

PIN s.c.r.l. – Polo Universitario città di Prato  
 1MW Photovoltaic System – Yeghegnadzor, Armenia  
 Ing. Paolo Taddei Pardelli

Enhancing SME competitiveness through promotion  
 and wider use of sustainable innovative technologies

SWITCHBOARD  
 LV Production

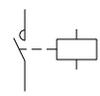
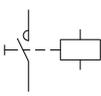
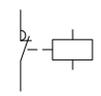
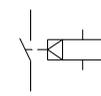
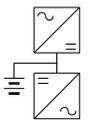
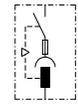
SWITCHBOARD CHARACTERISTICS

UPSTREAM PLANT	
VOLTAGE [V]	480
FREQ. [Hz]	50
SWITCHBOARD RATED CURRENT [A]	
SWITCHBOARD PERSPECTIVE CURRENT [kA]	23
NEUTRAL SYSTEM	TNS
BUSBAR SIZE	
In [A]	Icc [kA]
STRUCTURE	METALLICA
INSULATION CLASS	IP

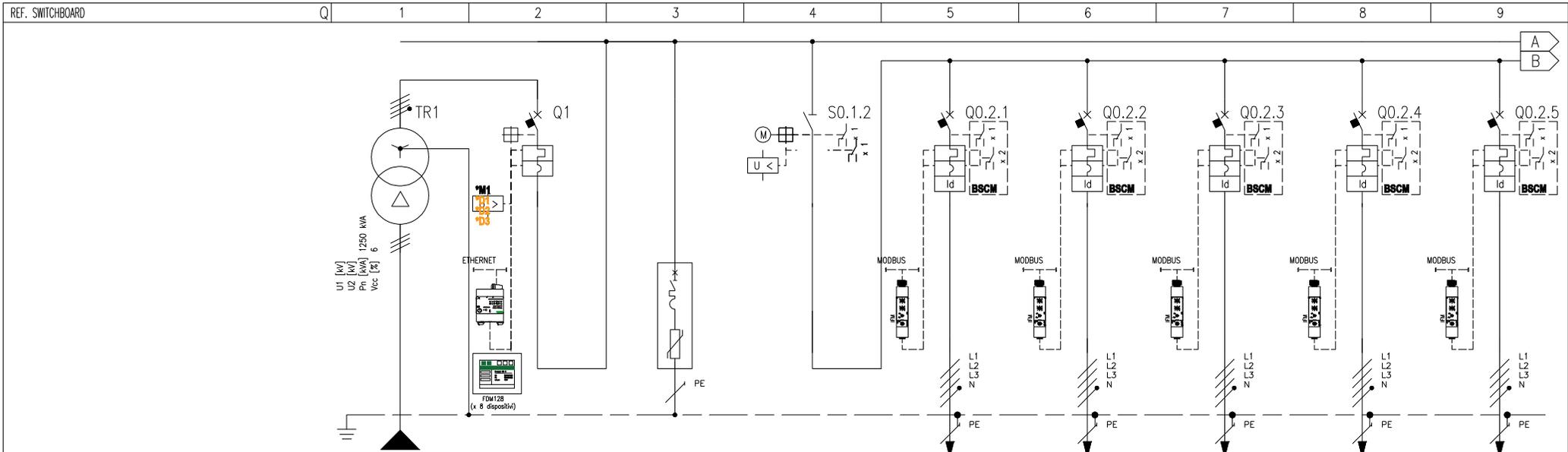
REFERENCE STANDARD	
MOULDED CASE CIRCUIT BREAKERS	<input checked="" type="checkbox"/> – CEI EN 60947-2
MINIATURE CIRCUIT BREAKERS	<input checked="" type="checkbox"/> – CEI EN 60947-2
	<input type="checkbox"/> – CEI EN 60898
STRUCTURE	<input checked="" type="checkbox"/> – CEI EN 60439-1
	<input type="checkbox"/> – CEI 23-48
	– CEI 23-49
	– CEI 23-51

CUSTOMER	PROJECT	-	FILE SPP Armenia LV Production Rev.01
	ARCHIVE	-	DATE 11/05/2017 REVISION
	DESIGNER	-	PAGE 1 NEXT 2
PLANT	SPP YEGHEGNADZOR – ARMENIA	TABLE	

# SYMBOLS

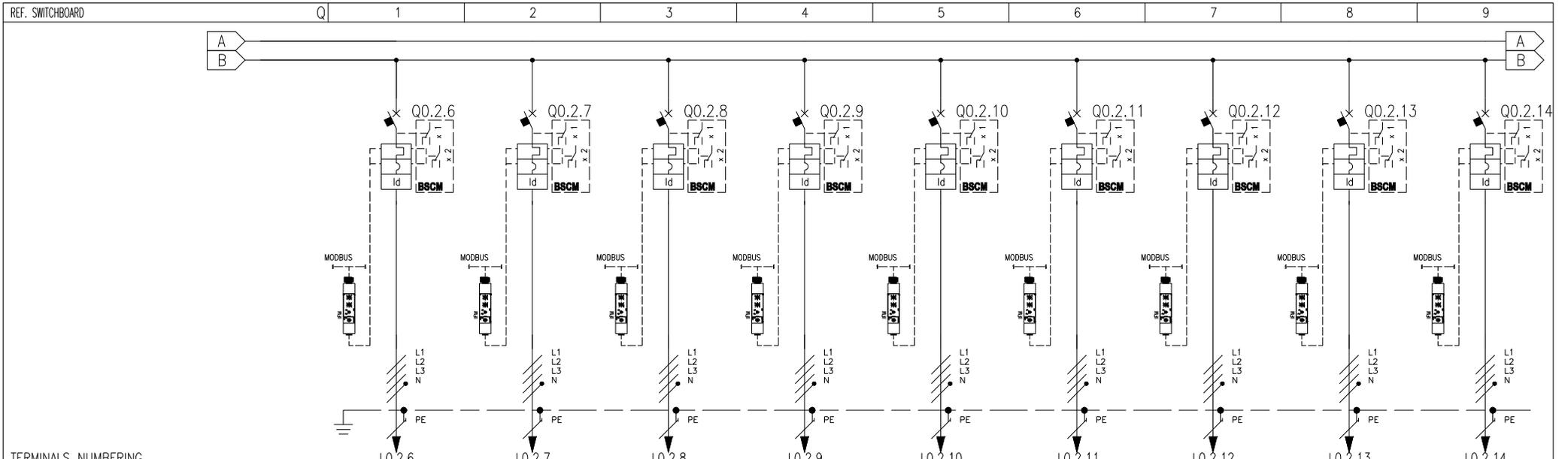
									
CIRCUIT BREAKER	DISCONNECTOR	SWITCH-DISCONNECTOR	THERMAL PROTECTION	MAGNETIC PROTECTION	RESIDUAL CURRENT PROTECTION	OVERLOAD CUT OUT	FUSE	TOROID	MANUAL CONTROL
									
AUTOMATIC CONTROL	TRIP FREE	ROTARY HANDLE	INTERLOCK	REMOVABLE/WITHDRAWAL EQUIPMENT	KEYLOCK OFF POSITION	KEYLOCK ON POSITION	AUXILIARY CONTACT	UNDERVOLTAGE RELEASE	SHUNT RELEASE
									
CHANGE OVER SWITCH (FOR MEASUREMENT)	AMMETER	VOLTMETER	FREQUENCY METER	METER	NO CONTACTS CONTACTOR	MANUAL CONTROL CONTACTOR	NC CONTACTS CONTACTOR	IMPULSE RELAY	CLOCK
									
TWILIGHT SWITCH	ASTRONOMIC CLOCK	UNINTERRUPTED POWER SYSTEM (UPS)	SOCKET	INTERLOCKED SOCKET WITH FUSES	SOFT STARTER	VARIABLE SPEED DRIVE	STAR DELTA STARTER	TRANSFORMER	SURGE PROTECTIVE DEVICE

<b>SPP</b>	CUSTOMER	PROJECT	- FILE SPP Armenia LV Production Rev.01
		ARCHIVE	- DATE 11/05/2017 REVISION
		DESIGNER	- PAGE 2 NEXT 3
	PLANT	SPP YEGHEGNADZOR – ARMENIA	
		TABLE	



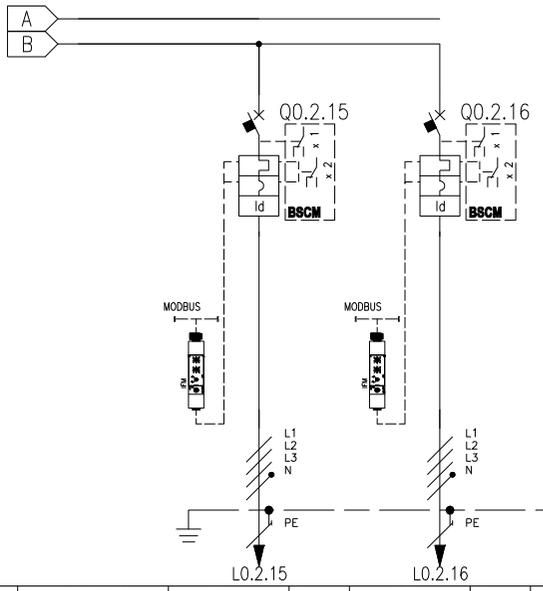
TERMINALS NUMBERING		1		2		3		4		5		6		7		8		9																			
CIRCUIT NUMBERING		DISTRIBUTION		L1L2L3NPE		1		2		L1L2L3NPE		3		L1L2L3N		4		L1L2L3NPE		5		L1L2L3NPE		6		L1L2L3NPE		7		L1L2L3NPE		8		L1L2L3NPE		9	
CIRCUIT DESCRIPTION		TRANSFORMER MT/BT PRODUCTION		TRANSFORMER MT/BT PRODUCTION		SPD		GENERAL SWITCH		INVERTER 1 ARRAY 1 12x STRING		INVERTER 2 ARRAY 2 12x STRING		INVERTER 3 ARRAY 3 12x STRING		INVERTER 4 ARRAY 4 12x STRING		INVERTER 5 ARRAY 5 12x STRING																			
EQUIPMENT				MT22-20 N1				MTZ1-16 HA		NSX160 F																											
CIRCUIT BREAKER	l <sub>cu</sub> [kA] / I <sub>cn</sub> [A]			42						30		30		30		30		30																			
	N. POLES	In [A]			4P 2000				1600		4P 100		4P 100		4P 100		4P 100		4P 100																		
	COURBE/TRIPPING UNIT				MicroL5.0X						MicroL5.2E		MicroL5.2E		MicroL5.2E		MicroL5.2E		MicroL5.2E																		
	I <sub>r</sub> [A]	t <sub>r</sub> [s]			1348						90		90		90		90		90																		
	I <sub>sd</sub> [A]	t <sub>sd</sub> [s]			13480 10x						900 10x		900 10x		900 10x		900 10x		900 10x																		
I <sub>i</sub> [A]	t <sub>g</sub> [s]			7,5																																	
RESIDUAL CURRENT DEVICE	TYPE	CLASS							Vigi MH A		Vigi MH A		Vigi MH A		Vigi MH A		Vigi MH A																				
	I <sub>dn</sub> [A]	t <sub>dn</sub> [ms]							0,03 Instant		0,03 Instant		0,03 Instant		0,03 Instant		0,03 Instant																				
CONTACTOR	TYPE	CLASSE																																			
IMPULSE RELAY	COIL	N. POLES	In [A]																																		
THERMAL RELAY	TYPE	I <sub>rth</sub> [A]																																			
FUSE	N. POLES	In [A]																																			
OTHER	TYPE	MODEL																																			
CONDUCTORS	INSULATION	INST.METHOD	EPR	21					EPR 61		EPR 61		EPR 61		EPR 61		EPR 61																				
	CROSS SECTION PHASE-N-PE/PEN [mmq]		5x300	3x300	3x300					1x70 1x35 1x35																											
	I <sub>b</sub> [A]	I <sub>z</sub> [A]	1347,7	2109					84 184,8		84 184,8		84 184,8		84 184,8		84 184,8																				
Un [V]	P <sub>n</sub> [kW]	800	1048					500 65,5		500 65,5		500 65,5		500 65,5		500 65,5																					
BOTTOM OF THE LINE	I <sub>cc min</sub> [kA]	I <sub>cc max</sub> [kA]	21,3	23					1,5 5,9		1,5 5,9		1,5 5,9		1,1 4,7		1,1 4,7																				
	LENGHT [m]	dV TOTAL [%]	3	0					150 1,5		150 1,5		150 1,5		200 2		200 2																				
NOTES	FG7R								FG7R		FG7R		FG7R		FG7R		FG7R																				

CUSTOMERS	PROJECT	- FILE SPP Armenia LV Production Rev.01
	ARCHIVE	- DATE 11/05/2017 REVISION
	DESIGNER	- PAGE 3 NEXT 4
PLANT	SPP YEGHEGNADZOR - ARMENIA	TABLE



TERMINALS NUMBERING		9		10		11		12		13		14		15		16		17					
CIRCUIT NUMBERING	DISTRIBUTION	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE	L1L2L3NPE				
CIRCUIT DESCRIPTION		INVERTER 6 ARRAY 6 12x STRING		INVERTER 7 ARRAY 7 12x STRING		INVERTER 8 ARRAY 8 12x STRING		INVERTER 9 ARRAY 9 12x STRING		INVERTER 10 ARRAY 10 12x STRING		INVERTER 11 ARRAY 11 12x STRING		INVERTER 12 ARRAY 12 12x STRING		INVERTER 13 ARRAY 13 12x STRING		INVERTER 14 ARRAY 14 11x STRING					
EQUIPMENT		NSX160 F		NSX160 F		NSX160 F		NSX160 F		NSX160 F		NSX160 F		NSX160 F		NSX160 F		NSX160 F					
CIRCUIT BREAKER	Icu [kA] / Icn [A]	30		30		30		30		30		30		30		30		30					
	N. POLES	4P		4P		4P		4P		4P		4P		4P		4P		4P					
	In [A]		100		100		100		100		100		100		100		100		100				
	COURBE/TRIPPING UNIT		MicroL5.2E		MicroL5.2E		MicroL5.2E		MicroL5.2E		MicroL5.2E		MicroL5.2E		MicroL5.2E		MicroL5.2E		MicroL5.2E				
	I <sub>r</sub> [A]	t <sub>r</sub> [s]	90	10x	90	10x	90	10x	90	10x	90	10x	90	10x	90	10x	90	10x	90	10x			
I <sub>sd</sub> [A]	t <sub>sd</sub> [s]	900	10x	900	10x	900	10x	900	10x	900	10x	900	10x	900	10x	900	10x	900	10x	900	10x		
I <sub>i</sub> [A]	t <sub>g</sub> [s]																						
RESIDUAL CURRENT DEVICE	TYPE	Vigi MH		Vigi MH		Vigi MH		Vigi MH		Vigi MH		Vigi MH		Vigi MH		Vigi MH		Vigi MH					
	CLASS	A		A		A		A		A		A		A		A		A					
	I <sub>dn</sub> [A]	0,03	Instant	0,03	Instant	0,03	Instant	0,03	Instant	0,03	Instant	0,03	Instant	0,03	Instant	0,03	Instant	0,03	Instant	0,03	Instant		
CONTACTOR	TYPE																						
IMPULSE RELAY	COIL																						
	N. POLES																						
THERMAL RELAY	TYPE																						
	I <sub>rth</sub> [A]																						
FUSE	N. POLES																						
	In [A]																						
OTHER	TYPE																						
	MODEL																						
CONDUCTORS	INSULATION	EPR		EPR		EPR		EPR		EPR		EPR		EPR		EPR		EPR					
	INST.METHOD	61		61		61		61		61		61		61		61		61					
	CROSS SECTION PHASE-N-PE/PEN [mmq]	1x70	1x35	1x35	1x70	1x35	1x35	1x70	1x35	1x35	1x70	1x35	1x35	1x70	1x35	1x35	1x70	1x35	1x35	1x70	1x35	1x35	
	I <sub>b</sub> [A]	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8
	I <sub>z</sub> [A]	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8	84	184,8
	U <sub>n</sub> [V]	500	65,5	500	65,5	500	65,5	500	65,5	500	65,5	500	65,5	500	65,5	500	65,5	500	65,5	500	65,5	500	65,5
BOTTOM OF THE LINE	I <sub>cc min</sub> [kA]	1,1	4,7	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9
	I <sub>cc max</sub> [kA]	1,1	4,7	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9	1,5	5,9
	LENGHT [m]	200	2	150	1,5	150	1,5	150	1,5	150	1,5	150	1,5	150	1,5	150	1,5	150	1,5	150	1,5	150	1,5
	dV TOTAL [%]	200	2	150	1,5	150	1,5	150	1,5	150	1,5	150	1,5	150	1,5	150	1,5	150	1,5	150	1,5	150	1,5
NOTES		FG7R		FG7R		FG7R		FG7R		FG7R		FG7R		FG7R		FG7R		FG7R					

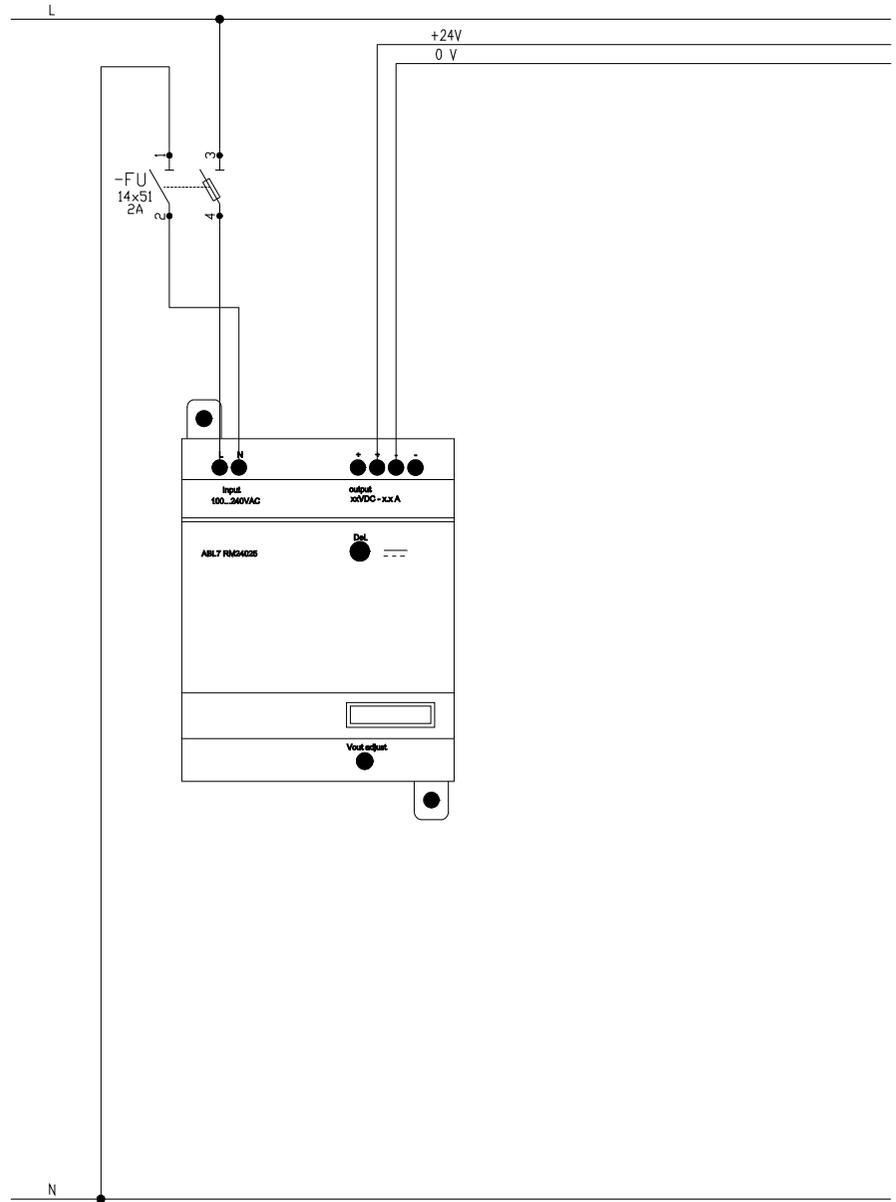
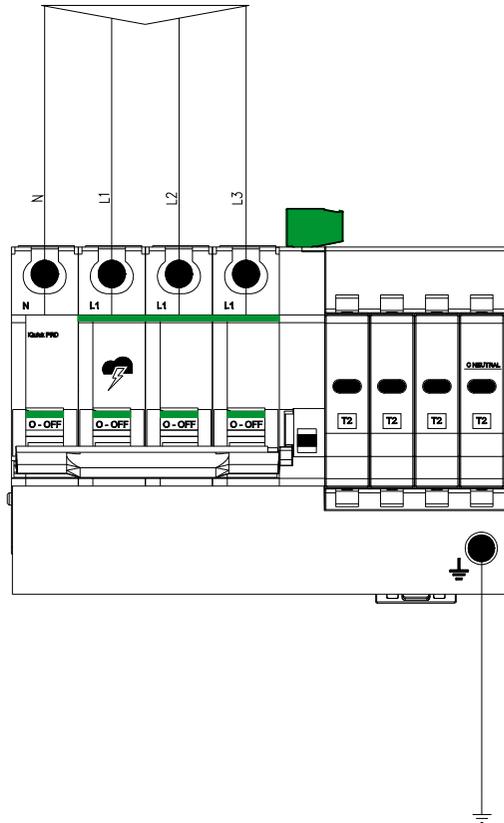
CUSTOMERS	PROJECT	- FILE SPP Armenia LV Production Rev.01
	ARCHIVE	- DATE 11/05/2017 REVISION
	DESIGNER	- PAGE 4 NEXT 5
PLANT	SPP YEGHEGNADZOR - ARMENIA	TABLE



TERMINALS NUMBERING		L0.2.15		L0.2.16		
CIRCUIT NUMBERING	DISTRIBUTION	18	L1L2L3NPE	19	L1L2L3NPE	
CIRCUIT DESCRIPTION		INVERTER 15 ARRAY 15 12x STRING		INVERTER 16 ARRAY 16 11x STRING		
EQUIPMENT		NSX160 F		NSX160 F		
CIRCUIT BREAKER	l <sub>cu</sub> [kA] / l <sub>cn</sub> [A]	30		30		
	N. POLES	In [A]	4P 100	4P 100		
	COURBE/TRIPPING UNIT		MicroL5.2E		MicroL5.2E	
	I <sub>r</sub> [A]	t <sub>r</sub> [s]	90 10x	90 10x		
	I <sub>sd</sub> [A]	t <sub>sd</sub> [s]	900 10x	900 10x		
	I <sub>i</sub> [A]					
RESIDUAL CURRENT DEVICE	I <sub>g</sub> [A]	t <sub>g</sub> [s]				
	TYPE	CLASS	Vigi MH A	Vigi MH A		
	I <sub>dn</sub> [A]	t <sub>dn</sub> [ms]	0,03 Instant	0,03 Instant		
CONTACTOR	TYPE	CLASSE				
IMPULSE RELAY	COIL	N. POLES	In [A]			
THERMAL RELAY	TYPE	I <sub>rth</sub> [A]				
FUSE	N. POLES	In [A]				
OTHER	TYPE	MODEL				
CONDUCTORS	INSULATION	INST.METHOD	EPR 61	EPR 61		
	CROSS SECTION PHASE-N-PE/PEN [mmq]		1x70 1x35 1x35	1x70 1x35 1x35		
	I <sub>b</sub> [A]	I <sub>z</sub> [A]	84 184,8	84 184,8		
BOTTOM OF THE LINE	U <sub>n</sub> [V]	P <sub>n</sub> [kW]	500 65,5	500 65,5		
	I <sub>cc</sub> min [kA]	I <sub>cc</sub> max [kA]	1,1 4,7	1,1 4,7		
	LENGHT [m]	dV TOTAL [%]	200 2	200 2		
NOTES		FG7R	FG7R			

CUSTOMERS	PROJECT	- FILE SPP Armenia LV Production Rev.01
	ARCHIVE	- DATE 11/05/2017 REVISION
	DESIGNER	- PAGE 5 NEXT 6
PLANT	SPP YEGHEGNADZOR - ARMENIA	TABLE

**SCHEMATIC  
DIAGRAMS**



CUSTOMER	PROJECT	- FILE Spp Armenia LV Production Rev.01
	ARCHIVE	- DATE 11/05/2017 REVISION
PLANT SPP YEGHEGNADZOR - ARMENIA	DESIGNER	- PAGE 6 NEXT 7
	TABLE	

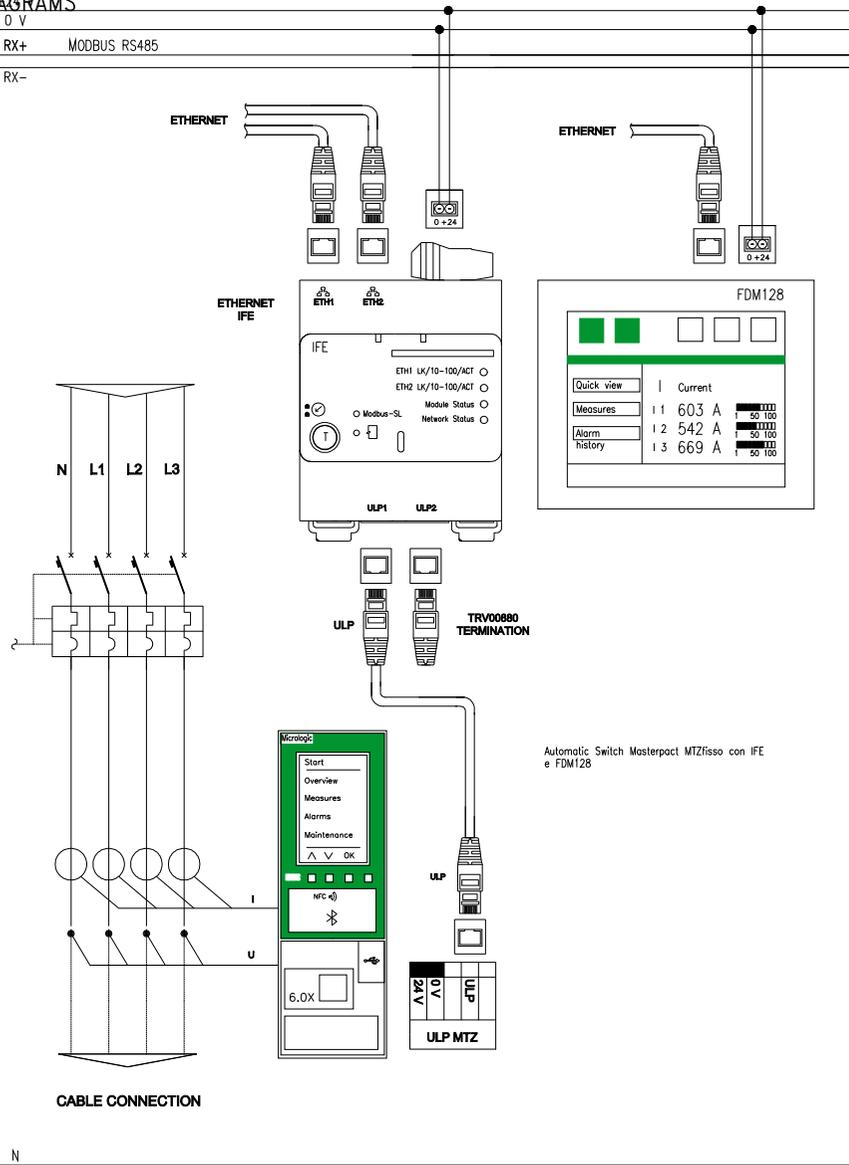
**SCHEMATIC**

**DIAGRAMS**

0 V

RX+ MODBUS RS485

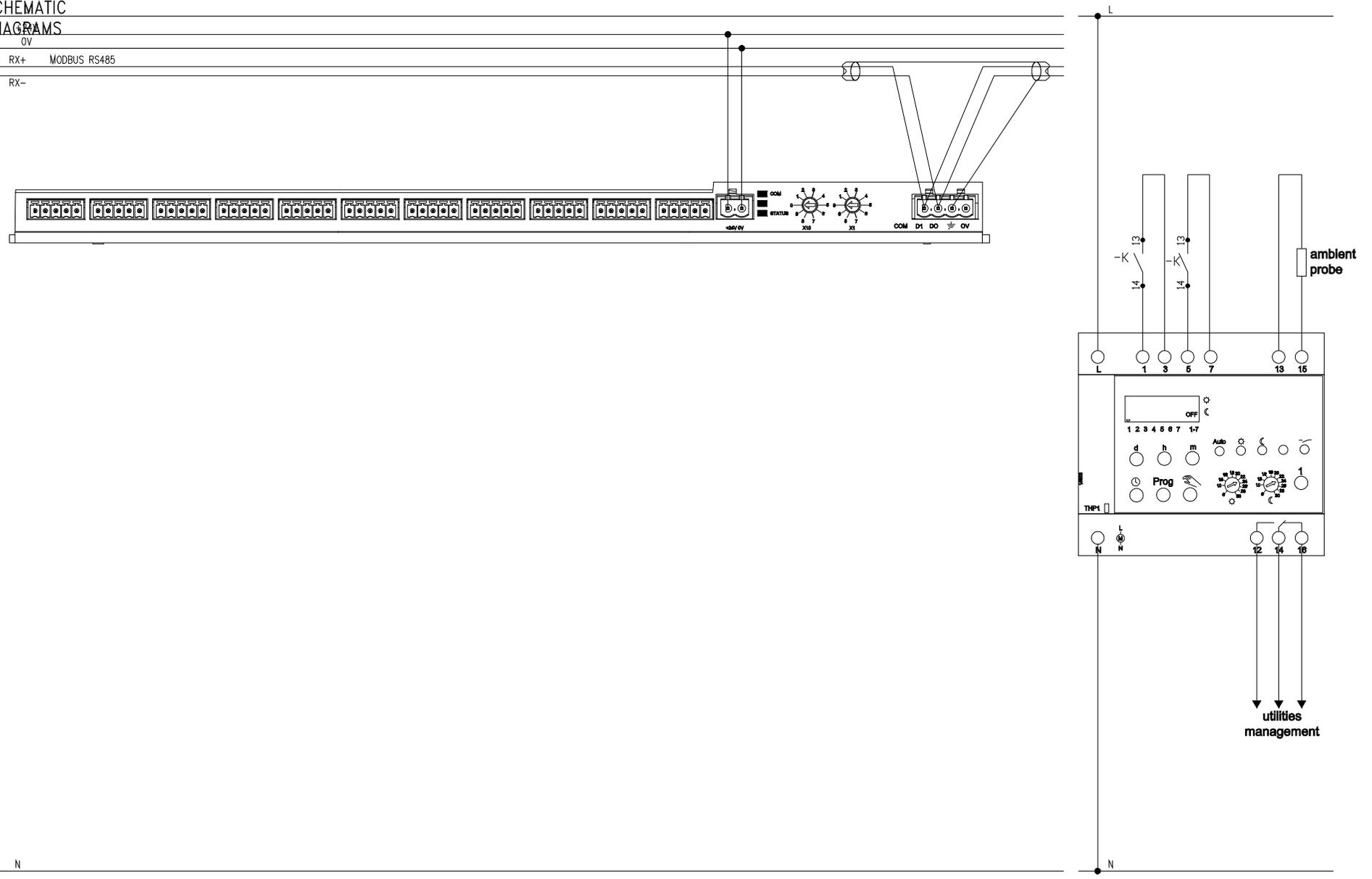
RX-



CUSTOMER	PROJECT	-	FILE SPP Armenia LV Production Rev.01
	ARCHIVE	-	DATE 11/05/2017 REVISION
	DESIGNER	-	PAGE 7 NEXT 8
PLANT	SPP YEGHEGNADZOR - ARMENIA	TABLE	

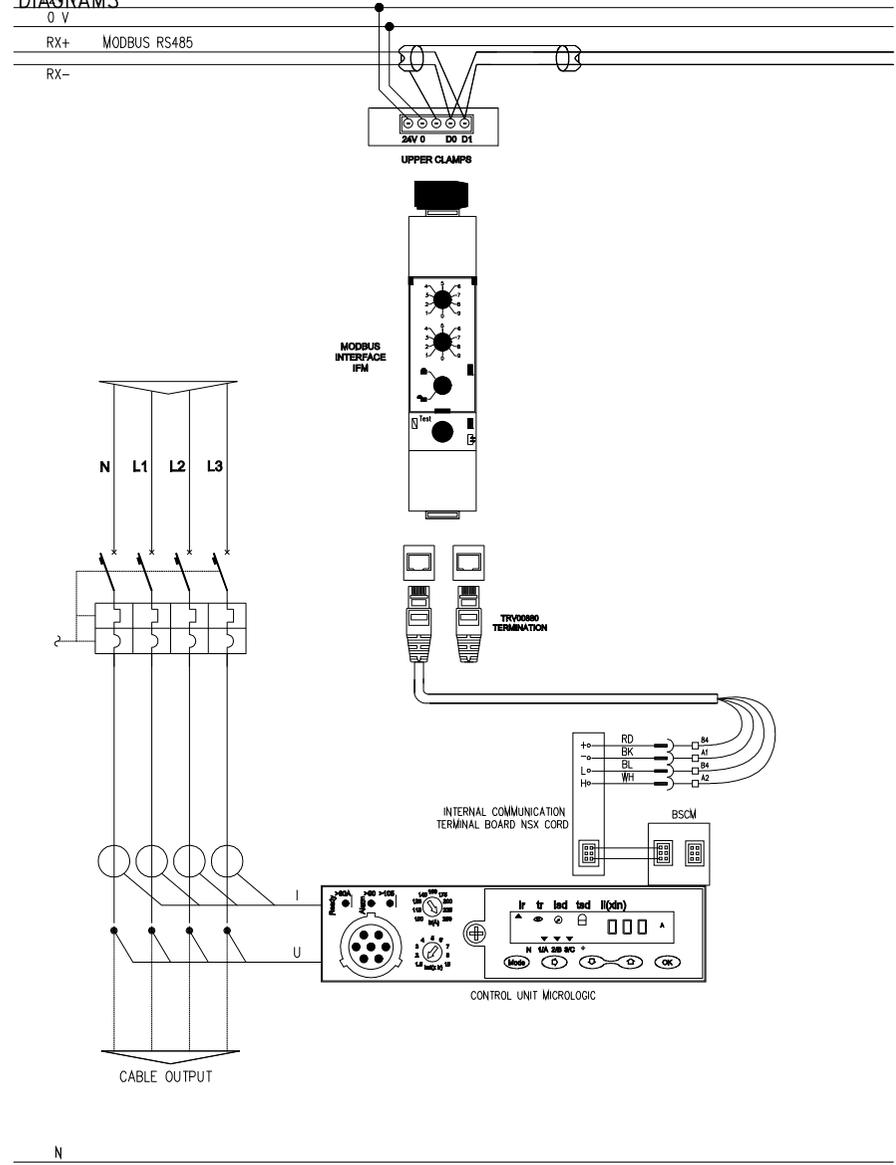
**SCHEMATIC**  
**DIAGRAMS**

OV  
RX+ MODBUS RS485  
RX-



CUSTOMER	PROJECT	- FILE SPP Armenia LV Production Rev.01
	ARCHIVE	- DATE 11/05/2017 REVISION
PLANT SPP YEGHEGNADZOR - ARMENIA	DESIGNER	- PAGE 8 NEXT 9
		TABLE

**SCHEMATIC**  
**DIAGRAMS**



CUSTOMER	PROJECT	- FILE SPP Armenia LV Production Rev.01
	ARCHIVE	- DATE 11/05/2017 REVISION
	DESIGNER	- PAGE 9 NEXT
PLANT	SPP YEGHEGNADZOR - ARMENIA	TABLE