

D					
C					
B					
A					
Indice Index	Data Date	Modificare Modification/Revision	Proiectant Designer	Aprobat Consultant Approved Consultant	Aprobat CFR Approved CFR



GUVERNUL ROMANIEI
ROMANIAN GOVERNMENT



PROIECT FINANȚAT DE UNIUNEA EUROPEANĂ
EUROPEAN UNION FINANCED PROJECT



C.N.C.F. "C.F.R." - S.A.

CLIENT / CLIENT



CONSULTANT / CONSULTANT

		Șef proiect Project manager	R. Liuzza	Data Date	Semnătură Signature
Aprobat Approved					
Aprobat Approved	Coordonator Section 1 Coordinator	C. Gambelli			
Verificat Checked	Tunel Expert Tunnel Expert	C. Gambelli			
Intocmit Elaborated	Proiectant Designer	P. Amodio			

SUBCONSULTANT / SUBCONSULTANT

Aprobat Approved	Responsabil Subconsultant Subconsultant Responsible	Intocmit Elaborated	Proiectant Designer	Project/Project
				Reabilitarea liniei de cale ferata Braşov - Simeria, parte componentă a coridorului IV Pan European, pentru circulația trenurilor cu viteza maximă de 160 km/h. Sectiune 1 Brasov - Sighisoara
				2004/RO/16/P/PA/003
				Faza / Phase: P.Th. / T.D.

Denumire desen / Drawing Title : **TUNNEL/TUNELUL ORMENIS**

NATURAL TUNNEL/TUNELUL NATURAL

Safety Tunnel Power Supply system /Sistem de alimentare de siguranță a tunelului
Single-line typological diagrams low-voltage electrical panels of section QdT
Diagrame single-line tipologică cadru electrice joasa tensiune de sectiune QdT

Codificare / Codification System

Scara / Scale

LOT

Nr. / No

E A 5 1

0 1

C

1 0

L X

T S

1 0

1

6

0 0 1

0

CHARACTERISTICS PANEL/CARACTERISTICI CADRU

SYSTEM/SYSTEM


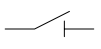
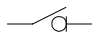






















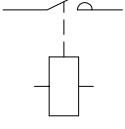
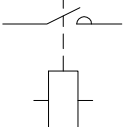
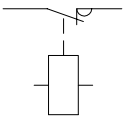
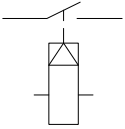



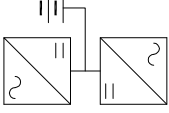
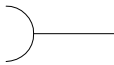
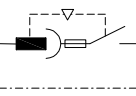

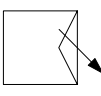

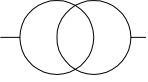

VOLTAGE/TENSIUNE [V]	230	FREQUENCY/FRECVENTA [Hz]	50
RETED CURRENT PANEL/CURRENT NOMINAL CADRU [A]			
SHORT CIRCUIT CURRENT ON PANEL [kA]			6
DISTRIBUTION SYSTEM/SISTEMUL DE DISTRIBUTIE			TNS
SIZE BARS/DIMENSIUNEA BARS			
In [A]			
Scc [kA]			
CARPENTRY/TAMPLARIE			METALLIC
INSULATION CLASS/CLASA DE IZOLARE			IP

REFERENCE STANDARDS/STANDARDDELE DE REFERINTA

BREAKERS SWITCHES/CIRCUITUL CONCASOARE	<input checked="" type="checkbox"/>	EN 60947-2
MODULAR SWITCHES/CIRCUITUL MODULAR	<input checked="" type="checkbox"/>	EN 60947-2
	<input type="checkbox"/>	EN 60898
CARPENTRY/TAMPLARIE	<input checked="" type="checkbox"/>	EN 60439-1

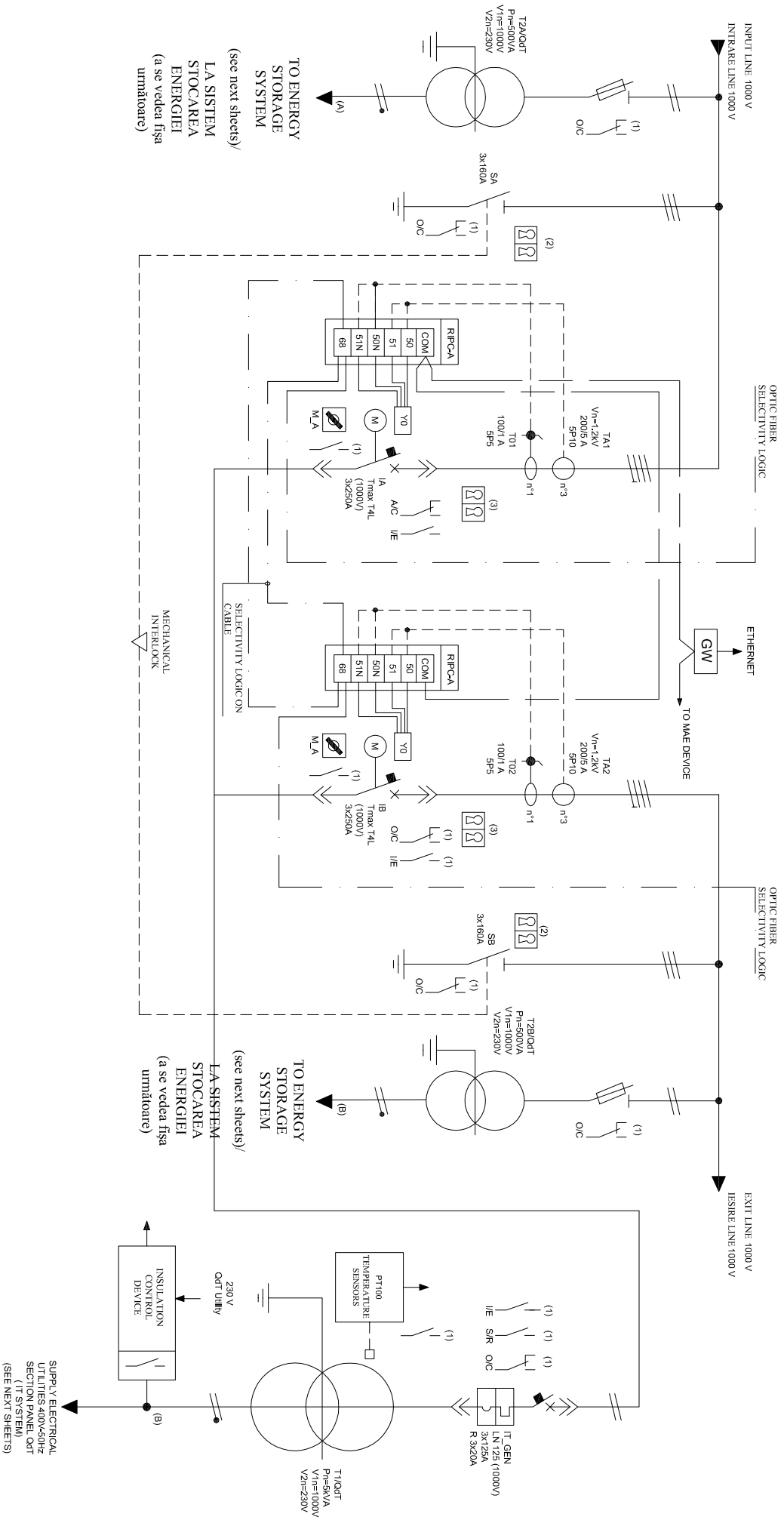
PANEL OF SECTION IN NICHE
CADRU DE SECTIUNE IN NISE

SYMBOLS LEGEND CHEIA SIMBOLURI

	CIRCUIT BREAKER INTERRUPTOR		SWITCH SWITCH		SWITCH OPERATION SWITCH OPERATIUNEA		THERMAL PROTECTION PROTECTIE TERMICA		MAGNETIC PROTECTION PROTECTIE MAGNETICA		DIFFERENTIAL PROTECTION PROTECTIE DIFERENTIALA		MOTOR MOTOR		FUSE ELEMENT FUZE ELEMENT		TOROID TOROID		MANUAL DRIVE MANUAL
	MOTORIZED CONTROL DE REGUL MOTORIZATE		FREE TRIP CALATORIE GRATUIA		ROTARY HANDLE INTERLOCKING MANER ROTATIV CENTRALIZARE		INTERLOCK INTERBLOCARE		REMOVABLE EQUIPMENT AMOVIBIL ECHIPAMENTE		LOCK KEY (LOCKED WITH APPLIANCE IN PLACE OF REST) LOCK (BLOCAT CU APARATULUI IN POZITIA DE ODHINA)		LOCK KEY (FREE WITH APPLIANCE IN PLACE OF REST) LOCK (GRATUIT CU APARATULUI IN POZITIA DE ODHINA)		AUX CONTACT (N=NUMBER OF INSTALLED CONTACTS, THE HATCH INDICATES WHICH EQUIPMENT PART ACT ON THE CONTACT) DATE DE CONTACT AUX (N=NUMARUL DE DATE INSTALATE, ACT HATCH CU PRIVIRE LA ECHIPAMENTUL INDICA FAPTUL CA DATE)		COIL A MINIMUM VOLTAGE COIL UN VOLTAJ MINIM		COIL A LAUNCH OF CORRENT COIL UN CAUSAREA DE CURENT
	CHANGEOVER SWITCH FOR INSTRUMENT (VOLTMETRIC/AMPEROMETRIC) SWITCH PENTRU INSTRUMENT (VOLTMETRIC/AMPEROMETRIC)		AMPEROMETER AMPEROMETRU		VOLTMETER VOLTMETRU		FREQUENCYMETER FRECVENTA		INSTRUMENT INTEGRATOR (CONTACTOR) INSTRUMENT INTEGRATOR (CONTACTOR)		CONTACTOR WITH NO CONTACT CONTACTOR CU DATE DE NO		CONTACTOR WITH POSSIBILITY OF MANUAL CONTACT WITH NO CONTACT CONTACTOR CU POSIBILITATEA DE DATE MANUAL CU DE CONTACT NO		CONTACTOR NORMALLY CLOSED CONTACT CONTACTOR CU DATE IN MOD NORMAL INCHIS		CONTACTOR (RELAY 'STEP / STEP') CONTACTOR (RELEU PAS CU PAS)		CLOCK CEASUL
	TWILIGHT CREPUSCULAR		ASTRONOMIC CLOCK CEASUL ASTRONOMIC		UPS UPS		SOCKET (GENERAL SYMBOL) SOCKET (GENERAL SIMBOLURI)		PLUG AND SWITCH FUSE BLOCK SOCKET CU INTERBLOCATA EA SIGURANTI		SOFT STARTER STARTER		INVERTER INVERTOR		STAR STARTER STAR STARTER		TRASFORMER TRASFORMER		SPD VAL

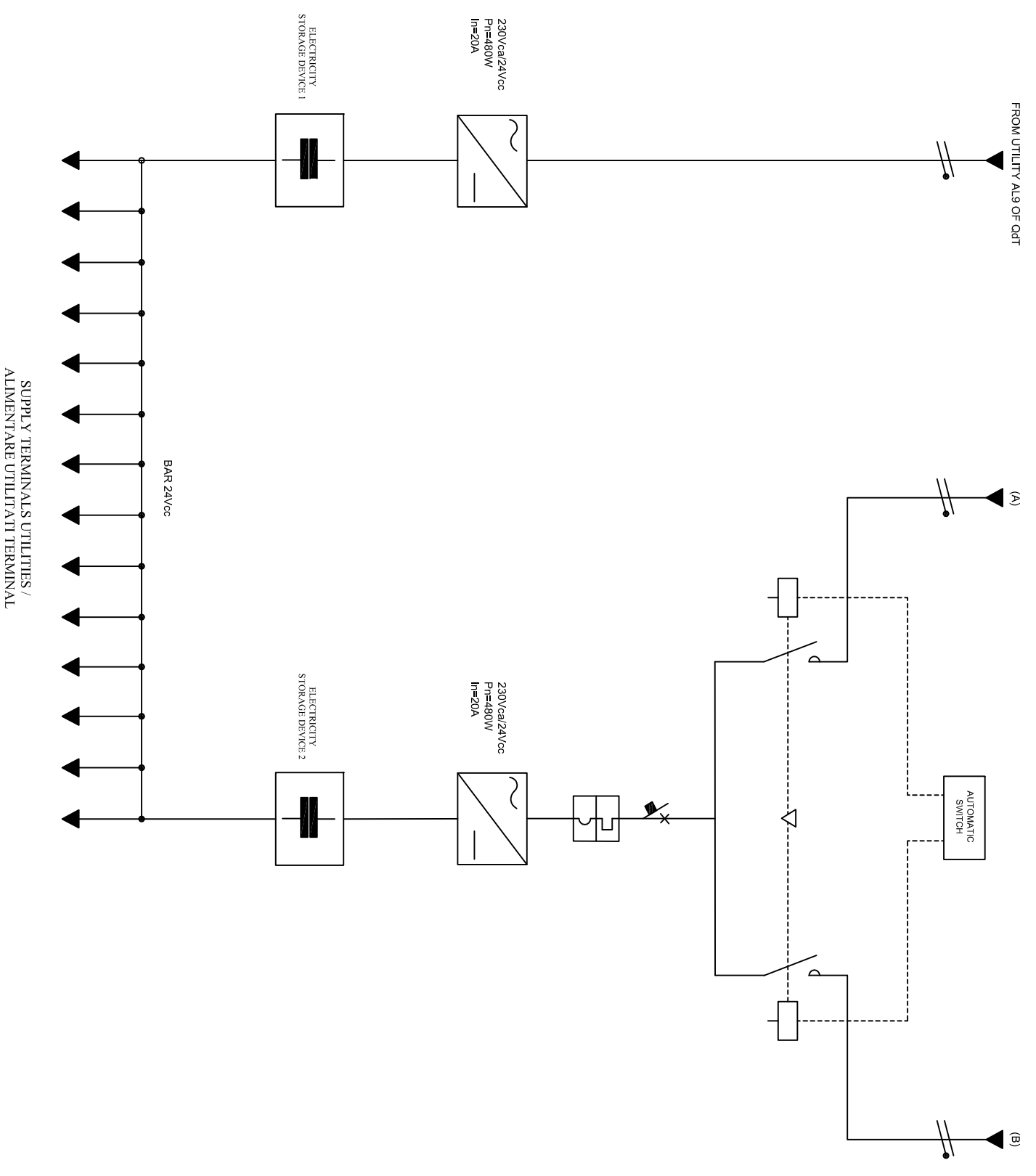
CIRCUIT BREAKER IA, IB (RIPC-A)		CIRCUIT BREAKER IT_GEN			
THRESHOLD	CALIBRATION TIME	CALIBRATION CURRENT	THRESHOLD	CALIBRATION TIME	CALIBRATION CURRENT
50	1s	0.5In - 10A	LONG DELAY (L)	FIXED	0.8In - 16A
51	0.1s	5In - 1000A	SHORT DELAY (S)	-	-
51N	0.1s	0.005Ino - 5A	INSTANTANEOUS (I)	INSTANTANEOUS	200 A

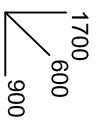
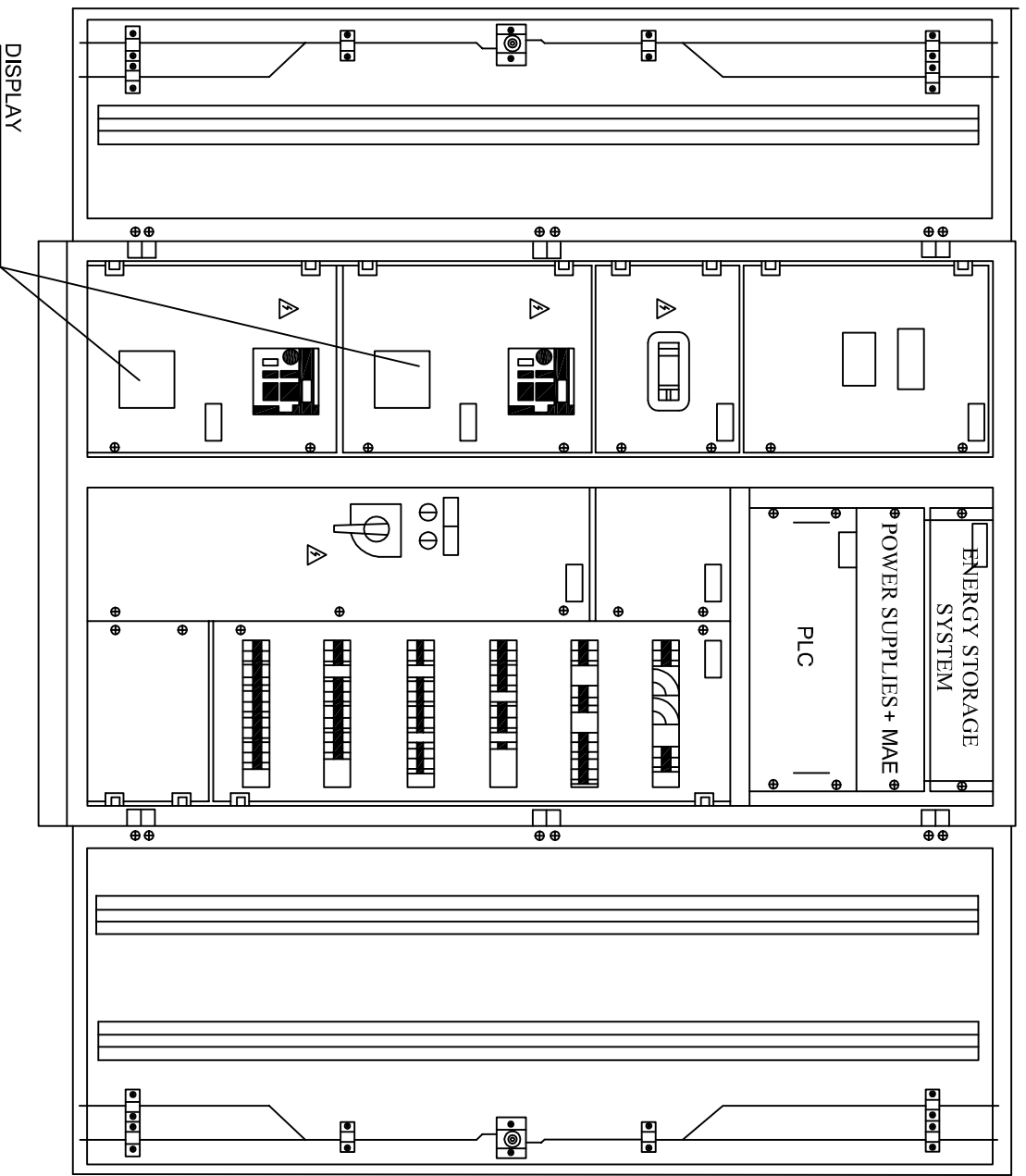
CALIBRATION PROTECTIONS



CODES ANSI LEGEND/ LEGENDA CODURI ANSI

49T	MAXIMUM TEMPERATURE (TRANSFORMER)/TEMPERATURA MAXIMA (TRANSFORMATOR)
50	MAXIMUM PEAK CURRENT/CURRENTUL MAXIM INSTANTANEU
51	CURRENT MAXIMUM LATE/CURRENTUL MAXIM INTARZIERE
51N	MAXIMUM EARTH FAULT LATE CURRENT/CURRENT MAXIM DE DEFECTE PAMANTULUI INTARZIERE
67	MAXIMUM CURRENT DIRECTIONAL PHASE/CURRENTUL MAXIM DE DIRECTIONAL FAZA
67N	MAXIMUM CURRENT DIRECTIONAL EARTH FAULT/MAXIME DIRECTIONAL CURENT DE DEFECT PAMANTULUI
68	SELECTIVITY LOGIC (NETWORK LOCK)/SELECTIVITATEA LOGIC (RETEA BLOCK)
52	SWITCH/SWITCH
89	DISCONNECTOR/SEPARATOR





CHARACTERISTICS PANEL/CARACTERISTICI CADRU

SYSTEM/SYSTEM


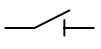
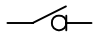






















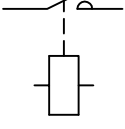
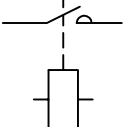
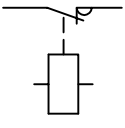
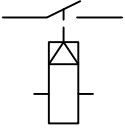



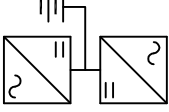
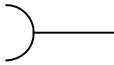
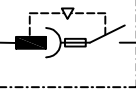



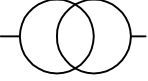
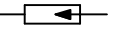
VOLTAGE/TENSIUNE [V] 230 | FREQUENCY/FRECVENTA [Hz] 50
 RETED CURRENT PANEL/CURENT NOMINAL CADRU [A] _____
 SHORT CIRCUIT CURRENT ON PANEL [kA] _____ 10
 DISTRIBUTION SYSTEM/SISTEMUL DE DISTRIBUTIE _____ TNS
 SIZE BARS/DIMENSIUNEA BARS _____
 I_n [A] _____ S_{cc} [kA] _____
 CARPENTRY/TAMPLARIE _____ METALLIC
 INSULATION CLASS/CLASA DE IZOLARE _____ IP _____

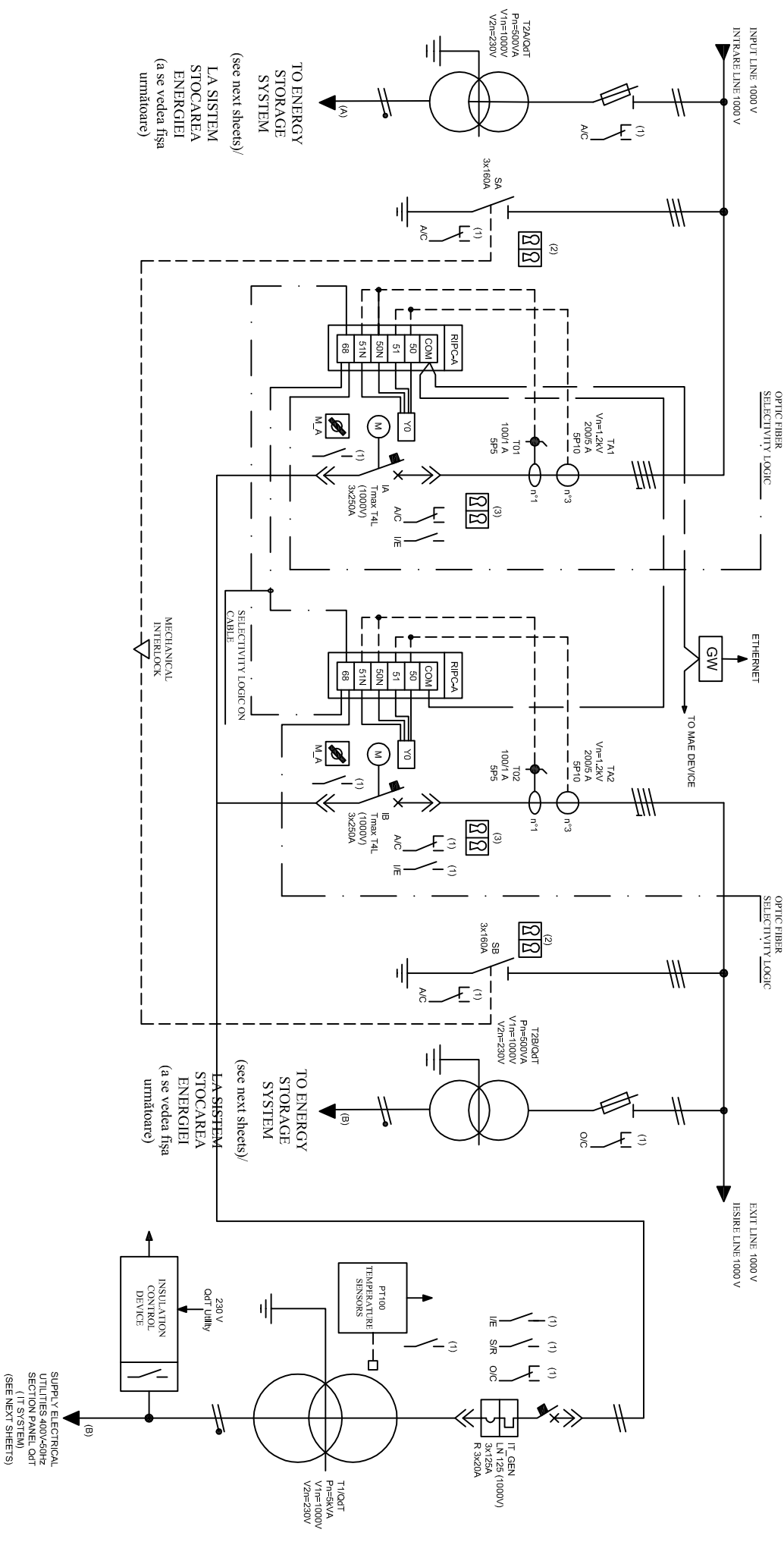
REFERENCE STANDARDS/STANDARDDELE DE REFERINTA

BREAKERS SWITCHES/CIRCUITUL CONCASOARE — EN 60947-2
 MODULAR SWITCHES/CIRCUITUL MODULAR — EN 60947-2
 — EN 60898
 CARPENTRY/TAMPLARIE — EN 60439-1

PANEL OF SECTION IN BY-PASS
 CADRU DE SECTIUNE IN BY-PASS

SYMBOLS LEGEND CHEIA SIMBOLURI

	CIRCUIT BREAKER INTERRUPTOR		SWITCH		SWITCH OPERATION SWITCH OPERATIUNEA		THERMAL PROTECTION PROTECTIE TERMICA		MAGNETIC PROTECTION PROTECTIE MAGNETICA		DIFFERENTIAL PROTECTION PROTECTIE DIFERENTIALA		MOTOR MOTOR		FUSE ELEMENT FUZE ELEMENT		TOROID TOROID		MANUAL DRIVE MANUAL
	MOTORIZED CONTROL DE REGUL MOTORIZATE		FREE TRIP CALATORIE GRATUIA		ROTARY HANDLE INTERLOCKING MANER ROTATIV CENTRALIZARE		INTERLOCK INTERBLOCARE		REMOVABLE EQUIPMENT AMOVIBIL ECHIPAMENTE		LOCK KEY (LOCKED WITH APPLIANCE IN PLACE OF REST) LOCK (BLOCAT CU APARATULUI IN POZITIA DE ODHNA)		LOCK KEY (FREE WITH APPLIANCE IN PLACE OF REST) LOCK (GRATUIT CU APARATULUI IN POZITIA DE ODHNA)		AUX CONTACT (N=NUMBER OF INSTALLED CONTACTS,THE HATCH INDICATES WHICH EQUIPMENT PART ACT ON THE CONTACT) DATE DE CONTACT AUX (N=NUMARUL DE DATE INSTALATE, ACT HATCH CU PRIVIRE LA ECHIPAMENTUL INDICA FAPTUL CA DATE)		COIL A MINIMUM VOLTAGE COIL UN VOLTAJ MINIM		COIL A LAUNCH OF CORRENT COIL UN CAUSAREA DE CURENT
	CHANGEOVER SWITCH FOR INSTRUMENT (VOLTMETRIC/AMPEROMETRIC) SWITCH PENTRU INSTRUMENT (VOLTMETRIC/AMPEROMETRIC)		AMPEROMETER AMPEROMETRU		VOLTMETER VOLTMETRU		FREQUENCYMETER FRECVENTA		INSTRUMENT INTEGRATOR (CONTACTOR) INSTRUMENT INTEGRATOR (CONTACTOR)		CONTACTOR WITH NO CONTACT CONTACTOR CU DATE DE NO		CONTACTOR WITH POSSIBILITY OF MANUAL CONTACT WITH NO CONTACT CONTACTOR CU POSIBILITATEA DE DATE MANUAL CU DE CONTACT NO		CONTACTOR NORMALLY CLOSED CONTACT CONTACTOR CU DATE IN MOD NORMAL INCHIS		CONTACTOR (RELAY 'STEP / STEP') CONTACTOR (RELEU PAS CU PAS)		CLOCK CEASUL
	TWILIGHT CREPUSCULAR		ASTRONOMIC CLOCK CEASUL ASTRONOMIC		UPS UPS		SOCKET (GENERAL SYMBOL) SOCKET (GENERAL SIMBOLURI)		PLUG AND SWITCH FUSE BLOCK SOCKET CU INTERBLOCATA EA SIGURANTI		SOFT STARTER STARTER		INVERTER INVERTOR		STAR STARTER STAR STARTER		TRASFORMER TRASFORMER		SPD VAL



CALIBRATION PROTECTIONS

CIRCUIT BREAKER IA, IB (RIPC-A)		CIRCUIT BREAKER IT_GEN			
THRESHOLD	CALIBRATION TIME	CALIBRATION CURRENT	THRESHOLD	CALIBRATION TIME	CALIBRATION CURRENT
50	1s	0.5In - 10A	LONG DELAY (L)	FIXED	0.8In - 16A
51	0.1s	5In - 1000A	SHORT DELAY (S)	-	-
51N	0.1s	0.005Ino - 5A	INSTANTANEOUS (I)	INSTANTANEOUS	200 A

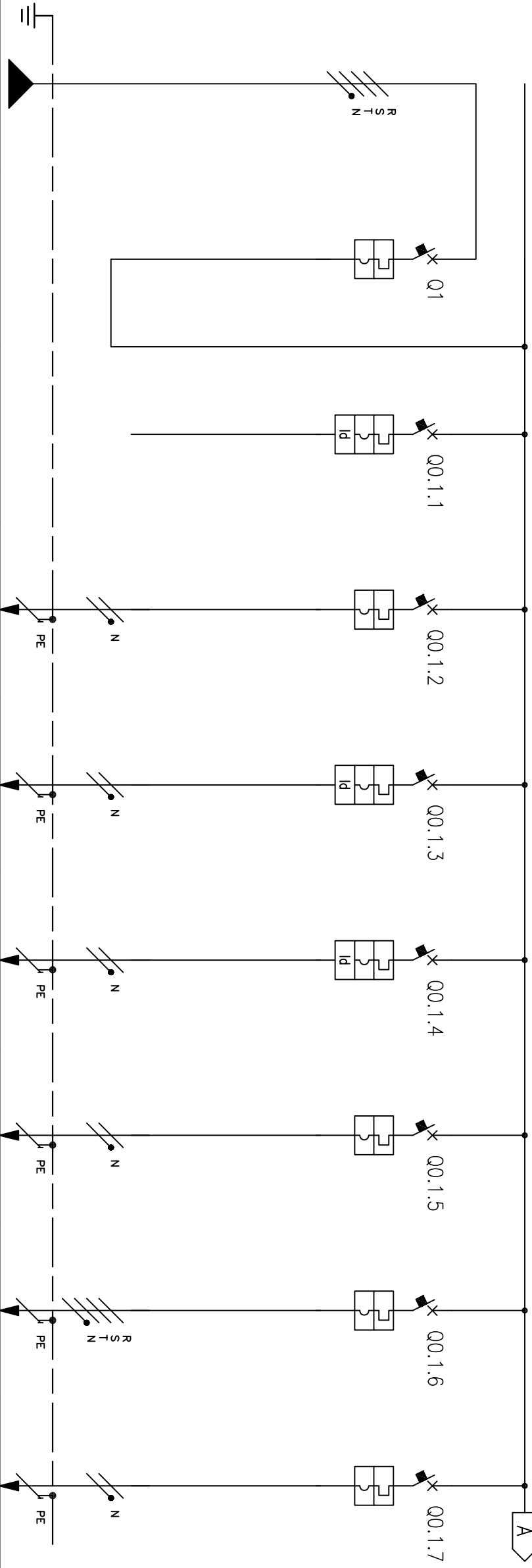
SUPRA V. ELECTRICAL UTILITIES ADIVIZORUL SECTION PANEL, ODT (IT SYSTEM) (SEE NEXT SHEETS)

TO ENERGY STORAGE SYSTEM (see next sheets)/ LA SISTEM STOCCAREA ENERGIIEI (a se vedea fişa următoare)

(see next sheets)/ LA SISTEM STOCCAREA ENERGIIEI (a se vedea fişa următoare)

CODES ANSI LEGEND/
LEGENDA CODURI ANSI

49T	MAXIMUM TEMPERATURE (TRANSFORMER)/TEMPERATURA MAXIMA (TRANSFORMATOR)
50	MAXIMUM PEAK CURRENT/CURRENTUL MAXIM INSTANTANEU
51	CURRENT MAXIMUM LATE/CURRENTUL MAXIM INTARZIERE
51N	MAXIMUM EARTH FAULT LATE CURRENT/CURRENT MAXIM DE DEFECTE PAMANTULUI INTARZIERE
67	MAXIMUM CURRENT DIRECTIONAL PHASE/CURRENTUL MAXIM DE DIRECTIONAL FAZA
67N	MAXIMUM CURRENT DIRECTIONAL EARTH FAULT/MAXIME DIRECTIONAL CURENT DE DEFECT PAMANTULUI
68	SELECTIVITY LOGIC (NETWORK LOCK)/SELECTIVITATEA LOGIC (RETEA BLOCK)
52	SWITCH/SWITCH
89	DISCONNECTOR/SEPARATOR



TERMINAL NUMBER/TERMINAL NUMARUL	NUMBER OF CIRCUIT NUMARUL DE CIRCUIT	DISTRIBUTION DISTRIBUTION	GENERAL PANEL RSTNPE	RESERVE/REZERVA RNPE	ANTICOND RESISTANCE CONDENS REZISTENTA TNPE	PANEL F.B. SOCKETS PORTABLE CABINET LIGHT CADRU PRIZE POMPIERPORTABLE CABINET LUMINAEM + DS + SWITCH TNPE	POWER/PUTERE AL4 TNPE	POWER/PUTERE AL5 RSTNPE	MAE+PMAE+Puls.Lum.+CONTR.ISOL.+LUCI RIF AL6 TNPE
	1	25	1	20	20	20	20	15	20
	2	20		10	6	16	10	25	6
	3	20		6	6	16	10	25	6
	4	20		16	6	16	10	25	6
	5	20		10	6	16	10	25	6
	6	20		10	6	16	10	25	6
	7	15		25	6	16	10	25	6
	8	20		6	6	16	10	25	6

TYPE APPARATUS/TIP APARATURA	SWITCH/SWITCH	N. POLI	ICU [kA]	In [A]	tr [s]	tsd [s]	ig [A]	tg [s]	tdn [ms]	Vigi	AC	Istant
NG125 N		4P	25	50	50	500				0,03		
C60 N		2P	20	10	10	100						
C60 N		2P	20	6	6	60						
C60 N		2P	20	16	16	160						
C60 N		2P	20	10	10	100						
C60 N		2P	20	16	16	160						
C60 N		2P	20	10	10	100						
C60 H		4P	15	25	25	250						
C60 N		2P	20	6	6	60						

PIPELINE/PIPELINE	TYPE ISOLATION	POSE/INSTALAREA	SECTION PHASE-N-PE/PEN [mmq]	lb [A]	lz [A]	Un [V]	Pn [kW]	Icc min [kA]	Icc max [kA]	LENGTH/LUNGIMEA[m]	hV TOTAL [%]
EPR	11	1x35 1x35 1x16	45,2 169	400	400	400	9,9	7,9	9,9	1	0

OTHER APP.	TYPE/TIP	MODEL

DIFFERENTIAL DIFFERENTIAL	TYPE/TIP	CLASS/CLASA	Idn [A]	tdn [ms]	Vigi	AC	Istant

CONTACTOR	TYPE/TIP	CLASS/CLASA	COIL [V]	N. POLE	In [A]

FUSE	N.POLE	In [A]

BOTTOM LINE/FUND LINE	Icc min [kA]	Icc max [kA]	LENGTH/LUNGIMEA[m]	hV TOTAL [%]
	7,9	9,9	1	0

NOTE

