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Flow Indicators Series SCFR2

Catalogue N°: 12SCFR2CATR03-E

Revision: 3 of 11.06.2002



1 General Features

1.1 Characteristics

The circulation indicators Series SCFR2, are designed to check the circulation of dielectric fluids, normally mineral oils, in the cooling installations of electric transformers. The possibility of using them with other fluids and/or in other types of installation depends on the fluid in circulation and its compatibility with the materials used in the construction of the device and must therefore be looked into in every case.

The dimensions, the assembly and all other characteristics are according to French standard NF C 52-122. The circulation is indicated optically by an arrow that indicates on a dial the running (M) or the stoppage (A) of the circulation pump and electrically by one or two electric contacts. The indicators Series SCFR2, only show that the flow speed inside the pipeline has the required value. The optical indication may not be proportional to the velocity.

The operation of the indicator Series SCFR2, is based on the dynamic thrust of the flowing oil on a detection paddle placed inside the pipe; the dimensions of the paddle depend on the diameter of the pipe. An adjustment device allows the triggering point to be altered within certain limits, even after the indicator has been mounted, in order to adapt it to the real flow conditions.

1.2 Field of Use

The circulation indicators Series SCFR2, may be used with the following characteristic values:

- pipeline diameter from 80 to 400 mm
- flow speed from 0,5 to 3,0 m/sec
- fluid mineral oil
- pressure in the pipeline from 0,0 to 5,0 bar
- working temperature from - 20°C to + 120°C
- resistance to vibrations up to 3 g on all axes
- resistance to shock up to 10 g on all axes

1.3 Special Features

On the basis of the experience of the previous series, special features have been included in the design of the circulation indicators Series SCFR2, aimed at simplifying the choice of the device, making interchangeability easy and allowing the user to modify the working characteristics, should he so desire.

- The diameter of the dial and the choice of colours for the dial and the arrow make the reading easy even from distance;
- the construction in two separable parts, mounting flange with detection paddle and adjustment system, and indicator with optical and electric indication, allows the indicator to be removed from the installation for repair or during shipment of the transformer while having with the pipeline still closed by the flange. Therefore it is possible to modify or replace the indicator part of the device without having to empty the plant;
- the transmission of the paddle movement is by magnetic transmission so as to guaranteeing a perfect seal;
- the adjustment system is simple and reliable; the adjustment can be made even after the device has been mounted on the pipeline in order to adjust the indicator to the real operating conditions.

2 Construction Features, Finish and Accessories

2.1 Construction Features

With reference to drawing N° 12.600.10/S and its nomenclature, which also indicates the materials, the device is constructed as follows:

- flange 2.0 allows the device to be assembled on the pipe; the gasket in groove 2.1 assures the seal;
- the adjustment assembly 2.2, fixed to flange 2.0 by four screws 2.3, includes one end of the magnetic transmission, the return spring 2.5 and the detection paddle 2.6;



- the indicating instrument 1.0 with the optical and electrical indication is mounted on flange 2.0 by the screws 1.5 and the lateral screw 1.6;
- a terminal box 3.0, attached to the instrument 1.0 and closed by a cover 3.1, includes the terminal board 3.2 which is used to connect the switch 3.3 to the external circuit as well as an earthing screw.

2.2 Finish

In standard execution, all cast parts are protected by one coat of two-pack epoxy primer and one coat of two-pack polyurethane paint, final colour RAL 7031 and screws and washer are in stainless steel; the protection degree of the device is IP 55 and of the contacts IP 67. Therefore the device is suitable for fitting in the open even in tropical climate and with high industrial pollution. Special versions are available for particularly severe climatic and/or aggressive atmospheric conditions.

2.3 Accessories

The device is supplied with its assembly gasket. A cable gland is supplied on request.

3 Wiring Diagrams and Contact Performance

3.1 Wiring Diagrams

As mentioned above, the circulation indicators Series SCFR2 can be supplied with one or two electric contacts, set out according to one of the wiring diagrams shown in the specification N° 12SCHRx, which indicates also the numbering of the terminals.

3.2 Contacts Performance

Specification N° 12SCHxx shows also the performance of the contacts; special contacts for electronic circuits having low current (1 to 100 mA) and voltage (4 to 10 V) can also be supplied.

4 Operation

The circulation indicators Series SCFR2 operate as follows:

- the oil flowing in the pipeline hits the detection paddle 2.6, thus causing the shaft on which it is mounted to rotate by about 90°, against the force of the return spring 2.5;
- the dimension of the paddle is chosen according to the diameter of the pipe and the oil flow that it should detect;
- the tension in the return spring 2.6, is pre-set at the factory in the centre of the adjustment range; the set point may however be further adjusted by turning the adjustment assembly 2.2 after removing the fixing screws 2.3; this adjustment can be made with the flange 2.0 mounted on the pipe;
- the magnetic transmission transmits the rotation of the paddle to the arrow and operates at the same time the switches.

5 Mounting, Adjustment and Maintenance

5.1 Mounting

The circulation indicators Series SCFR2 operate within the operating conditions indicated in chapter 1.2. The device is mounted on a flanged stub pipe, welded directly to the pipeline; the dimensions of the stub pipe should be as indicated in drawing N° 12.600.10.

To mount the device on the pipeline, separate the indicator 1.0 from the flange 2.0 by removing the lateral screw 1.6 and rotating the instrument by about 10° anticlockwise so as to free the screws 1.5 from their holes; then attach the flange 2.0 to the pipe by screws M8, with the assembly gasket in groove 2.1.

After having attached the flange to the pipe, assemble the instrument 1.0 on to the flange again and check that the optical display is operating correctly by starting up and stopping the circulation pump.

If it is functioning correctly, carry out the electrical connection according to the desired wiring diagram.



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If the optical or electrical indications are not correct, carry out the adjustment described later.

In order to make sure the signal paddle 2.6 is hit by the most uniform possible flow, avoid mounting the device immediately downstream of bends, necks or other parts which could cause turbulence in the flow; if this is impossible, the adjustment of the tension in the return spring 2.5, allows the indicator to be adapted to the real flow conditions.

5.2 Adjustment

The device is always supplied with the adjustment assembly set to position 3, so that it is possible to both increase and decrease the load of the return spring 2.5 in order to set the device for a higher or lower flow rate.

If the factory setting is not satisfactory adjust the setting as follows:

- remove the indicator 1.0 from flange 2.0 as described above, in order to get to the adjustment assembly 2.2 fixed on the flange 2.0 by the four screws 2.3;
- remove the four screws 2.3; even if there is pressure in the pipe the adjustment assembly cannot come off the flange 2.0; furthermore a gasket continues to guarantee the seal;
- turn the adjustment block until the notch 2.4 corresponds with one of the numbers on the flange, anticlockwise to increase the force of the spring 2.5 and trigger the device at a higher flow rate, and clockwise to have the opposite effect;
- replace the 4 screws 2.3 and the indicator 1.0 on the flange 2.0 and check that the adjustment made has the desired effect otherwise make a further adjustment.

5.3 Maintenance

The circulation indicators Series SCFR2 do not need periodic maintenance; however it is advisable to check regularly that they are operating correctly by starting up and stopping the circulation pump and checking that the optical and electrical display takes place as normal.

6 Order Specifications

When ordering it is necessary to indicate the type of device according to the table in drawing N° 12.600.10, the diameter of the pipeline, the mounting position and the required wiring diagram according to specification 12SCHRxx. Standard cable entry thread is $\frac{3}{4}$ "; should another thread be preferred and a cable gland be needed, this has to be mentioned in order.



Specification N° **SPR/**

Product:

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12SCHR01-E

Flow Indicators Series CCL2 and SCFR2

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Title:

Revision N°

Performance of contacts and description of wiring diagrams

01 - 20.11.01

1 Performance of the contacts and description of the wiring diagrams

The specification has a complete description of the contacts and of performance and function of the wiring diagrams.

2 Wiring diagrams

2.1 Identification by numbering of the wiring diagrams

The identification numbering of the wiring diagrams follows criteria that allow to identify type of contacts and operation of the wiring diagram from it's number.

2.1.1 Key to numbering of wiring diagrams

The following numbering system applies to wiring diagrams with standard contacts; wiring diagrams with low current contacts are considered special and have a separate numbering.

12-xxx = Wiring diagram for flow indicators;

12-Xxx = Total number of contacts:

1, 2, 3 and 4 = 1, 2, 3 or 4 contacts

12-xXx = Contact Type

0 = Normally open; **1** = Normally closed; **3 or 9** = Changeover

12-xxX = Contacts position:

1 = Contact/s for minimum flow; **2** = Contact/s for maximum flow;

3 = One contact for minimum + one contact for maximum flow

4 to 9 = Other positions

2.2 Table of Contact's Performance

2.2.1 Standard Contact (ST)

Changeover microswitch contact worked mechanically

Degree of protection

IP 67

Casing

Poliester

Gasket

Fluorosilicon rubber

Lever and push button

Stainless steel

Contact's material

Silver, nickel coated

Mechanical endurance of contact

1x10⁷ cycles

Temperature range

-40°C to +125°C

Standard power of interruption (1x10⁵ cycles)

AC 250V/5A - DC 125V/1A

Maximum power of interruption (1.000 cycles)

DC 125V/1,5A

Isolation to mass at 20°C

2.500 V

Isolation of open contact at 20°C

1.500 V

Minimum and maximum current

0,1 - 10A

2.2.2 Low Current Contact (BC)

Same performance as standard contact except:

Contact's material

Gold

Operation range

1 to 100 mA - 4 to 30 V

2.2.3 Electric circuitry

Degree of protection of instrument casing:

- Type CCL2

IP 65

- Type SCFR2

IP 55

Insulation to mass

2.500 V

Material of terminal board

tin coated brass



Specification N° **SPR/**

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Flow Indicators Series CCL2 and SCFR2

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Performance of contacts and description of wiring diagrams

01 - 20.11.01

3 Tables of function and performance o wiring diagrams

The most commonly used wiring diagrams are described in detail in the following tables; the following notes describe the acronyms.

3.1 Notes on tables of function and performance of wiring diagrams

The following tables showing the performance of the wiring diagrams make use of some acronyms; for a full understanding they are explained in the following:

NE = Normal exercise = corresponds to maximum flow

N° Term. = Numbers that identify the terminals

N° WD = Wiring diagram number

Pos. in NE = State of the contact in normal exercise.

3.2 Table

N° WD	N° Term.	Pos. in NE	Functional description of wiring diagram	Operates at
12-000			Without contacts, only optical indication	
12-131	1-2	Open	1 changeover contact for minimum flow	minimum
	1-3	Closed		
12-132	1-2	Open	1 changeover contact for maximum flow	maximum
	1-3	Closed		
12-291	1-2/4-5	Open	2 contacts for minimum flow	minimum
	1-3/4-6	Closed		
12-292	1-2/4-5	Open	2 contacts for maximum flow	maximum
	1-3/4-6	Closed		
12-293	1-2	Open	1 changeover contact for minimum flow	minimum
	1-3	Closed		
	4-5	Open	1 changeover contact for maximum flow	maximum
	4-6	Closed		



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Nomenclature N°:

12SCFR2-E

Reference drawing N°:

12.600.10/S

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Product:

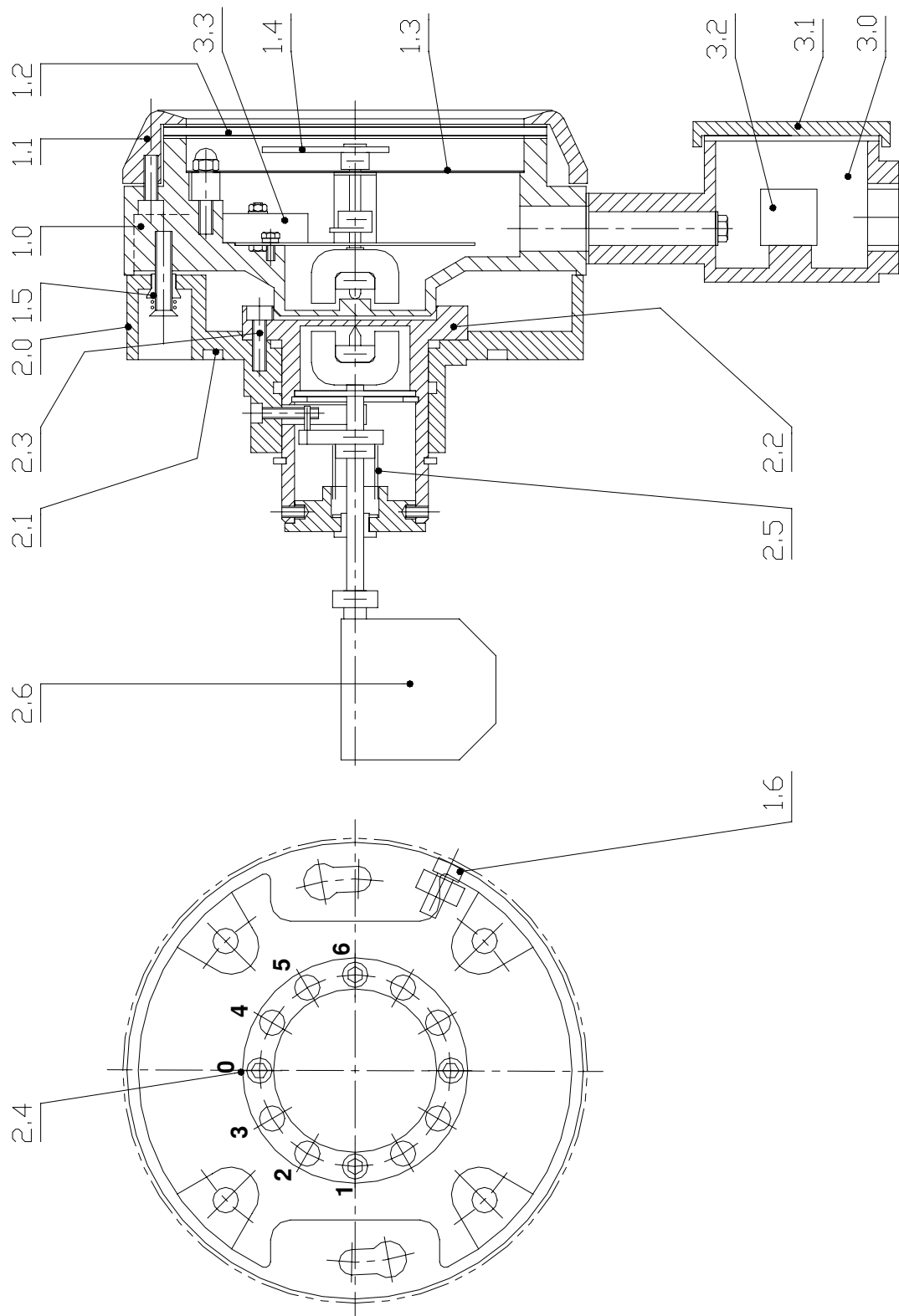
Oil Flow Indicator Series SCFR2

Revision N°

00 of 06.04.01

Pos.	Part denomination	N°	Material
1.0	Indicating instrument	1	Aluminium
1.1	Front glass holding rim	1	Aluminium
1.2	Front glass	1	Tempered glass
1.3	Dial	1	Aluminium
1.4	Arrow	1	Aluminium
1.5	Assembly screws of indicating instrument 1.0 on flange 2.0	4	Stainless steel
1.6	Lateral fixing screw	1	Stainless steel
2.0	Mounting flange	1	Aluminium
2.1	Gasket groove		
2.2	Adjustment assembly	1	Brass
2.3	Fixing screws of adjustment assembly 2.2	4	Stainless steel
2.4	Adjustment mark		
2.5	Return spring	1	Spring steel
2.6	Detection paddle	1	Brass
3.0	Electrical junction box	1	Aluminium
3.1	Junction box cover	1	Aluminium
3.2	Terminal board		
3.3	Switch	1/2	

N.rev	Nota sulla revisione	Data	Firma	Controllo
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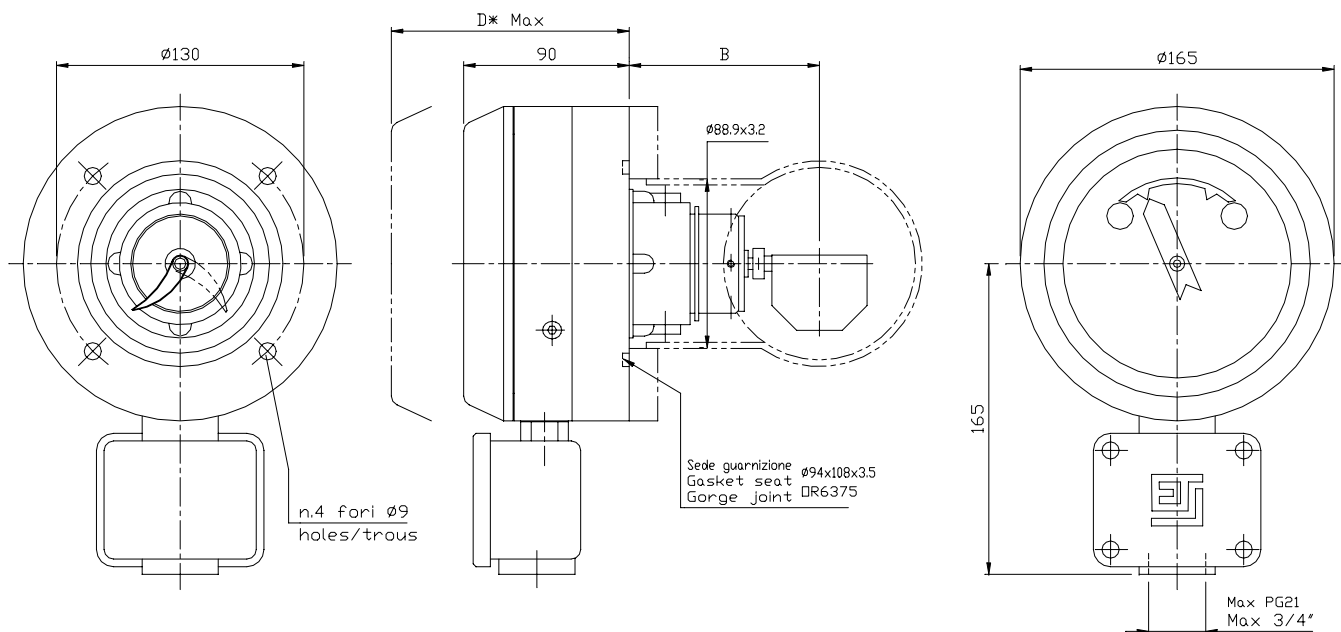


Rif.	Quantità	Titolo/Nome, designazione, materiale, dimensione, etc.			N. articolo/Riferimento	
Progettato da	Controllato da	Approvato da - data	Nome file	Data 23-04-92	Scala //	

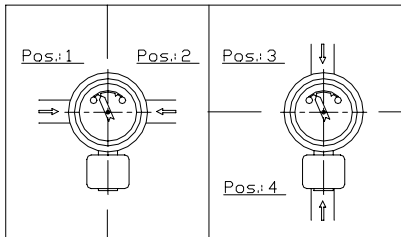
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Titolo/Nome
 Segnalatore di circolazione - Indicateur de circulation - Circulation indicator
 SCFR-2 Sezione - Section

Numero disegno 12.600.10/S	Modifica	Foglio
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Posizione tubatura e senso del fluido
 Position pipe et fluid way
 Position tuyauterie et sens du fluide



Tipo Type	Diametro interno tubazione Diameter interior pipe Diametro intérieur tuyauterie		Dimensioni Dimensions	
	Min	Max	B	D
1	80	105	100	250
2	122	158	130	280
3	180	230	160	310
4	260	300	200	340

* Ingombro di smontaggio
 Disassembling height
 Encombrement de demontage

N.rev Nota sulla revisione Data Signatura Controllo

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ETI ELETTRINDUSTRIA SpA 20032 CORMANO ITALY			Titolo/nome Segnalatore di circolazione - Circulation indicator - Indicateur de circulation Serie: SCFR-2		
			Numero disegno	Modifici	Foglio
			12.600.10		
Riproduzione vietata Non misurate le quote dal disegno					