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



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 Sectiune 1 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		
Reabilitarea liniei de cale ferata Brasov - Simeria, parte componentă a coridorului IV Pan European, pentru circulația trenurilor cu viteza maximă de 160 km/h. Sectiune 1 Brasov - Sighisoara		Project/Project	2004/RO/16/P/PA/003
Rehabilitation of the railway line Brasov - Simeria, component Part of the IV Pan-European Corridor, for the trains circulation with maximum speed of 160 km/h. Section 1 Brasov - Sighisoara		Faza / Phase: P.Th. / T.D.	

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

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 2 L X T S 2 0 6 6 0 0 3 A

CHARACTERISTICS PANEL/CARACTERISTICI CADRU

SYSTEM/SYSTEM


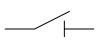
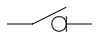






















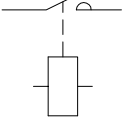
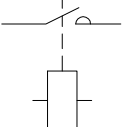
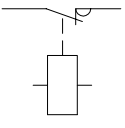
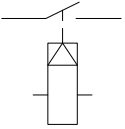



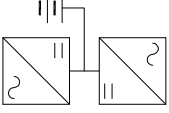
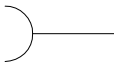
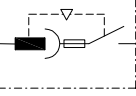

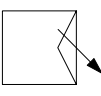

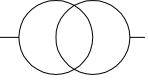

VOLTAGE/TENSIUNE [V] 230 | FREQUENCY/FRECVENTA [Hz] 50
 RETED CURRENT PANEL/CURRENT NOMINAL CADRU [A] _____
 SHORT CIRCUIT CURRENT ON PANEL [kA] _____ 6
 DISTRIBUTION SYSTEM/SISTEMUL DE DISTRIBUTIE _____ TNS
 SIZE BARS/DIMENSIUNEA BARS _____
 I_n [A] _____ S_{cc} [kA] _____
 CARPENTRY/TAMPLARIE _____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

REFERENCE STANDARDS/STANDARDELE DE REFERINTA

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

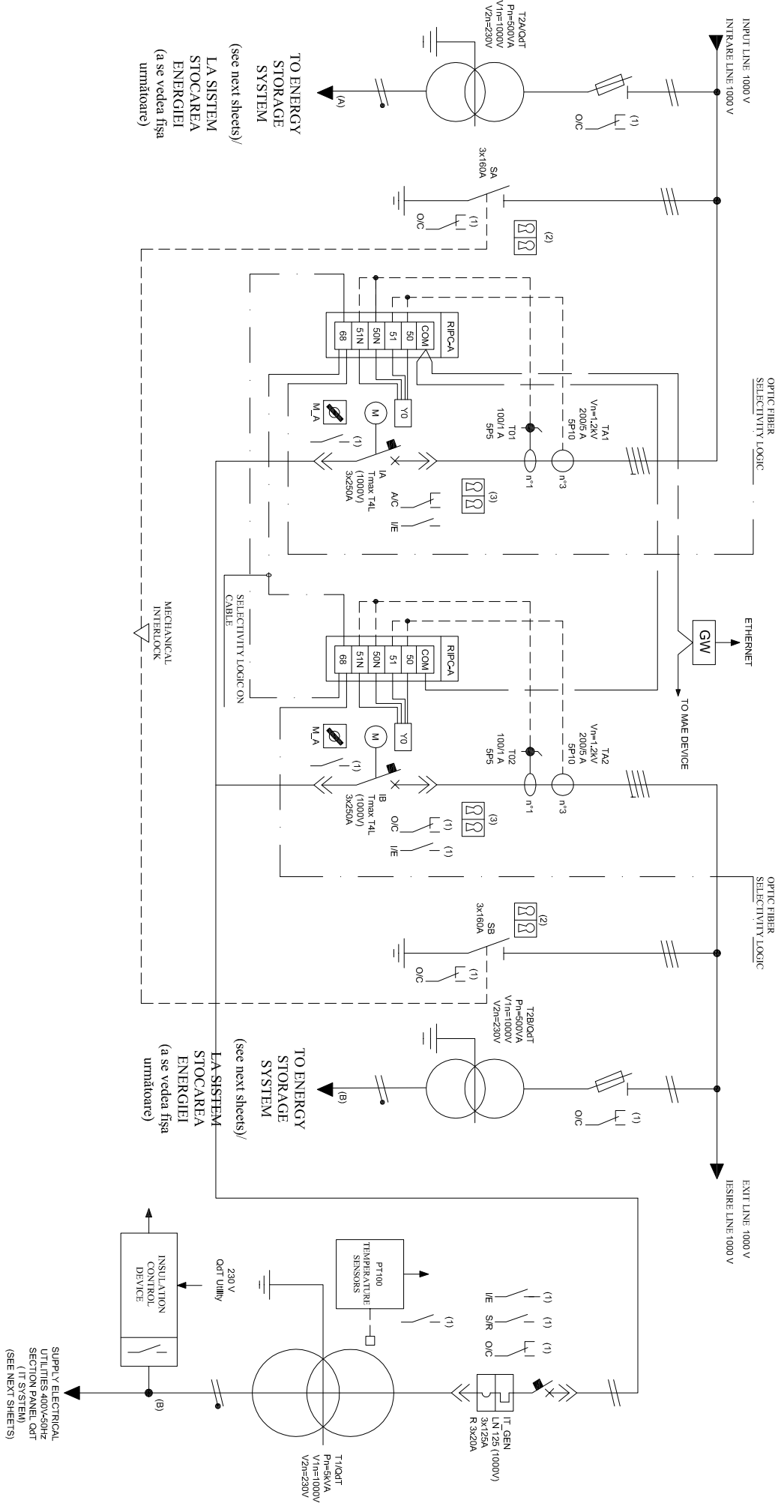
PANEL OF SECTION IN NICHE
 CADRU DE SECTIUNE IN NISE

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 REGLA 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/AMPERMETRIC) SWITCH PENTRU INSTRUMENT (VOLTMETRIC/AMPERMETRIC)		AMPERMETER AMPERMETRU		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

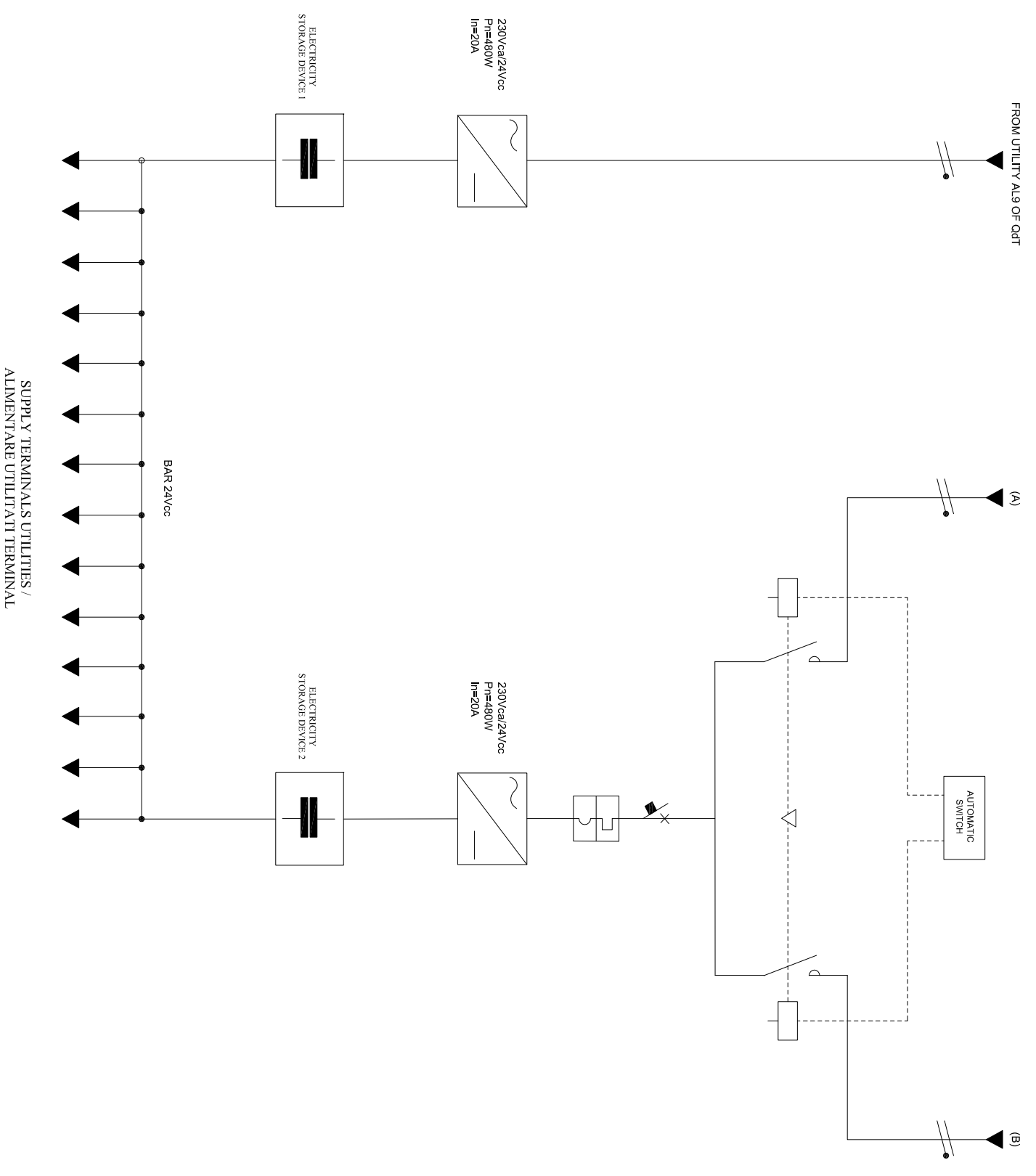
CIRCUIT BREAKER IA, IB (RIPC-A)		CIRCUIT BREAKER IT_GEN			
THRESHOLD	CALIBRATION TIME	CALIBRATION CURRENT	THRESHOLD	CALIBRATION TIME	CALIBRATION CURRENT
50	1s	0.5In - 10A	LONG DELAY (L)	FIXED	0.8In - 16A
51	0.1s	5In - 1000A	SHORT DELAY (S)	-	-
51N	0.1s	0.005Ino - 5A	INSTANTANEOUS (I)	INSTANTANEOUS	200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

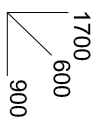
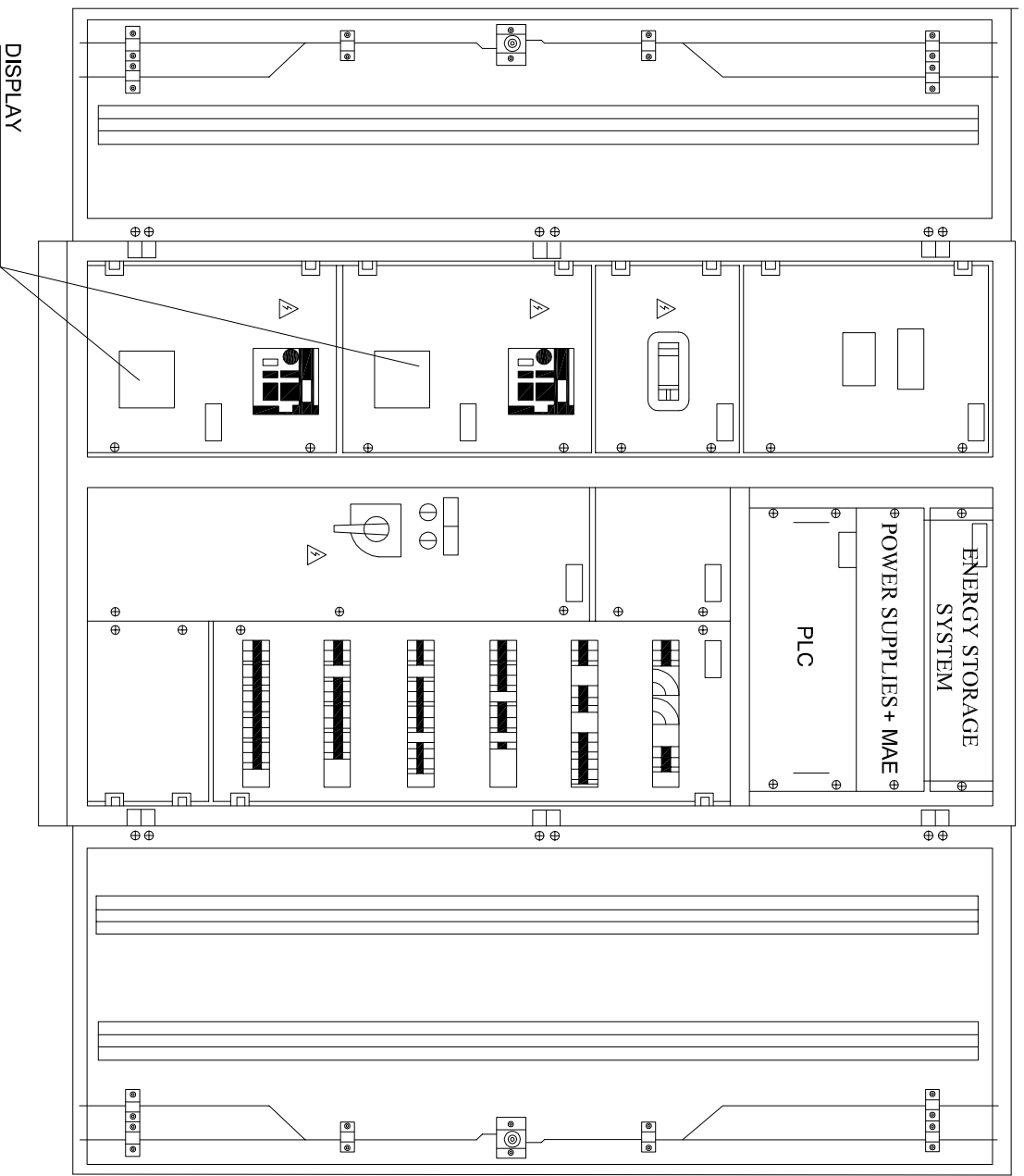
CALIBRATION PROTECTIONS



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


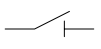
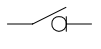






















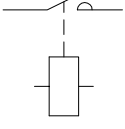
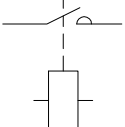
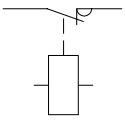
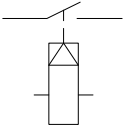



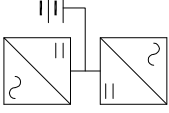
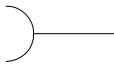
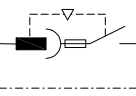

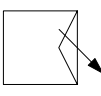

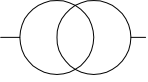

VOLTAGE/TENSIUNE [V] 230 | FREQUENCY/FRECVENTA [Hz] 50
 RETED CURRENT PANEL/CURRENT NOMINAL CADRU [A] _____
 SHORT CIRCUIT CURRENT ON PANEL [kA] _____ 10
 DISTRIBUTION SYSTEM/SISTEMUL DE DISTRIBUTIE _____ TNS
 SIZE BARS/DIMENSIUNEA BARS _____
 I_n [A] _____ S_{cc} [kA] _____
 CARPENTRY/TAMPLARIE _____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

REFERENCE STANDARDS/STANDARDELE DE REFERINTA

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

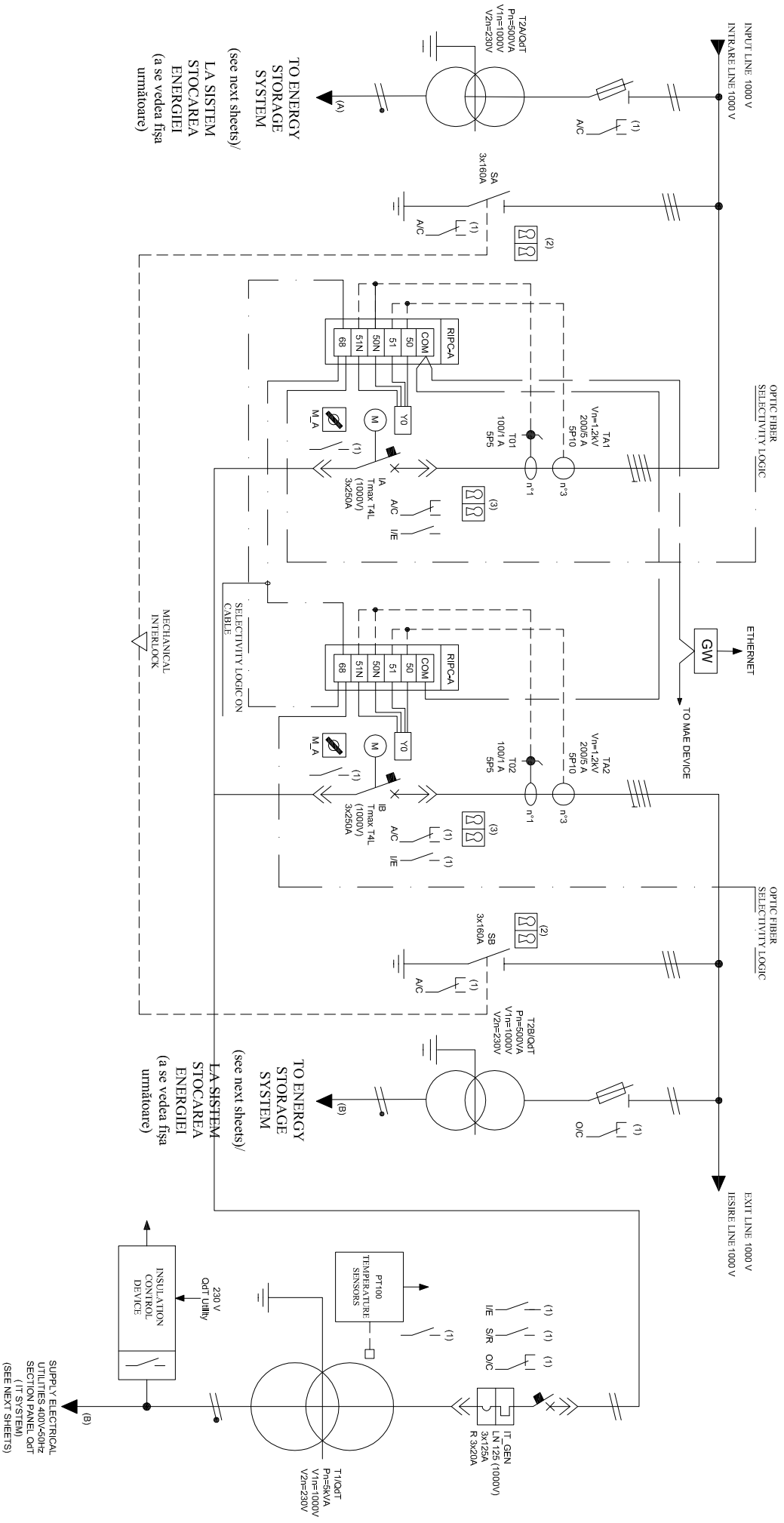
PANEL OF SECTION IN BY-PASS
 CADRU DE SECTIUNE IN BY-PASS

SYMBOLS LEGEND CHEIA SIMBOLURI

	CIRCUIT BREAKER INTERRUPTOR		SWITCH SWITCH		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 REGLA 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

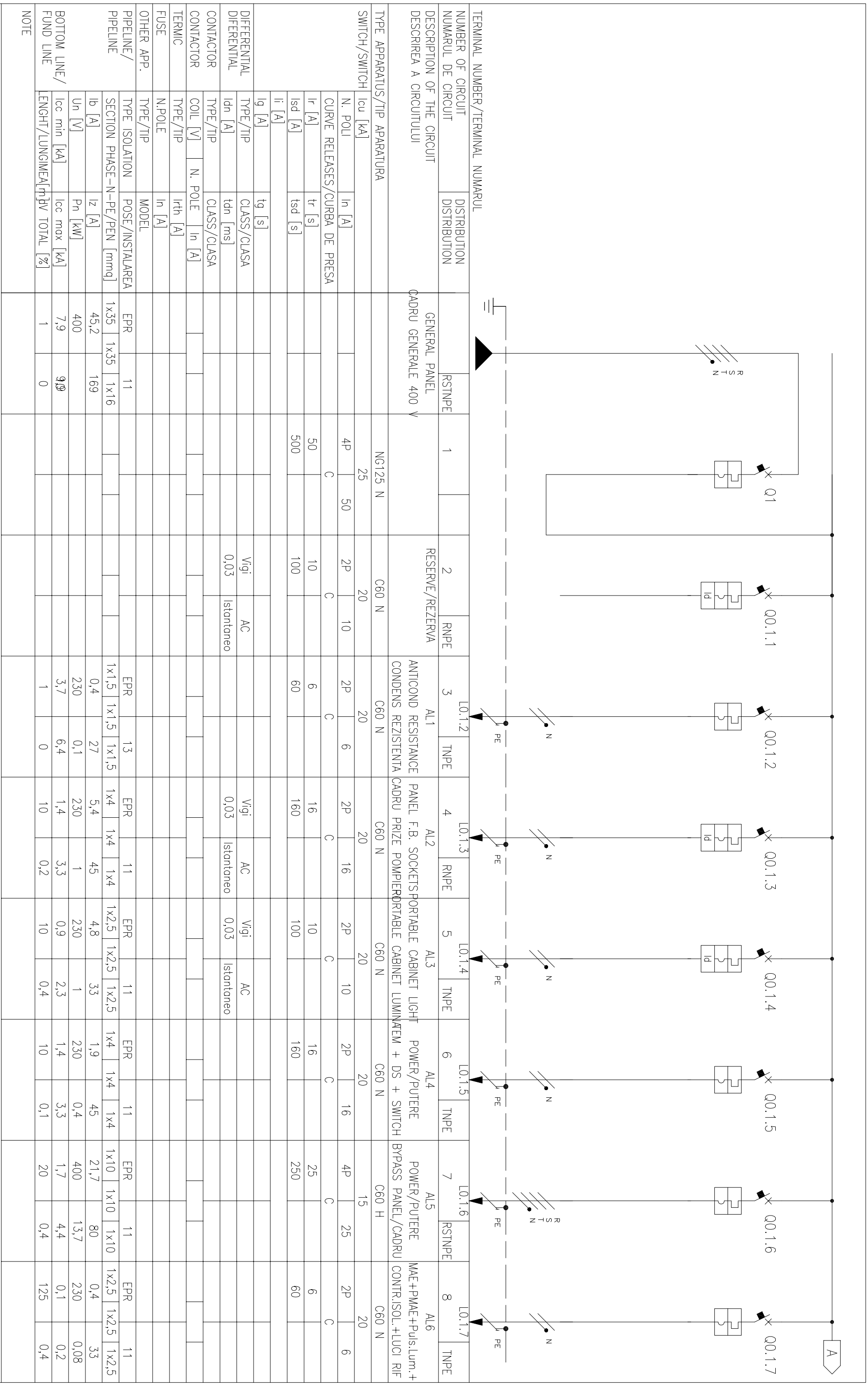
CALIBRATION PROTECTIONS



Supervisory Electrical Utilities Add/50Hz Section Panel, ODT (IT System) (See Next Sheets)

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	DISTRIBUTION DISTRIBUTION	GENERAL PANEL RSTNPE	1	2	3	4	5	6	7	8
NUMBER OF CIRCUIT NUMARUL DE CIRCUIT			1	2	3	4	5	6	7	8
DESCRIPTION OF THE CIRCUIT DESCRIEREA A CIRCUITULUI		CADRU GENERALE 400 V	RESERVE/REZERVA	ANTICOND RESISTANCE CONDENS REZISTENTA	PANEL F.B. SOCKETS PORTABLE CADRU PRIZE POMPIER	PORTABLE CABINET LIGHT CABINET LUMINATEM + DS + SWITCH	POWER/PUTERE	POWER/PUTERE	POWER/PUTERE	MAE+PMAE+Puls.Lum.+ CONTR.ISOL.+LUCI RIF
TYPE APPARATUS/TIP APARATURA		NG125 N	C60 N	C60 N	C60 N	C60 N	C60 N	C60 N	C60 H	C60 N
SWITCH/SWITCH	icu [kA]		20	20	20	20	20	20	15	20
N. POLE	In [A]	4P	2P	2P	2P	2P	2P	2P	4P	2P
CURVE RELEASES/CURBA DE PRESA		25	10	6	16	10	10	16	C	C
I _r [A]	tr [s]		C	C	C	C	C	C	C	C
I _{sd} [A]	t _{sd} [s]	50	100	60	160	100	100	160	250	60
I _i [A]										
I _g [A]	t _g [s]									
DIFFERENTIAL DIFFERENTIAL	TYPE/TIP		Vigi	AC	Vigi	AC	Vigi	AC		
	CLASS/CLASA		AC	AC	AC	AC	AC	AC		
	I _{dn} [A]		0,03	0,03	0,03	0,03	0,03	0,03		
CONTACTOR	TYPE/TIP									
	CLASS/CLASA									
CONTACTOR	COIL [V]									
	N. POLE									
TERMIC	TYPE/TIP									
	I _{rth} [A]									
FUSE	N. POLE									
	In [A]									
OTHER APP.	TYPE/TIP									
	MODEL									
PIPELINE/ PIPELINE	TYPE ISOLATION	EPR								
	POSE/INSTALAREA	11								
	SECTION PHASE-N-PE/PEN [mmq]	1x35 1x35 1x16								
	I _b [A]	45,2								
	I _z [A]	169								
	U _n [V]	400								
	P _n [kW]									
BOTTOM LINE/ FUND LINE	I _{cc} min [kA]	7,9								
	I _{cc} max [kA]	9,9								
	LENGHT/LUNGIME[m]	1								
	ΔV TOTAL [%]	0								

NOTE

TERMINAL NUMBER/TERMINAL NUMARUL	NUMBER OF CIRCUIT NUMARUL DE CIRCUIT	DISTRIBUTION DISTRIBUTIE	DESCRIPTION OF THE CIRCUIT DESCREREA A CIRCUITULUI	TYPE APPARATUS/TIP APARATURA	SWITCH/SWITCH	N. POLI	ICU [kA]	In [A]	Curve Releases/CURBA DE PRESA	Ir [A]	I _{sd} [A]	Ii [A]	I _g [A]	tg [s]	CLASS/CLASA	tdn [ms]	CONTACTOR	COIL [V]	N. POLE	In [A]	TYPE/TIP	Irth [A]	IN [A]	OTHER APP.	PIPELINE/PIPELINE	TYPE ISOLATION	POSE/INSTALAREA	SECTION PHASE-N-PE/PEN [mmq]	I _b [A]	I _z [A]	U _n [V]	P _n [kW]	I _{cc} min [kA]	I _{cc} max [kA]	BOTTOM LINE/ FUND LINE	LENGTH/LUNGIME[m]	ΔV TOTAL [%]	NOTE
	9	L0.1.8	AL7 EMERGENCY LIGHT ILUMINAT DE URGENTA	C60 N	2P	6	20	6	C	6	60														EPR	1x2,5	1x2,5	1x2,5	0,9	33	230	0,2	0,1	0,9	125			
	10	L0.1.9	AL8 EMERGENCY LIGHT ILUMINAT DE URGENTADX	C60 N	2P	6	20	6	C	6	60														EPR	1x2,5	1x2,5	1x2,5	0,9	33	230	0,2	0,1	0,9	125			
	11	L0.1.10	AL9 NICHE LIGHT ILUMINAT DE NISE	C60 N	2P	6	20	6	C	6	60														EPR	1x2,5	1x2,5	1x2,5	0,2	33	230	0,04	2,3	0	10			
	12	L0.1.11	AL10 POWER ENERGY STORAGE SYSTEM	C60 N	2P	6	20	6	C	6	60														EPR	1x2,5	1x2,5	1x2,5	2	33	230	0,46	2,3	0,9	10			
	13	L0.1.12	AL11 POWER/PUTERE BITS	C60 N	2P	20	20	20	C	20	200														EPR	1x25	1x25	1x16	16,3	230	0,3	0,9	300	3,3				
	14		RESERVE/REZERVA	C60 N	2P	6	20	6	C	6	60																											
	15		RESERVE/REZERVA	C60 N	2P	6	20	6	C	6	60																											
	16		RESERVE/REZERVA	C60 N	2P	6	20	6	C	6	60																											

