limit switch contact assemblies with pneumatic contacts are absolutely explosion-resistant, suitable for zone 0.	<p>Possible when using intrinsically safe switch amplifiers as it is about passive electrical equipment without storage properties.</p> <p>No marking according to ATEX, but a declaration by the manufacturer is available.</p>
Technical data	<p>Air consumption: < 30 l/h PP-transformer: <40 NI/h at 1.4 bar</p> <p>Operating air pressure: 1.4 bar ±0.1 bar</p> <p>Purity specification at control air: ≤ 0.04 mm</p> <p>Mech. durability: PP-transformer: approx. 10⁸ switching cycle</p>	<p>Breaking capacity max.: 10 W / 10 VA</p> <p>Switching voltage max.: 75 VDC, 50 VAC</p> <p>Switching current max.: 0.5 A at direct- or alternating voltage and ohmic load</p> <p>Adjustment range: 10% to 90% of the full scale value</p> <p>Mech. durability: approx. 10⁵-10⁶ switching cycles</p>
Measurement technique	<p>Switching pressure reversal error: ≤ accuracy class</p> <p>Switching accuracy: ≤ 1.5 x accuracy class</p> <p>Ambient temperature: -20 °C to + 70 °C</p>	<p>Switching pressure reversal error: max. 2.5% of the span</p> <p>Switching accuracy: ≤ 1.5 x accuracy class</p> <p>Ambient temperature: -30 °C to +75 °C</p>
CE-marking	Measuring instruments with pneumatic contacts do not belong to the CE-labelling obligation.	Measuring instruments with reed contacts are basically marked with the CE-sign for electromagnetic compatibility.
Options	<ul style="list-style-type: none"> More than 2 contacts are not available Instead of the pneumatic low pressure switch (PP-transformer) also a pneumatic/electrical converter can be applied. This is recommendable for the combination of pneumatic and electrical instruments and for the monitoring of signals over greater distances, to avoid delays. The switching functions can be reversed by plugging of P11 / P22 	<ul style="list-style-type: none"> More than 2 contacts are not available Single change-over contact R3

	Limit switch contact assemblies MS	Limit switch contact assemblies eG
Function  MS  e-Gauge	<ul style="list-style-type: none"> The microswitch is a snap switch in which a spring element controls the contacts erratically. It is attached to the movement Micro switches are basically of the 1-pin change-over contact type. They close or open the electrical circuits according to the direction of motion at adjusted limit values. 	<p>e-Gauge® is a patented, revolutionary sensor equipment for analogue pointer-instruments as pressure gauges and thermometers.</p> <ul style="list-style-type: none"> Via angle encoder with inductive tapping the e-Gauge® transforms almost every pressure gauge and thermometer into a switch and transmitter. The e-Gauge® functions contactless and transforms a „normal“ indicating instrument NSC 100 or 160 with bayonet ring case into a multi-function instrument with 2 digital NPN-switching outputs in series and an output signal of 4 – 20 mA. <p>All information concerning the e-Gauge®, especially concerning the analogue output 4-20 mA, can be found on the data sheets of the particular instruments with the final number .93, e.g. bourdon tube pressure gauges RCh 100/160 resp. RChG 100/160 with e-Gauge® data sheet 1201.93.</p>
Application / operating conditions	<ul style="list-style-type: none"> Micro switches are especially suitable where a high breaking capacity is required. Furthermore they stand out due to their vibration stability and their long durability. Movements with assembled micro switches are only limited suitable for low pressure ranges and have a minor switching accuracy because of the required minimum operating forces. 	<ul style="list-style-type: none"> Functions absolutely contactless Nearly no directive force of the measuring unit required, only the weight of the pointer increases slightly due to the electronic component. No influence on the indication because of spirals. Thereby they are also applicable for capsule gauges and bimetal thermometers. The limit values are programmed. Both limit values can be programmed so that they switch at the same reference value.
Installation in case-Ø (NCS)	100	100, 160
Case filling	Limit switch contact assemblies with micro switches can only be applied for instruments without case filling because of the externally accessible adjustability.	Limit switch contact assemblies with e-Gauge® can only be applied for instruments with case filling.
Ex-protection	–	–
Technical data	Rated operational voltage: max. 250 V AC Switching current: max. 5 A (ohmic load) max. 5 A (inductive load, $\cos\varphi > 0.75$)	Rated operational voltage: 8 - 28 VDC Current consumption: max. 50 mA Breaking capacity: max. 28 VDC, max. 50 mA
Measurement technique	Switching pressure reversal error: accuracy class plus 2-5% of the span Switching accuracy: $\leq 1.5 \times$ accuracy class Switching accuracy: ambient temperature: -20 °C to + 70 °C	Switching pressure reversal error: 1% of the span Ambient temperature: -30°C...+60°C (without case filling) -20°C...+60°C (with case filling) Additional output signal: 4 - 20 mA (3-wire)
CE-marking	Measuring instruments with micro switch are basically marked with the CE-sign for electromagnetic compatibility and the low voltage directive.	Measuring instruments with e-Gauge are basically marked with the CE-sign for electromagnetic compatibility.
Options	<ul style="list-style-type: none"> 2 contacts upon request 	<ul style="list-style-type: none"> More than 2 contacts are not available Reaction time deviating in 0.01s steps from 0.01s up to 20s Switching pressure reversal error deviating from 1% in 0.1% steps from 0 to 25% of the final value



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