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STÉ D'INSTRUMENTATION SCHLUMBERGER

DIVISION Rochar électronique

TECHNICAL HANDBOOK

DIGITAL PANEL INDICATOR

TYPE A 1454

Rochar électronique

51, Rue Racine, (92) MONTROUGE
FRANCE – Téléphone : 735 31-40

A.1454 and B

Issue 10-1966

DIGITAL PANEL INDICATOR

(single range)

- Easy reading
- Accuracy : 0.2 % of full scale
- Input impedance : 100 MΩ (on 1 V D.C. range)
- Printout
  (by means of the A. 1170 encoder and the A. 766 printer)

THIS INDICATOR WILL REPLACE CONVENTIONAL METERS

The following specifications will be given on purchase orders : (see questionnaire) :

– INPUT : VOLTAGE OR CURRENT (A.C. or D.C.)

– DISPLAY : 1 000, 2 000 or 5 000

– UNIT : VOLT, AMP (and sub-multiples) or
any unit defining a PHYSICAL QUANTITY : mm - pH - rpm, etc.

1. PURPOSE

Digital panel indicators **A.1454** are single range instruments, the range being chosen according to the measured value. Their field of application is the same as that of conventional meters, but they present the basic advantages of digital instruments, namely accuracy, easy reading and possible result printout.

They allow direct and alternative voltage and current measurements, and, in general, measurement and display, in a desired unit, of any physical parameter which can be converted into a D.C. or A.C. voltage or current by an appropriate transducer.

For this reason their presentation as square panels to be set in is near that of conventional instruments.

Standard instruments are available for alternative or direct voltages and currents with 3 types of scale : 1 - 2 - 5 from 1 V to 500 V and from 1 μA to 1 A.

Higher ranges are possible with additional resistors, external shunts or intensity transformers.

On request, for an input voltage (or current) as above, the scale can be selected so as to obtain a display in a desired unit.

Each instrument is manufactured for an electrical range, and a nominal electrical scale to specify on order.

2. GENERAL CHARACTERISTICS

Definition: 1 000 points, for the nominal electrical range.

Nominal scale (value displayed for an input signal equal to the nominal electrical range) : 1 000 - 2 000 or 5 000.

Direct display on 4 digital tubes (point and polarity display).

Sampling rate : operating mode chosen by the position of a strap :

— 3 measurements/second,
— external control by closing of an electric loop.

Response time at 0.2 % :

0.5 second approximately (D. C. range),
1.5 second approximately (A. C. range).

Isolation from ground: 500 V D.C.
300 V, 50 c/s.

Direction of connection to be observed.

Overload admittable in voltmeter : 10 times the range during less than one second with a maximum at 1 000 V and twice the range in permanence with a maximum at 600 V.

Power supply: 115/127/220 V, 50 to 400 c/s - 10 VA.

Vibrations : ± 0.5 mm from 0 to 80 c/s.

Transcription (on request). All models **A. 1454** can be provided with a transcription socket (output : 1-2-4-8 " 1 " state negative) ; then, they are referenced **A. 1454 T.** Particularly, it is possible to use the **A. 1170** encoder for printout of measurements on a printer **A. 766.**

3. RANGES OF INDICATORS

Direct current measurements (see tables).

Accuracy: ± 0.2 % of full scale over a temperature range of 0 to 50° C.

For direct currents, standard instruments are delivered with " zero on the left ". On request and with extra charge, they can be delivered with a " middle zero ". In this case, they include a tube for sign + or — display.

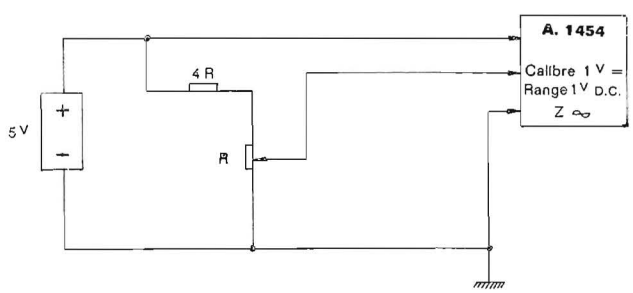
Alternative current measurements (see tables).

Accuracy : ± 0.5 % of full scale over a temperature range of 0 to 50° C.
Frequency : 30 c/s to 5 kc/s. (sine-wave).
Measurement of the average value of the rectified voltage.
Display in rms value.

4. UTILIZATION AS A RATIO METER

The possibility to use an external voltage of 5 V ± 20 % to supply the reference circuit permits to use the instrument **A. 1454** as a ratiometer (the corresponding input plug is available on the rear of the instrument).

However, it is possible to use an external voltage higher than 5 V, provided that the current applied to the reference circuit be equal to 1 mA.



Example of utilization of the **A. 1454** as a ratio meter

ELECTRICAL RANGES OF THE A. 1454 INDICATOR

Input : DIRECT VOLTAGE

Range in V	Display in overload up to	Input impedance
1	2 V	100 kΩ *
2	3 V	200 kΩ
5	6 V	500 kΩ
10	20 V	1 MΩ
20	30 V	1 MΩ
50	60 V	1 MΩ
100	200 V	1 MΩ
200	300 V	1 MΩ
500	600 V	1 MΩ

(*) On 1 V or ± 1 V range, 100 MΩ impedance, on request.

Input : ALTERNATIVE VOLTAGE

Range in V	Display in overload up to	Input impedance
1	2 V	2 000 Ω/V
2	3 V	
5	6 V	
10	20 V	
20	30 V	
50	60 V	
100	200 V	
200	300 V	
500	600 V	

INPUT : DIRECT CURRENT

Range in µA	Display in overload up to	Range in mA	Display in overload up to
1	2 µA	1	2 mA
2	3 µA	2	3 mA
5	6 µA	5	6 mA
10	20 µA	10	20 mA
20	30 µA	20	30 mA
50	60 µA	50	60 mA
100	200 µA	100	200 mA
200	300 µA	200	300 mA
500	600 µA	500	600 mA
		1 A (*)	2 A

Voltage drop for the nominal range: 1 V.
(*) Higher ranges by addition of shunts (1 V with 0.2 % or 0.1 V with 2 %); not supplied.

INPUT : ALTERNATIVE CURRENT

Range in mA	Display in overload up to
1	2 mA
2	3 mA
5	6 mA
10	20 mA
20	30 mA
50	60 mA
100	200 mA
200	300 mA
500	600 mA
1000	2000 mA

Voltage drop for the rated range : 0.1 V rms approximately.

Range	Display in overload up to	Type of shunt associated
2 A	3 A	Shunt 100 mV, 10 mA.
5 A	6 A	
10 A	20 A	
20 A	30 A	
50 A	60 A	

The above ranges are obtained by addition of an external shunt, supplied with the indicator.

5. EXTENSION

The possibilities of the **A. 1454** digital indicator can be extended by addition of accessories such as the **A. 1338** amplifier. The scale of this system will be thus comprised between ± 4 mV and ± 500 mV, according to the coefficient of amplification chosen for the **A. 1338** instrument.

Such a system can be mounted in a rack cabinet 19", 5 units, type **A. 1429.** It is particularly intended for low level measurements (temperature, strain measurements, etc...).

To this system can be added a power supply and a strain gauge bridge balance device type **A. 1428** providing digital display of measurements in extensometry.

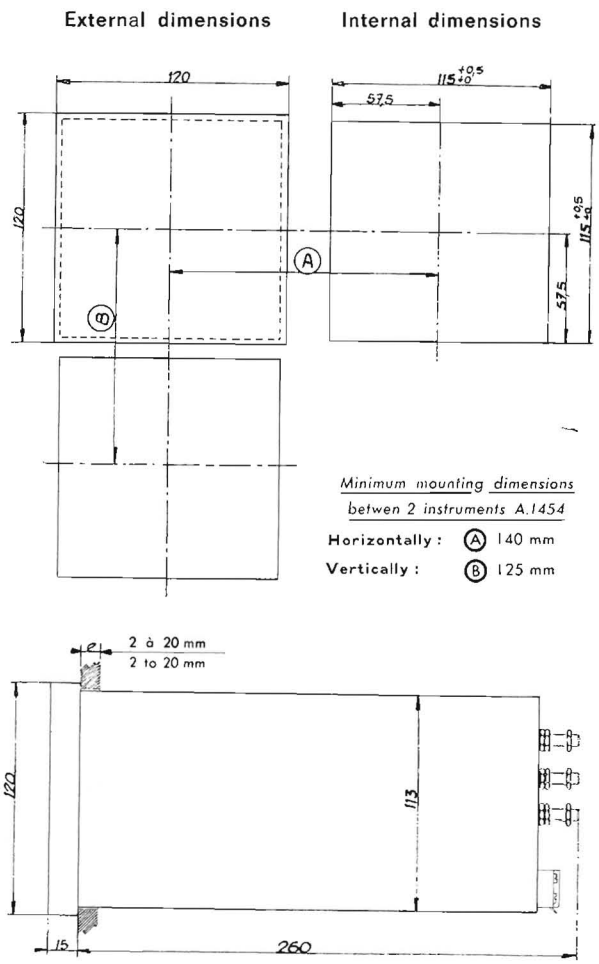
6. PRESENTATION

To facilitate their utilization, these indicators are presented in two versions :

— **A. 1454** (model to be set in) : flange 120 × 120 mm - Depth 250 mm - panel aperture : 115 × 115 mm - fixed by bolts behind the panel.

— **A. 1454 B :** front panel 177 × 120 mm - depth 250 mm for cabinet mounting (cabinet type A. 1430 for 1 × A. 1454 B or type rack A. 1429 for 3 × A. 1454 B).

— Weight : 3 kg.



Embedding of an instrument

Imprimé en France

Imp. Chassel - Lavallois (92)

STÉ D'INSTRUMENTATION SCHLUMBERGER
DIVISION ROCHAR ÉLECTRONIQUE
51, RUE RACINE - 92 - MONTROUGE
FRANCE TÉL. 735 31-40

DIGITAL INDICATOR

Choice and definition of specifications

(Refer to sales instruction leaflet A. 1454)

A. 1454

QUESTIONNAIRE

Questionnaire to be completed by the customer and attached to each order.

Use one copy for each type of indicator.

Key : (1) Mark a cross in the corresponding squares.

(2) Write legibly the specifications.

TYPE (1)

A. 1454	Dimensions 120 × 120 mm, without transcription output	panel mounting
A. 1454 T	— with —	
A. 1454 B	Dimensions 177 × 120 mm, without —	
A. 1454 BT	— with —	

Presentation : without cabinet ☐ (1)

cabinet mounting : independent cabinet type A. 1430 for 1 indicator ☐ (1)

cabinet mounting : rack 19" 5 units type A. 1429 for 3 indicators ☐ (1)

SPECIFICATIONS :

a) electrical range : — D.C. 0 to..... (2)

— D.C. ± ..... (2)

— A.C. ..... (2)

b) input impedance : only for 1 V or ± 1 V D.C. ranges : 100 kΩ ☐ (1) / 100 MΩ ☐ (1)

c) nominal range and decimal point : ☐ ☐ ☐ (1) (2)

d) front panel colour :

(1)

standard colours : GREEN ☐ / BLUE ☐ / YELLOW ☐ / RED ☐ / GREY ☐ / BLACK ☐

special colour ..... (2)

e) symbol engraved on the front panel label :

(1)

Standards labels : V ⎓ ☐ / V ∿ ☐ / µA ⎓ ☐ / mA ⎓ ☐ / A ⎓ ☐ / mA ∿ ☐ / A ∿ ☐

Special label ..... (2)

Company (trade name / address) :

Name :

Department :

VERSION FRANÇAISE AU VERSO

STÉ D'INSTRUMENTATION SCHLUMBERGER
DIVISION ROCHAR ÉLECTRONIQUE
51, RUE RACINE - 92 - MONTROUGE
FRANCE TÉL. 735 31-40

513 1-67

INDICATEUR NUMÉRIQUE

Choix et définition des caractéristiques

(Se reporter à la notice du A. 1454)

QUESTIONNAIRE

A. 1454

Questionnaire à compléter par le client et à joindre à toute commande.

Utiliser un exemplaire par type d'indicateur.

Légende : (1) Mettre une croix dans les cases correspondantes.

(2) Écrire lisiblement les spécifications correspondantes.

TYPE (1)

- A. 1454 ☐
- A. 1454 T ☐
- A. 1454 B ☐
- A. 1454 BT ☐

Format 120 × 120 mm, sans sortie transcription — présentation tableau
— avec sortie transcription —
Format 177 × 120 mm, sans — —
— avec — —

Présentation :
- sans coffret ☐ (1)
- avec coffret :
  - autonome, type A. 1430 ☐ (1) pour 1 indicateur
  - rack 19", 5 unités, type ☐ (1) A. 1429 pour 3 indicateurs

DÉFINITION :

a) du calibre électrique : — en ⎓ : 0 à ..... (2)
— en ⎓ : ± ..... (2)
— en ∿ : ..... (2)

b) de l'impédance d'entrée **uniquement** pour les calibres continus 1 V ou ± 1 V : 100 kΩ ☐ (1) — 100 MΩ ☐ (1)

c) de l'échelle nominale et virgule : ┐ ┐ ┐ (1) (2)

d) de la couleur du panneau avant :

couleurs standards (1) :
- VERT ☐
- BLEU ☐
- JAUNE ☐
- ROUGE ☐
- GRIS ☐
- NOIR ☐

couleur spéciale ..... (2)

e) de la gravure du symbole sur l'étiquette de la face avant :

Étiquettes standards (1) :
- V ⎓ ☐
- V ∿ ☐
- µA ⎓ ☐
- mA ⎓ ☐
- A ⎓ ☐
- mA ∿ ☐
- A ∿ ☐

Gravure spéciale ..... (2)

Société (raison sociale / adresse) :

Votre nom : M

Service :

ENGLISH VERSION P.T.O.

Rochar électronique

51, Rue Racine - 92 - MONTROUGE
FRANCE — Tel 735 31 40 +

TH

A 1454

Edition 12-65

D I G I T A L P A N E L I N D I C A T O R

T Y P E A. 1454

(Technical Handbook)

C O N T E N T S

DIAGRAMS : J. 578 - H. 191 - B 15.802 - B. 15.826 - B. 15.876 - B. 15.864 - 040 008

Attached document : IM. A. 1454 -

V.4 OM.

1 - PRINCIPLE (Diagram J 578)

The A. 1454 digital indicator is based on the principle of voltage to time conversion, and on measurement of this time by means of a digital chronometer.

Voltage to time conversion is obtained by comparison of the potentials applied to the input terminals with a variable voltage increasing with time (sawtooth or ramp).

The comparators, connected to the 2 input terminals, receive the ramp and deliver time measurement start and stop signals when a coincidence is obtained between the ramp voltage and the potentials available on each input terminal.

The measurement start pulse from the comparator starts the fixed frequency oscillator the periods of which are totalized in a counting register until reception of the measurement stop pulse from the second comparator which stops the oscillator.

The slope of the ramp has been determined in such a way that the 1 000 point nominal scale be covered for a potential difference of 1 volt between the inputs of the 2 comparators.

For "middle zero" instruments, the switching order of comparators provides a sign information of the input voltage.

Attenuators and shunts provide a wide range of dc voltmeters and ammeters from the basic 1 volt range.

For instruments measuring an alternative quantity, a special amplifier followed by a detection circuit converts the alternative input current into a direct voltage applied to the input of the comparators.

Basically, the measurement performed is a mean voltage measurement, to which is applied a coefficient in order to display the rms value of the measured quantity, in case of a sinewave.

I - DESCRIPTION (diagram M. 191)

The A. 1454 digital panel indicator consists of the following elements :

- power supply circuits(Z044) including the mains distributor, the fuse, the transformer, Zener diodes, filtering capacitors.

- an interconnection printed circuit board (Z046) placed in the middle of the instrument, bearing the connectors of the sub-units and the ramp generator Z045.

- a Y 9035 "comparator" sub-unit which bears also the triggered oscillator, and the polarity indicator tube. When this sub-unit has no polarity tube, its reference is Y 9036.

- a 4 sub-unit counting scale. Three types of scales can be used ; the corresponding circuits are :

a) Scale 1 000 : 3 X Y 9027 decades
1 X Y 9032 circuit

c) Scale 2 000 : 1 X Y 9028 quinade (even figures)
2 X Y 9027 decades
1 X Y 9033 circuit

c) Scale 5 000 : 1 X Y 9029 scale of 2 (figures 0 and 5)
2 X Y 9027
1 X Y 9034 circuit

- an input circuit, adapting the nominal range of the instrument to the nominal sensitivity of the comparator (1 000 points / volt).

3 - OPERATION - Basic diagram 040 008)

3.1. - Z045 Ramp generator -

In automatic operation, a gas tube oscillator delivers pulses for starting measurements. These pulses drive a bistable flip-flop S_4S_5, the change of state of which resets to zero the register and starts the ramp.

The zero reset pulse is delivered by transistor S_6 , the collector voltage of which varies from + 6 V to - 12 V. This pulse is finished before the ramp arrives in its useful part.

The ramp generator, formed by transistors S_1 S_2 S_{18} mounted as an operational amplifier, receives a constant current at the input during the time of the ramp. This current is furnished by an injection resistor connected to a + 6 V voltage obtained by means of a Zener diode used as a reference, or to an external reference when the instrument is used as a ratiometer, and is integrated by a capacitor mounted in feedback to the amplifier.

The low impedance ramp obtained on the collector of transistor S 18 is directed to the comparators (Y 9035 or Y 9036).

The injection resistor includes an adjusting potentiometer available on the rear panel of the instrument ("calibration"), as well as a positive temperature coefficient resistor, in order that the temperature coefficient of the whole ramp generator should be lower than 2 parts in 10^4/°C.

Instrument calibration is performed by ramp slope variation.

3.2. - Both input comparators C_1 and C_2 are identical.

For dc instruments, the comparator C_1 is connected to the input terminal, either directly, or through an attenuator. The comparator C_2 is connected to the reference terminal (electrical ground).

The comparator C_1 is composed of :

- a differential amplifier (transistor S_7) receiving the input voltage on its base and the ramp on its emitter, through a diode.

- a bistable flip-flop (S_8 S_9) driven by S_7 at the moment of coincidence between the input voltage and the ramp potential, which starts and stops the oscillator according as the comparator receives on its input a positive or negative voltage, relative to the input of comparator C1. This flip-flop, through a diode, cuts off the current flowing through transistor S_7 , as soon as coninicidence is achieved, thus providing a very low consumption on the input of the comparator.

A logic circuit with 4 resistors and 2 diodes collects the data delivered by the comparators to control the triggered oscillator ; the first comparator which obtains coincidence gives a start command to the oscillator, and the second, a stop command.

The triggered oscillator, composed of transistors S_{13} and S_{14}, delivers pulses that can be used directly by the counting scale (6 Volt amplitude). Frequency is about 200 kHz.

The Y 9035 circuit includes also a + or - display tube, driven by flip-flop S_{15} S_{16} , controlled itself by the gates driven by the comparators, which direct the pulses to S_{15} or S_{16} , according as the input voltage is positive or negative.

3.3. - Counting scale for 1 000 nominal scale -

3.3.1.- Y 9027 Decade -

The Y 9027 decade is composed of 4 flip-flops : the first flip-flop divides the input signal by 2. The 2nd and 3rd filp-flops work as a scale of 4, a gate controlled by the 4th flip-flop permitting to the pulses coming from the first flip-flop to reach the 2nd flip-flop as long as the 4th flip-flop is in "zero" state. The 3rd flip-flpp sets the 4th to state "1" during transition from 7 to 8, and the 1st flip-flop sets the 4th back to "0" state, during transition from 9 to 0. The latter delivers a positive edge to the next counting element.

The digital display tube, fixed directly to the decade, is a gas tube including one anode and 10 cathodes, the latter being driven by 10 NPN silicon transistors.

The anode of the display tube is supplied by a voltage of + 200 V approximately through a 33 kΩ resistor. Conduction of one of the 10 transistors illuminates the corresponding figure. The bases of these transistors are supplied by twos by a resistor logic network connected to the last 3 flip-flops, the head flip-flop indicating parity on the emitters.

3.3.2.- Y 9032 Three position scale -

This scale is placed after 3 Y 9027 decades and permits to display the figures 0, 1 and 2. This scale consists of 2 flip-flops mounted as a scale of 4, but only the states 0, 1 and 2 are decoded for display on the digital tube. Transition to 2 causes the overload lamp to light up (transistor S_7 conductive) as well as reset to zero of the comparators, thus causing counting to stop.

3.4.- Counting scale for 2 000 nominal scale -

3.4.1.- Y 9028 Quinade -

At the beginning of the counting scale, there is a scale of 5 which displays only even figures (Y 9028). It receives directly the pulses at 200 kHz from the oscillator, and delivers pulses at 40 kHz to the next stage (C 9027).

The three flip-flops of this sub-unit work exactly like the last 3 flip-flops of the Y 9027 decade.

3.4.2.- Y 9032 - 4 position scale -

After the Y 9028 quinade, threre are 2 9027 decades, and a scale of 4 (9032 sub-unit) which can display 0, 1, 2 and 3. This scale consists of 2 flip-flops and 4 display transistors. The first flip-flop delivers parity data to the display transistors ; and the second supplies the bases of these transistors by resistors. Transition to 3 causes the overload lamp to light up and resets the comparators to zero , thus stopping the counting process.

3.5. - Counting scale for 5 000 nominal scale -

3.5.1.- Y 9029 - 2 position scale -

At the begining of the counting scale, there is a scale of 2 which displays only 0 and 5. It receives directly pulses at 200 kHz from the oscillator, and delivers pulses at 100 kHz to the next stage (Y 9027).

The flip-flop of this sub-unit controls directly the 2 display transistors .

3.5.2.- Y 9034 - 7 position scale -

After the scale of 2 (Y 9029) are two Y 9027 decades, and a scale of 7 (Y 9034) which can display 0 to 6. This scale consists of 3 flip-flops mounted as a binary divider. The first flip-flop delivers a parity information to the 7 display transistors ; the last 2 flip-flops deliver the base currents through a resistor decoding logic network. Transition to 6 causes the overload lamp to light up , and resets the comparators to zero, thus stopping the counting process.

4 - MAINTENANCE -

The dimensions of elements and the stability of adjustments of the A. 1454 instrument are such that risks of breakdown are quite reduced.

To locate a fault, it is necessary to have clearly understood the theory of operation (§ 3) and to dispose of the following instruments :

- a 5 MHz oscilloscope with a high input impedance probe.
- a voltmeter or ammeter of higher accuracy than the A. 1454 instrument
- a stable voltage or current generator

4.1. - Instrument disassembling -

To remove the instrument from its cabinet, it is necessary to unscrew the two screws placed at the rear of the cabinet, then, to slip the instrument out from the rear.

Since the sub-unit locking device is a part of the cabinet, the sub-units are automatically unlocked when the instrument is removed from its cabinet.

If an intervention is necessary on the Z 045 ramp generator, remove the 4 screws which maintain the interconnection circuit and turn this one down to release the Z 045 circuit.

If an intervention is necessary on the power supply circuits, remove the power supply unit placed opposite to the input circuit.

4.2. - Repair of the instrument -

To repair a circuit, apply to the input terminals an electrical quantity corresponding approximately to the nominal scale of the instrument, that is a potential difference of 1 volt to the input of the comparators. Use an oscilloscope, and check the signals at the different points of the instrument, by comparison with the signals shown in the general circuit diagram.

If the nature of the breakdown does not make it possible to determine the origin of the fault, check in the following order :

- the supply voltages (- 6 V , + 12 V , + 6 V , + 12 V , + 200 V)
- the measurement driving pulses
- the ramp generator
- the comparators
- the 200 kHz oscillator
- the counting circuits
- the zero reset circuit

4.8. - Adjustment -

Test and calibration must be performed when the instrument is in its cabinet, and after at least one hour warmup.

4.3.1. - Zero check -

To check the zero, short-circuit the 2 inputs terminals of the instrument and, if necessary, adjust the zero with the "zero" potentiometer available on the rear of the indicator (the axis of the potentiometer is protected by a screwed cap which must be removed to reach the potentiometer).

4.3.2. - Calibration check -

For calibration, use a voltage or current source compatible with the scale of the instrument, and a standard of higher accuracy than the A. 1454 : in parallel for voltmeters and in series for ammeters.

Untighten the "calibration" potentiometer, perform the adjustment on the nominal range of the instrument, and tighten again the potentiometer.

G. DEMERLIAC/MBC

Dokumentet är delvis skannat.

De sex sista sidorna ger för dålig kvalitet vid skanning.