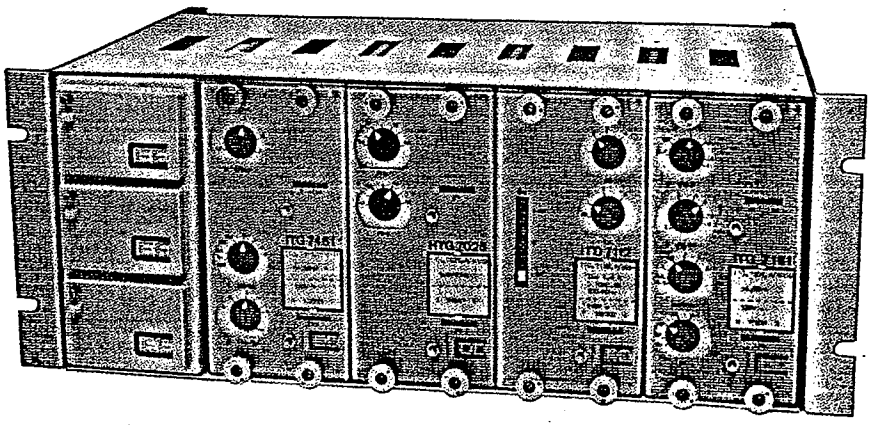
relais

de fréquence

frequency

relays

HTG 7000



COMPAGNIE
CONTINENTALE
D'EQUIPEMENTS
ELECTRIQUES

relais de fréquence en boîtier modulaire série HTG 7000

frequency relays in modular case series HTG 7000

Les HTG de la série 7000 constituent une gamme de relais de mesure à maximum et minimum de fréquence à 1 ou 2 seuils destinés à la surveillance des mouvements de fréquence des réseaux d'énergie électrique et des générateurs associés. Ils bénéficient de l'expérience exceptionnelle que nous avons acquise depuis de nombreuses années en matière de relais à éléments de mesures statiques, dans tous types d'installations tant en FRANCE que dans de nombreux pays du monde et sous toutes conditions climatiques. Le relais HTG 7024 notamment est agréé par Électricité de France comme protection de base par le découplage des sources autonomes.

Leur boîtier modulaire, type R, débrochable, peut indifféremment être monté :

– soit comme relais séparé : en saillie ou en encastré
– soit par insertion dans un panier rack au standard de 19".

Les différents relais de la série 7000 sont définis dans le tableau suivant :

The HTG relays of the series 7000 form a range of under and over-frequency relays with 1 or 2 pick-up levels, designed for the supervision of frequency movements in electrical networks and the associated generators. They are the direct result of our exceptional experience with relays using static measuring elements, acquired over many years, in all types of installation in France and in many other countries throught the world, and under all types of climatic conditions. The HTG 7024 relay in particular is agreed by Electricité de France (the French Power Authority) as the basic protection for the separation of customers with their own supply sources normally coupled to the network.

Their modular draw-out case, type R, may be mounted as follows:

– either as a separate relay: projecting or flush
– or by insertion into a standard 19" rack cradle.

The different relays of the 7000 series are defined in the following table:

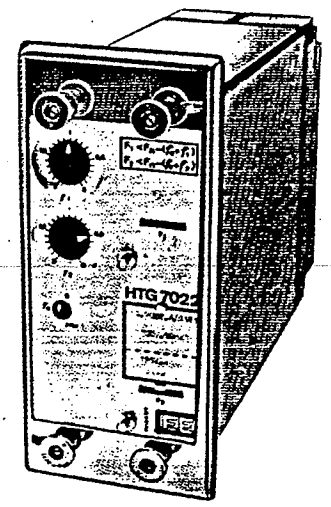
Fonction *Function*	Type *Type*
Maximum de fréquence : 1 seuil *Over frequency : 1 pick-up level*	HTG 7011
Minimum de fréquence : 1 seuil *Under-frequency: 1 pick-up level*	HTG 7012
Minimum de fréquence : 2 seuils *Under-frequency: 2 pick-up levels*	HTG 7022
Mini et Maxi de fréquence : seuils réglables *Under and over-frequency: adjustable levels*	HTG 7025
Mini et Maxi de fréquence : seuils fixes *Under and over-frequency: fixed levels*	HTG 7024

La désignation de chacun de ces types répond au code ci-après :

H = grandeur caractéristique : fréquence
T = élements de mesure : transistorisé
G = utilisation : générale
7 = identification de la série en boîtier R
0 = caractéristique de temps : instantané
1, 2 = nombre de mesures de la grandeur d'influence
1,2,4,5 = identification du type

The designation of each type follows the code below:

H = characteristic quantity : frequency
T = measuring elements : transistorised
G = use : general
7 = identification of relays in the R type modular case
1, 2 = number of measuring elements
1,2,4,5 = type identification



HTG 7022
Montage encastré
flush mounting

MONTAGE

Indépendamment du montage encastré, dont la photo ci-contre montre un exemple de boîtier prévu à cet effet, tous les relais de la série HTG 7000 peuvent être montés en saillie ou insérés dans un rack de 19".

MOUNTING

As well as flush mounting — the photograph opposite shows an example of a case equipped for this — all relays in the HTG 7000 series may be projection mounted, or inserted into a 19" rack.

PRINCIPAUX AVANTAGES

Éléments de mesures statiques à faible consommation et grande stabilité : précision meilleure que 0,1 Hz.

Dispositif de sécurité interdisant tout fonctionnement intempestif en cas de disparition brève de la tension de mesure ou de l'alimentation auxiliaire.

Insensibilité aux secousses sismiques : essais à 5 g selon norme IEEE 344.

Relais auxiliaires de sortie à 2 contacts de forte puissance avec voyant mécanique de fonctionnement à réarmement manuel excepté l'HTG 7024.

Boîtier modulaire de très grande robustesse et d'encombrement réduit. Plaques signalétiques avec inscription symbolisée d'interprétation aisée.

Protection pour environnement sévère : chaleur humide, air salin, moisissure, termites.

Absence de tension auxiliaire dans le cas de l'HTG 7025.

Capacité de stockage à très bonne température (vérification par le L.C.I.E. à – 57 °C).

MAJOR ADVANTAGES

Static measuring elements having a low burden and a high stability: precision better than 0.1 Hz.

Safety feature blocking spurious operation in the event of short duration loss of measured voltage or auxiliary voltage.

Insensitive to seismic shock: tests at 5 g according to IEEE standard 344.

Auxiliary output relay with two high-power contacts and a hand-reset mechanical operation indicator, with the exception of the HTG 7024.

Very robust, small-volume modular case. Nameplate with easily understood symbolized inscriptions.

Protection against severe environments: heat and humidity, saline atmosphere, corrosion, termites.

No auxiliary supply required in the case of the HTG 7025.

May be stored at very low temperature (tests performed by the L.C.I.E. at – 57 °C).

APPLICATIONS

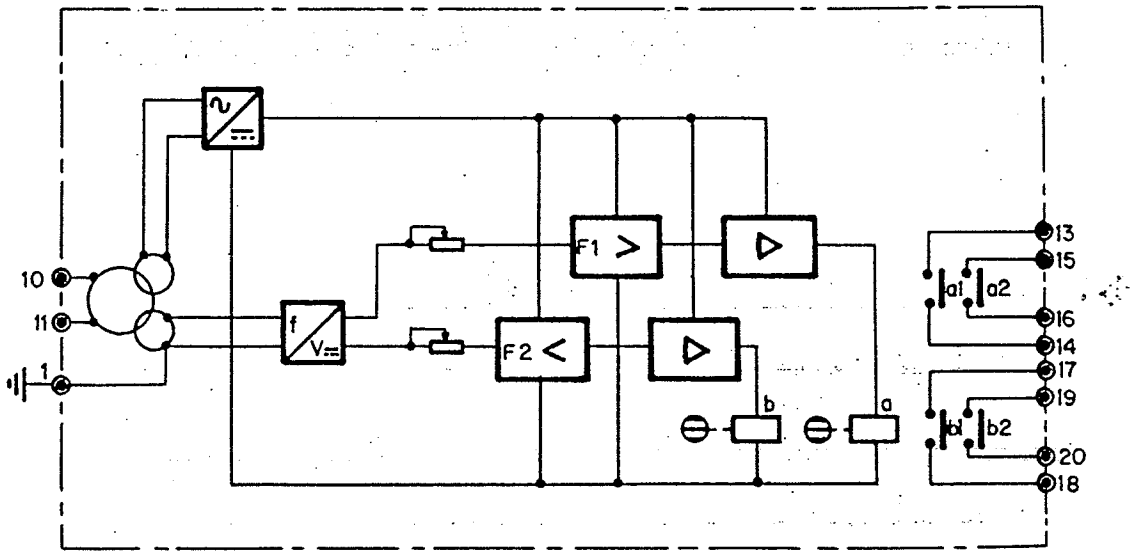
Les HTG série 7000 sont destinés à la surveillance de la fréquence des réseaux de transport et de distribution d'énergie électrique, ainsi que celle des machines génératrices. Quelques exemples sont cités ci-dessous :

- Création d'ordres de délestage dans un réseau industriel possédant des moyens autonomes de production d'énergie ..... HTG 7022
- Ilotage d'un réseau en deux ou plusieurs éléments distincts, dans le cas de perturbations graves des sources d'alimentation ..... HTG 7012
- Surveillance de la fréquence d'alternateur en fonctionnement autonome ..... HTG 7025
- Protection de base pour le découplage des sources autonomes couplées au réseau EDF .. HTG 7024
- Détection de survitesse d'un alternateur consécutive à un îlotage ou à un délestage ..... HTG 7011

APPLICATIONS

The HTG relays of the 7000 series have been designed for the supervision of the frequency of distribution networks, as well as that of generators. A few examples are given below:

- *Control of priority unloading within an industrial network having its own means of power generation ..... HTG 7022*
- *Splitting of a network into two or more distinct elements, in the event of severe supply disturbance ..... HTG 7012*
- *Supervision of the frequency of an autonomous generator ..... HTG 7025*
- *Basic protection for the separation of customers with their own supply sources normally coupled to the EDF network ..... HTG 7024*
- *Detection of alternator overspeed following severe loss of load ..... HTG 7011*



HTG 7025
Exemple de schéma de fonctionnement simplifié et de raccordement.

Example of simplified operation and connection diagram.

GENERAL CHARACTERISTICS

1	*Frequency settings:*	
	– HTG 7011 50 Hz	47-50 Hz
	– HTG 7012 50 Hz	45.5-49.5 or 46-50 Hz
	60 Hz	55.5-59.5 or 56-60 Hz
	– HTG 7022 50 Hz	45.5-47.5 and 47.5-49.5 or 46-48 and 48-50 Hz
	60 Hz	55.5-57.5 and 57.5-59.5 or 56-58 and 58-60 Hz
		(the two pick-up levels are automatically within the same 2 Hz range)
	– HTG 7025 50 Hz	**47-50 and 50-53 Hz**
	60 Hz	57-60 and 60-63 Hz
	– HTG 7024 50 Hz	2 fixed operating levels 49.5 and 50.5 Hz
2	Nominal input voltage	100 V/√3 or 110 V/√3 or 100 V or **110 V**
3	Operating time	HTG 7011/7012/7022/7025 : 200 ms HTG 7024 : 170 ms
4	Precision over the whole setting range, within the following limits: – temperature: between – 5 and + 45 °C – input voltage: • HTG 7011/7012/7022/7024, between 20 and 180% Un • HTG 7025, between 75 % and 115 % Un – auxiliary voltage between 80 % and 110 % of nominal value	0.1 Hz
5	Drop-off	HTG 7011/7012/7022/7025 : 0,3 Hz HTG 7024 : 0,2 Hz
6	Influence of harmonics:	
	– odd harmonics	Zero
	– even harmonics	10 % harmonic: error < 0.03 Hz
7	Temperature range over which operation is guaranteed	Between – 10° and + 55 °C
8	Overload:	Permanent / Temporary
	– HTG 7011/7012/7022/7024	1.3 Un / 2 Un for 10 sec
	HTG 7025	1.15 Un / 1.5 Un for 10 sec
9	Burden:	
	– on the input circuit:	
	• HTG 7011/7012/7022/7024	1 VA
	• HTG 7025	8 VA
	– on the auxiliary supply:	
	• HTG 7011/7012/7024	8 W at 125 V DC
	• HTG 7022	11 W at 125 V DC
	• HTG 7025	No auxiliary supply
10	Auxiliary voltage:	
	– HTG 7011/7012/7022	48 or 110 or 125 or 220 V DC + 10 – 20 %
	– HTG 7025	No auxiliary supply
	– HTG 7024	24 V DC ± 10 %, 48 or 110 or 125 or 220 V DC + 10 % – 20 %
11	Output contacts:	**2 NO** or 2 NC or 1 NO + 1 NC for each pick-up level
	– HTG 7011/7012/7022/7025	Alternating current / Direct current
	• making capacity	2500 VA with max. of 10 A or 500 V / 2500 W with max. of 10 A or 500 V
	• max. rupturing capacity	1250 VA with max. of 5 A or 500 V / 100 W resistive or 50 W inductive with max. of 3 A or 500 V
	• continuous carrying capacity	5 A / 5 A
	– HTG 7024	
	• continuous service current	3 A / 3 A
	• max. voltage between contacts	220 V / 220 V
	• making capacity	8 A / 8 A
	• rupturing capacity	4 A at 125 V (resistive) / 0.3 A at 125 V (resistive) 2.5 A at 125 V (cos φ = 0.3) / 0.25 A at 125 V (L/R = 20 ms)
12	Mechanical operation indicator: HTG 7011/7012/7022/7025	Hand-reset
13	Insulation:	
	– Dielectric withstand:	
	• between all terminals connected together and the chassis: test voltage	2 KV – 50 Hz for 1 minute
	– Impulse voltage withstand in common and transverse mode	5 kV peak, 1.2/5 µs according to IEC 255-5
14	Insensitive to high frequency disturbance	2.5 and 1 kV – 1 MHz according to class III of IEC 255-4 annex E
15	Case	R 2
16	Diagrams	HTG 7011 9797 / HTG 7012 9205 / HTG 7022 8181 / HTG 7025 8182 / HTG 7024 9715
17	Weights	HTG 7011 3.9 kg / HTG 7012 3.9 kg / HTG 7022 4 kg / HTG 7025 4 kg / HTG 4 kg

Note : The characteristics in heavy type correspond to those of the STAR range (immediat delivery).

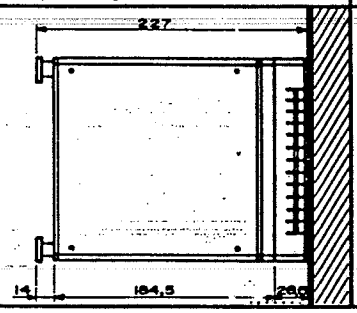
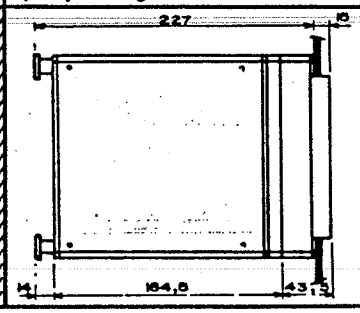
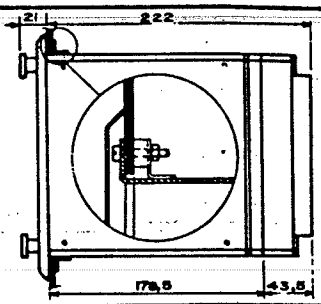
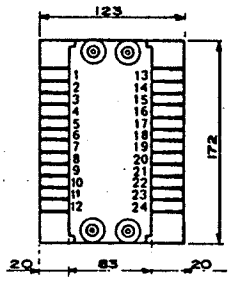
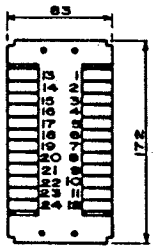
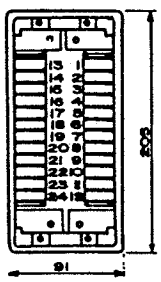
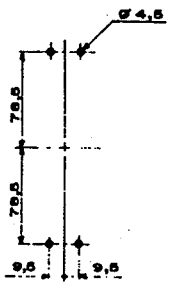
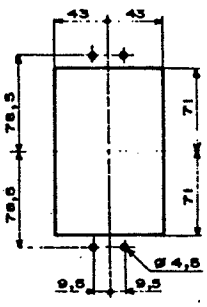
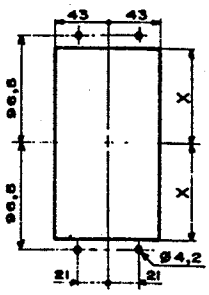
CARACTÉRISTIQUES GÉNÉRALES

1	Réglages de fréquence :	
	– HTG 7011 50 Hz	47-50 Hz
	– HTG 7012 50 Hz	45,5-49,5 ou 46-50 Hz
	60 Hz	55,5-59,5 ou 56-60 Hz
	– HTG 7022 50 Hz	45,5-47,5 et 47,5-49,5 ou 46-48 et 48-50 Hz
	60 Hz	55,5-57,5 et 57,5-59,5 ou 56-58 et 58-60 Hz
		(les 2 seuils sont obligatoirement dans la même plage de 2 Hz)
	– HTG 7025 50 Hz	**47-50 et 50-53 Hz**
	60 Hz	57-60 et 60-63 Hz
	– HTG 7024 50 Hz	2 seuils fixes 49,5 et 50,5 Hz
2	Tension nominale d'entrée	100 V/$\sqrt{3}$ ou 110 V/$\sqrt{3}$ ou 100 V ou **110 V**
3	Temps de fonctionnement	HTG 7011/7012/7022/7025 : 200 ms HTG 7024 : 170 ms
4	Précision dans toute l'étendue des gammes de réglage, à l'intérieur des domaines suivants : – température : entre – 5 et + 45° – tension d'entrée : • HTG 7011/7012/7022/7024 entre 20% et 180% de Un • HTG 7025 entre 75 % et 115 % de Un – tension auxiliaire entre 80 % et 110 % valeur nominale	0,1 Hz
5	Ecart de retour	HTG 7011/7012/7022/7025 : 0,3 Hz HTG 7024 : 0,2 Hz
6	Influence des harmoniques : – harmoniques impairs – harmoniques pairs	Nul 10 % d'harmonique : dérive < 0,03 Hz
7	Domaine de température à l'intérieur duquel le fonctionnement est garanti	Entre – 10° et + 55 °C
8	Surcharge :	Permanente / Temporaire
	– HTG 7011/7012/7022/7024	1,3 Un / 2 Un – 10 sec
	HTG 7025	1,5 Un – 10 sec / 1,15 Un – 10 sec
9	Consommation : – sur circuit d'entrée de mesure	
	• HTG 7011/7012/7022/7024	1 VA
	• HTG 7025	8 VA
	– sur tension auxiliaire	
	• HTG 7011/7012/7024	8 W sous 125 V CC
	• HTG 7022	11 W sous 125 V CC
	• HTG 7025	pas de tension auxiliaire
10	Tension auxiliaire :	
	– HTG 7011/7012/7022	48 ou 110 ou 125 ou 220 V CC + 10 — 20%
	– HTG 7025	Pas de tension auxiliaire
	– HTG 7024	24 V CC ± 10 %, 48 ou 110 ou 125 ou 220 V CC + 10 – 20 %
11	Contacts de sortie :	**2 NO** ou 2 NF ou 1 NO + 1 NF sur chaque seuil
	– HTG 7011/7012/7022/7025	*En alternatif* / *En continu*
	• pouvoir maximum de fermeture	2500 VA avec max. de 10 A ou 500 V / 2500 W avec max. de 10 A ou 500 V
	• pouvoir maximum de coupure	1250 VA avec max. de 5 A ou 500 V / 100 W (r) – 50 W (i) avec max. de 3 A ou 500 V
	• courant maximum de service continu	5 A / 5 A
	– HTG 7024	
	• courant de service continu	3 A / 3 A
	• tension maximum entre contacts	220 V / 220 V
	• pouvoir de fermeture	8 A / 8 A
	• pouvoir de coupure	4 A sous 125 V résistif, 2,5 A sous 125 V (cos φ=0,3) / 0,3 A sous 125 V résistif 0,25 A sous 125 V L/R = 20 ms
12	Voyant mécanique : HTG 7011/7012/7022/7025	A réarmement manuel
13	Isolement : – Tenue diélectrique :	
	• entre toutes bornes réunies et la masse : tension d'essai	2 KV – 50 Hz pendant 1 minute
	– Tenue à la tension de choc en mode commun et en mode différentiel	5 KV crête – 1,2/50 µs selon CEI 255/5
14	Insensibilité aux perturbations haute fréquence	2,5 et 1 KV – 1 MHz selon classe III CEI 255/4 annexe E
15	Boîtier	R 2

16 Schéma d'identification à utiliser pour toute commande ..	HTG 7011	HTG 7012	HTG 7022	HTG 7025	HTG 7024
	9797	9205	8181	8182	9715
17 Poids	HTG 7011	HTG 7012	HTG 7022	HTG 7025	HTG 7024
	3,9 kg	3.9 kg	4 kg	4 kg	4 kg

Nota : Les caractéristiques en caractères gras correspondent à celles de la gamme STAR (livraison immédiate).

BOITIER/*CASE* TYPE R2

		saillie prises avant *projecting front connection*	saillie prises arrière *projecting rear connection*	encastré prises arrière *flush rear connection*
ENCOMBREMENTS *CASE DIMENSIONS* RACCORDEMENT PAR VIS ØM4 *CONNECTING SCREWS. ØM4*				
				x = 89 pour panneau epr ⩽ 2 x = 90,5 pour panneau epr > 2 *x = 89 for panel th. ⩽ 2* *x = 90,5 for panel th. > 2*
R2	ENCOMBREMENTS *CASE DIMENSIONS*			
	PERÇAGES ET DECOUPES *DRILLING AND CUT OUT*			

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S.A. cap. 10.000.000 F - 154, rue de l'Université, 75007 Paris ☎ 550.32.04 - Télex 250692F - Usine à Meaux 77101 Cedex

Printed in France - EDIPOINT 607.00.31 11/84

Compagnie Continentale
d'Equipements Electriques

154, Rue de l'UNIVERSITE
75007 PARIS
Tel. 550.32.04
TELEX 250692 LESEXEL

INSTRUCTIONS FOR SETTING COMMISSIONING AND TESTING OF FREQUENCY RELAYS

H T G 7 0 0 0

I - DESCRIPTION OF H TG 7000 RELAYS

1) Identifying label
2) Potentiometers
3) Switch
4) Mechanical operation indicators

II - COMMISSIONING OF HTG 7000 RELAYS

1) Checks common to all relays
a) Checking items external to the relay
b) Checking the relay itself
2) Setting the operating level
3) Electrical tests on the relay
a) General
b) Testing relays HTG 7012, 7022, 7024
c) Testing the HTG 7025 relay

III - ON-SITE ANALYSIS OF ABNORMAL SITUATIONS

M. 1712/A.XE

I - DESCRIPTION OF HTG 7000 RELAYS

Relays of the HTG 7000 series form a complete range of instantaneous overfrequency or underfrequency relays (see general publication no 1712).

1) Identifying label

This carries the following information :

. The relay type, followed by a letter giving the nature of the contacts on the output unit(s), and also the number of the wiring and connection drawings.

. The nominal values of the input voltages and frequency.
. The auxiliary voltage except for the HTG 7025 relay.

. The serial number preceeded by a letter referring to the year of manufacture (e.g. P for 1977) and followed by a letter corresponding to the index of the manufacturing parts list.

2) Potentiometers

The potentiometers, which are accessible after removing the faceplate, provide adjustment for the operating level(s) at the required value(s). They are identified by the following symbols :

f : fine setting of the underfrequency level.
f1 : fine setting of the first level of underfrequency.
f2 : fine setting of the second level of underfrequency.
f1 > : setting of the overfrequency level.
f2 < : setting of the underfrequency level.

3) Switch

Relays HTG 7012 and 7022 are equipped with a rotating switch, accessible after removing the faceplate, providing selection of the required range.

4) Mechanical operation indicators

A mechanical operation indicator, whose position appears through a window, indicates operation of the output unit (red colour = operation). It may be reset using a push-button located close to the window.

With the exception of the HTG 7024, each output unit is fitted with a mechanical operation indicator.

.../...

II - COMMISSIONING OF HTG 7000 RELAYS

1) Checks common to all relays

a) Checking items external to the relay

. The nominal value of the voltage applied to the input terminals must be the same as that shown on the label. (In the HTG 7025, this voltage also serves as the auxiliary supply).

. The external wiring of the relay must conform to the connection diagram whose number is given on the identifying label.

. The auxiliary supply must be that shown on the identifying label. It should be noted that correct operation of the relay is obtained within the range 80 % to 110 % of the nominal auxiliary supply, with the exception of 24 V dc (HTG 7024) where the range is 90 % to 110 %.

ATTENTION : When the auxiliary supply is above 125 V, an external resistor must be mounted in series with the auxiliary supply. This resistor is provided with the relay, and the value is indicated on the identifying label.

b) Checking the relay itself

Check that the relay has not apparently suffered any mechanical damage during transport, handling or mounting.

If the relay has been stocked for a prolonged period in a humid atmosphere, it is advisable to plug and unplug the relay several times before applying voltage.

Check that the relay is correctly plugged in and that the four fixing screws are tightened, in order to ensure good contact.

After having removed the faceplate, check :

- that the mechanical operation indicators fall freely when the armatures of the output relays are gently pressed home.

- that the contacts on these output relays are apparently in good condition, with the nylon pushrods correctly located in the contact blades.

- all relays are delivered sealed. This seal should only be removed when commissioning, and then by a correctly qualified person.

2) Setting the operating level

The required frequency may be set using the potentiometers and range switches (HTG 7012, 7022) which are accessible with the faceplate removed.

.../...

HTG 7012 - 7022

The following formulae appear on the relay faceplate :

$$F < Fn - (fo + f) \quad HTG\ 7012$$

$$\left.\begin{array}{l} F1 < Fn - (fo + f1) \\ F2 < Fn - (fo + f2) \end{array}\right\} HTG\ 7022$$

In which :

F, F1 and F2 are the operating frequencies.
Fn is the relay nominal frequency (50 or 60 Hz).
fo is the range switch position.
f, f1, f2 are the values to be set on the potentiometers.

EXAMPLE : Set a nominal 50 Hz relay, with a range of 46 to 50 Hz at a value of 47,5 Hz.

First, determine the value of fo.

If $F \leqslant Fn - 2$ (range 46 to 50 Hz) or $F \leqslant Fn - 2.5$ (range 45,5 to 49,5 Hz) the switch fo must be set to 2.

The value of f to be set on the potentiometer must now be determined.

This value is obtained using one of the following formulae :

$F = Fn - (fo + f)$
$f = Fn - (fo + F)$
f will therefore be :
$f = 50 - (2 + 47,5)$
$f = 0.5$

HTG 7024 and 7025

Adjust the potentiometers f1 and f2 directly to the overfrequency and underfrequency settings required.

3) Electrical tests on the relay

a) General

If operating tests are required on these relays, a variable frequency voltage source is required, with a nominal power of 2 VA for the HTG 7012, 22 and 24 and 8 VA for the HTG 7025.

Note : Our test case type REF (see publication 1735 and scheme page 6) is particularly suitable for checking these relays, due to its output power and frequency adjusting means.

IMPORTANT : It is highly inadvisable to test the relay without its case by plugging standard commercially available plugs into the female terminals on the relay.

.../...

b) Testing relays HTG 7012 - 7022 - 7024

- Supply the relay with the nominal auxiliary voltage.

- Connect the input circuit (terminals 10-11) to the frequency generator. Apply, at nominal frequency, a voltage between 20 % and 130 % of the relay nominal input voltage. Under these circumstances, the output units should not be picked up.

Slowly decrease the frequency of the generator, and check that the output unit corresponding to the level under test operates at the set frequency ± 0.1 Hz.

Proceed in a similar manner for the overfrequency level (HTG 7024).

c) Testing the HTG 7025 relay

Connect the input circuit (terminals 10-11) to the frequency generator. Apply at nominal frequency, a voltage between 75 % and 115 % of the nominal input voltage. Under these circumstances, the output units should not be picked up.

Proceed in the same manner as for the HTG 7024 to check the over- and underfrequency operating levels.

III - ON-SITE ANALYSIS OF ABNORMAL SITUATIONS

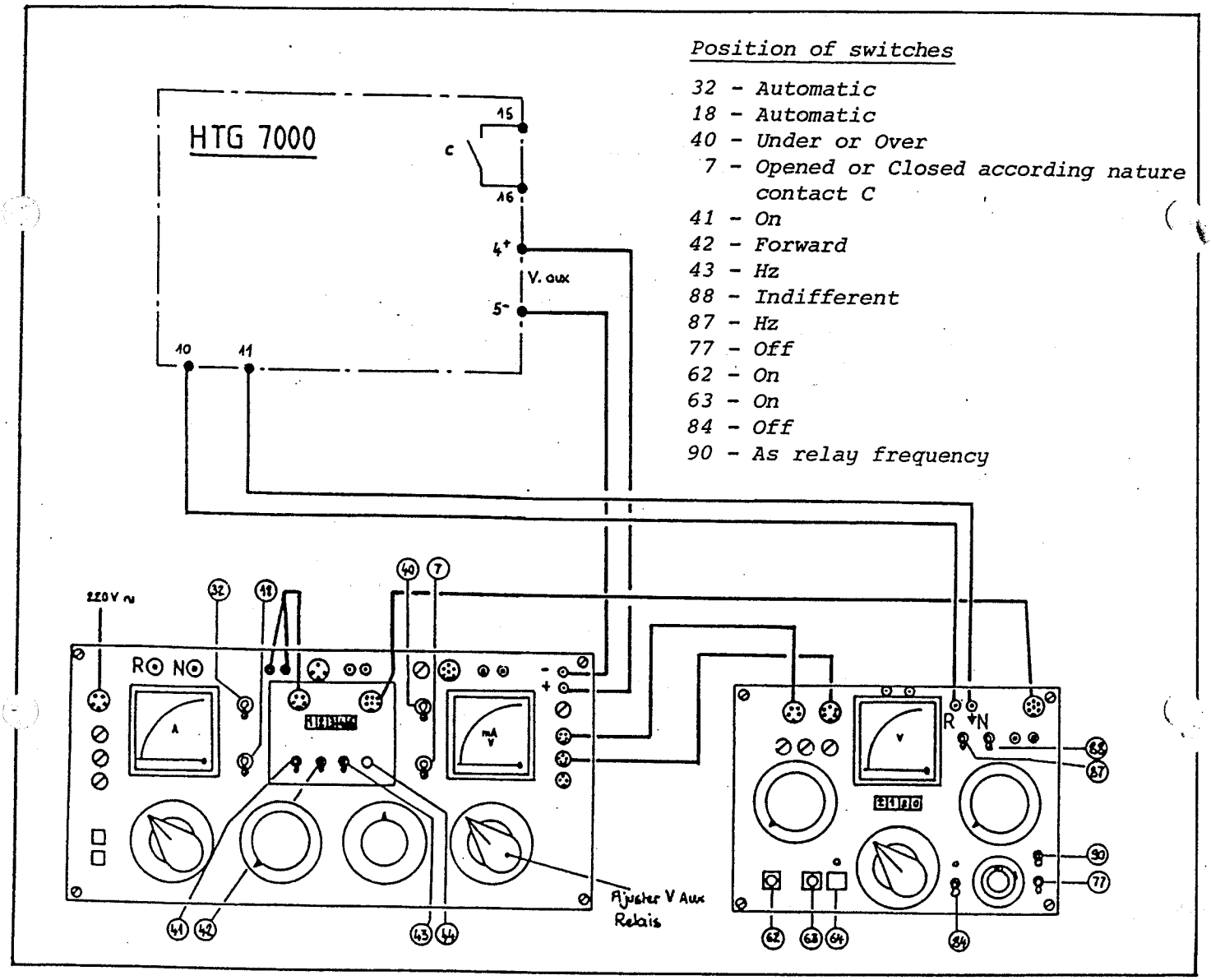
In the event of abnormal operation in service check :

- that the input voltage is present at the terminals of the input circuit.

- that the relay is correctly plugged in to the base (the fixing screws must be screwed tight home).

- that the wiring arriving at the input circuit conforms to the connection diagram and that the circuit is not broken (terminals and screws tightened, fuses, etc.).

- that the auxiliary circuit draws current, by inserting a milliameter (100 mA range in series with the auxiliary supply.



TEST OF FREQUENCY RELAY HTG 7000 SERIES WITH OUR TEST SET TREF