

Technical Proposal

Medium Voltage Air Insulated, Metal-Clad Switchgear Up to 36KV

PARSTABLEAU SANAT

تابلوهای DNF4 & DNF6 یکی از پیشرفته‌ترین تابلوهای فشار متوسط AIS است. رعایت استانداردهای IEC در طراحی و ساخت، به‌کارگیری تجهیزات الکتریکی با کیفیت، توجه به ضریب امنیت محصول و سهولت در نصب و نگهداری از جمله امتیازات این تابلوها محسوب می‌شوند.

مشخصات محصول

- سطح ولتاژ تا ۲۴ کیلوولت
- سطح جریان تا ۴۰۰۰ آمپر
- Metal Clad
- Indoor
- دارای محفظه‌های کشویی
- دارای پارتیشن‌های فلزی بین محفظه‌ها
- دارای کلید خلا و گازی برای قطع و وصل مدار
- دارای اینترلاک‌های مکانیکی
- طراحی و توسعه تابلو بر اساس استاندارد IEC ۶۲۲۷۱-۲۰۰۰/-۱۰۰ and IEC ۶۲۲۷۱-۱

مزایای محصول

- امکان دسترسی از پشت جهت نصب، تعمیر و نگهداری
- سهولت در بهره‌برداری، مونتاژ و تعمیرات
- سرعت و سهولت در تعویض کلید
- سهولت در کابل‌بندی
- ضریب امنیت بالا
- سازگار با محیط‌زیست

کاربردها

- پروژه‌های نفت، گاز و پتروشیمی
- معادن و فولاد
- حمل‌ونقل (پروژه‌های ریلی و فرودگاه)
- پروژه‌های زیرساختی

DNF4 - DNF6

فشار متوسط AIS



		DNF4	DNF6
Reference Standard	IEC	62271-200	62271-200
Rated Voltage	KV	12	24
Rated Frequency	Hz	50/60	50/60
Rated Insulation Level	-	-	-
Rated Power Frequency Withstand Voltage/1min	KV rms	28	50
Lightening Impulse Withstand Voltage (Peak Value)	KV P	75	125
Rated Current of Busbar	A	1250/1600/2000/2500/3150/4000	1250/1600/2000/2500
Rated Current of T-off bar	A	630/1250/1600/2000/2500/3150/4000	630/1250/1600/2000/2500
Rated short Time Withstand Current (3s)	KA	25/31 .5/40	25
Internal Arc Classification AFLR	KA	40/1 s	25/1 s
Rated Peak Withstand Current (Peak Value)	KA	63/82/100	63
Ingress Protection Degree	KA	IP 42	IP 42
Width	mm	750-900*	750-900*
Height	mm	2300	2300
Depth	mm	2225	2225

* For Switchgear > 1250

* For Switchgear > 1250A



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	Fax: 02187700871	Contract No:		Project Name: BINAK OILFIELD DEVELOPMENT
Sales Expert:	F.Moslemipour	Date: 03.05.01	Item No: 172	Switchgear Name: MV Switchgear
Technical Expert:	E.Ghorbannejad	Rev: 05	Page: 1 of 16	Switchgear Type: DNF4-11KV-1600A-25KA/1Sec

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1) Document purpose

This document defines the necessary information and data and gives a comprehensive presentation about the product features, advantageous, construction and technical characteristics.

In this proposal, all required main aspect of the project including project scope, main technical characteristics configurations as well as bill of quantities, dimensions, and sub vendor list are included.

This proposal is prepared for the below project and switchgear

Project Name: BINAK OILFIELD DEVELOPMENT

Switchgear Type: DNF4-11KV-1600A-25KA/1Sec

2) Codes & standards

Power Solution metal-clad switchgear has been designed in accordance with the latest revision of IEC62271-200 standard and validated by type tests in independent laboratories.

Description	Reference
Common standard for HV equipment	IEC62271-1
Metal enclosed switchgear and control gear, from 1KV to 52KV	IEC62271-200
HV AC circuit breakers	IEC62271-100
AC disconnectors and earthing switch	IEC62271-101
Alternating current disconnectors and earthing switches	IEC62271-102
Switches for rated voltages above 1 kV up to and including 52 kV	IEC62271-103
Alternating current switch-fuse combinations	IEC62271-105
surge arrester	IEC60099
Current transformers	IEC60044-1
Voltage transformers	IEC60044-2
Protection relays	IEC60255

3) Site conditions

Ambient temperature: (Indoor)	40 [^]
Humidity	%80
Altitude	<=1500m



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4) Pars Tableau at a glance

Pars Tableau was founded in 1982.

At the beginning Pars Tableau has been producing medium and low voltage switchgears, Control and protection panels and Wall mounted switchboards.

Recruiting skilled workforce, preparing modern machinery, extending workshops and investing in switchgears with modern technology, lead Pars Tableau to several contracts with well known companies.

In 1989 Pars Tableau reached it's first technical agreement with ALSTOM T&D for manufacturing withdrawable metal enclosed panel type DN6 24KV.

In addition in 1992 Pars Tableau renewed a contract with ASLTOM T&D for :

Medium voltage Metal Clad switchgears – DNF family DNF4,6,7 (3.3 up to 36KV)

Medium voltage Compact switchgear – FLUOKIT - SF6 RMU and other combination

Low voltage switchgear – MCC up to 6000A, front and Rear access types

Again in 2003 Pars Tableau renewed a license and technical assistance agreement for manufacturing AREVA T&D's latest medium voltage switchgear called PIX and Compact /Package Substation GRC.

In 1997 Pars Tableau was the very first granted ISO 9001 certificate within all panel manufacturers in Iran, accredited by SGS Switzerland and celebrated achieving ISO 9001 version 2000 in 2002. Pars Tableau got the HSE certificate in 2015.



A Switchgear manufacturer Main products

Low voltage : up to 6000A &100KA

Withdrawable type
front & rear access



Medium voltage : up to 36KV & 40KA

Withdrawable type : front & rear access



Compact type : front access



Compact / package substation GRC type



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5) General applications

Power Solution system has been designed to give an optimal solution to satisfy the requirements for MV

Utility project

Regional electric & distribution companies, Power plants



Oil & Gas

Refineries, Pumpstation, Pipe line
Petrochemical Plant



Heavy industries

Steel Plants, Cement Plants
Mineral Metal, Glass Makers



Transport

Subway, Airport



Infrastructure



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6) Scope of supply

In this section, Pars tableau scope of supply is defined.

Category	Main activities/items
Project management	Time management
	Resource management
	Risk management
	Cost management
Engineering	CT/VT calculations
	Relays and measuring equipment order code selection
	Single line diagram
	Logic diagram
	Signal list
	General arrangement diagram (Opening & Layout & section drawings)
	Front view drawings
	Schematic diagrams (Front view, circuit diagram, List of equipment)
Procurement	Connection MV cables is out of scope
	MV cables termination kits are out of scope
	Connection LV cables between switchgear is out of scope
	Cable glands and conduits are out of scope
FAT	As per Pars Tableau test procedure
Guarantee	12 Months after putting into operation or 18 months after delivery whichever comes earlier
Civil works	Out of scope
Supervision on installation	Included
Installation	Optional
Commissioning	Optional
Communication cables	Optional
SAT	Optional
Relay Setting and Coordination Report	Optional
Trainings	Optional



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7) Switchgear main features

Type tested according to IEC62271-200 standard

Fully internal arc tested

Metal-clad and withdrawable design and Metal partitions between compartments

Having rigid and reliable interlocking system.

Space saving and Safe and user-friendly

Easy access to compartments

Installation Convenient and Reduced installation and maintenance costs

Remote monitoring and control is possible.

Clear status indicators for all units available

Mimic available on each unit

Electrical operations are possible as options

All operations carried out with door closed

Equipped with fast making earthing switch



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8) Sub vendor list

Equipment	Manufacturer/Country of origin
Vacuum Circuit Breaker & Contactor	Hyundai/South Korea or Pars Switch/Iran or ABB/EUROPE or KGP/Iran
Current Transformer	Mag or Pars Shar or Nirou Trans/Iran or Electro Pejvak/Iran
Voltage Transformer	Mag or Pars Shar or Nirou Trans/Iran or Electro Pejvak/Iran
Protection Relay	Schneider&MiCOM/France or Siemens/Germany
RTD Relay	Contrel elettronica/Italy
Lockout Relay	Arteche/Spain or Siemens/Germany
TCS Relay	Arteche/Spain or Siemens/Germany
Trip Relay	Arteche/Spain or Siemens/Germany
Close Relay	Arteche/Spain or Siemens/Germany
DC Under Voltage Relay	Schneider/France
Test Block	Siemens/Germany
Test Box	Entrelec/France
Digital Metering	Schneider/France or IME/Italy or Siemens/Germany or Contrel elettronica/Italy
Analogue Metering (Ammeter & Voltmeter)	Taiwan Meters/Taiwan or BEW/Taiwan or Zigler/Germany
Alarm Annunciator	Mabna Niroo/Iran or Klemsan/Turkey
MV Fuse	AEG/EUROPE
Surge Arrester	Pars Arrester/Iran
Capacitive Insulator	Alce/Turkey or Liyond/China or Tavan barez/Iran
Electrical Insulation Materials (Insulator)	Ayegh Maghareh/Iran or Alce/Turkey or Tavan barez/Iran
Aux. Relay	Wiedmuller/Germany or Schrack/Austria or Omron/Japan or Finder/Spain
Timer	Schrack/Austria or Omron/Malaysia or Fanox/Spain or Autonics/China
Selector Switch	Kaveh/Iran
CB Control Discrepancy switch	Comeletric/Italy
LV Fuse	ETI/Slovenia
MCB	F&G/Europe
Push button	Schneider/ France
Signal lamp	Schneider/France
Terminal	Raad/Iran
Lighting Inside of Panel	Max Light/China
Heater	Koomesh/Iran
Thermostat	Koomesh/Iran
Wire Duct	RAAD/Iran
Metalic Sheets	Foulad Mobarakeh/Iran
Copper	Bahonar/Iran
Heat Shrink Material for Busbar	Woer/China
Cable/Wire Tag Markers or ID Markers	Pars Tableau/Iran
Cable	Khorasan/Iran
Wiring	Zar Sim/Iran or Kaveh Tak/Iran



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9) Special tools

Description	Remarks	Qty
Hand Crank For VCB Closing Spring Of Circuit Breaker	For Any Type Of CB	2
Hand lever For Earthing Switch	For Any Type Of ES	2
Hand lever For Withdrawable Truck	For Any Type Of Truck	2
Relay's Software	For Any Type Of Relay's Software	1
Cable Connection For Protection Relay	For Any Type	1
Spray Paint	For Any Type Of Color	1



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Medium Voltage Distribution

DNF6

Air Insulated Switchgear 12- 24kV



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DNF 6

Air Insulated Switchgear 12 - 24 kV



CUSTOMER BENEFITS

- Total safety for operators including full internal arc tested
- Immune to environmental influences
- Ideal to convey high current load



Wherever 12 - 24 kV power must be distributed and used with maximum availability and reliability, Pars Tableau has the time-proven equipment that best meets your needs.

If you are looking for a convenient product with proven technology based on decades of experience designing and manufacturing substation switchgear, we have the answer in our DNF6

The Fully Metal Clad Switchgear Robust For All Applications

Based on its four distinct compartment design (circuit breaker, cables, busbar and low voltage equipment) and the use of earthed automatic shutters, DNF6 is highly reliable switchgear. The cubicle is of the true metal clad category. It meets the highest level of service continuity (LSC2B). Both busbar and cable compartments service continuity are ensured when normal maintenance is carried out in the circuit breaker compartment. As safety is a key point in this design, a provision for comprehensive shutter padlocking ensures total operator safety during maintenance work.

DNF6 is equipped with either SF6 , or vacuum circuit breaker.

Quality

Quality Standards

DNF6 has been designed and fully tested according to the latest IEC standards (IEC 62271-200/-100 and IEC 62271-1).

All type tests have been performed in international recognized independent laboratories.

DNF6 is manufactured in our ISO 9001-2000 and HSE certified factories.



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References List

Oil ,Gas and Petrochemical



Project Name	End User	Client
REY PUMP STATION	NATIONAL IRANIAN OIL Co.	PIPE LINES CO .
POWER PLANT 20& 6KV	MOBIN PETROCHEMICAL	PARSIAN CO.
4 GAS COMPRESSOR STATIONS AZERBAIJAN	NATIONAL IRANIAN OIL Co.	ARIA PETRO GAZ
SONGON COOPER	National Iranian Copper Industries Company-(NICICO)	Songon Cooper
SOUTH PARS UTILITY PHASE 1	OIL & GAZ PARS .	MAPNA CO .
SOUTH PARS phase 9 & 10	OIL & GAZ PARS .	OIEC CO .
AHVAZ - REY PIPE LINES	IRANIAN OIL & PIPE LINE TELECOMMUNICATION COMPANY	IRANIAN OIL & PIPE LINE TELECOMMUNICATION COMPANY
AZADEGAN	PERTULEOM ENGINEERING DEVELOPMENT (PEDEC)	RAMPCO

Industry



Project Name	Client	Consolation
20KV SUBSTATION	TEHRAN REGIONAL ELECTRICITY Co.	TEHRAN REGIONAL ELECTRICITY Co.
20KV SUBSTATION	FARS REGIONAL ELECTRICITY Co.	FARS REGIONAL ELECTRICITY Co.
Tehran 7th Water Treatment Station	Tehran Water & Wastewater Co.	OMRAB CO.
MONTAZER GHAEM POWER PLANT	I.P.D.C. CO.	MAPNA CO .
FARS POWER PLANT	I.P.D.C. CO.	MAPNA CO .
KHOY POWER PLANT	I.P.D.C. CO.	MAPNA CO .
20KV SUBSTATION	IMAM KHOMEINI INTERNATIONAL AIRPORT	TABIRAN Co.
20KV SUBSTATION	P.E.D.E.E(Syria)	SUNIR
20KV SUBSTATION	Semnan Fajr steel complex	Persian Sazeh co.
20KV SUBSTATION	HORMOZGAN REGIONAL ELECTRICITY Co.	HORMOZGAN REGIONAL ELECTRICITY Co.
20KV SUBSTATION	ESFARAYEN STEEL Co.	ESFARAYEN STEEL Co.
20KV SUBSTATION	Mashhad Urban Rail way	Mashhad Urban Rail way
20KV SUBSTATION	IRAN KHODRO CO .	IRAN KHODRO CO .
20KV SUBSTATION	Shahin bonab steel complex	Sahand Steel Complex
20KV SUBSTATION	Shiraz Urban Rail way	FARANIROO
20KV SUBSTATION	Qom Urban Rail ways	SAFANICU



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Operator Safety First

Pars Tableau's DNF6 cubicle has been designed with operator safety as the number one priority.

Internal ARC Classification (IAC)

DNF6 has been successfully tested in an international recognized laboratory according to IEC 62271- 200 standards with the following classification ; IACAFLR 40 KA / 1s in all compartments.

Ingress Protection

The enclosure of DNF6 is designed with an ingress protection degree of IP4X.

Clear, Visible Switching Devices

The mechanism cover shows a visual display of circuit breaker ON/OFF condition, spring charged / discharged and earthing switch ON/OFF.

DNF6 has inspection windows for both breakers and cable compartments. This allows the positions of the withdrawable unit, earthing switch and the situation of the cable connection to be easily observed.



Complete Set Of Interlocks

All necessary positive interlocks are installed according to IEC standards and are designed to prevent:

- Impossibility to plug-in or to draw-out the circuit breaker in closed position.
- The closing operation can only be performed when the circuit breaker truck is in correct position.
- Impossibility to close the earthing switch if the circuit breaker is plugged-in or between the plug-in and withdrawn / test position.
- Impossibility to plug-in the circuit breaker if the earthing switch is closed .
- Impossibility to open the access panel of the cable compartment if the earthing switch is not in closed position

Necessary interlocks are also provided at the rear cable cover, which can only be opened when the breaker is tripped and brought to test position with the earthing switch closed.

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Technical Characteristics

Type Designation	DNF6	DNF 4	Cubicle Rated Current	A	1250	1600	2000	2500	3150
Rated voltage	24 KV	12 KV	Width	mm	750	900			
Frequency	50 HZ	50 HZ	Height A (Basic cubicle)	mm	1650				
Normal current	630 A-2500 A	630 A-3150 A	Height of low-voltage cabinet	mm	450/900				
Lightening impulse withstand voltage	125 KV	75 KV	Complete height with	mm	1650/2300				
Power frequency withstand voltage	60 KV	28 KV	low-voltage cabinet	mm					
Short time withstand current for main and earthing circuit	25 KA	up to 40 KA	Depth	mm	2225				
Peak withstand current for main and earthing circuit	62.5 KA	100 KA	Cubicle Rated Current	A	1250	1600	2000	2500	
Duration of short-circuit for main and earthing circuit	3 sec	3 sec	Width	mm	750	900			
Internal fault : short circuit current	25 KA	40 KA	Height A (Basic cubicle)	mm	1650				
Internal fault : short-circuit duration	1 s	1 s	Height of low-voltage cabinet	mm	450/900				
Internal fault : classification IAC (initials for internal arc classification)	AFLR	AFLR	Complete height with	mm	1650/2300				
Degree of protection	Up to 42	Up to 42	low-voltage cabinet	mm					
			Depth	mm	2225				

Standards :

The specified equipment is designed , built and tested according to the following IEC publications :

switchgears	: IEC62271-part200.
circuit breakers	: IEC62271-part100.
current transformers	: IEC60044-1.
voltage transformers	: IEC600186.
protective relays	: IEC600255

General Description :

Construction of these cubicles conforms to definition of metal clad cubicles in IEC standard . These cubicles consist of four completely separate compartments as following:

- switchgear compartment .
- busbars compartment.
- transformer and cable compartment.
- low voltage compartment.

Switchgear Compartment :

- In conventional cubicles the withdrawable circuit breaker or contactor is located in the front of the cubicle which is closed by a door fitted with 2 locks .
- The double tier cubicles are provided with two switchgear compartments which can be equipped with circuit breaker or contactor or voltage transformer . The withdrawable portion can be set in three different positions :
 - fully plugged-in on service position
 - un-plugged on test position.
 - fully withdrawn position.

In test and withdrawn position a set of metallic shutter is provided to cover the fixed contacts on busbars and circuit side .

- The shutters are automatically and simultaneously operated circuit breaker truck .

Busbars Compartment :

This compartment is located at the lower rear part of cubicle. Center of rear part is equipped with epoxy resin busbar insulators which support the copper or aluminum bars insulated in air . The cubicles busbars compartments form a totally unpartitioned enclosed channel which runs continuously throughout the switchboard .

Transformer and Cable Compartment :

This compartment is located at the upper rear part of cubicles .

- This compartment includes :
 - an earthing switch
 - connection for the MV cables
 - voltage detection by means of capacitive voltage dividers to indicate whether the cables are alive or not .
- The current and voltage transformers are of dry type molded in epoxy resin .

Low Voltage Compartment :

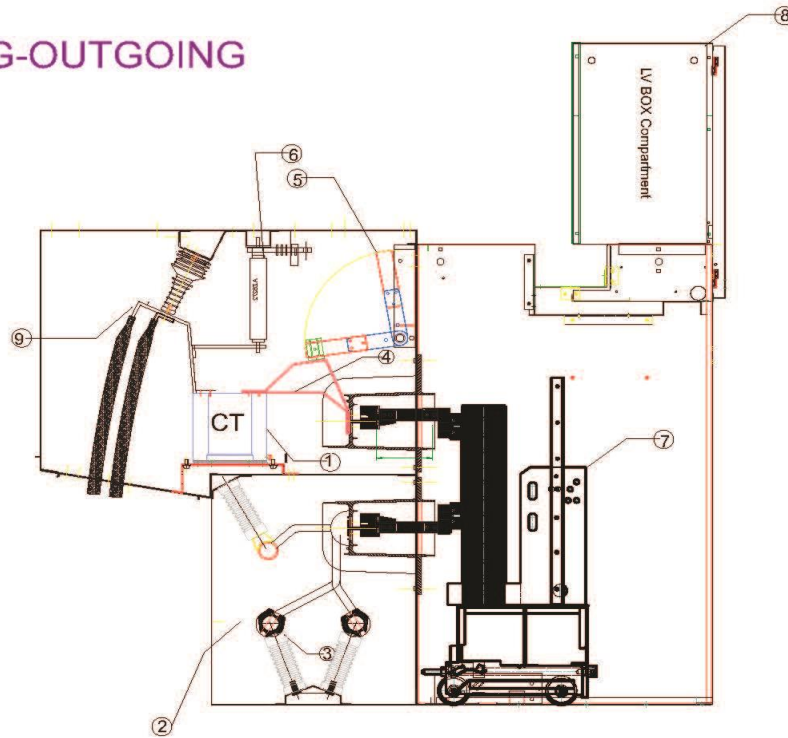
- This compartment is equipped with
 - low voltage cable tray
 - low voltage junction terminal for the inter cubicle links
 - low voltage equipment
- In double tier cubicles ,each tier has its individual low voltage compartment .



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Technical Expert:	E.Ghorbannejad	Rev: 05	Page: 14 of 16	Switchgear Type: DNF4-11KV-1600A-25KA/1Sec

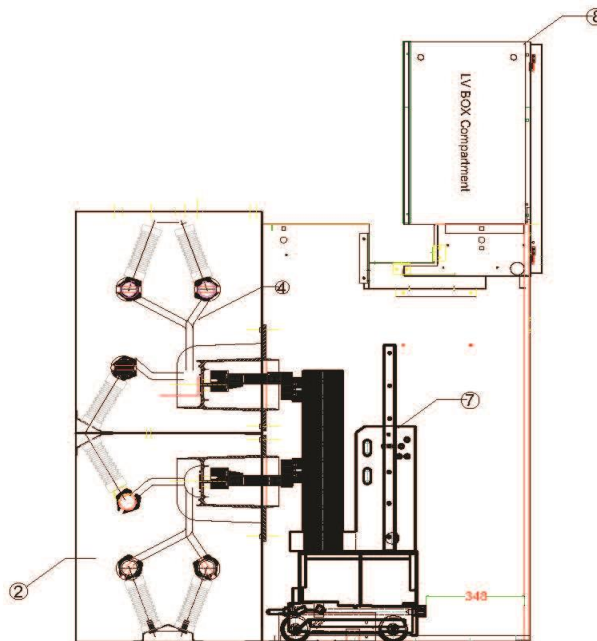
INCOMING-OUTGOING

ITEM	DESCRIPTION
1	Current transformers
2	Busbar support
3	Busbar
4	Bar connection
5	Line Earthing switch
6	Surge arrester
7	Circuit Breaker
8	LV BOX Compartment
9	Cable Connection
10	..
12	
13	



COUPLING

ITEM	DESCRIPTION
1	
2	Busbar support
3	Busbar
4	Bar connection
5	
6	
7	Circuit Breaker
8	LV BOX Compartment
9	
10	
12	
13	



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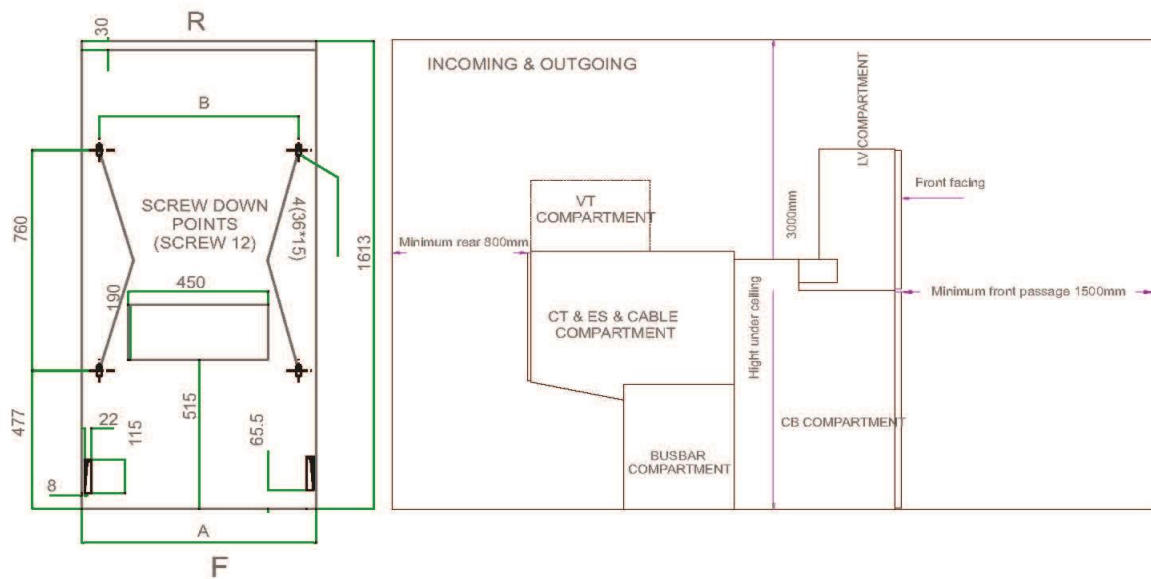
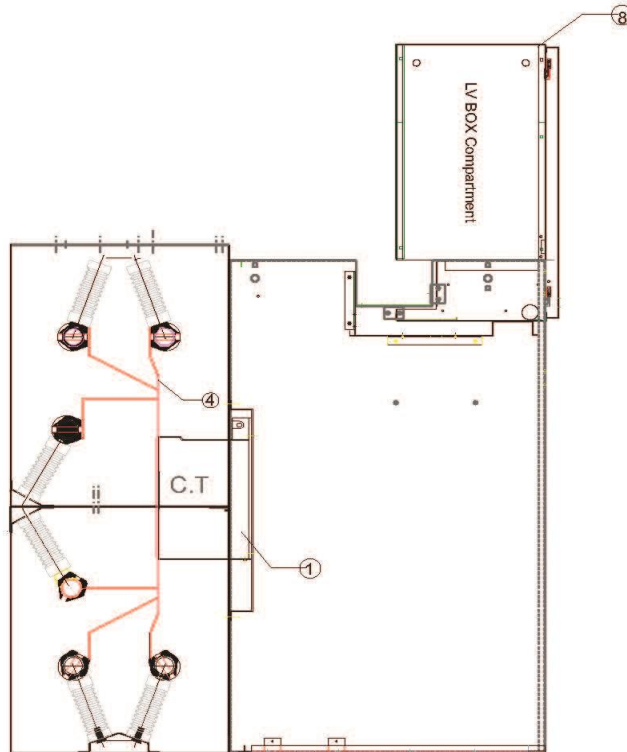


 PARS TABLEAU

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	Fax: 02187700871	Contract No:		Project Name: BINAK OILFIELD DEVELOPMENT
Sales Expert:	F.Moslemipour	Date: 03.05.01	Item No: 172	Switchgear Name: MV Switchgear
Technical Expert:	E.Ghorbannejad	Rev: 05	Page: 15 of 16	Switchgear Type: DNF4-11KV-1600A-25KA/1Sec

BUSRISER

ITEM	DESCRIPTION
1	Current transformers
2	Busbar support
3	Busbar
4	Bar connection
5	
6	
7	
8	LV BOX Compartment
9	
10	
12	
13	



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PARS TABLEAU

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Sales Expert:	F.Moslemipour	Date: 03.05.01	Item No: 172	Project Name: BINAK OILFIELD DEVELOPMENT
Technical Expert:	E.Ghorbannejad	Rev: 05	Page: 16 of 16	Switchgear Name: MV Switchgear
				Switchgear Type: DNF4-11KV-1600A-25KA/1Sec

Row	Description	Feeder Tag NO.	Type	Qty.
1	Motor Outgoing Feeder - C3	Motor Outgoing (=JM01,...,=JM04)	DNF4	4
2	Transformer Outgoing Feeder - C2	Transformer Outgoing (=JT01)	DNF4	1
3	Transformer Outgoing Feeder - C2	Transformer Outgoing (=JT02&03)	DNF4	2
4	Transformer Outgoing Feeder - C5	Transformer Outgoing (=JT04)	DNF4	1
Total				8

Technical data		
Type Designation	DNF6	DNF 4
Rated voltage	24 KV	12 KV
Frequency	50 HZ	50 HZ
Normal current	630A-2500A	630A-4000A
Lightening impulse withstand voltage	125 KV (peak)	75 KV (peak)
Power frequency withstand voltage	50 KV (rms)	28 KV (rms)
Short time withstand current for main and earthing circuit	25 KA	up to 40 KA
Peak withstand current for main and earthing circuit	62.5 KA	100 KA
Duration of short-circuit for main and earthing circuit	3 sec	3 sec
Internal fault :short circuit current	25 KA	40 KA
Internal fault : short-circuit duration	1 s	1 s
Internal fault :classification IAC(initials for internal arc classification)	AFLR	AFLR
Degree of protection	Up to 42	Up to 42
Width	750 - 900mm	750 - 900mm
Height	2300mm	2300mm
Depth	Contract No:	2223mm

Row	Feeder Designation>> Description	Motor Outgoing Feeder - C3 No.2	Qty.
1	Quantity of Feeders	Motor Outgoing (=JM01, JM02, JM03, JM04)	4
2	Interrupter	VCB	
2-1	-Type & Rated Current	24KV-1250A-25KA/3Sec (VCB-Hyundai-H)	1
2-2	-Type		
2-3	-Installation	withdrawable	
2-4	-Auxiliary Contact	XA+AB-(10NO+10NC)	-
2-5	-Pressure Switch	N.A	-
2-6	-Shunt Release	Y1 (Supplied as standard for motorized type)	-
2-7	-DC Under Voltage Relay(UVR+UVT)	Y7	-
2-8	-Electrical Control (Motor)	M1 (Supplied as standard)	-
2-9	-Close Coil	Y9+K1(Anti pumping)	-
2-10	-Position Indicator	S30,S40(2NO+2NC)	-
2-11	-Cradle For CB	Supplied as standard	-
2-12	-Fuse For Contactor	N.A	-
3	Earthing Switch Box Panel & VT Box Panel		
3-1	-Line Earthing Switch	parstableau	1
3-2	-Earthing Switch Box	N/A	-
3-3	-Voltage Transformer Box	Tilting REAR VT BOX DNF4-12KV (750mm) - CABLE	1
4	Voltage Transformer		
4-1	-Ratio(KV)	11000/V3 //110/V3//110/3	3
4-2	-Winding 1	Cl:1+3P-30VA	
4-3	-Winding 2	N/A	
4-4	-Fuse for VT's Primary Protection	12kv, 6.3A	3
4-5	-Winding (Open Delta)	suitable for damping resistor	
5	Current Transformer		
5-1	-Ratio	100/1-1-1A	3
5-2	-Core 1	CL:X,UK>500	
5-3	-Core 2	CL:5P50,15VA	
5-4	-Core 3	CL:1,F55,15VA	
5-5	-Core 4		
6	C.B.C.T		
6-1	-Ratio	60/1-Cl:1,F55,1.5VA	1
7	Protective Relays		
7-1	-Protective Relay (1)	P3M32 / 27,27R,48,46,49,66,87M,50BF	1
7-2	-Protective Relay (2)	P3U20 / 50,51,50G	1
7-3	-Protective Relay (3)	Control electronica CTT8 / 49T	1
7-4	-Protective Relay (4)	N/A	-
7-5	-Test Block	2RMLG01	3
7-6	-Lockout Relay External	7PA23 (86)	1
7-7	-Tcs Relay External	7PA30 (74)	1
7-8	-Trip Relay External	N/A	-
7-9	-Close Relay External	N/A	-
8	Panel and Accessories	DNF4-F-1250A-1600A-HYUNDAI	1
8-1	-Earth Switch Latch Coil	parstableau	1
8-2	-Mimic Diagram	parstableau	1
8-3	-Phase Indicator	parstableau	3
8-4	-Surge Arrester	12KV, 10KA	3
8-5	-Accessories	OUTGOING-DNF4(Wire,Wiring Duct,Rails,Terminal,...)	1
9	Metering Equipment		
9-1	-Ammeter	96x96 90° 6in Input:1A	3
9-2	-Voltmeter	N/A	-
9-3	-Active Energy Meter	N/A	-
9-4	-Current Transducer	4-20mA(1 Phase)	3
9-5	-Voltage Transducer	N/A	-
9-6	-Active Power Transducer	N/A	-
9-7	-Measuring Center/regulator	N/A	-
10	Control Equipment		
10-1	-Push Button	Schneider/FTC	3
10-2	-Signal Lamp	Schneider/FTC	5
10-3	-3 Position Selector Switch	Local-Off-Remote	1
10-4	-Voltmeter Selector Switch	7 Position	-
10-5	-Ammeter Selector Switch	4 Position	-
10-6	-Current Test Box	CTB	1
10-7	-Voltage Test Box	VTB	1
10-8	-3 Pole MCB	MCB+ AUX. contact	2
10-9	-2 Pole MCB	MCB+ AUX. contact	3
10-10	-2 Pole RCBO	RCBO+ AUX. contact	2
10-11	-Semaphore Position Indicator	LED TYPE -WESO	2
10-12	-CB Control Discrepancy switch	Close-open(Turn-On--Turn-Off)	1
10-13	-Alarm Window	N/A	-
10-14	-Timer	ON-Delay	1
10-15	-Aux.Relay- AS Required	4change.over	15
10-16	-Contactor For Space Heater	LC1-D09-3P	-
10-17	-Heater	230VAC-60W	2
10-18	-Thermostat	0-60°	2
10-19	-Floursent Lamp	8W/230VAC	1
10-20	-Door Limit Switch	1NO+1NC	1
11	General Cubicle Information		
11-1	-Busbar size	1600A-3*80*5	1
11-2	-Color code	RAL 7032	1
11-3	-Plate thickness	2-5mm	1
11-4	-IP Degree	IP42	1
11-5	-Panel Type	Metal Clad	1

Row	Feeder Designation>> Description	Transformer Outgoing Feeder - C2 No.3	Qty.	Transformer Outgoing Feeder - C2 No.4	Qty.
1	Quantity of Feeders	Transformer Outgoing (=JT01)	1	Transformer Outgoing (=JT02&03)	2
2	Interrupter	VCB		VCB	
2-1	-Type & Rated Current	24KV-1250A-25KA/3Sec (VCB-Hyundai-H)	1	24KV-1250A-25KA/3Sec (VCB-Hyundai-H)	1
2-2	-Type				
2-3	-Installation	withdrawable		withdrawable	
1	-Auxiliary Contact	XA+AB-(10NO+10NC)	-	XA+AB-(10NO+10NC)	-
2-5	-Pressure Switch	N.A	-	N.A	-
2-6	-Shunt Release	Y1 (Supplied as standard for motorized type)	-	Y1 (Supplied as standard for motorized type)	-
2-7	-DC Under Voltage Relay(UVR+UVT)	Y7	-	Y7	-
2-8	-Electrical Control (Motor)	M1 (Supplied as standard)	-	M1 (Supplied as standard)	-
2-9	-Close Coil	Y9+K1(Anti pumping)	-	Y9+K1(Anti pumping)	-
2-10	-Position Indicator	S30,S40(2NO+2NC)	-	S30,S40(2NO+2NC)	-
2-11	-Cradle For CB	Supplied as standard	-	Supplied as standard	-
2-12	-Fuse For Contactor	N.A	-	N.A	-
3	Earthing Switch Box Panel & VT Box Panel				
3-1	-Line Earthing Switch	parstableau	1	parstableau	1
3-2	-Earthing Switch Box	N/A	-	N/A	-
3-3	-Voltage Transformer Box	N/A	-	N/A	-
4	Voltage Transformer				
4-1	-Ratio(KV)	N/A	-	N/A	-
4-2	-Winding 1	N/A	-	N/A	-
4-3	-Winding 2	N/A	-	N/A	-
4-4	-Fuse for VT's Primary Protection		-		-
4-5	-Winding (Open Delta)	suitable for damping resistor	-	suitable for damping resistor	-
5	Current Transformer				
5-1	-Ratio	100/1-1A	3	75/1-1A	3
5-2	-Core 1	CL:5P20,15VA		CL:5P20,15VA	
5-3	-Core 2	CL:1,F55,15VA		CL:1,F55,15VA	
5-4	-Core 3				
5-5	-Core 4				
6	C.B.C.T				
6-1	-Ratio	60/1-Cl:1,F55,1.5VA	1	60/1-Cl:1,F55,1.5VA	1
7	Protective Relays				
7-1	-Protective Relay (1)	P3U20 / 50,51,50N,51N	1	P3U20 / 50,51,50N,51N	1
7-2	-Protective Relay (2)	MICOM P120 / 50G	1	MICOM P120 / 50G	1
7-3	-Protective Relay (3)	N/A	-	N/A	-
7-4	-Protective Relay (4)	N/A	-	N/A	-
7-5	-Test Block	2RMLG01	2	2RMLG01	2
7-6	-Lockout Relay External	7PA23 (86)	2	7PA23 (86)	2
7-7	-Tcs Relay External	7PA30 (74)	1	7PA30 (74)	1
7-8	-Trip Relay External	N/A	-	N/A	-
7-9	-Close Relay External	N/A	-	N/A	-
8	Panel and Accessories	DNF4-F-1250A-1600A-HYUNDAI	1	DNF4-F-1250A-1600A-HYUNDAI	1
8-1	-Earth Switch Latch Coil	parstableau	1	parstableau	1
8-2	-Mimic Diagram	parstableau	1	parstableau	1
8-3	-Phase Indicator	parstableau	3	parstableau	3
8-4	-Surge Arrester	N.A	-	N.A	-
8-5	-Accessories	OUTGOING-DNF4(Wire,Wiring Duct,Rails,Terminal,...)	1	OUTGOING-DNF4(Wire,Wiring Duct,Rails,Terminal,...)	1
9	Metering Equipment				
9-1	-Ammeter	96x96 90° 6In Input:1A	3	96x96 90° 6In Input:1A	3
9-2	-Voltmeter	N/A	-	N/A	-
9-3	-Active Energy Meter	MKG6	1	MKG6	1
9-4	-Current Transducer	4-20mA(1 Phase)	3	4-20mA(1 Phase)	3
9-5	-Voltage Transducer	4-20mA(1 Phase)	3	4-20mA(1 Phase)	3
9-6	-Active Power Transducer	4-20mA(3φ-4W)	1	4-20mA(3φ-4W)	1
9-7	-Measuring Center/regulator	PM2220	1	PM2220	1
10	Control Equipment				
10-1	-Push Button	Schneider/FTC	3	Schneider/FTC	3
10-2	-Signal Lamp	Schneider/FTC	5	Schneider/FTC	5
10-3	-3 Position Selector Switch	Local-Off-Remote	1	Local-Off-Remote	1
10-4	-Voltmeter Selector Switch	7 Position	-	7 Position	-
10-5	-Ammeter Selector Switch	4 Position	-	4 Position	-
10-6	-Current Test Box	CTB	1	CTB	1
10-7	-Voltage Test Box	VTB	1	VTB	1
10-8	-3 Pole MCB	MCB+ AUX. contact	2	MCB+ AUX. contact	2
10-9	-2 Pole MCB	MCB+ AUX. contact	3	MCB+ AUX. contact	3
10-10	-2 Pole RCBO	RCBO+ AUX. contact	2	RCBO+ AUX. contact	2
10-11	-Semaphore Position Indicator	LED TYPE -WESO	2	LED TYPE -WESO	2
10-12	-CB Control Discrepancy switch	Close-open(Turn-On--Turn-Off)	1	Close-open(Turn-On--Turn-Off)	1
10-13	-Alarm Window	N/A	-	N/A	-
10-14	-Timer	ON-Delay	1	ON-Delay	1
10-15	-Aux.Relay- AS Required	4change.over	15	4change.over	15
10-16	-Contactor For Space Heater	LC1-D09-3P	-	LC1-D09-3P	-
10-17	-Heater	230VAC-60W	2	230VAC-60W	2
10-18	-Thermostat	0-60°	2	0-60°	2
10-19	-Floursent Lamp	8W/230VAC	1	8W/230VAC	1
10-20	-Door Limit Switch	1NO+1NC	1	1NO+1NC	1
11	General Cubicle Information				
11-1	-Busbar size	1600A-3*80*5	1	1600A-3*80*5	1
11-2	-Color code	RAL 7032	1	RAL 7032	1
11-3	-Plate thickness	2-5mm	1	2-5mm	1
11-4	-IP Degree	IP42	1	IP42	1
11-5	-Panel Type	Metal Clad	1	Metal Clad	1

Row	Feeder Designation>> Description	Transformer Outgoing Feeder - C5 No.5	Qty.
1	Quantity of Feeders	Transformer Outgoing (=JT04)	1
2	Interrupter	VCB	
2-1	-Type & Rated Current	24KV-1250A-25KA/3Sec (VCB-Hyundai-H)	1
2-2	-Type		
2-3	-Installation	withdrawable	
1	-Auxiliary Contact	XA+AB-(10NO+10NC)	-
2-5	-Pressure Switch	N.A	-
2-6	-Shunt Release	Y1 (Supplied as standard for motorized type)	-
2-7	-DC Under Voltage Relay(UVR+UVT)	Y7	-
2-8	-Electrical Control (Motor)	M1 (Supplied as standard)	-
2-9	-Close Coil	Y9+K1(Anti pumping)	-
2-10	-Position Indicator	S30,S40(2NO+2NC)	-
2-11	-Cradle For CB	Supplied as standard	-
2-12	-Fuse For Contactor	N.A	-
3	Earthing Switch Box Panel & VT Box Panel		
3-1	-Line Earthing Switch	parstableau	1
3-2	-Earthing Switch Box	N/A	-
3-3	-Voltage Transformer Box	N/A	-
4	Voltage Transformer		
4-1	-Ratio(KV)	N/A	-
4-2	-Winding 1	N/A	-
4-3	-Winding 2	N/A	-
4-4	-Fuse for VT's Primary Protection		-
4-5	-Winding (Open Delta)	suitable for damping resistor	-
5	Current Transformer		
5-1	-Ratio	75/1-1A	3
5-2	-Core 1	CL:5P20,15VA	
5-3	-Core 2	CL:1,F55,15VA	
5-4	-Core 3		
5-5	-Core 4		
6	C.B.C.T		
6-1	-Ratio	60/1-Cl:1,F55,1.5VA	1
7	Protective Relays		
7-1	-Protective Relay (1)	P3U20 / 50,51,50N,51N	1
7-2	-Protective Relay (2)	MICOM P120 / 50G	1
7-3	-Protective Relay (3)	N/A	-
7-4	-Protective Relay (4)	N/A	-
7-5	-Test Block	2RMLG01	2
7-6	-Lockout Relay External	7PA23 (86)	2
7-7	-Tcs Relay External	7PA30 (74)	1
7-8	-Trip Relay External	N/A	-
7-9	-Close Relay External	N/A	-
8	Panel and Accessories	DNF4-F-1250A-1600A-HYUNDAI	1
8-1	-Earth Switch Latch Coil	parstableau	1
8-2	-Mimic Diagram	parstableau	1
8-3	-Phase Indicator	parstableau	3
8-4	-Surge Arrester	N.A	-
8-5	-Accessories	OUTGOING-DNF4(Wire,Wiring Duct,Rails,Terminal,...)	1
9	Metering Equipment		
9-1	-Ammeter	96x96 90° 6in Input:1A	3
9-2	-Voltmeter	N/A	-
9-3	-Active Energy Meter	N/A	-
9-4	-Current Transducer	4-20mA(1 Phase)	3
9-5	-Voltage Transducer	4-20mA(1 Phase)	3
9-6	-Active Power Transducer	4-20mA(3φ-4W)	1
9-7	-Measuring Center/regulator	N/A	-
10	Control Equipment		
10-1	-Push Button	Schneider/FTC	3
10-2	-Signal Lamp	Schneider/FTC	5
10-3	-3 Position Selector Switch	Local-Off-Remote	1
10-4	-Voltmeter Selector Switch	7 Position	-
10-5	-Ammeter Selector Switch	4 Position	-
10-6	-Current Test Box	CTB	1
10-7	-Voltage Test Box	VTB	1
10-8	-3 Pole MCB	MCB+ AUX. contact	2
10-9	-2 Pole MCB	MCB+ AUX. contact	3
10-10	-2 Pole RCBO	RCBO+ AUX. contact	2
10-11	-Semaphore Position Indicator	LED TYPE -WESO	2
10-12	-CB Control Discrepancy switch	Close-open(Turn-On--Turn-Off)	1
10-13	-Alarm Window	N/A	-
10-14	-Timer	ON-Delay	1
10-15	-Aux.Relay- AS Required	4change.over	15
10-16	-Contactor For Space Heater	LC1-D09-3P	-
10-17	-Heater	230VAC-60W	2
10-18	-Thermostat	0-60°	2
10-19	-Floursent Lamp	8W/230VAC	1
10-20	-Door Limit Switch	1NO+1NC	1
11	General Cubicle Information		
11-1	-Busbar size	1600A-3*80*5	1
11-2	-Color code	RAL 7032	1
11-3	-Plate thickness	2-5mm	1
11-4	-IP Degree	IP42	1
11-5	-Panel Type	Metal Clad	1

Spare Part-2Years			
Item	EQ. List	Spec	Qty
1	Close Coil For VCB	110VDC	2
1	Trip Coil For VCB	110VDC	2
3	Motor For VCB	110VDC	2
4	Voltage Transformer	11000/ $\sqrt{3}$ //110/ $\sqrt{3}$ //110/3 Cl:1+3P-30VA Cl:3P	1
5	Fuse for VT's Primary Protection	12kV, 6.3A	2
6	Current Transformer	100/1-1-1A CL:X,UK>500 CL:5P50,15VA CL:1,FS5,15VA	1
7	Current Transformer	100/1-1A CL:5P20,15VA CL:1,FS5,15VA	1
8	Current Transformer	75/1-1A CL:5P20,15VA CL:1,FS5,15VA	1
9	CBCT	60/1-Cl:1,FS5,1.5VA	2
10	Lockout Relay	7PA23	2
11	Tcs Relay External	7PA30	2
12	Test Block	2RMLG01	2
13	Protective Relay	P3M32	1
14	Protective Relay	P3U20	1
15	Protective Relay	CTT8	1
16	Surge Arrester	12KV, 10KA	2
17	Ammeter	96x96 90° 6In Input:1A	2
18	Current Transducer	4-20mA(1 Phase)	1
19	Voltage Transducer	4-20mA(1 Phase)	1
20	Active Power Transducer	4-20mA(3 ϕ -4W)	1
21	Push Button	1NO or 1NC	2
22	Signal Lamp	110VDC	3
23	Selector Switch	Local-Off-Remote	1
24	Current Test Box	CTB	1
25	Voltage Test Box	VTB	1
26	MCB	3P-2A	1
27	MCB	2P-6A	2
28	Semaphore Position Indicator	LED TYPE-110VDC	3
29	CB Control Discrepancy switch	Close-open(Turn-On--Turn-Off)	1
30	Timer	ON-Delay	1
31	Aux.Relay	4change.over	10
32	Heater	230VAC-60W	2
33	Thermostat	0-60^	2
34	Floursent Lamp	8W/230VAC	2
35	Door Limit Switch	1NO+1NC	2
36	Current Terminal	RSTTP6	20
37	Terminal	RTTP4	100

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Commissioning			
Item	EQ. List	Spec	Qty
1	Ammeter	96x96 90° 6In Input:1A	1
2	Push Button	1NO or 1NC	1
3	Signal Lamp	110VDC	2
4	Semaphore Position Indicator	LED TYPE-110VDC	1
5	Aux.Relay	4change.over	3
6	Heater	230VAC-60W	1
7	Thermostat	0-60^	1
8	Floursent Lamp	8W/230VAC	1
9	Door Limit Switch	1NO+1NC	1
10	Current Terminal	RSTTP6	5
11	Terminal	RTTP4	20

