REGIONE PUGLIA | PROVINCIA DI BARI | COMUNE DI TORITTO | COMUNE DI PALO DEL COLLE | COMUNE DI GRUMO APPULA

REALIZZAZIONE DI IMPIANTO AGRIFOTOVOLTAICO DESTINATO A PASCOLO DI OVINI E PRODUZIONE DI ENERGIA ELETTRICA DA FONTE RINNOVABILE FOTOVOLTAICA DA UBICARSI IN AGRO DI TORITTO (BA) INCLUSE LE RELATIVE OPERE DI CONNESSIONE ALLA RTN NEL COMUNE DI PALO DEL COLLE (BA) E DI IMPIANTO DI PRODUZIONE E DISTRIBUZIONE DI IDROGENO VERDE IN AREA INDUSTRIALE DISMESSA NEL COMUNE DI GRUMO APPULA (BA) ALIMENTATO DALLO STESSO IMPIANTO FOTOVOLTAICO

Potenza nominale cc: 30,38 MWp - Potenza in immissione ca: 29,97 MVA

ELABORATO

COMPONENTI PRINCIPALI - DATA SHEET

IMPIANTO IDROGENO

IDENTIFICAZIONE ELABORATO

Livello progetto	Codice Pratica	documento	codice elaborato	n° foglio	n° tot. fogli	Nome file	Data	Scala
PD		R	2.8_02			R_2.8_02_DATASHEETH2.pdf	03/2022	n.a.

REVISIONI

Rev. n°	Data	Descrizione	Redatto	Verificato	Approvato
00	04/03/2022	1° Emissione	MILELLA	PETRELLI	AMBRON

PROGETTAZIONE:

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mail: info@matesystemsrl.it pec: matesystem@pec.it

ORDINE DEGLI INGEGNERI PROVINCIA DI BARI
INGEGNERE FRANCESCO AMBRON
Sez. A - 8904
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PROPONENTE:
BANZI SOLARE S.R.L.
S.P 238 Km 52.500
ALTAMURA

Documento firmato da:
NINIVAGGI GIANFRANCO
15.03.2022 14:25:39 UTC

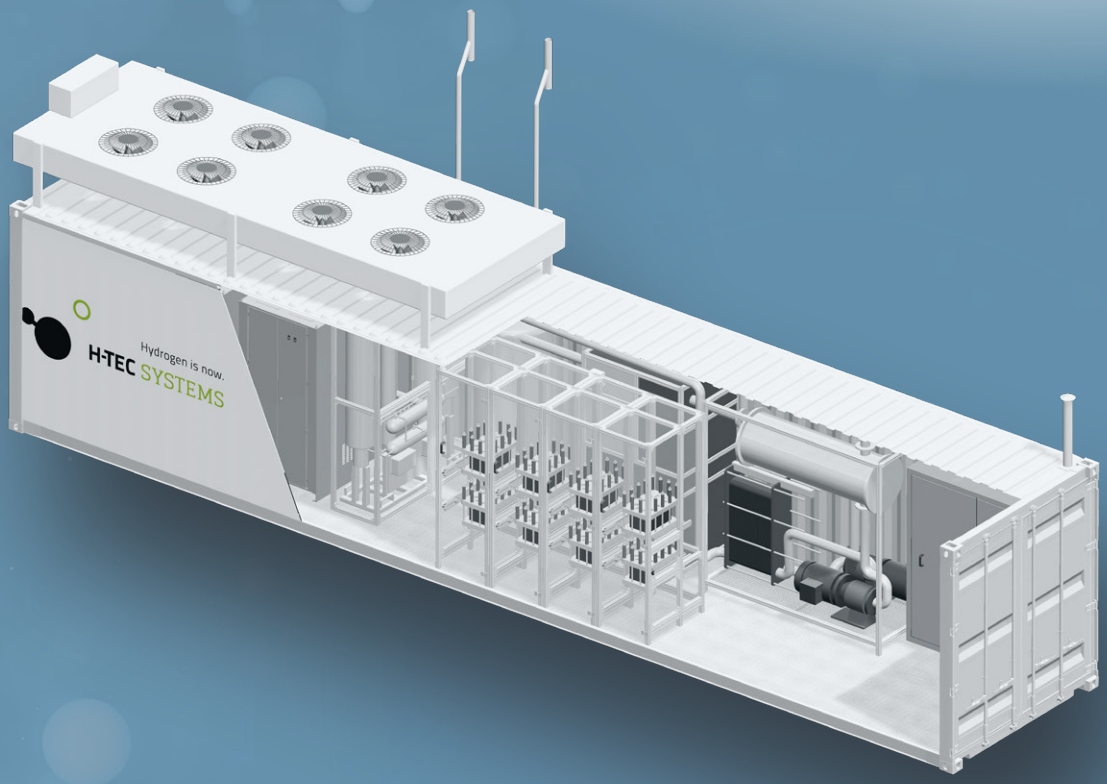
PARTNERSHIP:

enfoservice
Tutta la nostra energia al vostro servizio

SANROCCO

Hydrogen is now.

H-TEC SYSTEMS



H-TEC Series-ME: ME 450/1400*

READY. SET. SUPPLY.

PEM Electrolyser – The connecting link for sector integration and the decentralised production of hydrogen.

* The figure shows the core elements of the electrolyser.

MADE IN GERMANY

A GP JOULE COMPANY

INNOVATIVE PRODUCTS

for your supply of hydrogen.

The ME 450/1400 PEM Electrolyser belongs to H-TEC's Series-ME and is currently the most powerful electrolyser for decentralized applications in the megawatt class product range. New designs of the stack and the system allow the H-TEC electrolysers to achieve a very good price-performance ratio, with minimal production costs for hydrogen. Apart from that, the design of H-TEC's Series-ME offers many advantages. Its compact construction makes its transport, connection and use possible almost anywhere. Thanks to heat extraction, electrolysers made by H-TEC achieve an overall efficiency of up to 95 %.

Parameter	ME 450/1400	
H_2 nominal production	450 kg d^{-1}	210 Nm^3 h^{-1}
H_2 production range	25–210 Nm^3 h^{-1}	
H_2 purity	3.0, with adsorption drying: 5.0	
Nominal energy consumption	4.9 kWh Nm^{-3}	
Nominal load	1 MW	
Electrolyser power	0.2–1.4 MW	
Nominal system efficiency	74 %	
Load change	Partial load to nominal load = 30 s	
Heat extraction	max. 65 °C outlet temperature and 55 °C return temperature	
Operating pressure H_2	unpressurised – 30 bar	
Operating pressure O_2	unpressurised	
Feed water quality	Drinking water, nominal 350 kg h^{-1}	
Grid connection	Voltage: 3x 400 V/ 50 Hz + N + PE in accordance with IEC 60038. Connected load: 2 MVA	
Dimensions	40' container, approx. – ca. 12 m x 3 m x 3.5 m	
Weight	approx. 25 t	
Ambient temperature	-15 °C to +35 °C	

ABOUT US

H-TEC SYSTEMS was founded in 1997 and has more than 20 years of experience in the research and development of hydrogen technology. At sites in Schleswig-Holstein and Bavaria in Germany, PEM stacks and electrolysers are produced in the megawatt class for use in industry where hydrogen is required or the quality of an electrical supply has to be refined.

Since 2010, H-TEC SYSTEMS has been a member of the GP JOULE group, which integrates hydrogen-based energy storage equipment into intelligent operating and usage concepts for renewable energies. By using H-TEC electrolysers it is already today possible to couple the electrical power, heating and mobility sectors.

Find out more at **H-TEC.COM**

THE LINDE GROUP

Cryogenic Standard Tanks

LITS 2

Contents.

Title-page: The Linde standard tanks

Introduction.

To an increasing extent, industrial gases such as oxygen, nitrogen and argon are delivered to customers in liquid form at cryogenic temperatures and stored by the customer in tanks before further use.

The pressure ratings and sizes of these tanks have been standardised in accordance with the requirements of distribution logistics and economical series production.

Standard vacuum insulated tanks.

The vacuum-insulated double wall tanks consist of two concentric vessels, an austenitic steel inner tank and an outer jacket in carbon steel with an anti-corrosion primer and a special environmentally friendly top coat. The interspace between inner and outer tank is evacuated and filled with insulating powder (perlite). An adsorbent is also added to maintain the vacuum in the insulation interspace.

The standard tanks come in gross nominal water capacities from 3,160 litre to 61,620 litre. The maximum allowable working pressure for the inner vessels is 18, 22 or 36 bar gauge for design temperatures ranking from -196°C up to 20°C. All standard tanks have vertical configuration, requiring little space for installation.

The pressure vessels are manufactured and tested in accordance with the Pressure Equipment Directive EU 97/23/EC and EN 13458. These codes are internationally accepted. Consequently, it will be much easier than before to install and use these tanks in and outside of the European Union.

The Linde quality management system satisfies all elements of the ISO 9001 program. All produced tanks are subjected to inspection and quality control under supervision of independent inspection bodies.

The operating pressure may be set up to 90 % of the maximum allowable working pressure and is automatically maintained constant by the regulator and pressure building coil fitted to the tank.

Each tank can also be equipped with a tank mounted (clip-on) air-heated vaporiser to supply product in gaseous form at ambient temperatures and flow rates up to 120 Nm^3/h. Standard tank features are various fittings for transportation and installation. Vaporisers up to 1,000 Nm^3/h are installed separately.

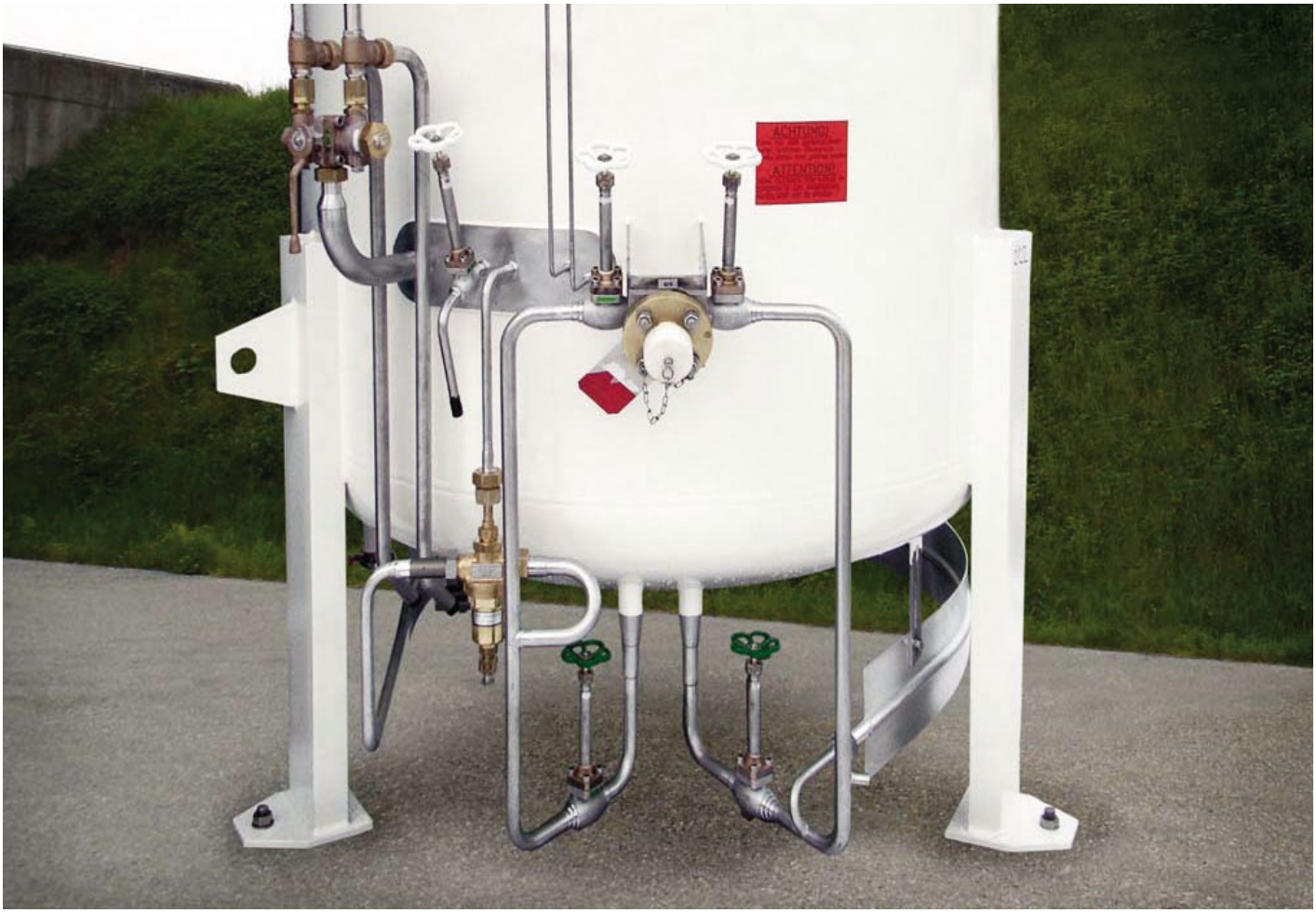
Based on the standard design, Linde offers additional features depending on client´s requirements.

Standard carbon dioxide tanks are very similar to the tanks for air gases. As a function of the application and customer's request you have here the choice between an inner vessel either manufactured from a low temperature resistant austenitic steel or a fine grain carbon steel. The insulation system is equal to the system which is used for the air gas tanks.

CO_2-tanks, equipped with an inner vessel made out of a low temperature resistant austenitic steel can therefore also be used as multi-purpose storage for other industrial gases.

Linde owns long standing experience in handling other liquefied gases such as for example LNG and hydrogen. Tanks for these gases are engineered and manufactured according to customers specifications, therefore quotations will be elaborated from case to case.

Arrangements of valves, pipes and instrumentation



Quality standards for cryogenic tanks.

Quality management and inspection is based on the following guiding principles:
Quality management and inspection is an indispensable part of our corporate strategy and therefore a managerial responsibility carried out at all levels of the company. We consider the improvement of our product quality and the continued development of our quality management system as a permanent challenge.

The Schalchen Plant is certified according to:
- EN ISO 9001/2000
- ASME (U, U2, R-Stamp)
- Manufacture license of special equipment People's Republic of China and others

Acceptance inspection is carried out by the experts of the Notified Body acc. to the valid (international) laws and further by Linde's own specialists.

Optional standards for enhanced quality

Depending on customer requirements the tanks are available in two enhanced quality degrees:

Quality degree	Technical detail	Applications
HQ Degree for media with purity >5.0	– Inner vessel stainless steel – Inner vessel and pipes pickled – Stainless steel cryogenic valves below sealed	High demands in semiconductor industry and research
IQ Degree for corrosive industrial environment	– Inner vessel stainless steel – Stainless steel cryogenic valves with stuffing box	Corrosive environment

Technical data - tanks for air gases LIN, LOX, LAR.

Size			30	60	110	200	300	490	610	800
Max. allowable working pressure	air gases: 18 bar, 36 bar									for LIN only
Gross capacity	approx. litre		3,160	6,365	11,535	20,355	30,205	49,020	61,620	80,360
Net capacity	approx. litre	18 bar	3,000	6,050	10,960	19,340	28,700	46,570	58,540	76,340
		36 bar	2,840	5,730	10,380	18,320	27,180	44,120	55,460	
Pressure stage										
18 bar,	kg LIN		2,425	4,890	8,855	15,630	23,190	37,630	47,300	61,680
filling ratio 95 %, 1 bar	kg LOX		3,425	6,910	12,530	22,090	32,885	53,180	66,850	
	kg LAR		4,185	8,440	15,290	26,980	40,040	64,965	81,660	
36 bar,	kg LIN		2,300	4,630	8,390	14,800	21,970	35,650	44,810	
filling ratio 90 %, 1 bar	kg LOX		3,250	6,540	11,850	20,920	31,050	50,390	63,340	
	kg LAR		3,970	7,990	14,480	25,560	37,920	61,550	77,370	
Boil-off rate	%/d LIN		0.67	0.58	0.44	0.31	0.30	0.21	0.20	0.19
1 bar, 15°C A.T.	%/d LOX		0.42	0.37	0.29	0.20	0.19	0.13	0.12	
referred to total capacity	%/d LAR		0.46	0.40	0.32	0.21	0.21	0.15	0.14	
vacuum < 2 x 10^{-2} mbar										
Discharge capacity with standard pressure building coil at 0,7 x MAWP and 8 hours operating time										
pressure stage										
18 bar	m^3/h (1 bar, 15°C) LIN			150	300	300	600		600	600
	m^3/h (1 bar, 15°C) LOX			190	380	380	750		750	
	m^3/h (1 bar, 15°C) LAR			190	380	380	750		750	
36 bar	m^3/h (1 bar, 15°C) LIN			140	140	140	280		280	
	m^3/h (1 bar, 15°C) LOX			180	180	180	360		360	
	m^3/h (1 bar, 15°C) LAR			180	180	180	360		360	
Capacity of one safety valve at 1.1 x MAWP/cold condition										
pressure stage										
18 bar	kg/h LIN					1,090				1,070
	kg/h LOX					1,010				
	kg/h LAR					1,240				
36 bar	kg/h LIN					5,610				
	kg/h LOX					2,260				
	kg/h LAR					2,850				
Insulation	insulating powder (perlite), vacuum < 5 x 10^{-2} mbar (tank in operation), status of delivery: 5 mbar									
Main material	inner vessel: low temperature resistant austenitic steel outer vessel: carbon steel									
Main dimensions	overall diameter		1,600	1,600	2,000	2,400	2,400	3,000	3,000	3,000
	overall hight		4,150	7,150	7,350	8,350	11,550	11,550	14,150	18,050
Weight empty, kg	18 bar type		2,510	4,910	5,940	9,840	13,920	19,300	23,370	29,650
	36 bar type		2,600	5,220	7,180	12,310	17,090	24,570	30,260	

LIN = liquid nitrogen; LOX = liquid oxygen; LAR = liquid argon

Technical data - tanks for carbon dioxide.

Size		30	60	110	200	300	490	610
Max. allowable working pressure	CO_2: 22 bar							
Gross capacity	approx. litre	3,160	6,365	11,535	20,355	30,205	49,020	61,620
Net capacity	approx. litre	2,940	5,920	10,730	18,930	28,090	45,590	57,310
Filling ratio 93 %, 1 bar	kg CO_2	3,120	6,280	11,370	20,065	29,780	48,330	60,740
Boil-off rate 1 bar, 15°C A.T. referred to total capacity vacuum < 2 x 10^{-2} mbar	%/d CO_2	0.22	0.19	0.14	0.10	0.10	0.07	0.06
Discharge capacity with standard pressure building coil at 0.7 x MAWP and 8 hours operating time								
pressure stage 22 bar	kg/h (1 bar, 15°C) CO_2	70		140	140	280	280	
Capacity of one safety valve at 1.1 x MAWP/cold condition								
pressure stage 22 bar	kg/h, CO_2				975			
Insulation	insulating powder (perlite), vacuum < 5 x 10^{-2} mbar (tank in operation) status of delivery: 5 mbar							
Main material	inner vessel: low temp. resistant austenitic steel outer vessel: carbon steel							
Main dimensions	overall diameter	1,600	1,600	2,000	2,400	2,400	3,000	3,000
	overall hight	4,150	7,150	7,350	8,350	11,550	11,550	14,150
Weight empty, kg	22 bar Type	2,510	4,910	6,300	10,250	14,500	20,500	24,800

Features.

Highly effective operation

Two service valves provide an exchange possibility for the filling valves even if the tank is filled.
Integrated pressure building coil for standard discharge capacities (service valves see flow diagrams: valve 2 pressure building and valve 13 gas shut-off). The tank also has an optimized design to reduce ice formation.

Safety

In case that the safety valves will release product, the medium will be blown off to a safe place.

Easy operation

All valves required for operation are set in one line

Ergonomical position of controls and instruments

The tank controls and instruments are set in two lines.

- **Operation line:**
  Operation controls and instruments
- **Service line:**
  Service controls and instruments
- Weather protection for instruments

The operation controls and instruments can be operated by the user. A white handwheel is fixed on top of this instruments and will be used for filling or extraction.

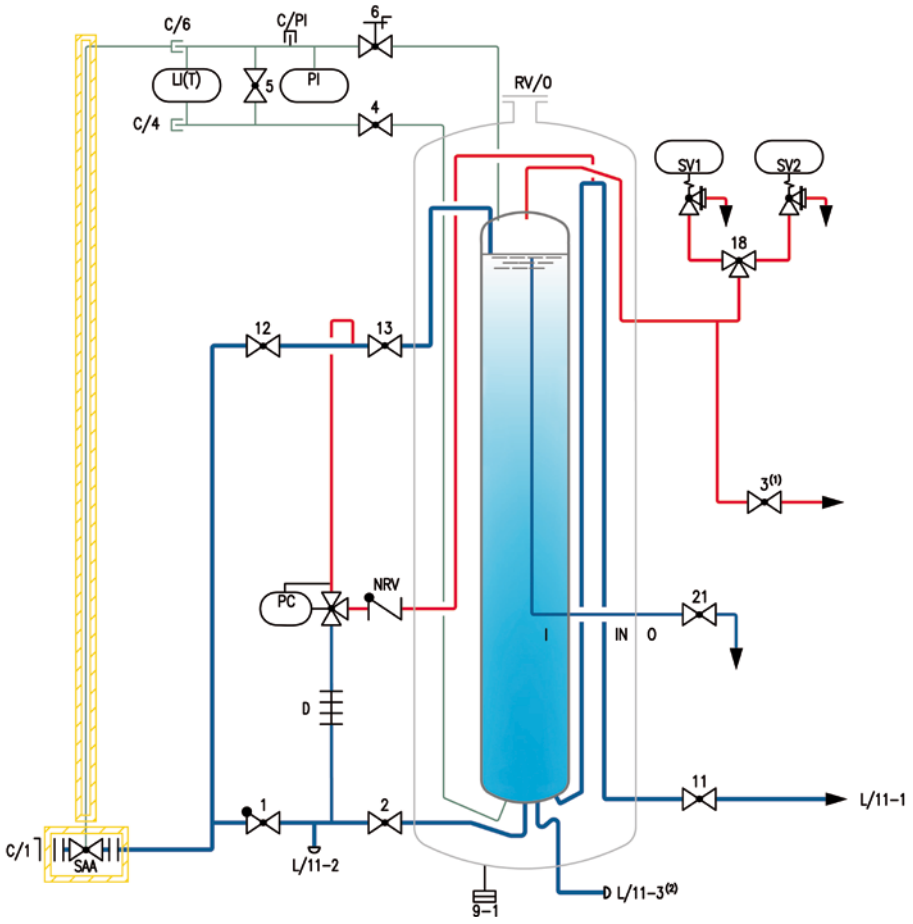
The service controls and instruments will be used by trained employees of the gas supplier only. These valves are marked with a green handwheel.

Non-corroding transport and lifting devices

Stainless steel transport legs

Additional vent valve (for T.. V110 - T.. V610)

Lifting lugs with stainless steel inlay



Flow diagram - tanks for nitrogen, oxygen, argon.

Instrumentation and equipment, standard

C/1	Fill coupling
C/4, C/6	Connection add. transmitter
C/PI	Test connection pressure indicator
D	Pressure building coil
I	Inner vessel
IN	Insulation
LI	Level indicator
L/11-1	Pipeline discharge
L/11-2	Pipeline discharge (plugged)
L/11-3	Pipeline discharge (plugged)
NRV	Non return valve
O	Outer vessel
PC	Pressure controller
PI	Pressure indicator
RV/O	Relief valve-outer vessel
SV1, SV2	Safety valve

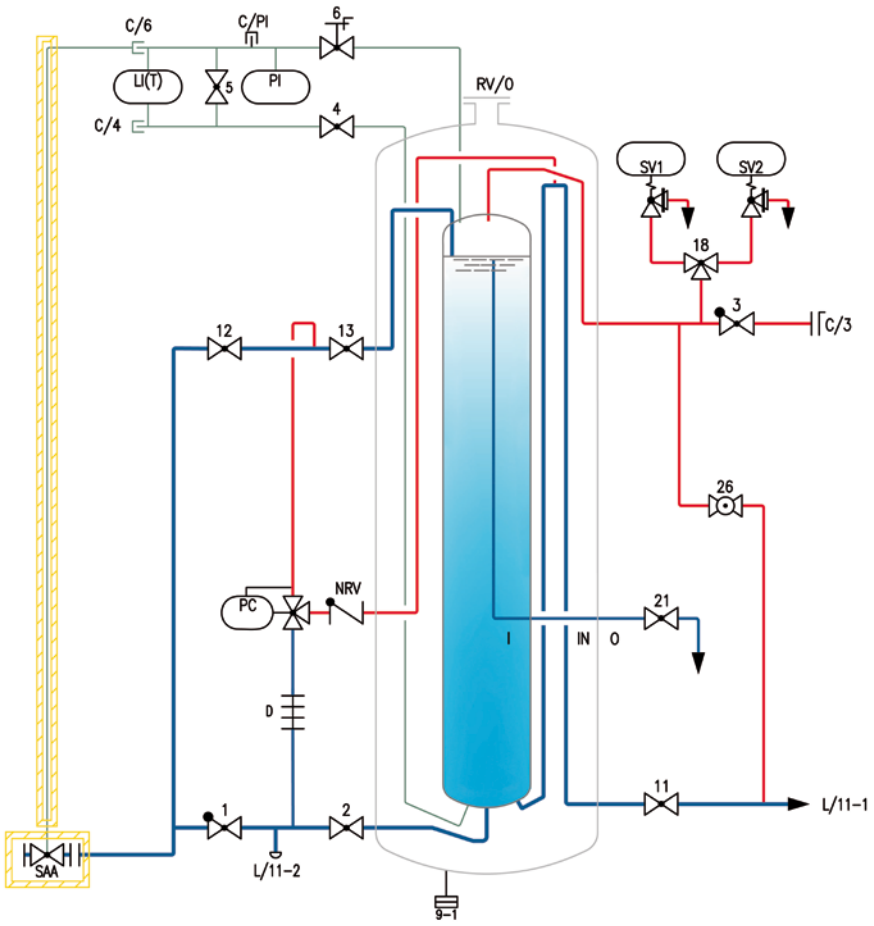
(1) only T ... V110 - T ... V800
(2) only T18 V200 - T18 V800

Valves, standard

1	Filling
2	Pressure building valve
3	Vent valve
4	Bottom gauge (+)
5	Gauge bypass
6	Top gauge (-)
9-1	Evacuation connection
11	Discharge
12	Top filling
13	Gas shut-off
18	Change over
21	Trycock

Options

SAA	Safety shut-off valve, control line for SAA
LI(T)	Level indicator Samson Media 6 incl. instrument panel and standard programming, extra programming of Samson Media 6 acc. to customer requirements
LI(T)	Level indicator WIKA with transmitter output 4 - 20 mA



Flow diagramm - tanks for carbon dioxide.

Instrumentation and equipment, standard

C/3	Vent coupling
C/4, C/6	Connection add. transmitter
C/PI	Test connection pressure indicator
D	Pressure building coil
I	Inner vessel
IN	Insulation
LI(T)	Level indicator
L/11-1	Pipeline discharge
L/11-2	Pipeline discharge (plugged)
NRV	Non return valve
O	Outer vessel
PC	Pressure controller
PI	Pressure indicator
RV/O	Relief valve-outer vessel
SV1, SV2	Safety valve

Valves, standard

1	Filling
2	Pressure building valve
3	Vent
4	Bottom gauge (+)
5	Gauge bypass
6	Top gauge (-)
9-1	Evacuation connection
11	Discharge
12	Top filling
13	Gas shut-off
18	Change over
21	Trycock
26	Pressuring

Options

SAA	Safety shut-off valve, control line for SAA
LI(T)	Level indicator Samson Media 6 incl. instrument panel and standard programming, extra programming of Samson Media 6 acc. to customer requirements
LI(T)	Level indicator WIKA with transmitter output 4 - 20 mA

Clip-on standard design.

Special VAP - Quality for specific use.

The vaporisers are suitable for a design overpressure = max. allowable working pressure (PS) of 40 bar and an allowable operating temperature range (TS) of -269°C/+50°C.

Design and testing was carried out in accordance with the directive 97/23/EC concerning pressure equipment, AD 2000-Merkblätter and DIN EN.

The Linde finned tubes and connecting flanges are made of aluminium alloy and the seals are formed according to Linde Standards.

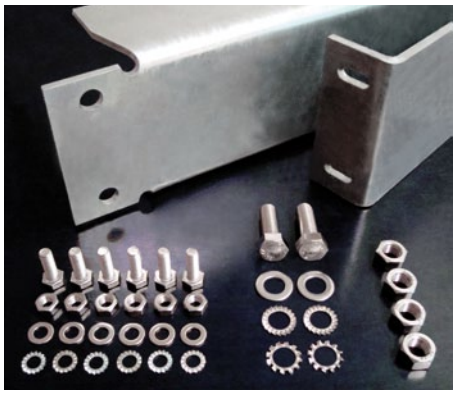
Clip-on standard design means the vaporiser without frame. Upon customer request, a mounting kit for installation on a cryo-tank is available.

Explanation of type designation:

L = air heated
40 = max. permissible working overpressure: 40 bar
8 F = number of Finned tubes: 8
2,5 = length of single finned tube: 2,5 m

Type L 40 - 4 F 2,5

Mounting kit



Type L 40 - 2 F 2,5

vaporiser type	dimensions approx.			weight empty	nominal capacity*)	connections (inlet/outlet)	Linde ident-no.
	depth [m]	widht [m]	height[m]	[kg]	N_2 [Nm³/h]	[mm]	
L 40 - 8 F 2,5	1,67	0,516	2,733	140	120	screwed: M40 x 2 pipe: DN 15 (21,3 x 1,5) socket welding end: ø18,2 material: stainless steel	J34895
L 40 - 4 F 2,5	1,67	0,276	2,733	74	60		I32740
L 40 - 2 F 2,5	0,69	0,276	2,709	37	30		I32631

*) The capacity is based on an ambient temperature of 20°C, 70 % rel. humidity, 15°C temperature difference between ambient and gas outlet temperature at a continuous 8-hours-operation


Linde Gas
Linde

SHEQ - safety, health, environment and quality police.

At the Engineering Division, we do not want to harm people or the environment. We will comply with all applicable legal, regulatory, internal and industry requirements.

We strive to be leading in SHEQ to meet safe, secure and healthy working conditions and supplying safe, compliant and environmentally responsible products and services for our customers.

SHEQ is a key part of The Linde Group's overall strategy and we will also require our contractors and partners to manage in line with this policy.

To achieve this vision,
SHEQ is 100 % of our behaviour,
100 % of the time.

Service and guarantee.

Welcome to the Engineering Division

The Linde Schalchen Plant is located 100 km east of Munich, Germany. 700 engineers and skilled workers design and manufacture components and complete modules for the application in process plants.

Backed up by more than 100 years of production know-how, highly developed plant modules are manufactured. Our innovative technologies and our competitiveness open the door to participation in prestigious plant projects worldwide.

Linde provides complete services on field installation and operation. A specialised service crew is available for immediate and professional repair services.

Do you need further and more detailed information?
Just ask us – we will be pleased to help you.

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83342 Tacherting/Germany
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E-Mail: plantcomponents@linde-le.com
Internet: www.linde.de

Production area
of standardised equipment:
- Advice and sale
  Phone: +49.8621.85-6777
- After sales service, guarantee, spare parts
  Phone: +49.8621.85-6279

Other products by production area
of standardised equipment:
- Static vacuum insulated cryogenic vessels
- Spiral welded pipes

Designing processes – constructing plants.

Linde´s Engineering Division continuously develops extensive process engineering know-how in the planning, project management and construction of turnkey industrial plants.

The range of products comprises:
- Petrochemical plants
- LNG and natural gas processing plants
- Synthesis gas plants
- Hydrogen plants
- Gas processing plants
- Adsorption plants
- Air separation plants
- Cryogenic plants
- Biotechnology plants
- Furnaces for petrochemical plants and refineries

More than 4,000 plants worldwide document the leading position of the Engineering Division in international plant construction.

Production facilities.

At Linde Engineering Schalchen Plant over 700 skilled engineers and workers design and manufacture components and complete modules for numerous applications in process plants such as ethylene plants, hydrogen and synthesis gas plants, LNG plants and air separation plants. Production capacity totals approx. 1.3 million hours per year.

In addition, the plant offers services for field installation and advice on operation. A specialised service crew is available for immediate and professional repair services.

Product range.

- Aluminium plate-fin heat exchangers as single units or as manifolded assemblies
- Cold boxes with aluminium plate-fin heat exchangers, columns and vessels
- Coil-wound heat exchangers and isothermal reactors for chemical and petrochemical plants
- Columns and pressure vessels in aluminium for cryogenic plants
- Spiral-welded pipes in aluminium
- Storage tanks for liquefied gases
- Steam-heated waterbath vaporisers as well as air-heated vaporisers for liquefied gases

For further informations please contact:

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P/3.3.e/12

CHINT GLOBAL

PCS(POWER conversion System), for changing DC to AC, but in this system, the batteries is not made by Chint, Because Chint does not produce batteries, Batteries shall be ordered separately from BYD minimum 20MW each time.

YBM29-40.5/0.4-4200

Power Conversion System

1.1

Power Conversion System

Overview

Medium-Voltage Power Conversion System integrates Power Conversion system (PCS), medium-voltage transformer, medium-voltage ring main unit, medium-voltage cables, and low-voltage cables in a rust-proof and moisture-proof cabinet. The primary and secondary equipment of the power transformation system are highly integrated, safe and reliable, with the reasonable design and compact structure. The product has many advantages such as small footprint, simple installation, reliable operation, convenient maintenance, beautiful appearance, and color coordination with the surrounding environment.

Standards

– IEC 61378-1 Converter transformers - Part 1: Transformers for industrial applications
– IEC 60071 Insulation co-ordination
– IEC 60076-1 Power transformer Part 1: General
– IEC 60076-2 Power transformer Part 2: Temperature rise for liquid-immersed transformers
– IEC 60076-3 Power transformer Part 3: Insulation levels, dielectric tests and external clearances in air
– IEC 60076-4 Power transformer Part 4: Guide to the lightning impulse and switching impulse testing – Power transformers and reactors
– IEC 60076-5 Power transformer Part 5: Ability to withstand short circuit
– GB/T 17467 High-voltage/low-voltage prefabricated substation

Service Environment

— Altitude: ≤2000m
— Ambient air temperature: -25℃ ~ 40℃
— Ambient humidity: 0~100%
— Earthquake intensity: ≤8 degrees
— Pollution level: III level
— Salt spray grade: C4
— Installation location: no danger of fire and explosion, no severe chemical corrosion and severe vibration

Note: Please contact the manufacturer if the above-mentioned environmental conditions are exceeded.

Main Technical Parameters

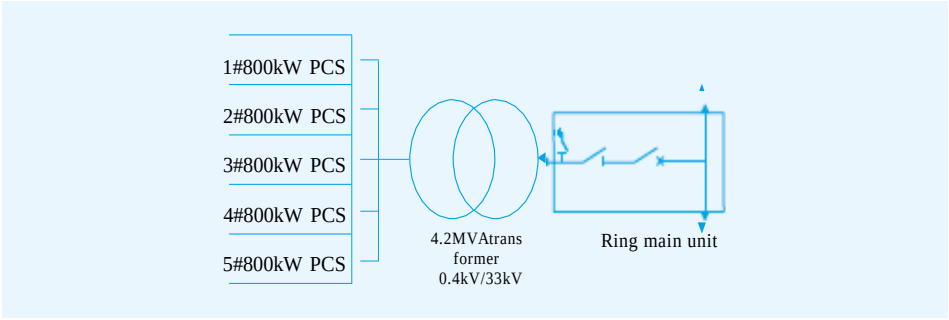
No.	Items	Unit	Parameter
1	Rated voltage	kV	33/0.4
2	Rated current	A	High voltage side74; Low voltage side 6062
3	Rated capacity	kVA	4200
4	Rated frequency	Hz	50
5	Power frequency withstand voltage	kV	High voltage side 70; Low voltage side 2.2
6	Protection level		IP54
7	Neutral point of system		Ungrounded

1.2

Power Conversion System

Main Functions of Power Conversion System

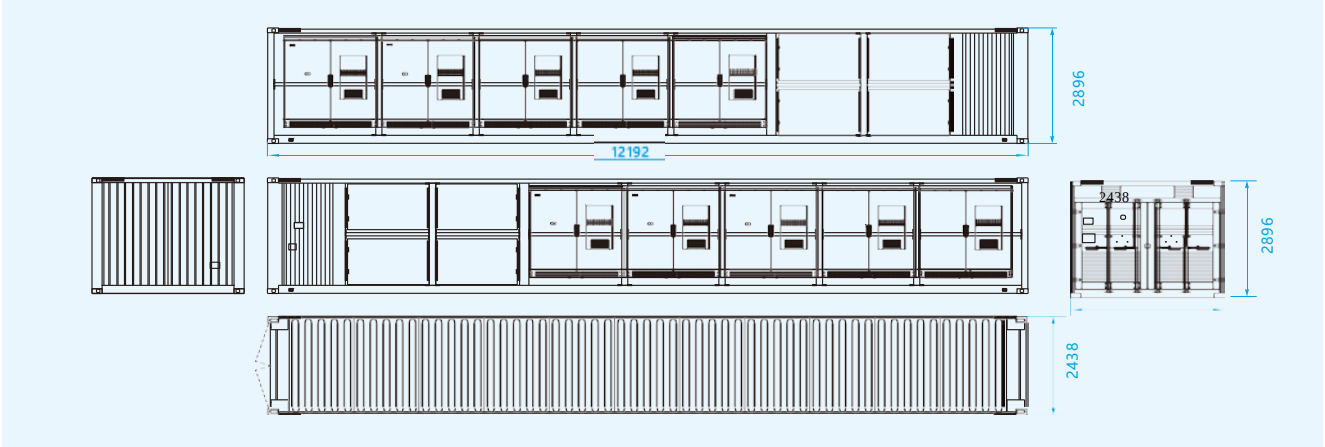
Medium-voltage PCS system functions to control the charging and discharging processes of battery, perform AC-DC conversion, and directly supply power to AC loads in case of no power grid. It mainly consists of the DC/AC bidirectional converter, control unit, etc. PCS controller receives the background control commands, and guides the converter to charge or discharge the battery according to the sign and size of power command, so as to regulate the active power and reactive power of grid. Meanwhile, PCS can obtain the information about the battery pack status with the communication with BMS through CAN interface, dry contact transmission, etc., and realize the protective charging and discharging of battery to ensure the safe operation of battery. If the grid is connected, the energy storage system performs constant power or constant current control according to the microgrid monitoring instructions to charge or discharge the battery, while smoothing the output of fluctuating power sources such as wind power and solar energy; In case of microgrid, the energy storage system provides the support in terms of voltage and frequency (V/F control) for the microgrid of main power supply, and the loads in the microgrid works based on this voltage and frequency. With the double closed-loop control and SPWM pulse modulation, PCS is able to accurately and quickly adjust the output voltage, frequency, active and reactive power.



Main Features

— The integrated design of charging and discharging realizes the two-way flow of energy between the AC and DC systems;
— Efficient vector control algorithm reaches the decoupling control of active and reactive power;
— The power factor can be adjusted arbitrarily, and complete reactive power may be generated within the capacity range to realize the reactive power compensation;
— On-grid and off-grid operations are supported and can be switched in a seamless and smooth manner;
— Multiple PCSs may operate in parallel with the total output power not less than 95% of the total power;
— High-reliability cabinet design can meet the needs of different operating areas.

Installation Dimensions of Product



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