W.O. HB442895J - Repair MV SF6 breakers in all electrical substations

Caserma Del Din

Annex 2 – Technical specifications for each medium voltage panel

1 General Specification: Switchgear ESS-K

1.1 General Data / Type of apparatus

Type:	Complete switchgear
Application:	Standard IEC 62271-200
Additional technical requests:	n.a.
Degree of protection:	IP3X
Internal Arc Classification (IAC):	Front, Lateral and Rear Accessibility (AFLR)
ATTENTION: IAC A-FLR version - No access limitations to the Swg Room. Installation distances to be respected.	
Packing:	Domestic
FAT Factory acceptance test:	Internal Routine Test (no FAT)
ZPA Qualification Seismic Level (acc. IEC 62271-210):	No
Operative temperature range (min/Max):	-5°C /40°C
Storage temperature:	-5°C
Ageing Test compliance (acc. IEC 62271-304):	Not available
Altitude:	≤1000 m

1.2 Electrical Data

Rated voltage:	24kV
Service voltage:	20kV
Power frequency withstand voltage:	50kV
BIL:	125kV
Rated frequency:	50Hz
Rated busbar current:	630A
Rated short circuit current:	16kA
Rated short circuit current duration:	1s
Peak current:	40kA
Arc test current 1s (According to IEC 62271-200):	16kA

1.3 Additional Data

Internal lighting	Yes
Anti Condensation heater of self-regulating type	Yes, in cable compartment
Arc gas relief system	Relief inside switchgear room
Voltage presence indicating system	Type VDIS with fixed lamps (aux contacts as options)
Pressure indicator for switch disconnector	
Type of key locks interlocking for operation on Load Break Switch \ Disconnector (if selected in functional units)	Giussani
Address labels on functional units	Yes
Routine test reports	Yes
standard drawing template	Yes
Switchgear colour	RAL 7035
Busbars treatment	No
Floor fixing	Not in scope

1.4 Auxiliary supply and wiring data

Local control voltage:	48VDC
Spring charging motor voltage for CB:	48VDC
Auxiliary control voltage for Electromechanical lock on ES mechanism:	48VDC
Control circuits cross section	1 mm^2
Voltage circuits cross section	1.5 mm^2
Current circuits cross section	2.5 mm^2
Earthing circuits cross section	2.5 mm^2
Interconnection circuits cross section	2.5 mm^2
Auxiliary Supply circuits cross section	4 mm^2
Wiring cable type	Standard, PVC
Wiring cable rated voltage	standard
Wiring cable colors	STANDARD
Colour of Auxiliary AC	Black
Colour of Auxiliary DC	Black
Colour of CT circuits	Black
Colour of VT circuits	Black
Colour of Earthing circuits	Yellow/Green

1.5 Control and Communication

Protocol: IEC61850 Single (PRP), Ethernet (TCP-IP)

IEC61850: v. 2.0

GOOSE: ---

1.6 Switchgear Accessories

1	Operating handle for switch disconnector
1	Lifting hooks
1	Left end cover - 2000 mm, not painted, IAC
1	Right end cover for WBC, not painted
1	Service trolley for withdrawable apparatus at fixed height; at 24kV (WBC/WBS 750mm wide)

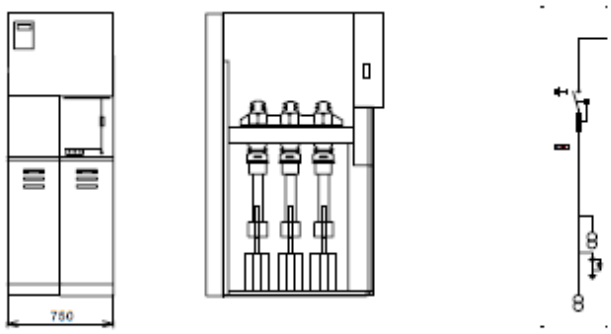
1.7 Switchgear Composition: Switchgear ESS-K

Description	Qty	Weight (Kg)	*Overall dimensions* Width (mm)	Depth (mm)	Height (mm)
SFV Metering (6 A) *J01*	1	493,52	750	1320	2000
WBC Feeder Line 1-2 (630 A) *J02, J03*	2	1034,12	750	1535	2300
WBC Incoming DG (630 A) *J04*	1	1074,05	750	1535	2300
Sidewalls			54		
		3635,81	***3054***	***1535***	***2300***

2 Typical Units Description

2.1 Panel: SFV Metering

(6 A, 1: J01)



1 Panel type SFV, LSC2A - Switch-fuse combination unit for measuring - 750 mm

Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Anti condensation heater for cable compartment 50W 110-250 AC/DC
Internal light
Arc filter 750 mm
Installation and operating manual in Italian

1 GSec Air - Three position switch-disconnector with earthing switch with T2 actuator

General purpose switch; GWP=0; volume < 25 liters
Tripping coil for opening 48 VDC
Auxiliary contacts for switch-disconnector
Auxiliary contacts for earthing switch
- Set of 4 pcs change-over
- Set of 4 pcs change-over
standard earth key locks closed / opened (2 locks for earthing)
Air pressure level monitoring + remote control

3 HV fuse 24 kV - 2 A (e=442mm)

Fuse base 375 for fuses 442mm
Fuse tripping
Fuse blow indication (1NO)

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

3 Photovoltaic solution - Voltage Transformer Phase-earth - TJC 6 20000:V3 - 100:3 – 10_50VA – cl. 0.5_0.5/3P

Core 1 : Us=0,1/V3 kV; 10 VA; 0.5

Core 2 : Us=0,1/3 kV; 50 VA; 0.5/3P

Frequency: 50Hz

2 Phase-phase VT TDC6, Up=25kV

Core 1 : Us=0.1 kV; 10 VA; 0.5/3P

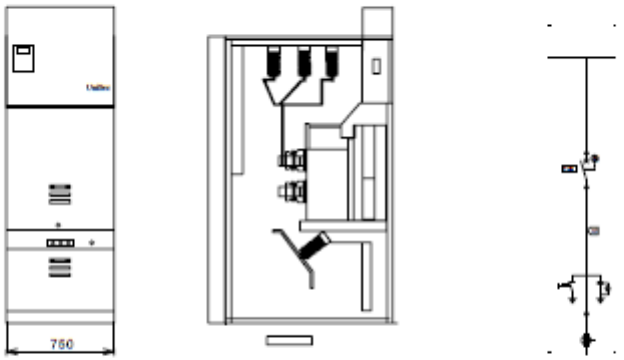
Frequency: 50Hz

Damping resistor 200 W, 220 V = 100 Ohm

1 Mounting and wiring of a multimeter device

2.2 Panel: WBC Feeder Line 1-2

(630 A, 2: J02, J03)



1 Panel type WBC, LSC2B-PI – unit with withdrawable apparatus - 750mm

Cable entry for 1-phase cables up to 400 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Blocking magnet for CB Door 48 VDC
Push buttons for CB On - Off on door
Internal light
Lighting in cable compartment
Heater in cable compartment
Arc filter 750 mm
standard earth key locks closed / opened (2 locks for earthing)
Electromechanical lock on ES mechanism 230 VAC

1 Earthing switch, full making capacity

Auxiliary contacts for earthing switch
- Set of 5+5 pcs change-over
- Up to 250 VAC / 16 A, 250 VDC / 0.3 A

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

1 Circuit breaker, type VD4/Sec (vacuum) 24kV, 630A, 16kA

Opening push button
Closing push button
Mechanical signalling device for closing springs
Mechanical signalling device for circuit breaker
Operation counter
Key locks for CB truck, type Giussani
Set of 9 auxiliary contacts for CB position indication
Anti-racking-in lock for different currents
Shunt opening release 48 VDC
Shunt closing release 48 VDC
Spring charging motor 48 VDC
Electrical indication for charged/discharged spring
Truck Blocking magnet

3 Current and Voltage Sensor KEVCD 24 AE3 (set 1, Ip=80 A, Polarity: P1 on busbar side)

DIN CTs secondary terminals: busbar side
Frequency: 50Hz

1 TO11S3 SIPIE Earth Fault Ring current transformer 110mm 100/1A 0.5VA cl.5P20 (neutral, Ip=100 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 0.5VA; 5P20
Frequency: 50Hz

1 REX615-B (Feeder current and voltage protection - Sensors - Wide HMI)

Line protection (50P-51P, 50N-51N, 49F, 67N)
Three-phase overcurrent protection, instantaneous stage (50)
Non-directional earth-fault, instantaneous stage (50N)
Three-phase overvoltage (59)
Residual overvoltage (59G)
Three-phase directional overcurrent, low stage (67-1)
Three-phase directional overcurrent, high stage (67-2)
Directional earth-fault, low stage (67N-1)
Directional earth-fault, high stage (67N-2)
Three-phase inrush detector (68)
Master trip TRPPTRC1 Master Trip (94/86)
Circuit-breaker control (I <-> O CB)
Disconnector position indication (I <-> O DC)
Earthing switch indication (I <-> O ES)
Circuit-breaker condition monitoring (CBCM)
Three-phase current measurement (3I)
Residual current measurement (In)
Three-phase voltage measurement (3U)
Residual voltage measurement (Vn)
-- Slot X000 -- Communication module: Ethernet 100Base-TX (3 x RJ-45) and IEC61850-9-2LE
-- Slot X100 -- Power supply: 24-60 Vdc + 6BO
-- Slot X105 -- Binary I/O: 8BI + 4BO

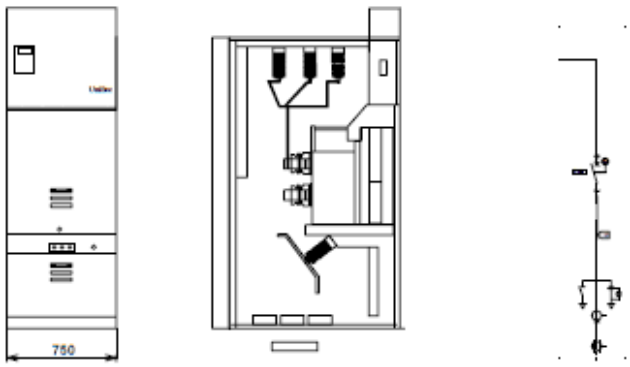
-- Slot X110 -- Binary I/O: 8BI + 4BO
-- Slot X115 -- Binary I/O: 8BI + 4BO
-- Slot X130 -- Analog inputs option: 3Is + 3Us + Io
Global language pack: English, Chinese, Czech, Finnish, French, German, Hungarian, Italian, Polish, Portuguese, Spanish, Swedish, Turkish
Large LCD, (10 rows) with single line diagram (SLD)
APP1 - Current protection package (50,51,50N,51N/67N,46PD,59N,49,37,50BF,68,79)
APP2 - Earth fault protection extension package (21NY,32N,51NH,PHIZ)
APP3 - Voltage protection package (67,51V,32R/U,55U)
APP5 - Voltage protection package (25,27,59,59N,81,81LSH)
Compression type signal connectors
Without conformal coating
PCL1 Connectivity level
Communication protocol: IEC 61850 (for Ethernet communication modules)

1	Additional Data

2 Push button
1 Time relay multifunctional CT-MFD

2.3 Panel: WBC Incoming DG

(630 A, 1: J04)



1 Panel type WBC, LSC2B-PI – unit with withdrawable apparatus - 750mm

Cable entry for 1-phase cables up to 400 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Push buttons for CB On - Off on door
Operating Handle for Switch-disconnector and Earthing switch
Operating Handle for Earthing switch
Internal light
Lighting in cable compartment
Heater in cable compartment
Arc filter 750 mm
standard earth key locks closed / opened (2 locks for earthing)

1 Earthing switch, full making capacity

Auxiliary contacts for earthing switch
- Set of 5+5 pcs change-over
- Up to 250 VAC / 16 A, 250 VDC / 0.3 A

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

1 Circuit breaker, type VD4/Sec (vacuum) 24kV, 630A, 16kA

Opening push button
Closing push button
Mechanical signalling device for closing springs
Mechanical signalling device for circuit breaker
Operation counter
Set of 9 auxiliary contacts for CB position indication
Anti-racking-in lock for different currents
Shunt opening release 48 VDC
Shunt closing release 48 VDC
Undervoltage release 48 VDC
Mechanical override for undervoltage release
Spring charging motor 48 VDC
Electrical indication for charged/discharged spring
Truck Blocking magnet

3 Current and Voltage Sensor KEVCD 24 AE3 (set 1, Ip=80 A, Polarity: P1 on busbar side)

DIN CTs secondary terminals: busbar side
Frequency: 50Hz

3 Ring current transformer, BD00-A - 300A, Ø:69mm, one core (set 2, Ip=300 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 5VA; 0.5; fs 5
Frequency: 50Hz

1 TO11S3 SIPIE Earth Fault Ring current transformer 110mm 100/1A 0.5VA cl.5P20 (neutral, Ip=100 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 0.5VA; 5P20
Frequency: 50Hz

1 REX615-B (CEI 0-16 Incoming Feeder current and voltage protection - Sensors - Wide HMI)

Line protection (50P-51P, 50N-51N, 49F, 67N)
Three-phase overcurrent protection, instantaneous stage (50)
Non-directional earth-fault, instantaneous stage (50N)
Three-phase overvoltage (59)
Residual overvoltage (59G)
Three-phase directional overcurrent, low stage (67-1)
Three-phase directional overcurrent, high stage (67-2)
Directional earth-fault, low stage (67N-1)
Directional earth-fault, high stage (67N-2)
Three-phase inrush detector (68)
Master trip TRPPTRC1 Master Trip (94/86)
Circuit-breaker control (I <-> O CB)
Disconnector position indication (I <-> O DC)
Earthing switch indication (I <-> O ES)
Circuit-breaker condition monitoring (CBCM)
Three-phase current measurement (3I)

Residual current measurement (In)
Three-phase voltage measurement (3U)
Residual voltage measurement (Vn)
-- Slot X000 -- Communication module: Ethernet 100Base-TX (3 x RJ-45) and IEC61850-9-2LE
-- Slot X100 -- Power supply: 24-60 Vdc + 6BO
-- Slot X105 -- Binary I/O: 8BI + 4BO
-- Slot X110 -- Binary I/O: 8BI + 4BO
-- Slot X115 -- Binary I/O: 8BI + 4BO
-- Slot X130 -- Analog inputs option: 3Is + 3Us + Io
Global language pack: English, Chinese, Czech, Finnish, French, German, Hungarian, Italian, Polish, Portuguese, Spanish, Swedish, Turkish
Large LCD, (10 rows) with single line diagram (SLD)
APP1 - Current protection package (50,51,50N,51N/67N,46PD,59N,49,37,50BF,68,79)
APP2 - Earth fault protection extension package (21NY,32N,51NH,PHIZ)
APP3 - Voltage protection package (67,51V,32R/U,55U)
APP5 - Voltage protection package (25,27,59,59N,81,81LSH)
Compression type signal connectors
Without conformal coating
PCL1 Connectivity level
Communication protocol: IEC 61850 (for Ethernet communication modules)

1 Additional Data

2 Push button
1 Time relay multifunctional CT-MFD

3 General Specification: Switchgear BLDG #55 CEP

3.1 General Data / Type of apparatus

Type:	Complete switchgear
Application:	Standard IEC 62271-200
Additional technical requests:	n.a.
Degree of protection:	IP3X
Internal Arc Classification (IAC):	Front, Lateral and Rear Accessibility (AFLR)
ATTENTION: IAC A-FLR version - No access limitations to the Swg Room. Installation distances to be respected.	
Packing:	Domestic
FAT Factory acceptance test:	Internal Routine Test (no FAT)
ZPA Qualification Seismic Level (acc. IEC 62271-210):	No
Operative temperature range (min/Max):	-5°C /40°C
Storage temperature:	-5°C
Ageing Test compliance (acc. IEC 62271-304):	Not available
Altitude:	≤1000 m

3.2 Electrical Data

Rated voltage:	24kV
Service voltage:	20kV
Power frequency withstand voltage:	50kV
BIL:	125kV
Rated frequency:	50Hz
Rated busbar current:	630A
Rated short circuit current:	16kA
Rated short circuit current duration:	1s
Peak current:	40kA
Arc test current 1s (According to IEC 62271-200):	16kA

3.3 Additional Data

Internal lighting	Yes
Anti Condensation heater of self-regulating type	Yes, in cable compartment
Arc gas relief system	Relief inside switchgear room
Voltage presence indicating system	Type VDIS with fixed lamps (aux contacts as options)
Pressure indicator for switch disconnector	
Type of key locks interlocking for operation on Load Break Switch \ Disconnector (if selected in functional units)	Giussani
Address labels on functional units	Yes
Routine test reports	Yes
standard drawing template	Yes
Switchgear colour	RAL 7035
Busbars treatment	No
Floor fixing	Not in scope

3.4 Auxiliary supply and wiring data

Local control voltage:	48VDC
Spring charging motor voltage for CB:	48VDC
Auxiliary control voltage for Electromechanical lock on ES mechanism:	48VDC
Control circuits cross section	1 mm^2
Voltage circuits cross section	1.5 mm^2
Current circuits cross section	2.5 mm^2
Earthing circuits cross section	2.5 mm^2
Interconnection circuits cross section	2.5 mm^2
Auxiliary Supply circuits cross section	4 mm^2
Wiring cable type	Standard, PVC
Wiring cable rated voltage	standard
Wiring cable colors	STANDARD
Colour of Auxiliary AC	Black
Colour of Auxiliary DC	Black
Colour of CT circuits	Black
Colour of VT circuits	Black
Colour of Earthing circuits	Yellow/Green

3.5 Control and Communication

Protocol: IEC61850 Single (PRP), Ethernet (TCP-IP)
IEC61850: v. 2.0
GOOSE: Interlocks and logic via GOOSE. In this new approach the conventional hard-wired blocking signal paths among the switchgear cubicles are replaced with a substationwide Ethernet LAN.

3.6 Switchgear Accessories

1	Operating handle for switch disconnector
1	Lifting hooks
1	Left end cover - 1700 mm, IAC
1	Right end cover - 1700 mm, IAC
1	Service trolley for withdrawable apparatus at fixed height; at 24kV (WBC/WBS 750mm wide)
2	Service trolley for withdrawable apparatus with adjustable height; at 24kV (WBC/WBS 750mm wide)

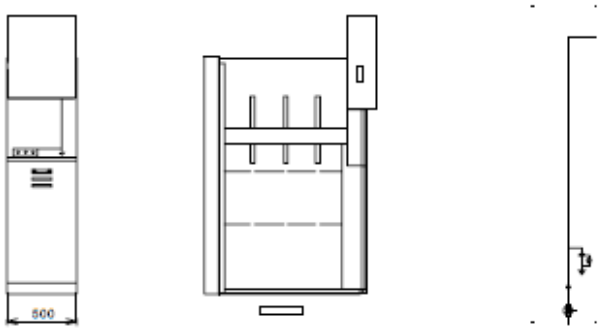
3.7 Switchgear Composition: Switchgear BLDG #55 CEP

Description	Qty	Weight (Kg)	*Overall dimensions* Width (mm)	Depth (mm)	Height (mm)
DRC Incoming 1-2 (630 A) *J01, J26*	2	243,25	500	1320	2000
SFV Metering 1 (6 A) *J02*	1	448,82	750	1320	2000
SDC Bypass 1 (630 A) *J03*	1	303,92	500	1320	2000
WBS DDI 1-2 (630 A) *J04, J23*	2	1035,45	750	1535	2300
DRS Riser 1-2 (630 A) *J05, J24*	2	243,65	500	1535	2300
SDC Bypass 2 (630 A) *J06*	1	303,92	500	1320	2000
WBC Ring Feeder 1-2-3-4 (630 A) *J07, J08, J21, J22*	4	1029,12	750	1535	2300
WBS Bus Tie 1-2 (630 A) *J10, J19*	2	998,35	750	1535	2300
DRS Riser 1-2 (630 A) *J11, J20*	2	243,65	500	1535	2300
SFV Busbar Metering (6 A) *J12*	1	357,34	500	1320	2000
WBC Feeder 1-2-3-4 (630 A) *J09, J13, J14, J15*	4	1029,12	750	1535	2300
WBC Generator Feeder 1-2-3 (630 A) *J16, J17, J18*	3	1095,67	750	1535	2300
SFV Metering 2 (6 A) *J25*	1	448,82	750	1320	2000
Sidewalls			54		
		18894,09	***17304***	***1535***	***2300***

4 Typical Units Description

4.1 Panel: DRC Incoming 1-2

(630 A, 2: J01, J26)



1 Panel type DRC, LSC1 - Direct riser unit with cable - 500 mm

Earthing points - CEI 0-16
Cable entry for 1-phase cables up to 240 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Anti condensation heater for cable compartment 50W 110-250 AC/DC
Internal light
Arc filter 500 mm
Installation and operating manual in Italian

1 Wide low voltage compartment for 500 mm functional unit

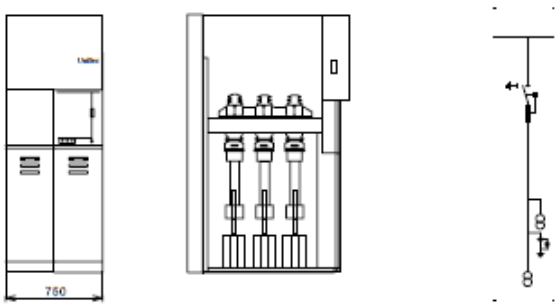
Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

1 TO11S3 SIPIE Earth Fault Ring current transformer 110mm 100/1A 0.5VA cl.5P20 (neutral, Ip=100 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 0.5VA; 5P20
Frequency: 50Hz

4.2 Panel: SFV Metering 1

(6 A, 1: 302)



1 Panel type SFV, LSC2A - Switch-fuse combination unit for measuring - 750 mm

Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Anti condensation heater for cable compartment 50W 110-250 AC/DC
Internal light
Arc filter 750 mm

1 GSec Air - Three position switch-disconnector with earthing switch with T2 actuator

General purpose switch; GWP=0; volume < 25 liters
Tripping coil for opening 48 VDC
Tripping coil for closing 48 VDC
Auxiliary contacts for switch-disconnector
Auxiliary contacts for earthing switch
- Set of 4 pcs change-over
- Set of 4 pcs change-over
standard line key locks open
standard earth key locks closed / opened (2 locks for earthing)
Air pressure level monitoring + remote control

3 HV fuse 24 kV - 2 A (e=442mm)

Fuse base 375 for fuses 442mm
Fuse tripping
Fuse blow indication (1NO)

1 Wide low voltage compartment for 750 mm functional unit

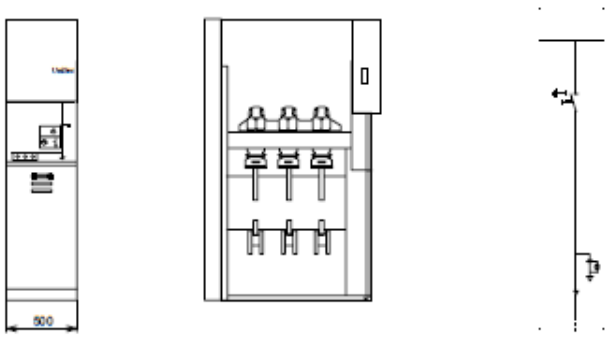
Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.
Selector switch for remote control and push buttons on lv door

3	Photovoltaic solution - Voltage Transformer Phase-earth - TJC 6 20000:V3 - 100:3 – 10_50VA – cl. 0.5_0.5/3P
Core 1 : Us=0,1/V3 kV; 10 VA; 0.5	
Core 2 : Us=0,1/3 kV; 50 VA; 0.5/3P	
Frequency: 50Hz	

2	Phase-phase VT TDC6, Up=25kV
Core 1 : Us=0.1 kV; 10 VA; 0.5/3P	
Frequency: 50Hz	
Damping resistor 200 W, 220 V = 100 Ohm	

4.3 Panel: SDC Bypass 1

(630 A, 1: J03)



1 Panel type SDC, LSC2 - Switch disconnector unit - 500 mm

Cable entry for 1-phase cables up to 240 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Anti condensation heater for cable compartment 50W 110-250 AC/DC
Internal light
Arc filter 500 mm

1 Gsec Air - Three position switch-disconnector with earthing switch with T1 actuator

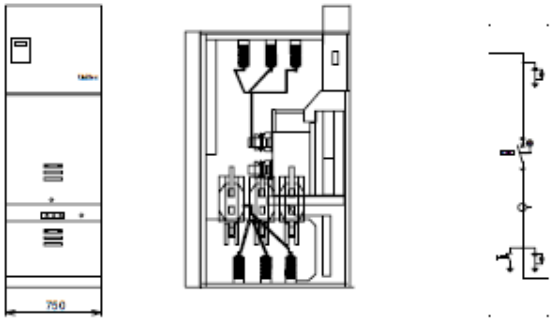
General purpose switch; GWP=0; volume < 25 liters
Auxiliary contacts for switch-disconnector
Auxiliary contacts for earthing switch
- Set of 4 pcs change-over
- Set of 4 pcs change-over
Line locking coil 48 VDC
standard line key locks closed / opened (2 locks for lineing)
standard earth key locks closed / opened (2 locks for earthing)
Air pressure level monitoring + remote control

1 Wide low voltage compartment for 500 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

4.4 Panel: WBS DDI 1-2

(630 A, 2: J04, J23)



1 Panel type WBS, LSC2B-PI – unit with withdrawable apparatus - 750mm

Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Busbar side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Push buttons for CB On - Off on door
Internal light
Lighting in cable compartment
Heater in cable compartment
Arc filter 750 mm
standard earth key locks closed / opened (2 locks for earthing)
Electromechanical lock on ES mechanism 48 VDC

1 Earthing switch, full making capacity

Auxiliary contacts for earthing switch
- Set of 5+5 pcs change-over
- Up to 250 VAC / 16 A, 250 VDC / 0.3 A

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

1 Circuit breaker, type VD4/Sec (vacuum) 24kV, 630A, 16kA

Opening push button
Closing push button
Mechanical signalling device for closing springs
Mechanical signalling device for circuit breaker
Operation counter
Key locks for CB truck, type Giussani
Set of 9 auxiliary contacts for CB position indication
Anti-racking-in lock for different currents

Shunt opening release 48 VDC
Shunt closing release 48 VDC
Undervoltage release 48 VDC
Mechanical override for undervoltage release
Spring charging motor 48 VDC
Electrical indication for charged/discharged spring
Truck Blocking magnet

3 Generic Cast Epoxy DIN CT 24kV, Ip=300 A (set 1, Ip=300 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 10VA; 5P20
DIN CTs secondary terminals: busbar side
Core2 : Is=1A; 5VA; 0.5; fs 5
Frequency: 50Hz

1 REX615-B CEI 0-16 DI (Feeder current and voltage protection - Traditional ITs - Wide HMI)

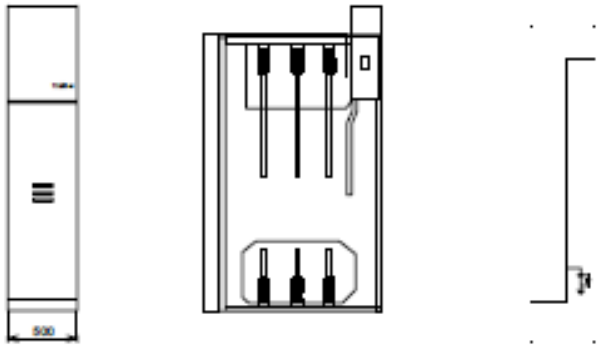
Line protection (50P-51P, 50N-51N, 49F, 67N)
Three-phase overcurrent protection, instantaneous stage (50)
Non-directional earth-fault, instantaneous stage (50N)
Three-phase overvoltage (59)
Residual overvoltage (59G)
Three-phase directional overcurrent, low stage (67-1)
Three-phase directional overcurrent, high stage (67-2)
Directional earth-fault, low stage (67N-1)
Directional earth-fault, high stage (67N-2)
Three-phase inrush detector (68)
Master trip TRPPTRC1 Master Trip (94/86)
Circuit-breaker control (I <-> O CB)
Disconnector position indication (I <-> O DC)
Earthing switch indication (I <-> O ES)
Circuit-breaker condition monitoring (CBCM)
Three-phase current measurement (3I)
Residual current measurement (In)
Three-phase voltage measurement (3U)
Residual voltage measurement (Vn)
-- Slot X000 -- Communication module: Ethernet 100Base-TX (3 x RJ-45) and IEC61850-9-2LE
-- Slot X100 -- Power supply: 24-60 Vdc + 6BO
-- Slot X105 -- Binary I/O: 8BI + 4BO
-- Slot X110 -- Binary I/O: 8BI + 4BO
-- Slot X115 -- Binary I/O: 8BI + 4BO
-- Slot X120 -- Analog inputs and binary I/O options: 4I (Io 1/5 A) + 4BI
-- Slot X130 -- Analog inputs and binary I/O options: 5U + 4BI
Global language pack: English, Chinese, Czech, Finnish, French, German, Hungarian, Italian, Polish, Portuguese, Spanish, Swedish, Turkish
Large LCD, (10 rows) with single line diagram (SLD)
APP1 - Current protection package (50,51,50N,51N/67N,46PD,59N,49,37,50BF,68,79)
APP2 - Earth fault protection extension package (21NY,32N,51NH,PHIZ)
APP3 - Voltage protection package (67,51V,32R/U,55U)
APP5 - Voltage protection package (25,27,59,59N,81,81LSH)
Compression type signal connectors

Without conformal coating
PCL1 Connectivity level
Communication protocol: IEC 61850 (for Ethernet communication modules)

Additional Data	
1	Key distributor: 10 keys constrained and 1 key free
2	Push button
1	Time relay multifunctional CT-MFD

4.5 Panel: DRS Riser 1-2

(630 A, 2: J05, J24)



1	Panel type DRS, LSC1 - Direct riser unit for sectionalizing - 500 mm, height 2000 mm

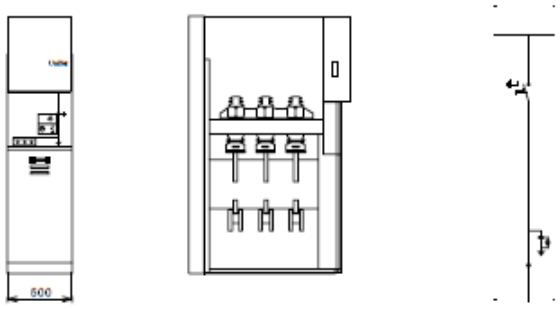
Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Anti condensation heater for cable compartment 50W 110-250 AC/DC
Internal light
Arc filter 500 mm

1	Wide low voltage compartment for 500 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

4.6 Panel: SDC Bypass 2

(630 A, 1: J06)



1 Panel type SDC, LSC2 - Switch disconnector unit - 500 mm

Cable entry for 1-phase cables up to 240 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Anti condensation heater for cable compartment 50W 110-250 AC/DC
Internal light
Arc filter 500 mm

1 Gsec Air - Three position switch-disconnector with earthing switch with T1 actuator

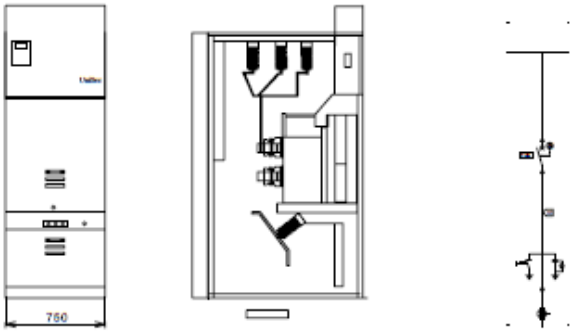
General purpose switch; GWP=0; volume < 25 liters
Auxiliary contacts for switch-disconnector
Auxiliary contacts for earthing switch
- Set of 4 pcs change-over
- Set of 4 pcs change-over
Line locking coil 48 VDC
standard line key locks closed / opened (2 locks for lineing)
standard earth key locks closed / opened (2 locks for earthing)
Air pressure level monitoring + remote control

1 Wide low voltage compartment for 500 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

4.7 Panel: WBC Ring Feeder 1-2-3-4

(630 A, 4: J07, J08, J21, J22)



1 Panel type WBC, LSC2B-PI – unit with withdrawable apparatus - 750mm

Cable entry for 1-phase cables up to 400 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Push buttons for CB On - Off on door
Internal light
Lighting in cable compartment
Heater in cable compartment
Arc filter 750 mm
standard earth key locks closed / opened (2 locks for earthing)
Electromechanical lock on ES mechanism 48 VDC

1 Earthing switch, full making capacity

Auxiliary contacts for earthing switch
- Set of 5+5 pcs change-over
- Up to 250 VAC / 16 A, 250 VDC / 0.3 A

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

1 Circuit breaker, type VD4/Sec (vacuum) 24kV, 630A, 16kA

Opening push button
Closing push button
Mechanical signalling device for closing springs
Mechanical signalling device for circuit breaker
Operation counter
Key locks for CB truck, type Giussani
Set of 9 auxiliary contacts for CB position indication

Anti-racking-in lock for different currents
Shunt opening release 48 VDC
Shunt closing release 48 VDC
Spring charging motor 48 VDC
Electrical indication for charged/discharged spring
Truck Blocking magnet

3	Current and Voltage Sensor KEVCD 24 AE3 (set 1, Ip=80 A, Polarity: P1 on busbar side)

DIN CTs secondary terminals: busbar side
Frequency: 50Hz

1	TO11S3 SIPIE Earth Fault Ring current transformer 110mm 100/1A 0.5VA cl.5P20 (neutral, Ip=100 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 0.5VA; 5P20
Frequency: 50Hz

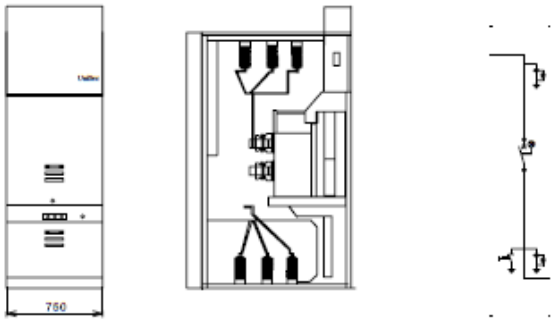
1	Mounting and wiring of a multifunction relay REF620 supplied by other

Voltage Adapter 48VDC

Additional Data	
2	Push button
1	Time relay multifunctional CT-MFD

4.8 Panel: WBS Bus Tie 1-2

(630 A, 2: J10, J19)



1 Panel type WBS, LSC2B-PI – unit with withdrawable apparatus - 750mm

Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Busbar side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Push buttons for CB On - Off on door
Internal light
Lighting in cable compartment
Heater in cable compartment
Arc filter 750 mm
standard earth key locks closed / opened (2 locks for earthing)
Electromechanical lock on ES mechanism 48 VDC

1 Earthing switch, full making capacity

Auxiliary contacts for earthing switch
- Set of 5+5 pcs change-over
- Up to 250 VAC / 16 A, 250 VDC / 0.3 A

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.
Selector switch for remote control and push buttons on lv door
Open/close signalling on low voltage box door

1 Circuit breaker, type VD4/Sec (vacuum) 24kV, 630A, 16kA

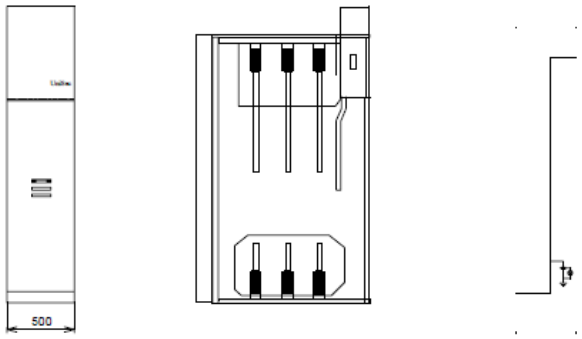
Opening push button
Closing push button
Mechanical signalling device for closing springs
Mechanical signalling device for circuit breaker
Operation counter

Key locks for CB truck, type Giussani
Set of 14 auxiliary contacts for CB position indication
Anti-racking-in lock for different currents
Shunt opening release 48 VDC
Shunt closing release 48 VDC
Spring charging motor 48 VDC
Electrical indication for charged/discharged spring
Truck Blocking magnet

Additional Data	
1	Key distributor: 10 keys constrained and 1 key free
3	Push button
2	Cross Indicator (CIRCLE)
4	Signalling lamp

4.9 Panel: DRS Riser 1-2

(630 A, 2: J11, J20)



1 Panel type DRS, LSC1 - Direct riser unit for sectionalizing - 500 mm, height 2000 mm

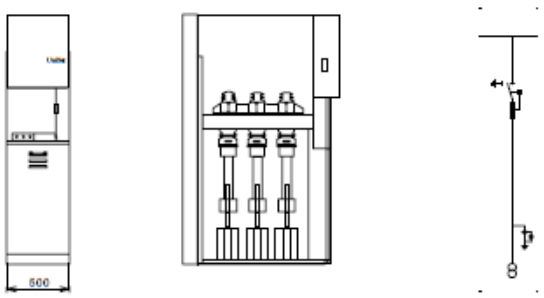
Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Anti condensation heater for cable compartment 50W 110-250 AC/DC
Internal light
Arc filter 500 mm

1 Wide low voltage compartment for 500 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

4.10 Panel: SFV Busbar Metering

(6 A, 1: J12)



1 Panel type SFV, LSC2A - Switch-fuse combination unit for measuring - 500 mm

Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Anti condensation heater for cable compartment 50W 110-250 AC/DC
Internal light
Arc filter 500 mm

1 GSec Air - Three position switch-disconnector with earthing switch with T2 actuator

General purpose switch; GWP=0; volume < 25 liters
Tripping coil for opening 48 VDC
Auxiliary contacts for switch-disconnector
Auxiliary contacts for earthing switch
- Set of 4 pcs change-over
- Set of 4 pcs change-over
standard line key locks open
standard earth key locks closed / opened (2 locks for earthing)
Air pressure level monitoring + remote control

3 HV fuse 24 kV - 2 A (e=442mm)

Fuse base 500 for fuses 442mm
Fuse tripping
Fuse blow indication (1NO)

1 Wide low voltage compartment for 500 mm functional unit

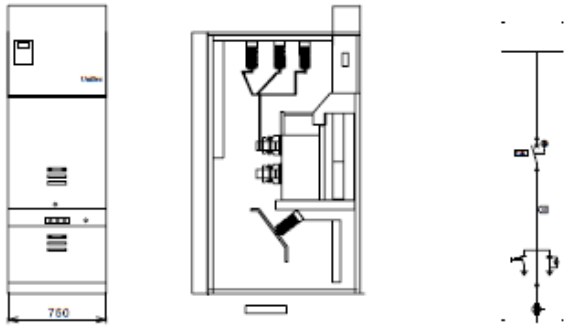
Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

3 Photovoltaic solution - Voltage Transformer Phase-earth - TJC 6 20000:V3 - 100:3 – 10_50VA – cl. 0.5_0.5/3P

Core 1 : Us=0,1/V3 kV; 10 VA; 0.5
Core 2 : Us=0,1/3 kV; 50 VA; 0.5/3P
Frequency: 50Hz
Damping resistor 200 W, 220 V = 100 Ohm

4.11 Panel: WBC Feeder 1 (BESS) – 2 (TR5) – 3 (TR4) – 4 (Load Bank)

(630 A, 4: J09, J13, J14, J15)



1 Panel type WBC, LSC2B-PI – unit with withdrawable apparatus - 750mm

Cable entry for 1-phase cables up to 400 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Push buttons for CB On - Off on door
Internal light
Lighting in cable compartment
Heater in cable compartment
Arc filter 750 mm
standard earth key locks closed / opened (2 locks for earthing)
Electromechanical lock on ES mechanism 48 VDC

1 Earthing switch, full making capacity

Auxiliary contacts for earthing switch
- Set of 5+5 pcs change-over
- Up to 250 VAC / 16 A, 250 VDC / 0.3 A

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

1 Circuit breaker, type VD4/Sec (vacuum) 24kV, 630A, 16kA

Opening push button
Closing push button
Mechanical signalling device for closing springs
Mechanical signalling device for circuit breaker
Operation counter
Key locks for CB truck, type Giussani
Set of 9 auxiliary contacts for CB position indication

Anti-racking-in lock for different currents
Shunt opening release 48 VDC
Shunt closing release 48 VDC
Spring charging motor 48 VDC
Electrical indication for charged/discharged spring
Truck Blocking magnet

3	Current and Voltage Sensor KEVCD 24 AE3 (set 1, Ip=80 A, Polarity: P1 on busbar side)

DIN CTs secondary terminals: busbar side
Frequency: 50Hz

1	TO11S3 SIPIE Earth Fault Ring current transformer 110mm 100/1A 0.5VA cl.5P20 (neutral, Ip=100 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 0.5VA; 5P20
Frequency: 50Hz

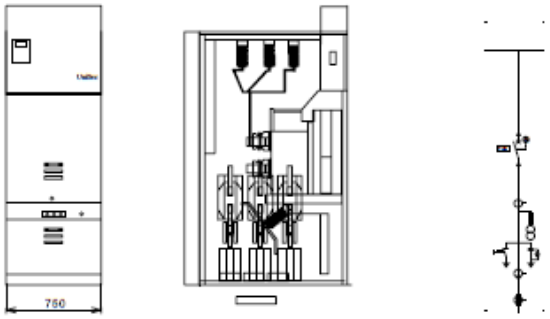
1	Mounting and wiring of a multifunction relay REF620 supplied by other

Voltage Adapter 48VDC

Additional Data	
2	Push button
1	Time relay multifunctional CT-MFD

4.12 Panel: WBC Generator Feeder 1-2-3

(630 A, 3: J16, J17, J18)



1 Panel type WBC, LSC2B-PI – unit with withdrawable apparatus - 750mm

Cable entry for 1-phase cables up to 400 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Push buttons for CB On - Off on door
Internal light
Lighting in cable compartment
Heater in cable compartment
Arc filter 750 mm
standard earth key locks closed / opened (2 locks for earthing)
Electromechanical lock on ES mechanism 48 VDC

1 Earthing switch, full making capacity

Auxiliary contacts for earthing switch
- Set of 5+5 pcs change-over
- Up to 250 VAC / 16 A, 250 VDC / 0.3 A

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

1 Circuit breaker, type VD4/Sec (vacuum) 24kV, 630A, 16kA

Opening push button
Closing push button
Mechanical signalling device for closing springs
Mechanical signalling device for circuit breaker
Operation counter
Key locks for CB truck, type Giussani
Set of 9 auxiliary contacts for CB position indication

Anti-racking-in lock for different currents
Shunt opening release 48 VDC
Shunt closing release 48 VDC
Undervoltage release 48 VDC
Mechanical override for undervoltage release
Spring charging motor 48 VDC
Electrical indication for charged/discharged spring
Truck Blocking magnet

3 Generic Cast Epoxy DIN CT 24kV, Ip=100 A (set 1, Ip=100 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 5VA; 0.5; fs 5
DIN CTs secondary terminals: busbar side
Core2 : Is=1A; 5VA; 0.5/5P10
Core3 : Is=5A; 10VA; 0.5; fs 5
Frequency: 50Hz

3 Ring current transformer, BD00-B - 100A, Ø:59mm, two cores (set 2, Ip=100 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 1.5VA; 5P10
Core2 : Is=1A; 1.5VA; 0.5; fs 10
Frequency: 50Hz

1 TO11S3 SIPIE Earth Fault Ring current transformer 110mm 100/1A 0.5VA cl.5P20 (neutral, Ip=100 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 0.5VA; 5P20
Frequency: 50Hz

3 Voltage Transformer Phase-earth VT TJP6 with fuses 2A, Up=20/V3kV

HV fuse 24 kV - 2 A (e=310mm)
Core 1 : Us=0,1/V3 kV; 10 VA; 0.5
Core 2 : Us=0,1/3 kV; 50 VA; 6P
Frequency: 50Hz
Damping resistor 600 W, 100 V = 22 Ohm

1 Mounting and wiring of a multifunction relay REF620 supplied by other

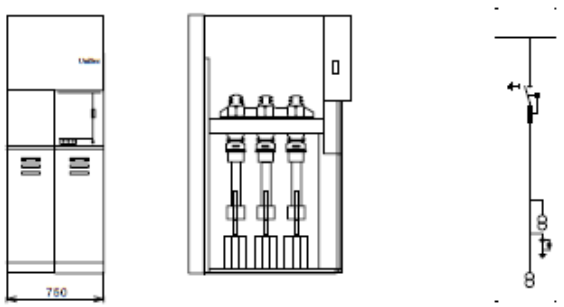
Voltage Adapter 48VDC

Additional Data

2	Push button
1	Time relay multifunctional CT-MFD

4.13 Panel: SFV Metering 2

(6 A, 1: 325)



1 Panel type SFV, LSC2A - Switch-fuse combination unit for measuring - 750 mm

Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Anti condensation heater for cable compartment 50W 110-250 AC/DC
Internal light
Arc filter 750 mm

1 GSec Air - Three position switch-disconnector with earthing switch with T2 actuator

General purpose switch; GWP=0; volume < 25 liters
Tripping coil for opening 48 VDC
Tripping coil for closing 48 VDC
Auxiliary contacts for switch-disconnector
Auxiliary contacts for earthing switch
- Set of 4 pcs change-over
- Set of 4 pcs change-over
standard line key locks open
standard earth key locks closed / opened (2 locks for earthing)
Air pressure level monitoring + remote control

3 HV fuse 24 kV - 2 A (e=442mm)

Fuse base 375 for fuses 442mm
Fuse tripping
Fuse blow indication (1NO)

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.
Selector switch for remote control and push buttons on lv door

3	Photovoltaic solution - Voltage Transformer Phase-earth - TJC 6 20000:V3 - 100:3 – 10_50VA – cl. 0.5_0.5/3P
Core 1 : Us=0,1/V3 kV; 10 VA; 0.5	
Core 2 : Us=0,1/3 kV; 50 VA; 0.5/3P	
Frequency: 50Hz	

2	Phase-phase VT TDC6, Up=25kV
Core 1 : Us=0.1 kV; 30 VA; 0.5/3P	
Frequency: 50Hz	
Damping resistor 200 W, 220 V = 100 Ohm	

5 General Specification: Switchgear CEP 11kV (q.ty 3)

5.1 General Data / Type of apparatus

Type:	Complete switchgear
Application:	Standard IEC 62271-200
Additional technical requests:	n.a.
Degree of protection:	IP3X
Internal Arc Classification (IAC):	Front, Lateral and Rear Accessibility (AFLR)
ATTENTION: IAC A-FLR version - No access limitations to the Swg Room. Installation distances to be respected.	
Packing:	Domestic
FAT Factory acceptance test:	Internal Routine Test (no FAT)
ZPA Qualification Seismic Level (acc. IEC 62271-210):	No
Operative temperature range (min/Max):	-5°C /40°C
Storage temperature:	-5°C
Ageing Test compliance (acc. IEC 62271-304):	Not available
Altitude:	≤1000 m

5.2 Electrical Data

Rated voltage:	24kV
Service voltage:	11kV
Power frequency withstand voltage:	50kV
BIL:	125kV
Rated frequency:	50Hz
Rated busbar current:	630A
Rated short circuit current:	16kA
Rated short circuit current duration:	1s
Peak current:	40kA
Arc test current 1s (According to IEC 62271-200):	16kA

5.3 Additional Data

Internal lighting	Yes
Anti Condensation heater of self-regulating type	Yes, in cable compartment
Arc gas relief system	Relief inside switchgear room
Voltage presence indicating system	Type VDIS with fixed lamps (aux contacts as options)
Pressure indicator for switch disconnector	
Type of key locks interlocking for operation on Load Break Switch \ Disconnector (if selected in functional units)	Giussani
Address labels on functional units	Yes
Routine test reports	Yes
standard drawing template	Yes
Switchgear colour	RAL 7035
Busbars treatment	No
Floor fixing	Not in scope

5.4 Auxiliary supply and wiring data

Local control voltage:	48VDC
Control circuits cross section	1 mm^2
Voltage circuits cross section	1.5 mm^2
Current circuits cross section	2.5 mm^2
Earthing circuits cross section	2.5 mm^2
Interconnection circuits cross section	2.5 mm^2
Auxiliary Supply circuits cross section	4 mm^2
Wiring cable type	Standard, PVC
Wiring cable rated voltage	standard
Wiring cable colors	STANDARD
Colour of Auxiliary AC	Black
Colour of Auxiliary DC	Black
Colour of CT circuits	Black
Colour of VT circuits	Black
Colour of Earthing circuits	Yellow/Green

5.5 Control and Communication

IEC61850: ---

GOOSE: ---

5.6 Switchgear Accessories

1	Operating handle for switch disconnector
1	Lifting hooks
1	Left end cover - 1700 mm, IAC
1	Right end cover - 1700 mm, IAC

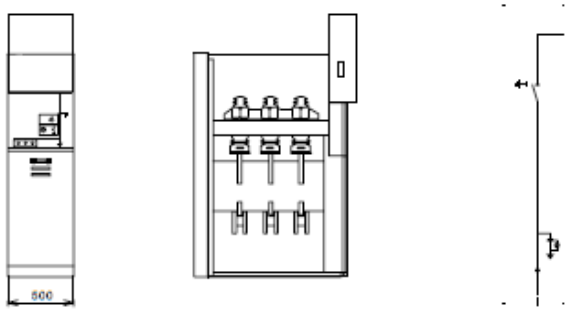
5.7 Switchgear Composition: Switchgear CEP 11kV

Description	Qty	Weight (Kg)	Overall dimensions Width (mm)	Depth (mm)	Height (mm)
SDC Incoming Generator (630 A) *K01*	**1**	350,92	500	1320	2000
SFV Metering (6 A) *K02*	**1**	403,82	750	1320	2000
SDC Transformer Feeder (630 A) *K03*	**1**	342,42	500	1320	2000
Sidewalls			54		
		1097,16	***1804***	***1320***	***2000***

6 Typical Units Description

6.1 Panel: SDC Incoming Generator

(630 A, 1: K01)



1 Panel type SDC, LSC2 - Switch disconnector unit - 500 mm

Cable entry for 1-phase cables up to 240 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Anti condensation heater for cable compartment 50W 110-250 AC/DC
Internal light
Arc filter 500 mm
Installation and operating manual in Italian

1 GSec Air - Three position switch-disconnector with earthing switch with T2 actuator

General purpose switch; GWP=0; volume < 25 liters
Tripping coil for opening 48 VDC
Auxiliary contacts for switch-disconnector
Auxiliary contacts for earthing switch
- Set of 4 pcs change-over
- Set of 4 pcs change-over
standard line key locks open
standard earth key locks closed / opened (2 locks for earthing)
Air pressure level monitoring + remote control

1 Wide low voltage compartment for 500 mm functional unit

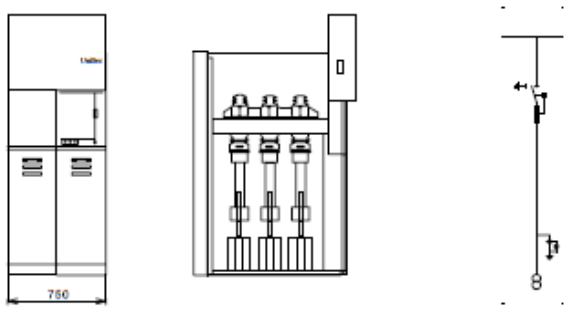
Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.
Selector switch for remote control and push buttons on lv door

Additional Data

2	Push button
2	Cross Indicator (CIRCLE)
3	Signalling lamp

6.2 Panel: SFV Metering

(6 A, 1: K02)



1 Panel type SFV, LSC2A - Switch-fuse combination unit for measuring - 750 mm

Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Anti condensation heater for cable compartment 50W 110-250 AC/DC
Internal light
Arc filter 750 mm

1 GSec Air - Three position switch-disconnector with earthing switch with T2 actuator

General purpose switch; GWP=0; volume < 25 liters
Tripping coil for opening 48 VDC
Auxiliary contacts for switch-disconnector
Auxiliary contacts for earthing switch
- Set of 4 pcs change-over
- Set of 4 pcs change-over
standard line key locks open
standard earth key locks closed / opened (2 locks for earthing)
Air pressure level monitoring + remote control

3 HV fuse 24 kV - 2 A (e=442mm)

Fuse base 375 for fuses 442mm
Fuse tripping
Fuse blow indication (1NO)

1 Wide low voltage compartment for 750 mm functional unit

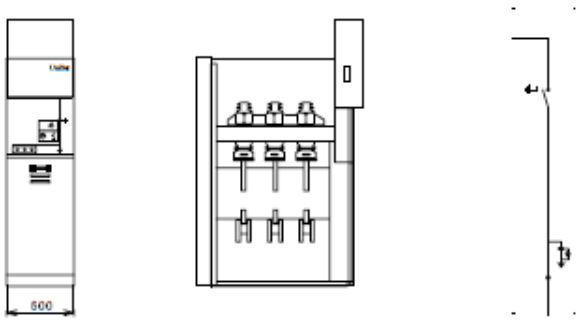
Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.
Selector switch for remote control and push buttons on lv door

3 Voltage Transformer Phase-earth - TJC 6 - 11/V3

Core 1 : Us=0,1/V3 kV; 10 VA; 0.5
Core 2 : Us=0,1/3 kV; 50 VA; 3P
Frequency: 50Hz
Damping resistor 600 W, 100 V = 22 Ohm

6.3 Panel: SDC Transformer Feeder

(630 A, 1: K03)



1 Panel type SDC, LSC2 - Switch disconnector unit - 500 mm

Cable entry for 1-phase cables up to 240 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Operating Handle for Switch-disconnector and Earthing switch
Anti condensation heater for cable compartment 50W 110-250 AC/DC
Internal light
Arc filter 500 mm

1 GSec Air - Three position switch-disconnector with earthing switch with T2 actuator

General purpose switch; GWP=0; volume < 25 liters
Tripping coil for opening 48 VDC
Auxiliary contacts for switch-disconnector
Auxiliary contacts for earthing switch
- Set of 4 pcs change-over
- Set of 4 pcs change-over
standard line key locks open
standard earth key locks closed / opened (2 locks for earthing)
Air pressure level monitoring + remote control

1 Wide low voltage compartment for 500 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.
Selector switch for remote control and push buttons on lv door

Additional Data

3	Push button
2	Cross Indicator (CIRCLE)
3	Signalling lamp

7 General Specification: Switchgear ESS-N(S)-n (q.ty 13)

7.1 General Data / Type of apparatus

Type:	Complete switchgear
Application:	Standard IEC 62271-200
Additional technical requests:	
Degree of protection:	IP3X
Internal Arc Classification (IAC):	Front, Lateral and Rear Accessibility (AFLR)
ATTENTION: IAC A-FLR version - No access limitations to the Swg Room. Installation distances to be respected.	
Packing:	Domestic
FAT Factory acceptance test:	Internal Routine Test (no FAT)
ZPA Qualification Seismic Level (acc. IEC 62271-210):	No
Operative temperature range (min/Max):	-5°C /40°C
Storage temperature:	-5°C
Ageing Test compliance (acc. IEC 62271-304):	Not available
Altitude:	≤1000 m

7.2 Electrical Data

Rated voltage:	24kV
Service voltage:	20kV
Power frequency withstand voltage:	50kV
BIL:	125kV
Rated frequency:	50Hz
Rated busbar current:	630A
Rated short circuit current:	16kA
Rated short circuit current duration:	1s
Peak current:	40kA
Arc test current 1s (According to IEC 62271-200):	16kA

7.3 Additional Data

Internal lighting	Yes
Anti Condensation heater of self-regulating type	Yes, in cable compartment
Arc gas relief system	Relief inside switchgear room
Voltage presence indicating system	Type VDIS with fixed lamps (aux contacts as options)
Pressure indicator for switch disconnector	
Type of key locks interlocking for operation on Load Break Switch \ Disconnector (if selected in functional units)	Giussani
Address labels on functional units	Yes
Routine test reports	Yes
standard drawing template	Yes
Switchgear colour	RAL 7035
Busbars treatment	No
Floor fixing	Not in scope

7.4 Auxiliary supply and wiring data

Local control voltage:	48VDC
Spring charging motor voltage for CB:	48VDC
Auxiliary control voltage for Electromechanical lock on ES mechanism:	48VDC
Control circuits cross section	1 mm^2
Voltage circuits cross section	1.5 mm^2
Current circuits cross section	2.5 mm^2
Earthing circuits cross section	2.5 mm^2
Interconnection circuits cross section	2.5 mm^2
Auxiliary Supply circuits cross section	4 mm^2
Wiring cable type	Standard, PVC
Wiring cable rated voltage	standard
Wiring cable colors	STANDARD
Colour of Auxiliary AC	Black
Colour of Auxiliary DC	Black
Colour of CT circuits	Black
Colour of VT circuits	Black
Colour of Earthing circuits	Yellow/Green

7.5 Control and Communication

Protocol: IEC61850 Single (PRP), Ethernet (TCP-IP)
IEC61850: v. 2.0
GOOSE: Interlocks and logic via GOOSE. In this new approach the conventional hard-wired blocking signal paths among the switchgear cubicles are replaced with a substationwide Ethernet LAN.

7.6 Switchgear Accessories

1	Operating handle for switch disconnector
1	Lifting hooks
1	Left end cover for WBC, not painted
1	Right end cover for WBC, not painted
1	Service trolley for withdrawable apparatus at fixed height; at 24kV (WBC/WBS 750mm wide)

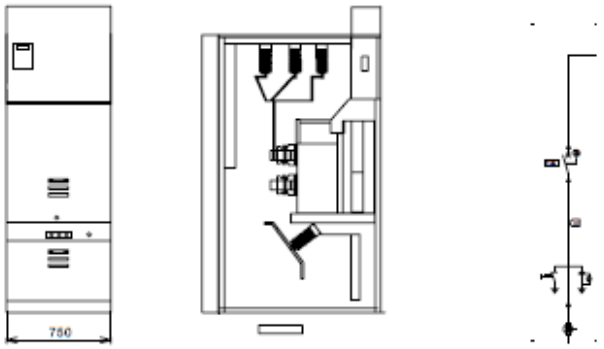
7.7 Switchgear Composition: Switchgear ESS-N(S)-n

			Overall dimensions		
Description	**Qty**	**Weight (Kg)**	**Width (mm)**	**Depth (mm)**	**Height (mm)**
WBC Ring Feeder 1-2 (630 A) *J01, J02*	**2**	1077,5	750	1535	2300
WBC Transformer Feeder 1-2 (630 A) *J03, J04*	**2**	1029,12	750	1535	2300
Sidewalls			54		
		4205,09	***3054***	***1535***	***2300***

8 Typical Units Description

8.1 Panel: WBC Ring Feeder 1-2

(630 A, 2: J01, J02)



1 Panel type WBC, LSC2B-PI – unit with withdrawable apparatus - 750mm

Cable entry for 1-phase cables up to 400 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Push buttons for CB On - Off on door
Internal light
Lighting in cable compartment
Heater in cable compartment
Arc filter 750 mm
standard earth key locks closed / opened (2 locks for earthing)
Electromechanical lock on ES mechanism 48 VDC

1 Earthing switch, full making capacity

Auxiliary contacts for earthing switch
- Set of 5+5 pcs change-over
- Up to 250 VAC / 16 A, 250 VDC / 0.3 A

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

1 Circuit breaker, type VD4/Sec (vacuum) 24kV, 630A, 16kA

Opening push button
Closing push button
Mechanical signalling device for closing springs
Mechanical signalling device for circuit breaker
Operation counter
Key locks for CB truck, type Giussani
Set of 9 auxiliary contacts for CB position indication
Anti-racking-in lock for different currents
Shunt opening release 48 VDC
Shunt closing release 48 VDC
Spring charging motor 48 VDC
Electrical indication for charged/discharged spring
Truck Blocking magnet

3 Current and Voltage Sensor KEVCD 24 AE3 (set 1, Ip=80 A, Polarity: P1 on busbar side)

DIN CTs secondary terminals: busbar side
Frequency: 50Hz

1 TO11S3 SIPIE Earth Fault Ring current transformer 110mm 100/1A 0.5VA cl.5P20 (neutral, Ip=100 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 0.5VA; 5P20
Frequency: 50Hz

1 Mounting and wiring of a multifunction relay REF620 supplied by other

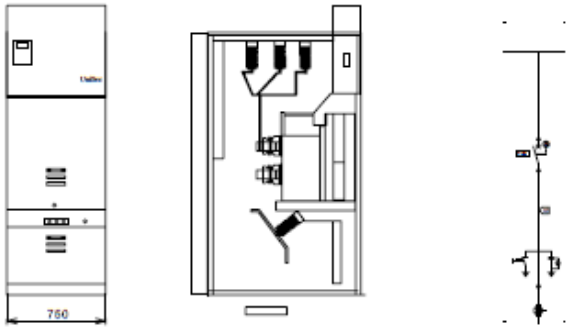
Voltage Adapter 48VDC

Additional Data

2	Push button
1	Time relay multifunctional CT-MFD

8.2 Panel: WBC Transformer Feeder 1-2

(630 A, 2: J03, J04)



1 Panel type WBC, LSC2B-PI – unit with withdrawable apparatus - 750mm

Cable entry for 1-phase cables up to 400 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Push buttons for CB On - Off on door
Internal light
Lighting in cable compartment
Heater in cable compartment
Arc filter 750 mm
standard earth key locks closed / opened (2 locks for earthing)
Electromechanical lock on ES mechanism 48 VDC

1 Earthing switch, full making capacity

Auxiliary contacts for earthing switch
- Set of 5+5 pcs change-over
- Up to 250 VAC / 16 A, 250 VDC / 0.3 A

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

1 Circuit breaker, type VD4/Sec (vacuum) 24kV, 630A, 16kA

Opening push button
Closing push button
Mechanical signalling device for closing springs
Mechanical signalling device for circuit breaker
Operation counter
Key locks for CB truck, type Giussani
Set of 9 auxiliary contacts for CB position indication

Anti-racking-in lock for different currents
Shunt opening release 48 VDC
Shunt closing release 48 VDC
Spring charging motor 48 VDC
Electrical indication for charged/discharged spring
Truck Blocking magnet

3	Current and Voltage Sensor KEVCD 24 AE3 (set 1, Ip=80 A, Polarity: P1 on busbar side)

DIN CTs secondary terminals: busbar side
Frequency: 50Hz

1	TO11S3 SIPIE Earth Fault Ring current transformer 110mm 100/1A 0.5VA cl.5P20 (neutral, Ip=100 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 0.5VA; 5P20
Frequency: 50Hz

1	Mounting and wiring of a multifunction relay REF620 supplied by other

Voltage Adapter 48VDCV

1	Mounting and wiring of a Temperature Control Unit T154 supplied by other

Additional Data	
2	Push button
1	Time relay multifunctional CT-MFD

9 General Specification: Switchgear ESS-S-7

9.1 General Data / Type of apparatus

Type:	Complete switchgear
Application:	Standard IEC 62271-200
Additional technical requests:	n.a.
Degree of protection:	IP3X
Internal Arc Classification (IAC):	Front, Lateral and Rear Accessibility (AFLR)
ATTENTION: IAC A-FLR version - No access limitations to the Swg Room. Installation distances to be respected.	
Packing:	Domestic
FAT Factory acceptance test:	Internal Routine Test (no FAT)
ZPA Qualification Seismic Level (acc. IEC 62271-210):	No
Operative temperature range (min/Max):	-5°C /40°C
Storage temperature:	-5°C
Ageing Test compliance (acc. IEC 62271-304):	Not available
Altitude:	≤1000 m

9.2 Electrical Data

Rated voltage:	24kV
Service voltage:	20kV
Power frequency withstand voltage:	50kV
BIL:	125kV
Rated frequency:	50Hz
Rated busbar current:	630A
Rated short circuit current:	16kA
Rated short circuit current duration:	1s
Peak current:	40kA
Arc test current 1s (According to IEC 62271-200):	16kA

9.3 Additional Data

Internal lighting	Yes
Anti Condensation heater of self-regulating type	Yes, in cable compartment
Arc gas relief system	Relief inside switchgear room
Voltage presence indicating system	Type VDIS with fixed lamps (aux contacts as options)
Pressure indicator for switch disconnector	
Type of key locks interlocking for operation on Load Break Switch \ Disconnector (if selected in functional units)	Giussani
Address labels on functional units	Yes
Routine test reports	Yes
standard drawing template	Yes
Switchgear colour	RAL 7035
Busbars treatment	No
Floor fixing	Not in scope

9.4 Auxiliary supply and wiring data

Local control voltage:	48VDC
Spring charging motor voltage for CB:	48VDC
Auxiliary control voltage for Electromechanical lock on ES mechanism:	48VDC
Control circuits cross section	1 mm^2
Voltage circuits cross section	1.5 mm^2
Current circuits cross section	2.5 mm^2
Earthing circuits cross section	2.5 mm^2
Interconnection circuits cross section	2.5 mm^2
Auxiliary Supply circuits cross section	4 mm^2
Wiring cable type	Standard, PVC
Wiring cable rated voltage	standard
Wiring cable colors	STANDARD
Colour of Auxiliary AC	Black
Colour of Auxiliary DC	Black
Colour of CT circuits	Black
Colour of VT circuits	Black
Colour of Earthing circuits	Yellow/Green

9.5 Control and Communication

Protocol: IEC61850 Single (PRP), Ethernet (TCP-IP)

IEC61850: v. 2.0

GOOSE: Interlocks and logic via GOOSE. In this new approach the conventional hard-wired blocking signal paths among the switchgear cubicles are replaced with a substationwide Ethernet LAN.

9.6 Switchgear Accessories

1	Operating handle for switch disconnector
1	Lifting hooks
1	Left end cover for WBC, not painted
1	Right end cover for WBC, not painted
1	Service trolley for withdrawable apparatus at fixed height; at 24kV (WBC/WBS 750mm wide)

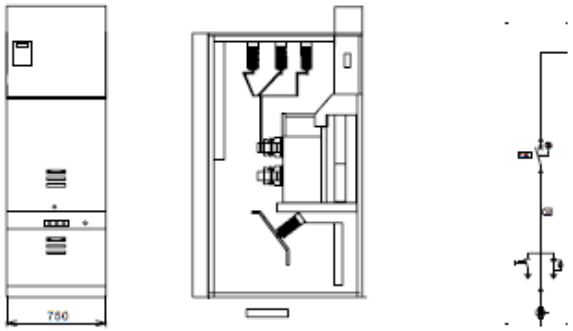
9.7 Switchgear Composition: Switchgear ESS-S-7

Description	Qty	Weight (Kg)	*Overall dimensions* Width (mm)	Depth (mm)	Height (mm)
WBC Ring Feeder 1-2 (630 A) *J01, J02*	**2**	1077,5	750	1535	2300
WBC Line_TR Feeder 1-2-3 (630 A) *J03, J04, J05*	**3**	1029,12	750	1535	2300
Sidewalls			54		
		5234,21	***3804***	***1535***	***2300***

10 Typical Units Description

10.1 Panel: WBC Ring Feeder 1-2

(630 A, 2: J01, J02)



1 Panel type WBC, LSC2B-PI – unit with withdrawable apparatus - 750mm

Cable entry for 1-phase cables up to 400 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Push buttons for CB On - Off on door
Internal light
Lighting in cable compartment
Heater in cable compartment
Arc filter 750 mm
standard earth key locks closed / opened (2 locks for earthing)
Electromechanical lock on ES mechanism 48 VDC

1 Earthing switch, full making capacity

Auxiliary contacts for earthing switch
- Set of 5+5 pcs change-over
- Up to 250 VAC / 16 A, 250 VDC / 0.3 A

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

1 Circuit breaker, type VD4/Sec (vacuum) 24kV, 630A, 16kA

Opening push button
Closing push button
Mechanical signalling device for closing springs
Mechanical signalling device for circuit breaker
Operation counter
Key locks for CB truck, type Giussani
Set of 9 auxiliary contacts for CB position indication
Anti-racking-in lock for different currents
Shunt opening release 48 VDC
Shunt closing release 48 VDC
Spring charging motor 48 VDC
Electrical indication for charged/discharged spring
Truck Blocking magnet

3	Current and Voltage Sensor KEVCD 24 AE3 (set 1, Ip=80 A, Polarity: P1 on busbar side)

DIN CTs secondary terminals: busbar side
Frequency: 50Hz

1	TO11S3 SIPIE Earth Fault Ring current transformer 110mm 100/1A 0.5VA cl.5P20 (neutral, Ip=100 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 0.5VA; 5P20
Frequency: 50Hz

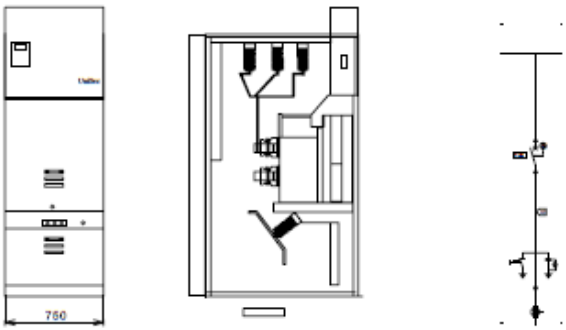
1	Mounting and wiring of a multifunction relay REF620 supplied by other

Voltage Adapter 48VDC

Additional Data	
2	Push button
1	Time relay multifunctional CT-MFD

10.2 Panel: WBC Line_TR Feeder 1-2-3

(630 A, 3: J03, J04, J05)



1 Panel type WBC, LSC2B-PI – unit with withdrawable apparatus - 750mm

Cable entry for 1-phase cables up to 400 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Push buttons for CB On - Off on door
Internal light
Lighting in cable compartment
Heater in cable compartment
Arc filter 750 mm
– standard earth key locks closed / opened (2 locks for earthing)
Electromechanical lock on ES mechanism 48 VDC

1 Earthing switch, full making capacity

Auxiliary contacts for earthing switch
- Set of 5+5 pcs change-over
- Up to 250 VAC / 16 A, 250 VDC / 0.3 A

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

1 Circuit breaker, type VD4/Sec (vacuum) 24kV, 630A, 16kA

Opening push button
Closing push button
Mechanical signalling device for closing springs
Mechanical signalling device for circuit breaker
Operation counter
Key locks for CB truck, type Giussani
Set of 9 auxiliary contacts for CB position indication

Anti-racking-in lock for different currents
Shunt opening release 48 VDC
Shunt closing release 48 VDC
Spring charging motor 48 VDC
Electrical indication for charged/discharged spring
Truck Blocking magnet

3	Current and Voltage Sensor KEVCD 24 AE3 (set 1, Ip=80 A, Polarity: P1 on busbar side)

DIN CTs secondary terminals: busbar side
Frequency: 50Hz

1	TO11S3 SIPIE Earth Fault Ring current transformer 110mm 100/1A 0.5VA cl.5P20 (neutral, Ip=100 A, Polarity: P1 on busbar side)

Core1 : Is=1A; 0.5VA; 5P20
Frequency: 50Hz

1	Mounting and wiring of a multifunction relay REF620 supplied by other

Voltage Adapter 48VDCV

1	Mounting and wiring of a Temperature Control Unit T154 supplied by other (for Transformer Feeder only)

Additional Data	
2	Push button
1	Time relay multifunctional CT-MFD

11 General Specification: Switchgear ESS-S-9

11.1 General Data / Type of apparatus

Type:	Complete switchgear
Application:	Standard IEC 62271-200
Additional technical requests:	
Degree of protection:	IP3X
Internal Arc Classification (IAC):	Front, Lateral and Rear Accessibility (AFLR)
ATTENTION: IAC A-FLR version - No access limitations to the Swg Room. Installation distances to be respected.	
Packing:	Domestic
FAT Factory acceptance test:	Internal Routine Test (no FAT)
ZPA Qualification Seismic Level (acc. IEC 62271-210):	No
Operative temperature range (min/Max):	-5°C /40°C
Storage temperature:	-5°C
Ageing Test compliance (acc. IEC 62271-304):	Not available
Altitude:	≤1000 m

11.2 Electrical Data

Rated voltage:	24kV
Service voltage:	20kV
Power frequency withstand voltage:	50kV
BIL:	125kV
Rated frequency:	50Hz
Rated busbar current:	630A
Rated short circuit current:	16kA
Rated short circuit current duration:	1s
Peak current:	40kA
Arc test current 1s (According to IEC 62271-200):	16kA

11.3 Additional Data

Internal lighting	Yes
Anti Condensation heater of self-regulating type	Yes, in cable compartment
Arc gas relief system	Relief inside switchgear room
Voltage presence indicating system	Type VDIS with fixed lamps (aux contacts as options)
Pressure indicator for switch disconnector	
Type of key locks interlocking for operation on Load Break Switch \ Disconnector (if selected in functional units)	Giussani
Address labels on functional units	Yes
Routine test reports	Yes
standard drawing template	Yes
Switchgear colour	RAL 7035
Busbars treatment	No
Floor fixing	Not in scope

11.4 Auxiliary supply and wiring data

Local control voltage:	48VDC
Spring charging motor voltage for CB:	48VDC
Auxiliary control voltage for Electromechanical lock on ES mechanism:	230VAC
Control circuits cross section	1 mm^2
Voltage circuits cross section	1.5 mm^2
Current circuits cross section	2.5 mm^2
Earthing circuits cross section	2.5 mm^2
Interconnection circuits cross section	2.5 mm^2
Auxiliary Supply circuits cross section	4 mm^2
Wiring cable type	Standard, PVC
Wiring cable rated voltage	standard
Wiring cable colors	STANDARD
Colour of Auxiliary AC	Black
Colour of Auxiliary DC	Black
Colour of CT circuits	Black
Colour of VT circuits	Black
Colour of Earthing circuits	Yellow/Green

11.5 Control and Communication

Protocol: IEC61850 Single (PRP), Ethernet (TCP-IP)
IEC61850: v. 2.0
GOOSE: Interlocks and logic via GOOSE. In this new approach the conventional hard-wired blocking signal paths among the switchgear cubicles are replaced with a substationwide Ethernet LAN.

11.6 Switchgear Accessories

1	Operating handle for switch disconnector
1	Lifting hooks
1	Left end cover - 2000 mm, not painted, IAC
1	Right end cover for WBC, not painted
1	Service trolley for withdrawable apparatus at fixed height; at 24kV (WBC/WBS 750mm wide)

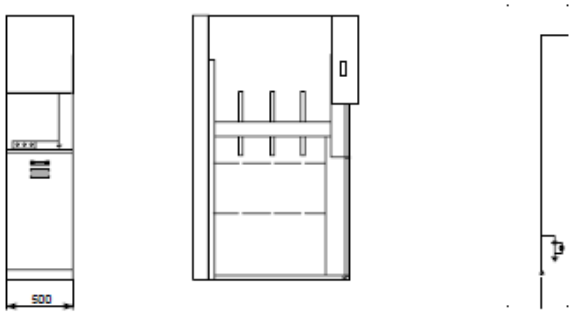
11.7 Switchgear Composition: Switchgear ESS-S-9

			Overall dimensions		
Description	**Qty**	**Weight (Kg)**	**Width (mm)**	**Depth (mm)**	**Height (mm)**
DRC Riser (630 A) *J01*	**1**	246,25	500	1320	2000
WBC Transformer Feeder (630 A) *J02*	**1**	1069,35	750	1535	2300
Sidewalls			54		
		1315,6	***1304***	***1535***	***2300***

12 Typical Units Description

12.1 Panel: DRC Riser

(630 A, 1: J01)



1 Panel type DRC, LSC1 - Direct riser unit with cable - 500 mm

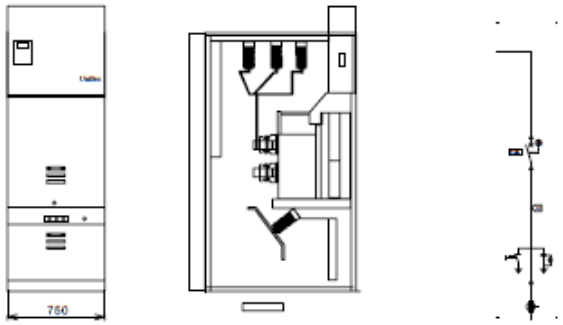
Earthing points - CEI 0-16
Cable entry for 1-phase cables up to 240 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Anti condensation heater for cable compartment 50W 110-250 AC/DC
Internal light
Arc filter 500 mm

1 Wide low voltage compartment for 500 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

12.2 Panel: WBC Transformer Feeder

(630 A, 1: 302)



1 Panel type WBC, LSC2B-PI – unit with withdrawable apparatus - 750mm

Cable entry for 1-phase cables up to 400 mm2 (Single core)
Cable clamps for single cables from 25 to 185 mm2
Feeder side Voltage Detecting Indicating System with fixed lamps type VDIS (acc. to IEC 62271-213)
Blocking magnet for CB Door 48 VDC
Push buttons for CB On - Off on door
Operating Handle for Earthing switch
Internal light
Lighting in cable compartment
Heater in cable compartment
Arc filter 750 mm
standard earth key locks closed / opened (2 locks for earthing)
Electromechanical lock on ES mechanism 230 VAC

1 Earthing switch, full making capacity

Auxiliary contacts for earthing switch
- Set of 5+5 pcs change-over
- Up to 250 VAC / 16 A, 250 VDC / 0.3 A

1 Wide low voltage compartment for 750 mm functional unit

Necessary auxiliary circuit and MCBs are automatically included as per factory stds according panel configuration/selections.

1 Circuit breaker, type VD4/Sec (vacuum) 24kV, 630A, 16kA

Opening push button
Closing push button
Mechanical signalling device for closing springs
Mechanical signalling device for circuit breaker
Operation counter

Key locks for CB truck, type Giussani	
Set of 9 auxiliary contacts for CB position indication	
Anti-racking-in lock for different currents	
Shunt opening release 48 VDC	
Shunt closing release 48 VDC	
Spring charging motor 48 VDC	
Electrical indication for charged/discharged spring	
Truck Blocking magnet	

3	Current and Voltage Sensor KEVCD 24 AE3 (set 1, Ip=80 A, Polarity: P1 on busbar side)
DIN CTs secondary terminals: busbar side	
Frequency: 50Hz	

1	TO11S3 SIPIE Earth Fault Ring current transformer 110mm 100/1A 0.5VA cl.5P20 (neutral, Ip=100 A, Polarity: P1 on busbar side)
Core1 : Is=1A; 0.5VA; 5P20	
Frequency: 50Hz	

1	Mounting and wiring of a multifunction relay REF620 supplied by other
Voltage Adapter 48VDCV	

1	Mounting and wiring of a Temperature Control Unit T154 supplied by other

Additional Data	
2	Push button
1	Time relay multifunctional CT-MFD