Automatic filling system

Pallet type new filling way



System specification

- At present, the filling station in use and some new filling stations still use a flat-shaped filling area, but for convenience, speed and space saving, it is now necessary to build a filling system in an integrated format fill way. (referred to as: pallet type new type of filling system)
- Pallet type new filling: there are more transfer racks with 4*4 and 4*5.
- Filling platform material: carbon steel, galvanized steel, stainless steel and aluminum alloy, etc.
- Control system: manual, semi-automatic, fully automatic three type.
- Gas components: unary, mixed gas (binary: Ar+CO2), multi-component mixed gas.
- Filling busbar (hose): fixed type, telescopic drawing type, cylinder automatic lifting type。
- Fully automatic filling principle：
- 1）Pump area： Automatic pre-cooling ⟹ automatic start and stop of the pump ⟹ monitoring of overpressure and overtemperature, and alarm interlocking;;
- 2）filling area： Vacuum ⟹ purge displacement ⟹ refill ⟹ temperature and pressure monitoring ⟹ refill &switch；
- Pressure design: can be filled with 20Mpa, all valves and pipe fittings can bear pressure not less than 25Mpa.
- Note： 1.Different gas cylinders have different treatment methods and different vacuum replacement methods.。
- 2、In principle, for oxygen gas filling using brass tubes, and stainless steel 304 tubes are used for other gas medium

Advantage



1

Save space: make full use of the filling platform to better meet the needs of empty bottle area and full bottle area



2

Save manpower: electric forklift, Young and female employees can also operate



3

High efficiency: intelligent control and moni in the whole process, one-key operation



4

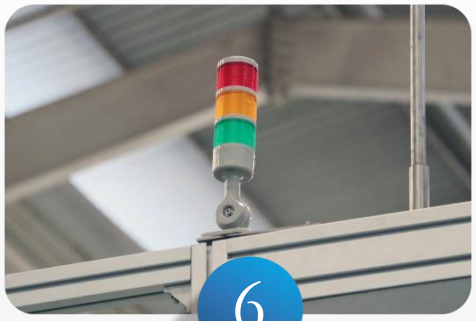
Save time: the traditional manual bottle push (one bottle at a time) can now move one container at a time (16 bottles, 20 bottles, etc.)



5

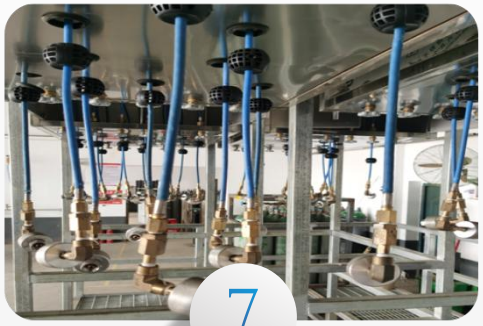
Accurate precision: artificial intelligence controls ratio, pressure, temperature, flow rate, etc.

Advantage



6

Real-time display of pressure and temperature, automatic alarm for overpressure and low temperature



7

Increased hose life: automatic hose lift protection



8

Simple filling: only connect and dismantle the hose, transport the container, and confirm the program start in the whole process



9

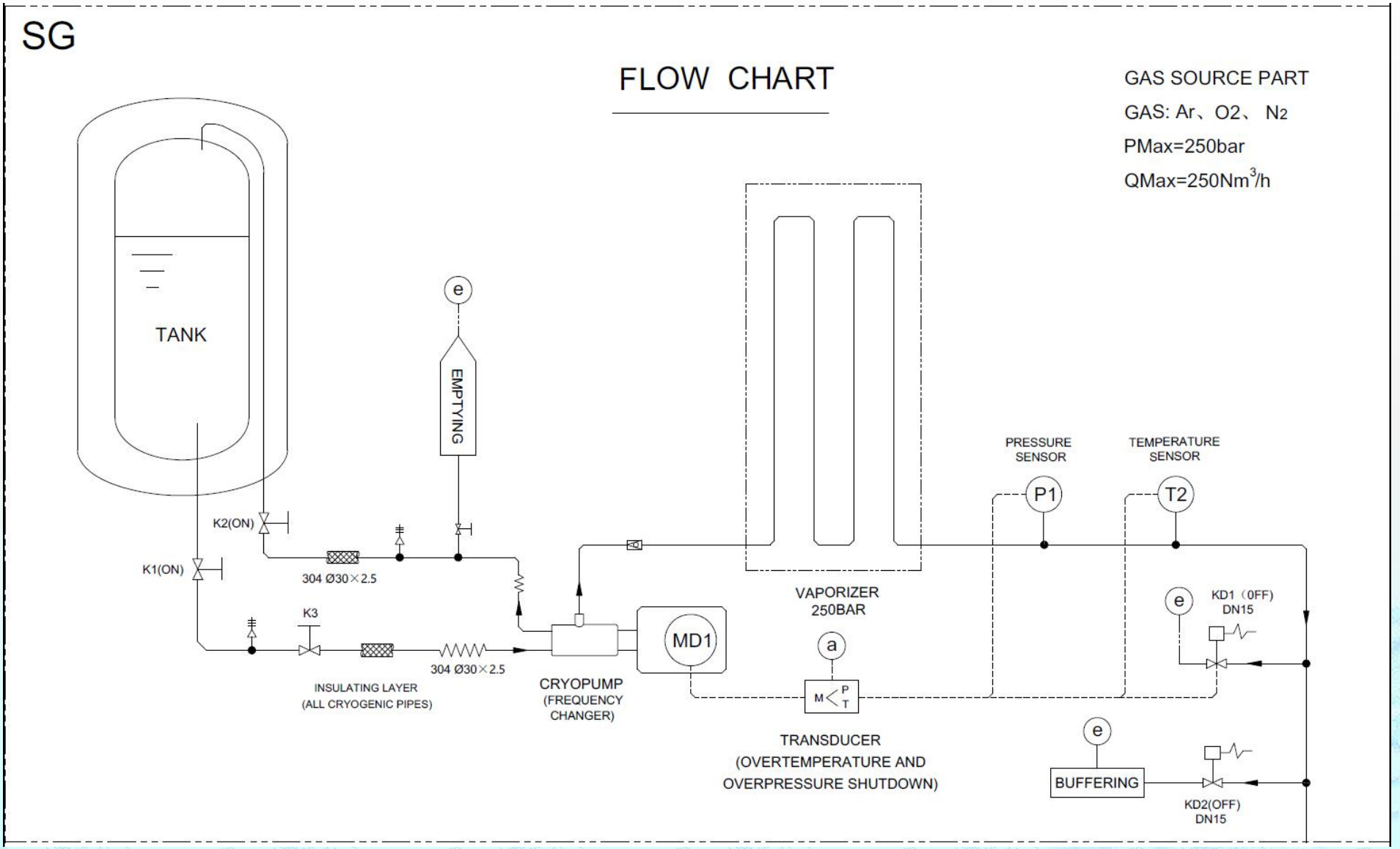
Comprehensive safety protection measures: the protective cover protects when filling, and the system cannot be raised if it does not stop

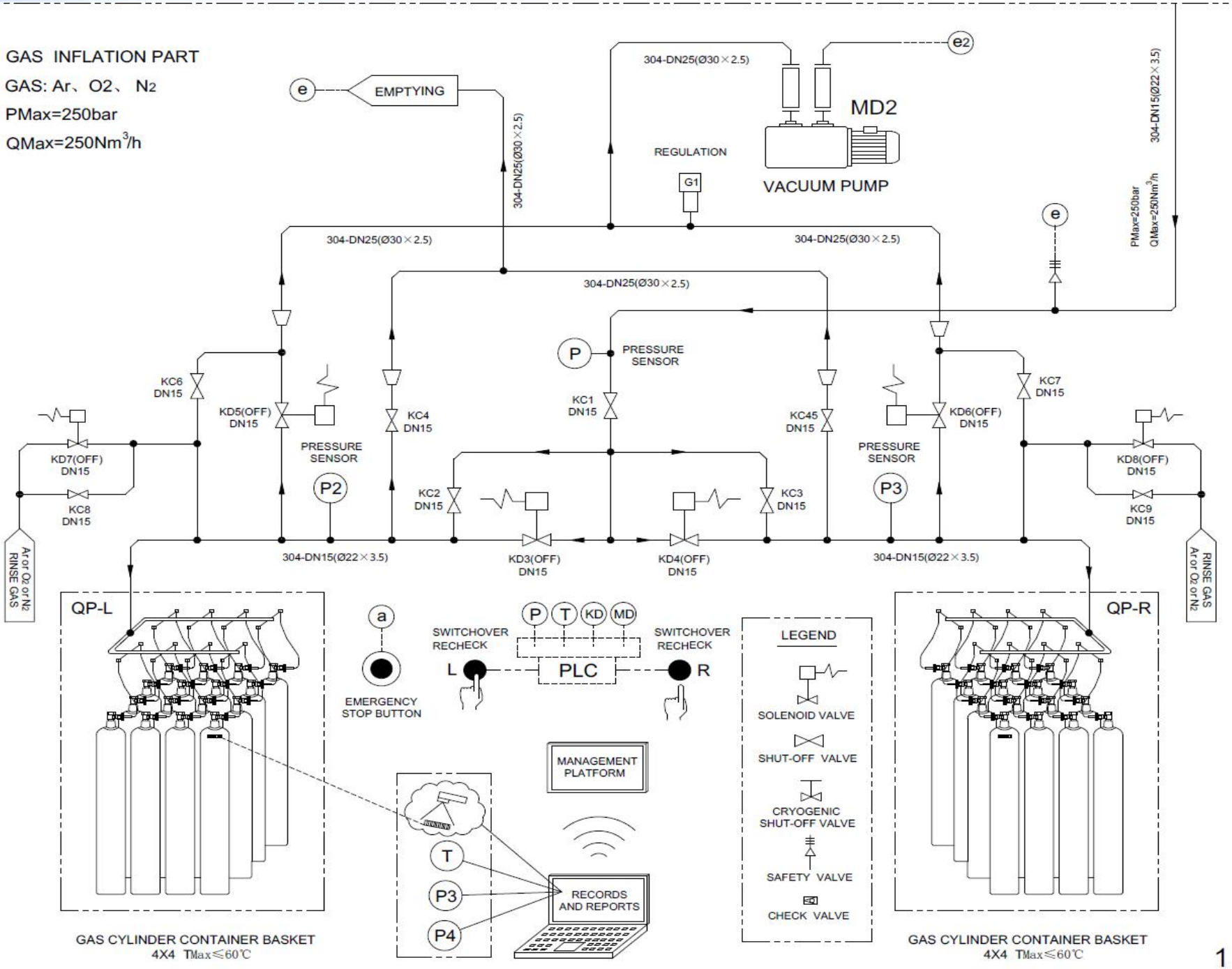


10

High-end, atmospheric, high-grade

Flow Chart


SG
FLOW CHART
GAS SOURCE PART
GAS: Ar、O2、 N2
PMax=250bar
QMax=250Nm3/h
TANK
EMPTYING
e
K2(ON)
K1(ON)
304 Ø30×2.5
K3
304 Ø30×2.5
INSULATING LAYER
(ALL CRYOGENIC PIPES)
CRYOPUMP
(FREQUENCY
CHANGER)
MD1
VAPORIZER
250BAR
a
M P T
TRANSDUCER
(OVERTEMPERATURE AND
OVERPRESSURE SHUTDOWN)
PRESSURE
SENSOR
P1
TEMPERATURE
SENSOR
T2
e
KD1（0FF)
DN15
e
BUFFERING
KD2(OFF)
DN15


GAS INFLATION PART
GAS: Ar、O2、 N2
PMax=250bar
QMax=250Nm3/h
e
EMPTYING
304-DN25(Ø30×2.5)
e2
304-DN25(Ø30×2.5)
MD2
REGULATION
G1
VACUUM PUMP
304-DN15(Ø22×3.5)
PMax=250bar
QMax=250Nm3/h
e
304-DN25(Ø30×2.5)
304-DN25(Ø30×2.5)
304-DN25(Ø30×2.5)
P
PRESSURE SENSOR
KC6 DN15
KD5(OFF) DN15
KC4 DN15
KC1 DN15
KC45 DN15
KD6(OFF) DN15
KC7 DN15
PRESSURE SENSOR
KD7(OFF) DN15
KC8 DN15
P2
KC2 DN15
KC3 DN15
P3
KD8(OFF) DN15
KC9 DN15
Ar or O2 or N2 RINSE GAS
304-DN15(Ø22×3.5)
KD3(OFF) DN15
KD4(OFF) DN15
304-DN15(Ø22×3.5)
RINSE GAS Ar or O2 or N2
QP-L
a
EMERGENCY STOP BUTTON
SWITCHOVER RECHECK
P T KD MD
L
PLC
R
SWITCHOVER RECHECK
QP-R
LEGEND
SOLENOID VALVE
SHUT-OFF VALVE
CRYOGENIC SHUT-OFF VALVE
SAFETY VALVE
CHECK VALVE
MANAGEMENT PLATFORM
T
P3
P4
RECORDS AND REPORTS
GAS CYLINDER CONTAINER BASKET
4X4 TMax≤60℃
GAS CYLINDER CONTAINER BASKET
4X4 TMax≤60℃

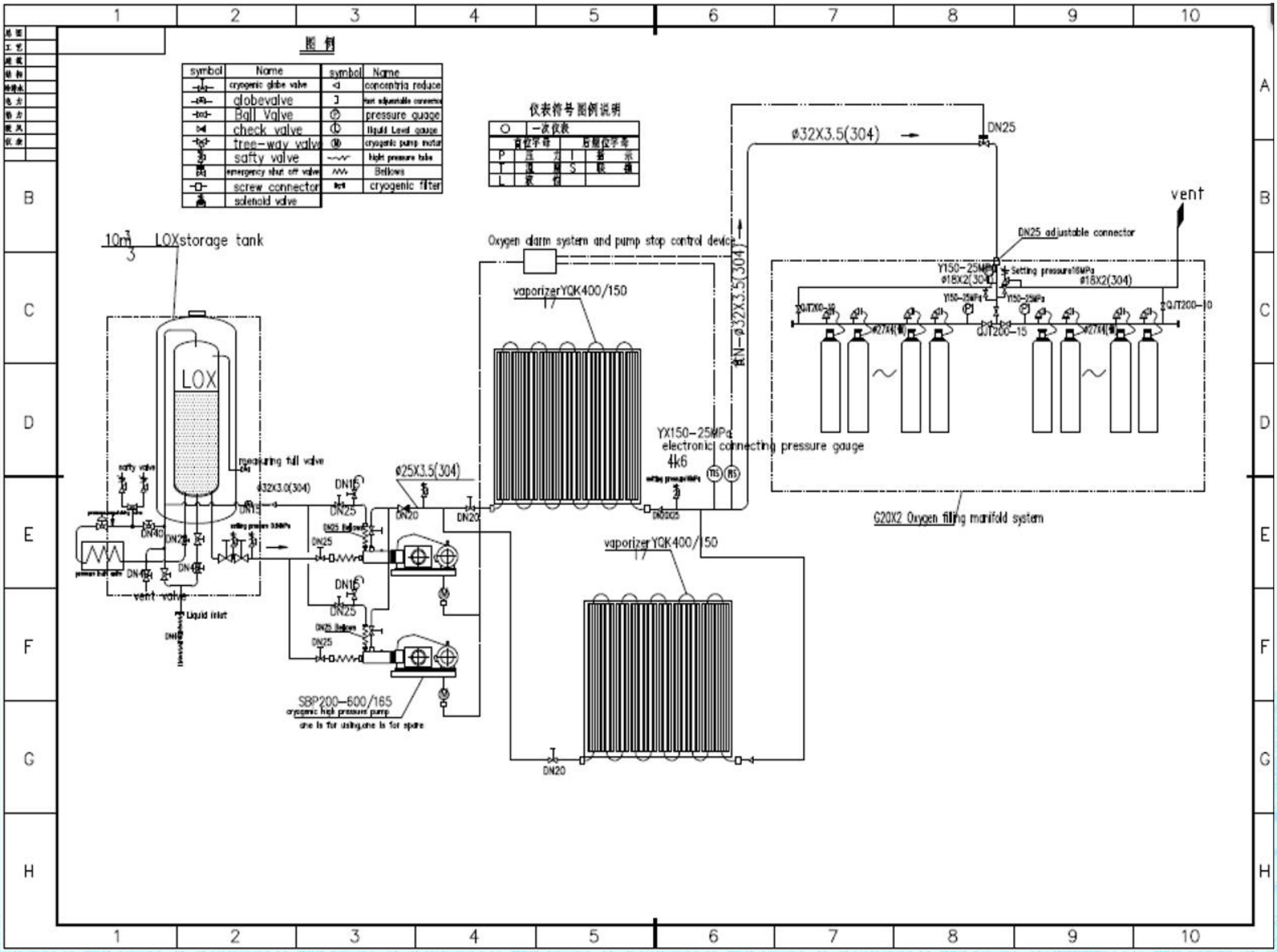
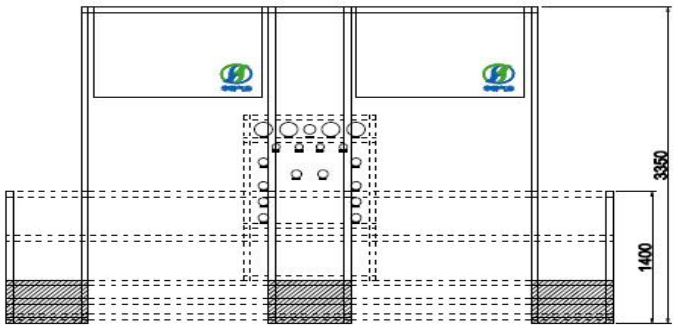


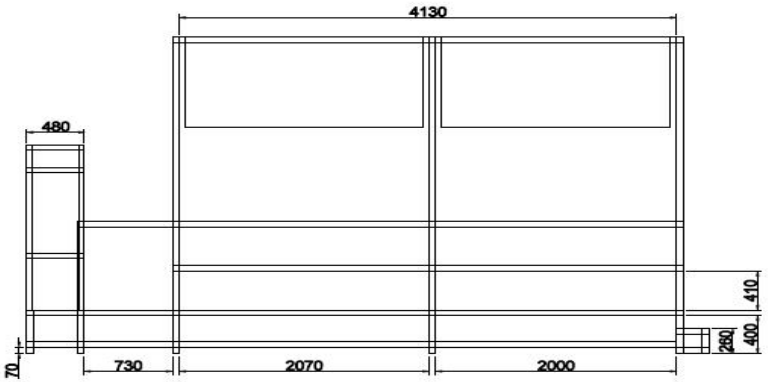
图 例
symbol
Name
cryogenic globe valve
globevalve
Ball Valve
check valve
tree-way valve
safty valve
emergency shut off valve
screw connector
solenoid valve
concentric reduce
pressure guage
liquid Level gauge
cryogenic pump motor
high pressure tube
Bellows
cryogenic filter
仪表符号图例说明
一次仪表
10m³ LOXstorage tank
LOX
safty valve
measuring full valve
vent valve
Liquid inlet
DN40
DN15
DN25
DN20
ø32X3.0(304)
ø25X3.5(304)
SBP200-600/165
cryogenic high pressure pump
one is for using,one is for spare
Oxygen alarm system and pump stop control device
vaporizerYQK400/150
YX150-25MPa
electronic connecting pressure gauge
4k6
ø32X3.5(304)
DN25
vent
DN25 adjustable connector
Y150-25MPa
ø18X2(304)
Setting pressure16MPa
QJT200-15
QJT200-10
G20X2 Oxygen filling manifold system

Filling Rack Schematic Diagram 1

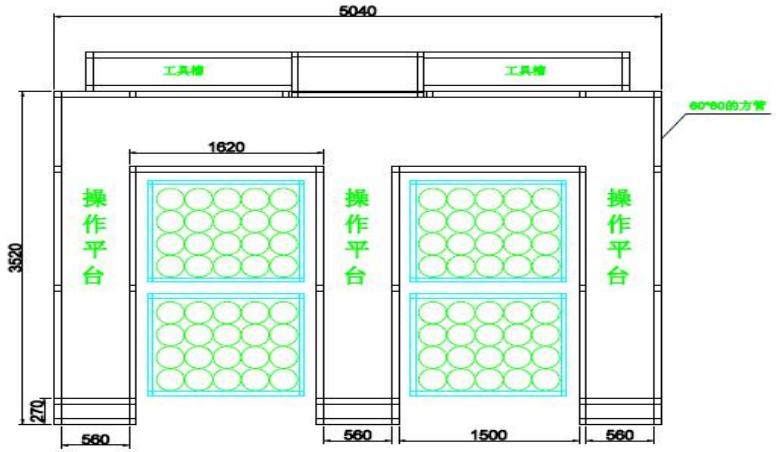
- Advantage :save space. Filling rack can be same in and out, one in and one out, placed on both sides, total three way.



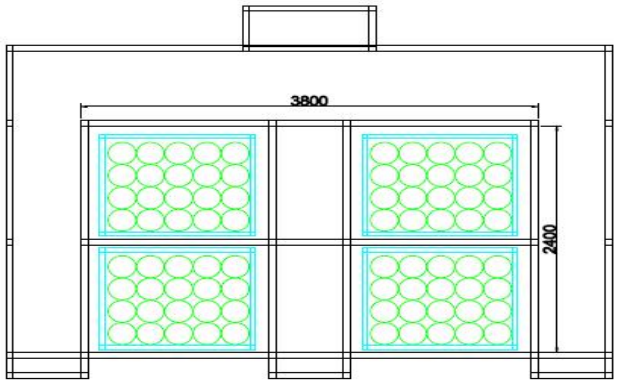
正视图



侧视图



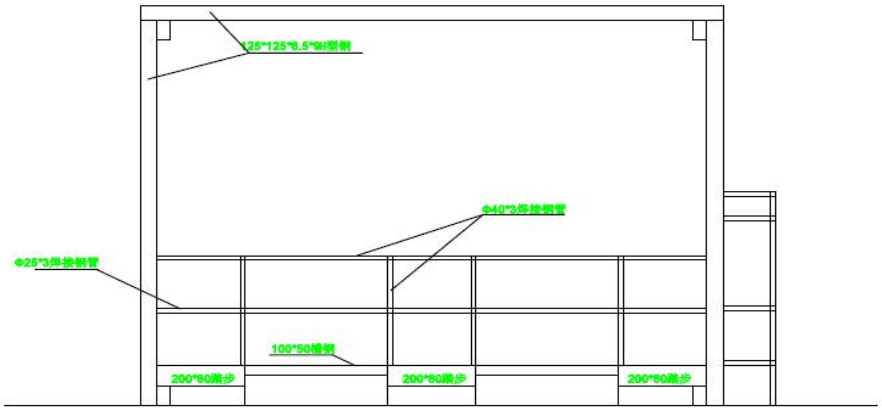
底部主视图



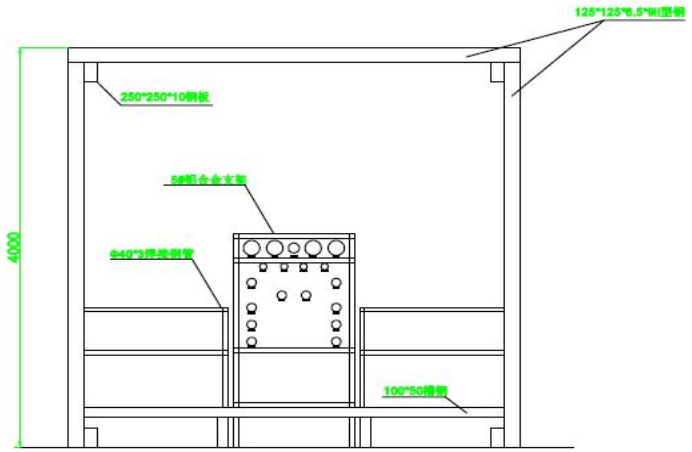
顶部主视图

充装框架平台		

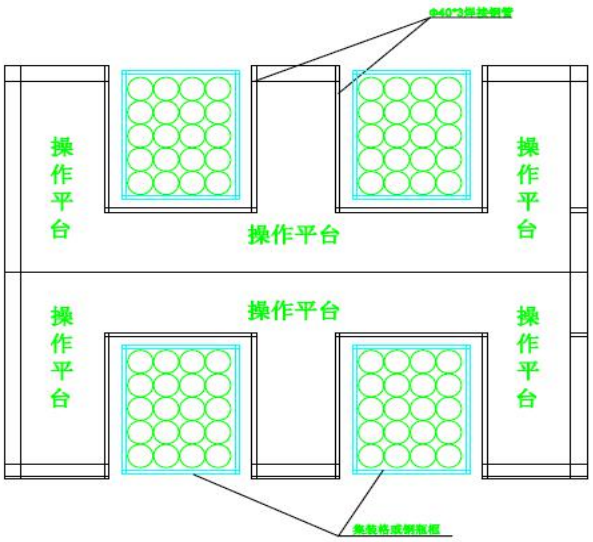
Filling Rack Schematic Diagram 2



A面

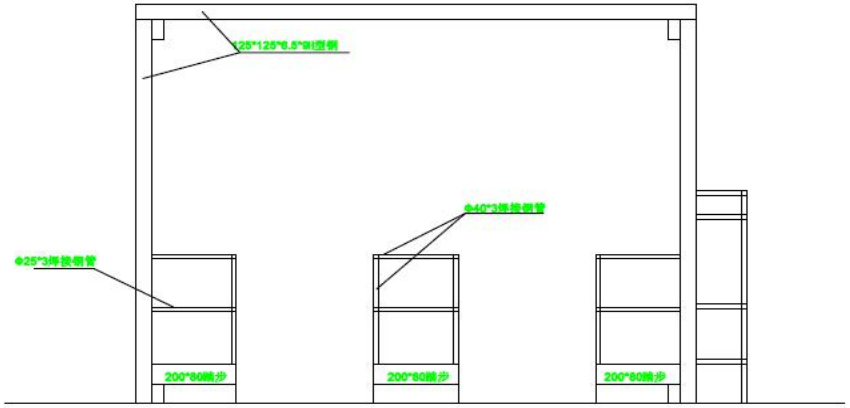


C面

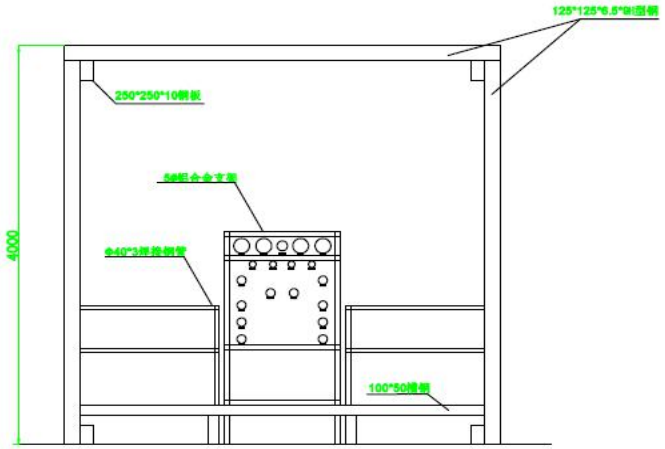


充装框架平台		工程号	
		图号	
		设计项目	
		比例	

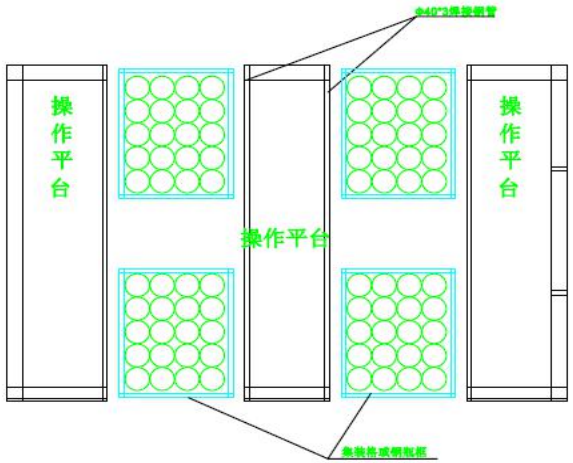
Filling Rack Schematic Diagram 3



A面

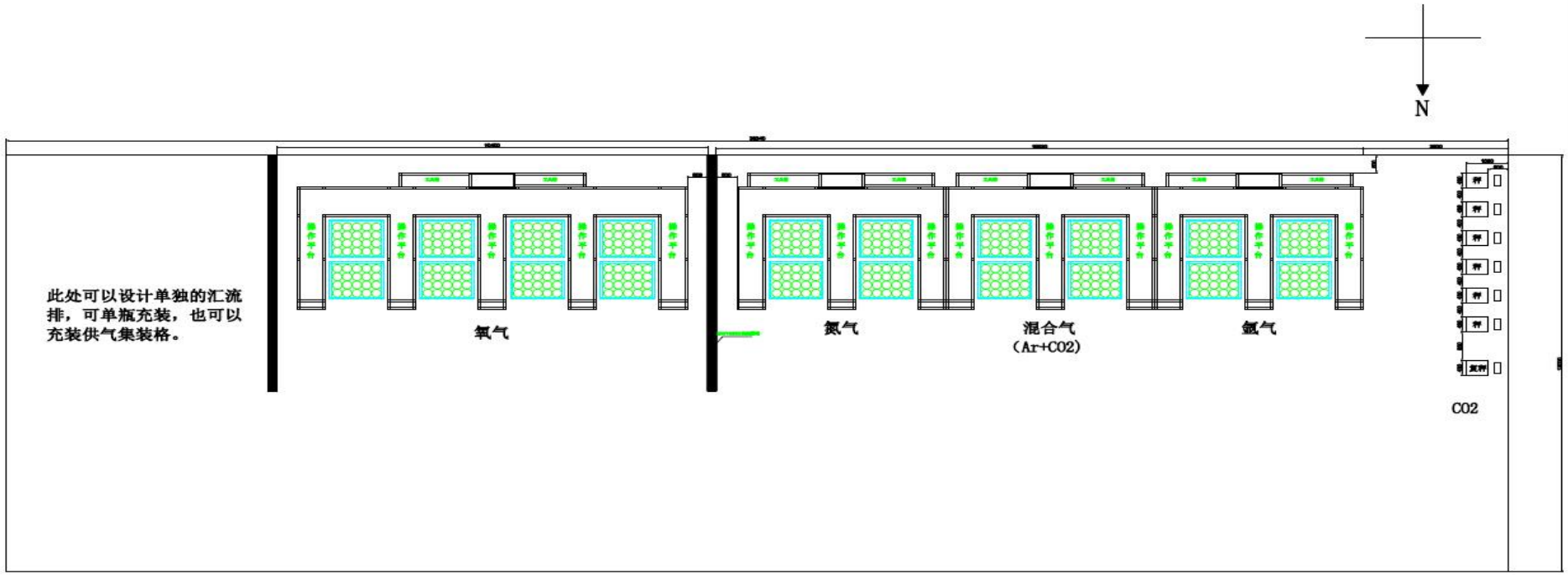


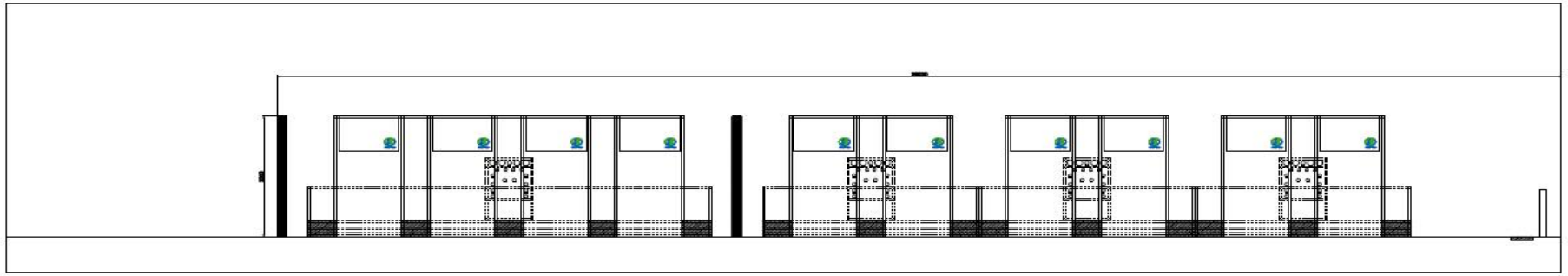
C面



充装框架平台		工程号	
		图号	
		设计项目	
制图		设计阶段	
设计		版本	
校核		比例	
审核		第1张	共1张

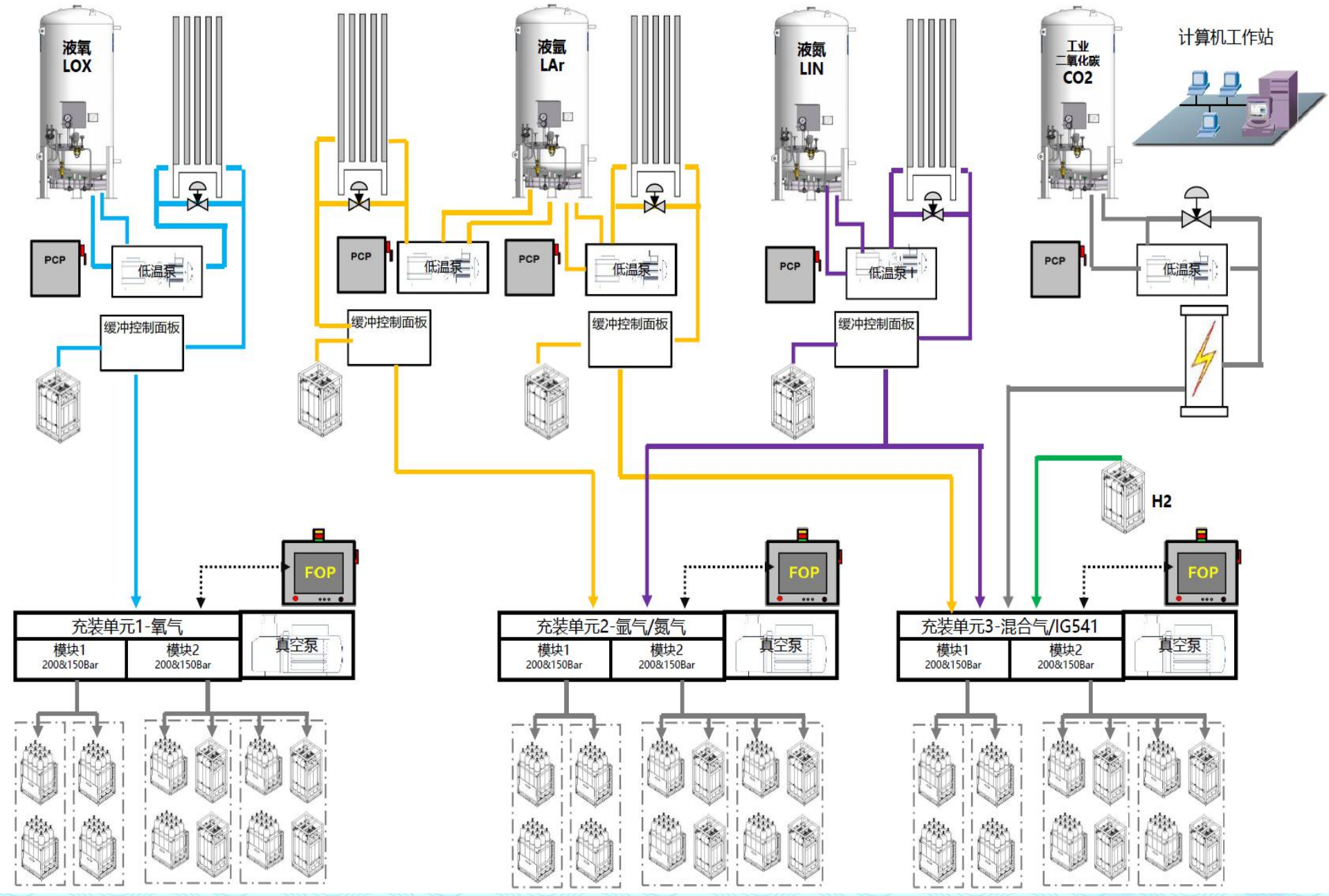
Floor Plan





工业气体充装平台

The whole station system schematic diagram

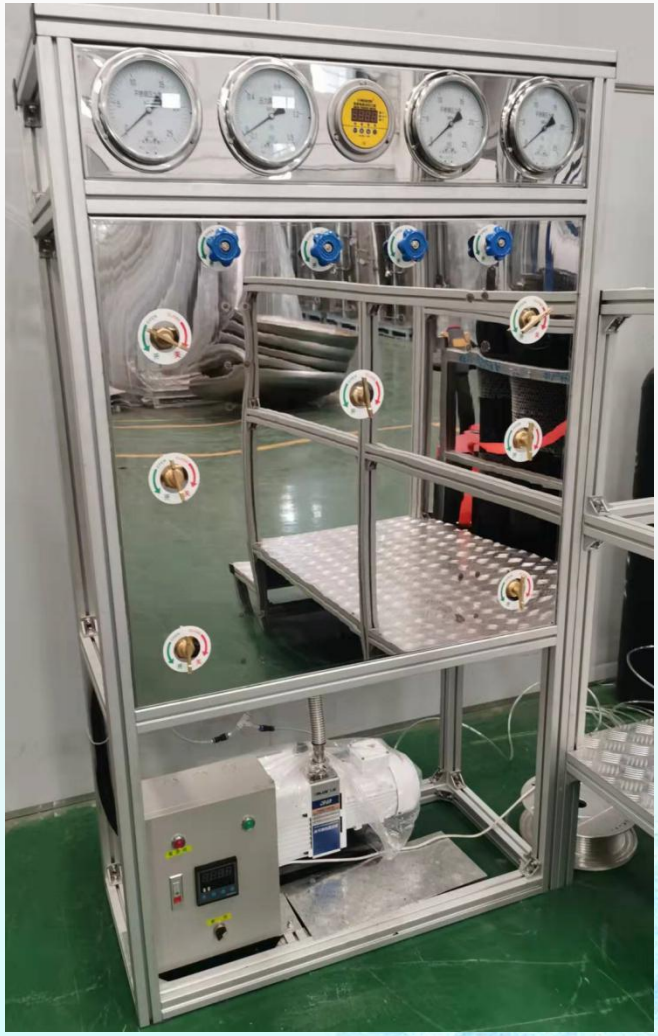


Control Panel

- mixed gas



Nitrogen, oxygen, argon



- The filling system (except the cryogenic part) uses a fully automatic control rack for filling

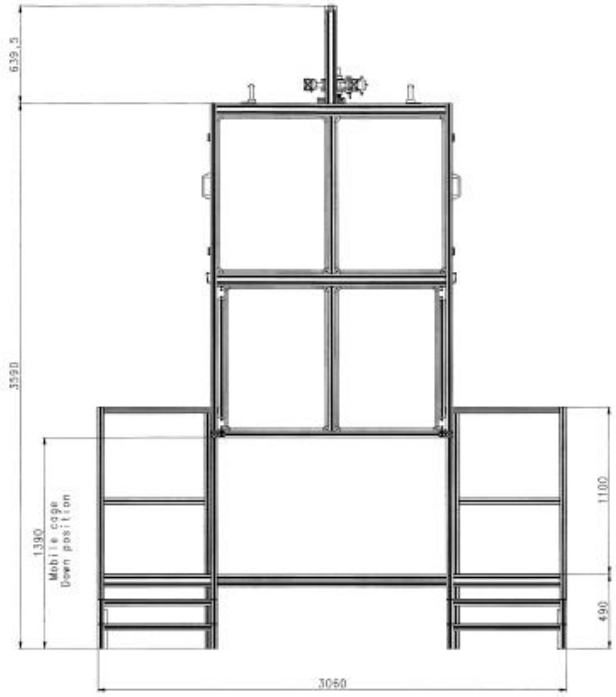


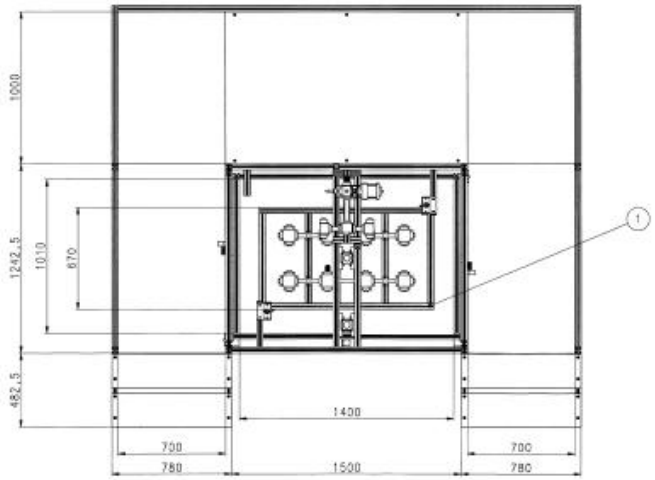


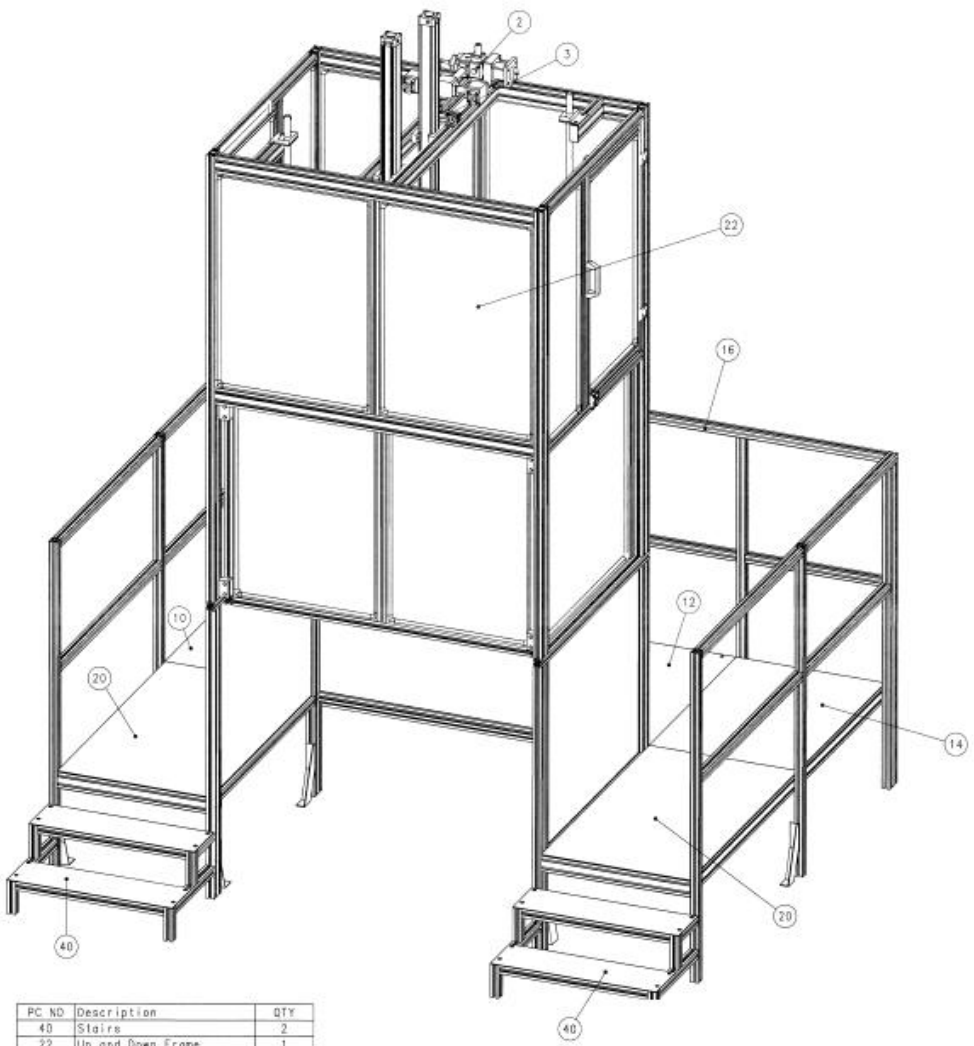
Lifting and Filling Platform



Platform Drawings







PC ND	Description	QTY
40	Stairs	2
22	Up and Down Frame	1
20	Walkway 20	2
16	Handrail	1
14	Walkway 14	1
12	Walkway 12	1
10	Walkway 10	1
3	Up and down Sub Assembly	1
2	Up and Down connexion	1
1	Distribution tray	1

Hose Telescopic Busbar Manifold Rack

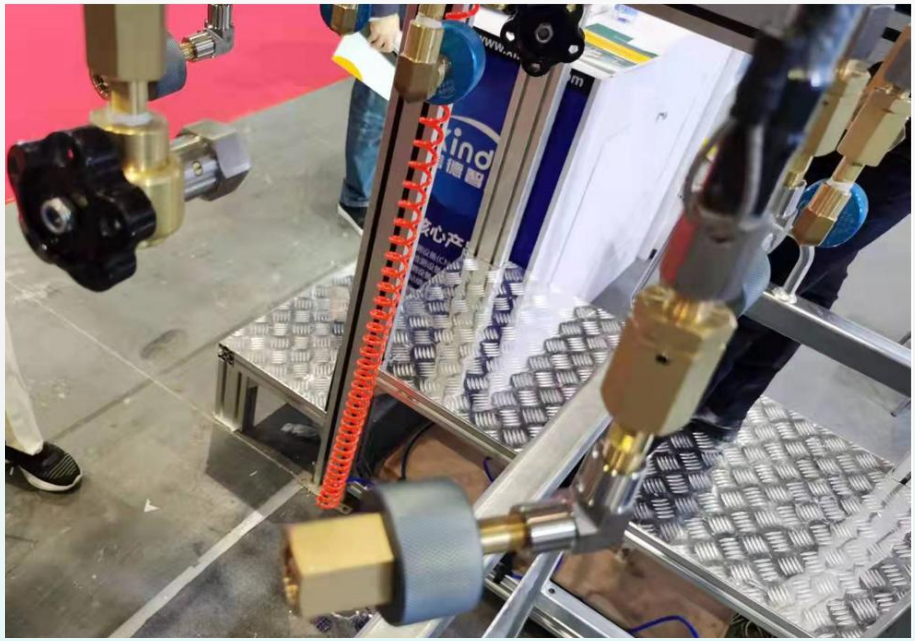




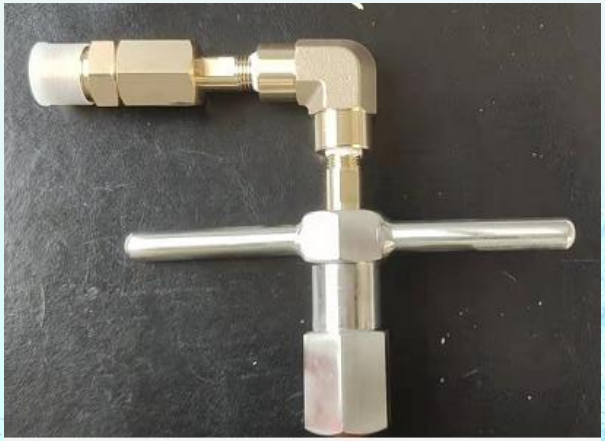



Cylinder Hose Connector

- With valve and without valve







Valves

- High pressure globe valve

It has the advantages of light operation, excellent sealing and long life, so it is used in the current basket filling system.



Ultra High Pressure Solenoid Valve



- DZGL1715B-200P-D24V DN15 ⊕
- DZGL1720B-200P-D24V DN20
- DZGL1725B-200P-D24V DN25

- Medium gaseous state, temperature 80℃, material CF8, working pressure 20Mpa, working mode normally closed, connection mode thread, voltage DC24V, power 26W, response time ≤0.1 seconds, coil life 1 million/time.

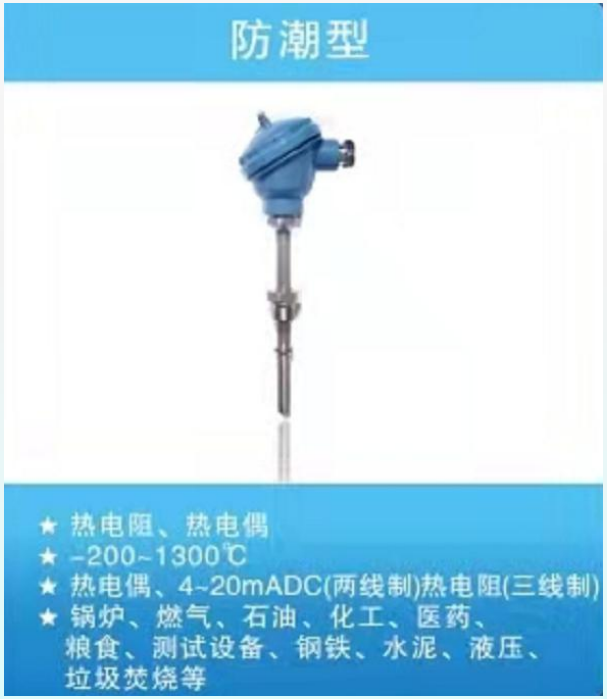
- Mainly used on manifold filling pipeline.

Safety cut off

- cryogenic cut off

Over-pressure cut off

Pneumatic high pressure ball valve







Above items are used in high pressure vaporizer outlet terminal , all filling station systems need to be installed

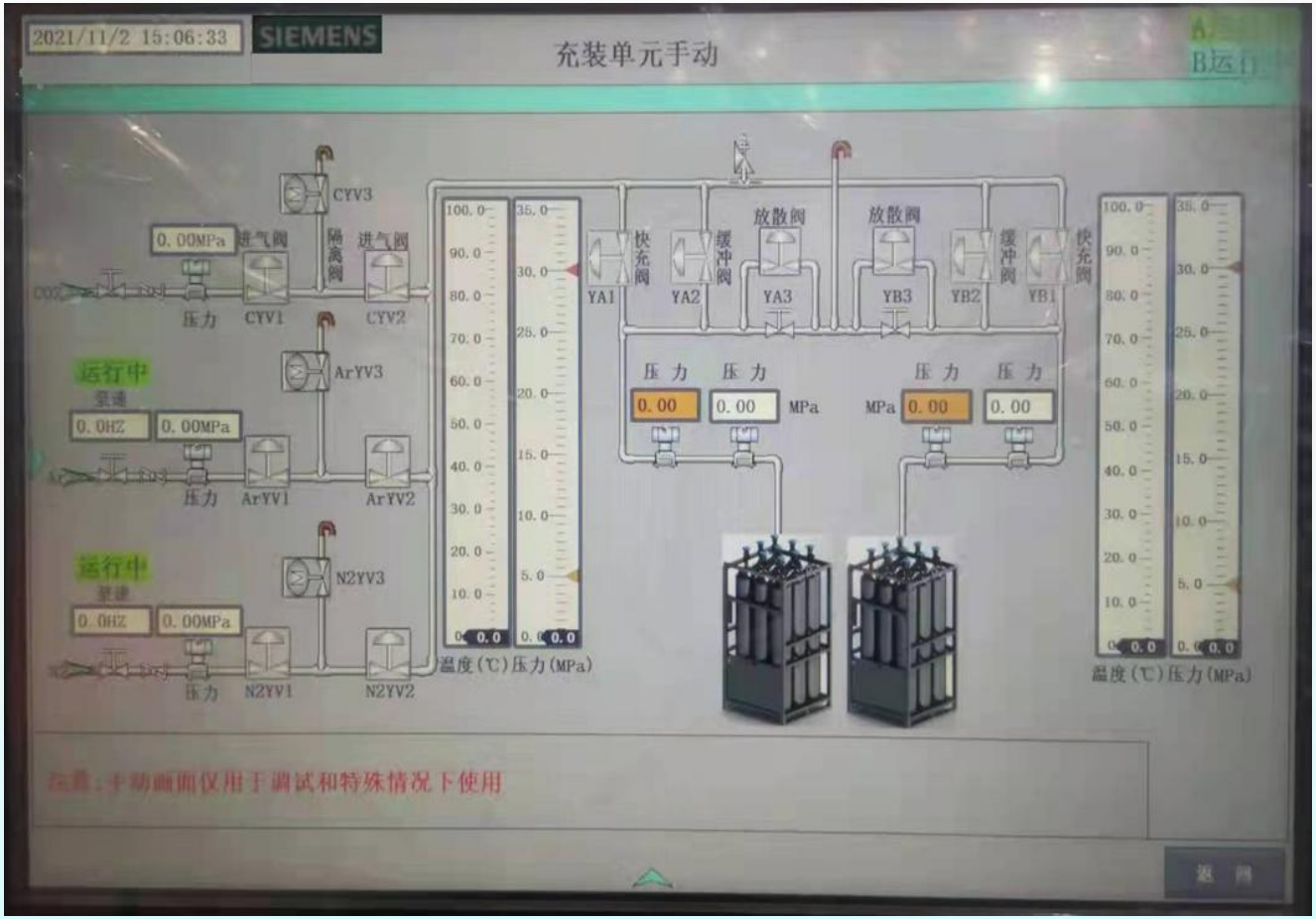
Vacuum Pump



- 1、Single-stage and double-stage pumps;
- 2、Common industrial gases use single-stage pumps;
- 3、High-purity gases require dual-stage pumps;

LCD screen and alarm on the filling rack

- A 7-inch, 10-inch or larger display screen can be installed on the panel of the filling rack, which can display the temperature and pressure intuitively, and operate the confirmation button and the execution button.





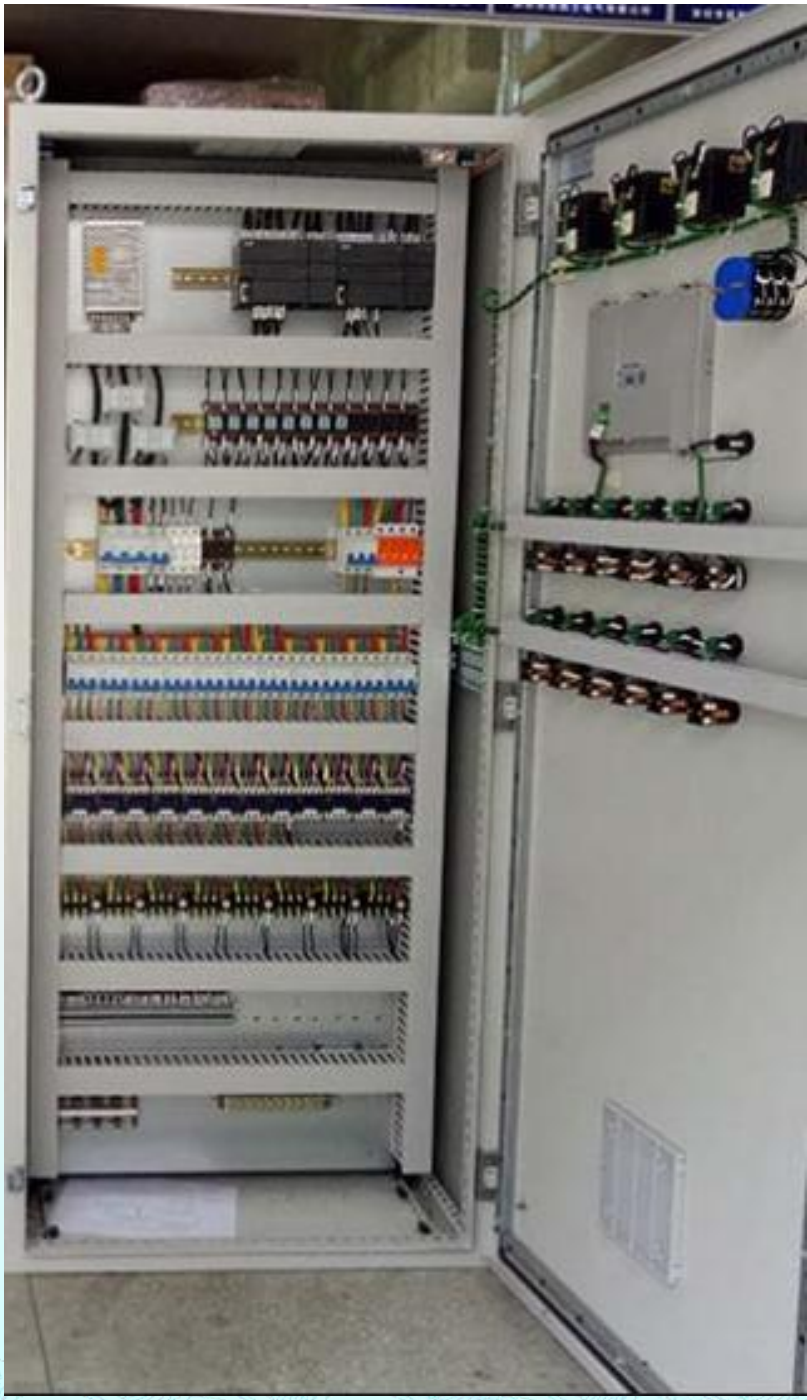


PLC Control cabinet

- PLC: Programmable logic controller, which uses a type of programmable memory for internal storage of programs, executes user-oriented instructions such as logic operations, sequence control, timing, counting and arithmetic operations, and uses digital or analog input/output. Control various types of machinery or production processes.







Cylinder transfer rack



- 1. There are G4*4, G4*5 ect.Cylinder transfer rack;
- 2. Material: carbon steel, galvanized;
- 3. With up and down cylinder movable board;
- 4. It can be transported by crane or forklift.
- 5. Check immediately when unloading the truck, and then install it on the shelf and then use a forklift to transfer it to the filling rack.。

Automatic filling scale





- filling medium：CO2、liquid gas
- 1. LED display and 304ss main body.;
- 2. Net weight and gross weight filling can be selected, when the weight reaches the setting value, it will automatically cut off and alarm;
- 3. A link can be made between scales, and the filling can be automatically opened without manual buttons;
- 4. After the filling is completed, the data of the filling cylinder is automatically saved, which can realize the networking function.

Applications

