8774
GAS DENSITY SENSOR

ANWENDUNG
- Hochspannungsanlagen
- Mittelspannungsanlagen

APPLICATION
- Installations de haute tension
- Installations de moyenne tension

APPLICATION
- High voltage switchgear
- Medium voltage switchgear



HAUPTMERKMALE

Dichtesensor für SF_6 und andere Gase

- Messprinzip: Schwingquarzmessung
- Messbereich: 0...60 kg SF_6 /m^3
- Ausgang
  - Digital: Stromimpulse auf Speisestrom
  - Analog: Stromschlaufe
- Genauigkeit: ±1.8% d.S. max.
  ±1.0% d.S. typ.

Der Trafag Gasdichtesensor Typ 8774 wurde speziell für die Überwachung von Isolationsgas konstruiert.
Die konstante Resonanzfrequenz eines in Vakuum schwingenden Quarzes wird mit der Resonanzfrequenz eines im Messgas schwingenden, identischen Quarz' verglichen. Die Differenz ist proportional zur Dichte des Messgases. Der Messwert ist ein Frequenzsignal proportional zur Gasdichte, das entweder auf den Speisestrom aufmoduliert oder in ein Stromsignal umgerechnet wird.

Bei der Digitalvariante kann über die Impulsbreite des Frequenzsignals zusätzlich die Temperatur gemessen werden.

CARACTÈRES DISTINCTIFS

Capteur de densité pour SF_6 et autres gaz

- Principe: Mesure quartz de vibration
- Plage de mesure: 0...60 kg SF_6 /m^3
- Sortie
  - Numérique: impulsion de courant sur le courant d'alimentation
  - Analogique: circuit fermé
- Précision: ±1.8% E.M. max.
  ±1.0% E.M. typ.

Le capteur de densité Trafag type 8774 a été spécialement construit pour la surveillance de gaz d'isolation.
La densité de gaz est mesurée par un quartz de vibration avec une excellente stabilité à long terme. Une erreur de température possible est compensée par un deuxième quartz de vibration en vacuum. La valeur de mesure est un signal de fréquence proportionnellement à la densité de gaz qui est modulée sur le courant d'alimentation ou convertée dans un signal electrique.

En plus avec la variante numérique la température peut être mesurée au-dessus de la largeur d'impulsion du signal de fréquence.

MAIN CHARACTERISTICS

Density Sensor for SF_6 and other gases

- Principle: Oscillating quartz measurement
- Measuring range: 0...60 kg SF_6 /m^3
- Output
  - Digital: current pulses onto supply current
  - Analogue: current loop
- Accuracy: ±1.8% FS max.
  ±1.0% FS typ.

The Trafag gas density sensor type 8774 was specifically designed for surveying insulation gases.
The gas density is measured with an oscillating quartz with excellent long term stability. The constant resonant frequency of a quartz oscillator under vacuum is compared with the resonant frequency of an identical quartz situated in the sample gas. The difference in the resonant frequency is proportional to the density of the sample gas. The measured density is proportional to the pulse frequency or to the mA output.

With the digital variant additionally the temperature can be measured over the pulse width of the frequency signal.

VORTEILE
- Kontinuierliche Dichte- und Temperaturmessung
- Driftfreies Langzeitverhalten des Ausgangssignals
- Schutzart IP65
- Wartungsfrei
- Kompakt
- Vibrations- und schockfest
- Freilufttauglich
- Reaktionszeit <10ms (bei Dichteänderung)

AVANTAGES PRINCIPAUX
- Mesure en continu de la densité et de la température
- Comportement à long terme du signal de sortie pas à la dérive
- Protection IP65
- Sans entretien
- Compact
- Résistant au choc et vibration
- Approprié pour utilisation en extérieur
- Temps de réponse < 10ms (changement de densité)

MAIN FEATURES
- Continuous measurement of density and temperature
- long-term drift-free output signal
- Protection IP65
- Maintenance-free
- Compact
- Vibration and shock proof
- Suitable for outdoor usage
- Response time <10ms (with density changes)

BESTELLINFORMATION / INFORMATION POUR LA COMMANDE / ORDERING INFORMATION

Varianten Code/ Codification de variantes/ Custom build code **XXXX.XX.XXXX.XX.XX.XXXXX**

8774 .50

Druckanschluss **Raccord de pression** **Pressure connection**	G3/8" aussen/ mâle/ male		**11**
	andere Anschlüsse auf Anfrage/ autre raccords sur demande/ other connections on request		
Gehäusematerial **Matériel boîtier** **Housing material**	Rostfreier Stahl/ Acier inox/ Stainless steel		**0**
Sensor **Capteur** **Sensor**	Digital: 2-Leiter/ 2-fils/ 2-wire (10...20 VDC) 10 ... 253 Hz		**0**
	3-Leiter/ 3-fils/ 3-wire (14...28 VDC) 10 ... 253 Hz		**3**
	Analog: 2-Leiter/ 2-fils/2 -wire 6.5...20 mA (10...32 VDC)		**4**
Ausführung **Exécution** **Execution**	Gerätestecker/ Embase mâle/ Male electrical plug	DIN43650–A (Mat.: PA)	**04**
	Gerätestecker/ Embase mâle/ Male electrical plug	M12x1, 5-pol (Mat.: PA)	**35**
	[1)] Kabel abgeschirmt/ Câble avec écran/ Cable with shield	2x0.5mm², Radox 125	**51**
	[1)] Kabel abgeschirmt/ Câble avec écran/ Cable with shield	3x0.5mm², 4xAWG22/19	**52**
	[1)] Empfohlen für Aussenanwendungen/ recommandé pour les applications en extérieur/ recommended für outdoor usage		
Zubehör **Assosoires** **Accessories**	Kabeldose/ Fiche femelle/ Female electrical connector	DIN43650–A	**58**
		M12x1, 5-pol	
		Mat.: Polyamid (PA)	**33**
		Mat.: Messing vernickelt/ Laiton nickelé/ Brass nickel plated	**34**
	Adapter G3/8" i - 3 x Ø7/Ø29	Rostfreier Stahl/ Acier inox/ Stainless steel (ohne O-Ring/ sens Joint torique/ without O-ring)	**22**
	Adapter G3/8" i - M30x2 i	Rostfreier Stahl/ Acier inox/ Stainless steel	**23**
	Adapter G3/8" i - M30x2 i	Ms vernickelt/ Laiton nickelé/ Brass nickel plated	**24**
	Adapter M30x2 a - M30x2 i - G3/8"i	Rostfreier Stahl/ Acier inox/ Stainless steel	**25**
	Adapter M30x2 a - M30x2 i - G3/8"i	Ms vernickelt/ Laiton nickelé/ Brass nickel plated	**26**
Kabellänge	Länge in mm/ Longueur en mm/ Length in mm		**XXXXX**

Trafag entwickelt und produziert auch speziell auf Ihre Bedürfnisse zugeschnittene Produkte. Bitte fragen Sie uns an.
Trafag développe et fabrique des produits adaptés à vos besoins spécifiques en se basant sur votre cahier des charges. Contactez-nous s.v.p.
Trafag develops and manufactures customized products according to your specifications to meet your requirements. Please contact us.

SPEZIFIKATIONEN

HAUPTMERKMALE

Messprinzip:	Schwingquarzmessung
Messbereich:	0...60 kg SF_6 /m^3
	10 ... 253 Hz
Ausgang:	
Digital:	Stromimpulse auf Speisestrom
Analog:	Stromschlaufe

GENAUIGKEIT

Genauigkeit:	±1.8% d.S. max.
	±1.0% d.S. typ.
Reproduzierbarkeit:	±0.2% v. Messwert
Temperatursignal:	±2°C typ.
	±4°C max.

ELEKTRISCHE DATEN

Ausgangssignal	
Digital:	Stromimpulse
Dichte Signal:	Frequenz der Impulsfolge 10...292 Hz (= Dichte 0...60 kg SF_6/m^3)
Ausgangssignal	
Analog:	6.5...20 mA
Dichte Signal:	Stromschlaufe 10...275 Hz (= Dichte 0...56.1 kg SF_6/m^3)
Speisespannung	
Digitalausgang:	2-Leiter, 10...20 VDC
	3-Leiter, 14...28 VDC
Erdung:	via Gasanschluss des Sensors
Speisespannung	
Anlogausgang:	2-Leiter, 10...32 VDC
Reaktionszeit:	<10 ms (bei Dichteänderung)
Temperatursignal:	Impulsbreite 2188 ... 2565 ... 2975µs (=Temp. -40...23...85°C)

UMGEBUNGSBEDINGUNGEN

Betriebstemperatur:	
(Dauernd)	-40... +70°C
(max 200h pro Jahr)	-55... +70°C
Medientemperatur	-40... +70°C
Lagertemperatur:	-40... +85°C
Betriebsdruck max.:	max. 15 bar
Feuchtigkeit:	freilufttauglich; 55°C und 98% relativ
Schutzart:	[1]IP65
Vibrationen:	15 g (max. 6 mm), (5...2000 Hz)
Schock:	100g/ 6 ms

EMV-SCHUTZ

ESD:	8kV/15kV air EN/IEC 61000-4-2
Radiated Immunity:	10V/m, 80...2700Hz EN/IEC 61000-4-3
Burst:	4kV EN/IEC 61000-4-4
Surge:	2kV (42 Ω) EN/IEC 61000-4-5
Conducted Immunity:	10V, EN/IEC 61000-4-6

SPÉCIFICATIONS

CARACTÈRES DISTINCTIFS

Principe:	Mesure quartz de vibration
Plage de mesure:	0...60 kg SF_6 /m^3
	10 ... 253 Hz
Sortie	
Numérique:	impulsion de courant sur le courant d'alimentation
Analogique:	circuit fermé

PRÉCISION

Précision:	±1.8% E.M. max.
	±1.0% E.M. typ.
Reproductibilité:	±0.2% valeur de mesure
Signal de température:	±2°C typ.
	±4°C max.

SPÉCIFICATIONS ÉLECTRIQUES

Signal de sortie	
Numérique:	impulsion de courant
Signal de densité:	fréquence des impulsions 10...292 Hz (régime 0...60 kg SF_6/m^3)
Signal de sortie	
Analogique:	6.5...20 mA
Signal de densité:	circuit fermé 10...275 Hz (régime 0...56.1 kg SF_6/m^3)
Tension d'alimentation	
Sortie numérique:	2-fils, 10...20 VDC
	3-fils, 14...28 VDC
Mise à la terre:	par raccord de gaz du capteur
Tension d'alimentation	
Sortie analogique:	2-fils, 10...32 VDC
Temps de réponse:	<10 ms (changement de densité)
Signal de témp.:	duréé des impulsions 2188 ... 2565 ... 2975µs (=Temp. -40...23...85°C)

CONDITIONS D'ENVIRONNEMENT

Température de service:	
(Permanent)	-40... +70°C
(max 200h par année)	-55... +70°C
Température de médias:	-40... +70°C
Temp. de stockage:	-40... +85°C
Pression de service:	15 bar max.
Humidité:	installation en plein air possible; 55°C et 98% relatif
Protection:	[1]IP65
Vibrations:	15 g (max. 6 mm), (5...2000 Hz)
Choc:	100g/ 6 ms

CEM PROTECTION

ESD:	8kV/15kV air EN/CEI 61000-4-2
Radiated Immunity:	10V/m, 80...2700Hz EN/CEI 61000-4-3
Burst:	4kV EN/CEI 61000-4-4
Surge:	2kV (42 Ω) EN/CEI 61000-4-5
Conducted Immunity:	10V, EN/CEI 61000-4-6

SPECIFICATIONS

MAIN CHARACTERISTICS

Principle:	Oscillating quartz measurement
Measuring range:	0...60 kg SF_6 /m^3
	10 ... 253 Hz
Output	
Digital:	current pulses onto supply current
Analogue:	current loop

ACCURACY

Accuracy:	±1.8% FS max.
	±1.0% FS typ.
Repeatability:	±0.2% of measured value
Temperature signal:	±2°C typ.
	±4°C max.

ELECTRICAL DATA

Output signal	
Digital:	current pulses
Density signal:	pulse frequency 10...292 Hz (range 0...60 kg SF_6/m^3)
Output signal	
Analogue:	6.5...20 mA
Density signal:	current loop 10...275 Hz (range 0...56.1 kg SF_6/m^3)
Supply voltage	
Digital output:	2-wire, 10...20 VDC
	3-wire, 14...28 VDC
Ground:	via gas connection of sensor
Supply voltage	
Analogue output:	2-wire, 10...32 VDC
Reaction time:	<10 ms (with density changes)
Temperature signal:	Pulse width 2188 ... 2565 ... 2975µs (=Temp. -40...23...85°C)

ENVIRONMENTAL CONDITIONS

Operating temperature:	
(Permanent)	-40... +70°C
(max 200h per year)	-55... +70°C
Media temperature:	-40... +70°C
Storage temp.:	-40... +85°C
Operating pressure:	max. 15 bar
Humidity:	suitable for outdoor usage; 55°C and 98% relative
Protection:	[1]IP65
Vibration:	15 g (max. 6 mm), (5...2000 Hz)
Shock:	100g/ 6 ms

EMC PROTECTION

ESD:	8kV/15kV air EN/IEC 61000-4-2
Radiated Immunity:	10V/m, 80...2700Hz EN/IEC 61000-4-3
Burst:	4kV EN/IEC 61000-4-4
Surge:	2kV (42 Ω) EN/IEC 61000-4-5
Conducted Immunity:	10V, EN/IEC 61000-4-6

[1] nur mit vorschriftsmässig montierter Kabeldose gültig/ valable seulement avec fiche femelle montée selon instructions/ provided female connector is mounted according to instructions

MECHANISCHE DATEN

Material	
Druckanschluss:	1.4435 (AISI316L)
Hülse:	1.4301
O-Ring:	EPDM
Gerätestecker:	siehe Bestellinformationen
Kabelverschraubung:	Messing vernickelt
Montage:	beliebig
Gewicht:	ca. 200...400 g

SPÉCIFICATIONS MÉCANIQUES

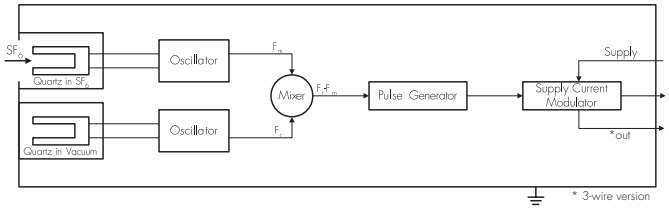
Matériel:	
Raccord de pression:	1.4435 (AISI316L)
Tube:	1.4301
Joint torique:	EPDM
Embase mâle:	voir info. pour la commande
Passe-câble à vis:	laiton nickelé
Montage:	toute position
Poids:	env. 200...400 g

MECHANICAL DATA

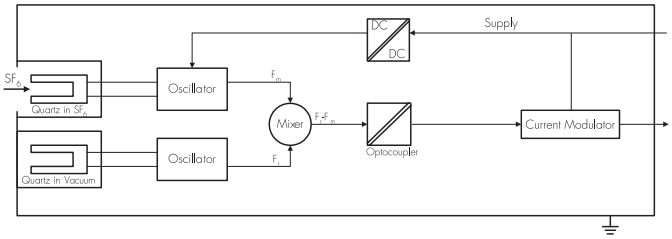
Material:	
Pressure connection:	1.4435 (AISI316L)
Tube	1.4301
O-Ring:	EPDM
Male electrical plug:	see ordering info
Screwed cable gland:	brass nickel plated
Mounting:	any position
Weight:	approx. 200...400 g

FUNKTIONSSCHEMA / SCHÉMA FONCTIONNEL / FUNCTIONAL DIAGRAM

Digital 2- oder 3-Leiter/ Numérique 2- où 3-fils/ Digital 2- or 3 wire

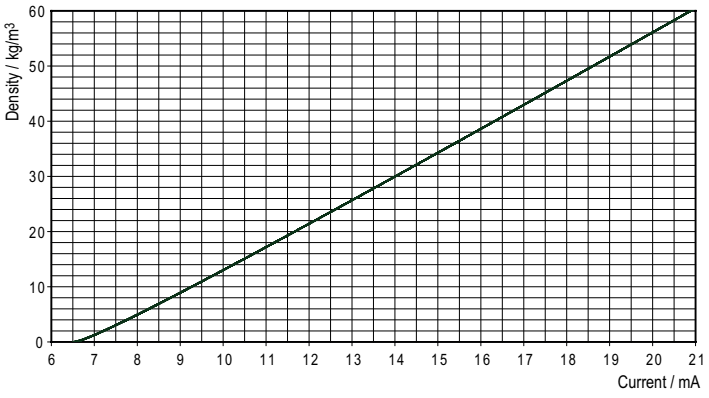


Analog 2-Leiter/ Analogique 2-fils/ Analogue 2-wire



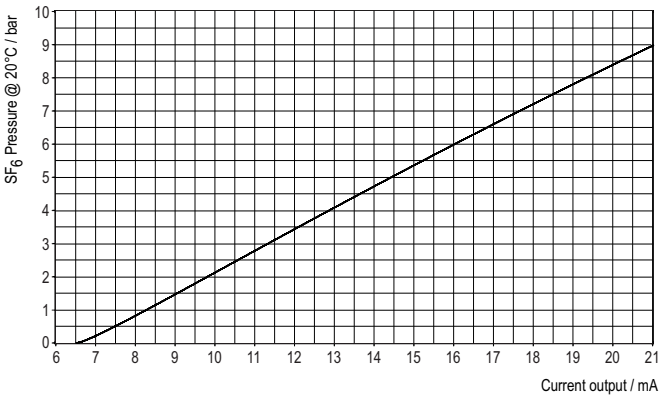
AUSGANGSSIGNAL ANALOG / SIGNAL DE SORTIE ANALOGIQUE / OUTPUT SIGNAL ANALOGUE

SF_6 Gasdichte / Densité de gaz SF_6 / SF_6 gas density



Dichte/ Densité/ Density $\rho = \{ \sqrt{4{,}651*(I-6{,}005)-2{,}185} - 0{,}44 \}^2$

SF_6 Gasdruck: / Pression de gaz SF_6: / SF_6 gas pressure: @ 20°C

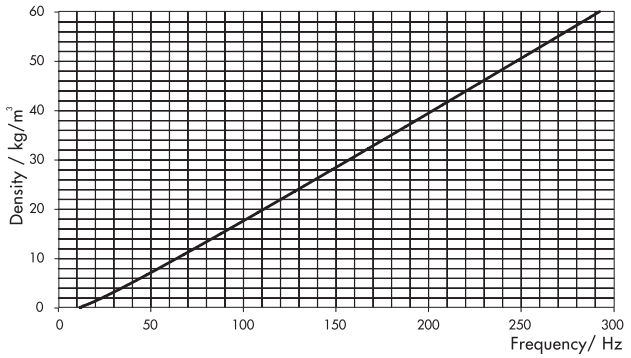


Druck/ Pression/ Pressure p @ 20°C = { 0,000569502*T[K]*Density[kg/m^3] + (0,00250695*0,000569502*T[K] – 0,00073822)*Density[kg/m^3]^2 – (0,00000212238*0,000569502*T[K] – 0,000000513)*Density[kg/m^3]^3}

≈ 0.6303*current [mA]-4.1419
(add. non-linearity ±0.3 FS between 9.5 and 19.25mA)

AUSGANGSSIGNAL DIGITAL / SIGNAL DE SORTIE NUMÉRIQUE / OUTPUT SIGNAL DIGITAL

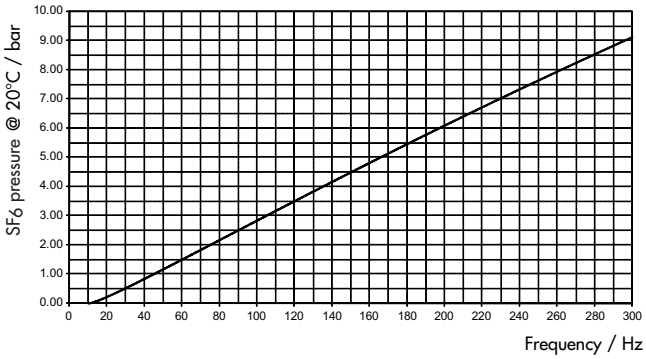
Umrechnung Messfrequenz in SF_6 Gasdichte
Conversion de la fréquence de mesure en densité de gaz SF_6
Conversion frequency to SF_6 gas density



Dichte/ Densité/ Density $\rho = \{ \sqrt{(0{,}237^* F[\text{Hz}]) - 2{,}182} - 0{,}44 \}^2$

Umrechnung Messfrequenz in SF_6 Gasdichte / Druck @ 20°C
Conversion de la fréquence de mesure en densité de gaz SF_6 / pression @ 20°C
Conversion frequency to SF_6 gas density / pressure @ 20°C

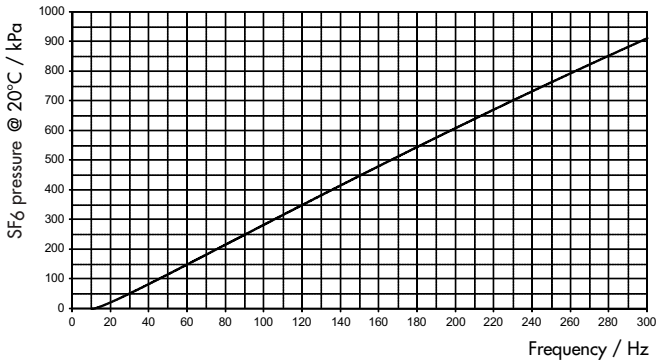
Characteristic line SF_6 pressure @ 20°C - Frequency



SF_6 Pressure [bar] @ 20°C ≈ 0.032 * F [Hz] – 0.32
(linearized approximation with additional error of ± 0.3 FS within 100...250 Hz)

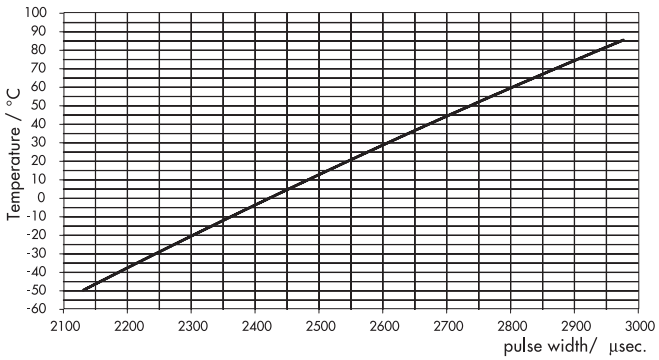
Umrechnung Messfrequenz in SF_6 Gasdichte / Druck @ 20°C
Conversion de la fréquence de mesure en densité de gaz SF_6 / pression @ 20°C
Conversion frequency to SF_6 gas density / pressure @ 20°C

Characteristic line SF_6 pressure @ 20°C - Frequency



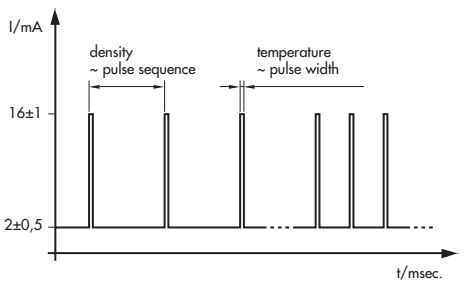
SF_6 Pressure [kPa] @ 20°C ≈ 3.2 * F [Hz] – 32
(linearized approximation with additional error of ± 0.3 FS within 100...250 Hz)

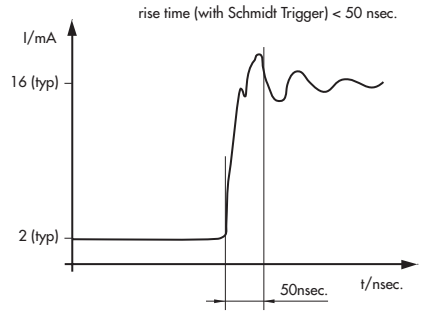
Umrechnung Impulsbreite in Temperatur
Conversion de largeur d'impulsion en température
Conversion pulse width to temperature



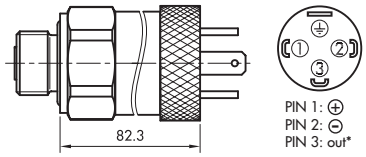
Temp. $T = -1{,}951 * 10^{-5} * I[\mu s]^2 + 0{,}2595 * I[\mu s] - 514{,}3$

current pulses, height typical 12-14 mA; power consumption electronics, without pulses typical 2 mA



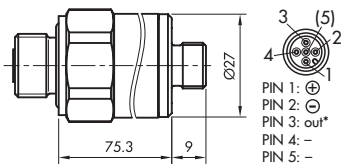


MASSBILDER / COTES D'ENCOMBREMENT / DIMENSIONS



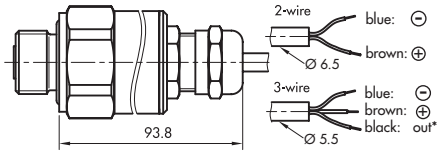
* for digital 3-wire version 8774.XX.XXX3..

8774.XX.XXXX.**04**...



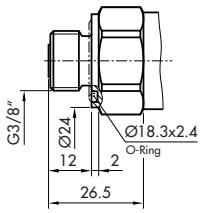
* for digital 3-wire version 8774.XX.XXX3..

8774.XX.XXXX.**35**...

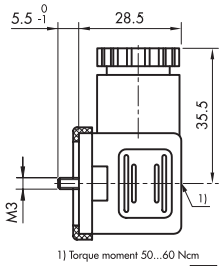


* for digital 3-wire version 8774.XX.XXX3..

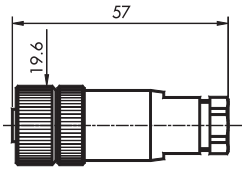
8774.50.XXXX.**51**...



8774.XX.**11**XX...

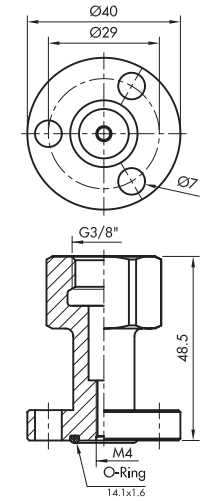


8774.XX.XXXX.XX.**58**...

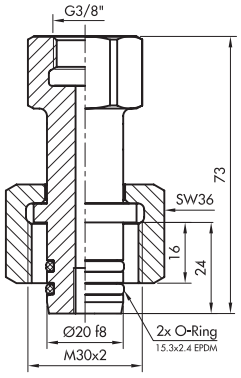


8774.XX.XXXX.XX.**33**...

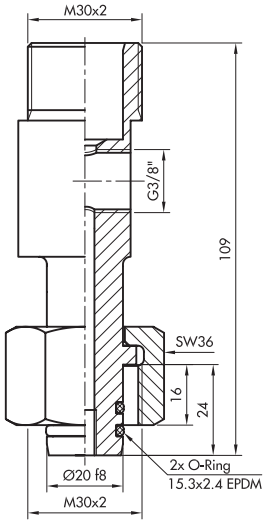
ADAPTER / ADAPTEURS / ADAPTERS



8774.XX.XXXX.XX.XX.**22**...



8774.XX.XXXX.XX.XX.**23**...
.**24**...



8774.XX.XXXX.XX.XX.**25**...
.**26**...