



UNIDO ATMOsphere Technology Summit- Natural Solutions for Developing Countries

**FIELD CASES
WITH NATURAL REFRIGERANTS
IN DEVELOPING COUNTRIES**

MYCOM Compressor and Development



1924: Piston Compressor



1964: Screw Compressor



1978:
4°K Super Low temp.
Particle Accelerator
(Helium)



1981:
Nuclear
Fusion
(Helium)



1984:
Mag-Levi
Train
(Helium)



1989:
Rocket Fuel
(Hydrogen)



1993: Super GE
(Superconduct-
EL-Generator)



1958: Multi-Cylinder
Piston Compressor



Ethylene Plant



LNG/LPG Tanker



Organic (EOEG)



Inorganic:
(NH₃)



Pharma Plant

1924

1960

1970

1980

1985

1990

● More than 100.000 Screw and Piston Compressors have been installed over 100 countries.

CRYO-NUCLEAR-TECHNOLOGY

CERN, Genf, CH





PETROCHEMICAL



FIELD CASES

WITH NATURAL REFRIGERANTS IN DEVELOPING COUNTRIES

Authors :
Jan Boone Mayekawa Europe
Zikica Andrejevic Klima Serbia

MYCOM COMPRESSORS : SERBIA - CROATIA – BOSNIA HERZEGOVINA – RUSSIA - EGYPT

Cooling Plants:

Number of constructed facilities	36
Total storage capacity	136.500 ton
Total number of continious freezing tunnels	38
Total capacity of continious tunnels (2,5 t/h – 7,0 t/h)	140,5 t/h
Number of installed compressors “Mayekawa – Mycom”	92
Time period of compressors' installlation	1976 – 2013
Compressor models	
Piston: N6K, N8K, N6WB, F4.2WA	2, 1, 2, 1 = 6 pcs
Screw: N160, N200, N250, N320, FM160, F200	5, 30, 39, 5, 5, 2 = 86 pcs
Electrical motor power	37 – 450 kW
Compressor with the highest number of working hours	162.000 h

Cooling plant 2012
"Fathalla Compound"
Alexandria - Egypt











MYCOM COMPRESSORS : SERBIA – MACEDONIA - CROATIA**Meat industries:**

Number of meat industries	12
Total annual production of meat and meat products	9.940 t / month
Number of installed compressors “Mayekawa – Mycom”	45
Time period of compressors' installation	1987 – 2013
Compressor models	
Piston: N4WB, N6A, N8K	1, 2, 2 = 5 pcs
Screw: N160, N200, N250, FM160	11, 13, 7, 9 = 40 pcs
Electrical motor power	37 – 400 kW
Compressor with the highest number of working hours	135.000 h



1987

Meat industry
"Yuhor export"
Jagodina, Serbia



1987

N250LUD -10/+35° C

RT/BKW=1608/390kW

N200MUD RT/BKW=682/171kW

N160SUD-LB -42(-30)/-10° C RT/BKW=108/30kW

N160LUD-LB (") RT/BKW=205/60kW

N4WB

135.000 HRS

MAYEKAWA

MAYEKAWA Europe nv/sa

DOC.2013-539 Vienna



2006

FM160L TE/TC=-10/+35° C

RT/BKW=410/104kW

MYCOM COMPRESSORS : SERBIA – BOSNIE HERZEGOVINA - SLOVENIAOther industries:

Number of industries	11
Number of installed compressors “Mayekawa – Mycom”	24
Time period of compressors' installation	1988 – 2010
Compressor models	1 = 1 pcs 3, 8, 6, 6 = 23 pcs
Piston: N6HK Screw: N160, N200, N250, FM160	
Electrical motor power	90 – 355 kW
Compressor with the highest number of working hours	115.600 h
A) Wine and soft drinks production B) Production of fruit concentrates C) Motor oil refineries D) Production of edible oil and vegetable fats E) Dairies F) Production of technical gases G) Production of lyophilized fruit and vegetables H) Heat pumps	

Dairy
"Mlekara Šabac"
Šabac , Serbia





2010

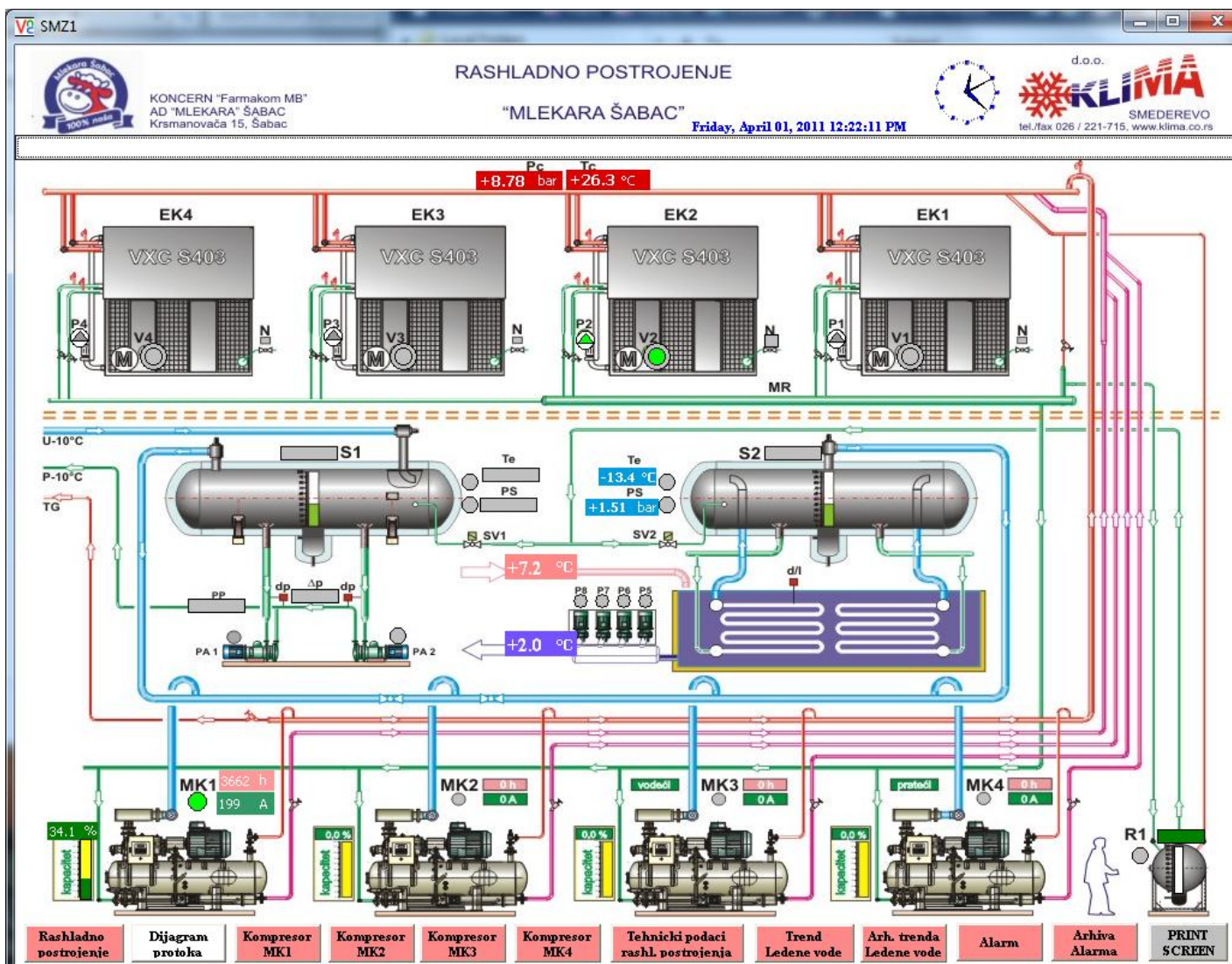
N200VLD 15000hrs

TE:TC=-10/+35° C

RT/BKW=818/220kW

(850/203kW)





MYCOM COMPRESSORS : SERBIA - MACEDONIA

Breweries:

Number of breweries	8
Total annual production of beer	7.200.000 hl/year
Number of installed compressors "Mayekawa – Mycom"	19
Time period of compressors' installation	1988 – 2012
Compressor models	
Piston: -	0 = 0 pcs
Screw: N200, N250, FM160	6, 11, 2 = 19 pcs
Electrical motor power	132 – 450 kW
Total cooling capacity of all compressors at operating conditions -10°C/+35°C	18.650 kW
Compressor with the highest number of working hours	128.000 h



Brewery 1994 / 2000
"Carlsberg" Čelarevo, Serbia



3x N250SUD 1994
1 x N250VSD 2000
TE/TC=-8/+35° C
RT/BKW=1162/272kW
(1205/245kW)

128.000 HRS

ENERGY SAVING REALISED CARLSBERG :

REDUCING THE CONDENSING PRESSURE FROM
35° C (12,5 barg) to 29° C (10,3 barg)

PER COMPRESSOR :

CAPACITY INCREASE OF 43kW (1205-1162) (4%)

POWER DECREASE OF 27kW (272-245) (10%)

COP-C INCREASE OF 0,63 (15%)

OBTAINED POWER SAVING ON 7000 HRS(80% YR) :

$27 \times 4 \times 7000 = 756.000 \text{ kWh}$

At electricity cost price of 0,045 €/kWh

34.020 €/year

OBTAINED COOLING SAVING ON 7000 HRS/YR(80% YR) :

$43 \times 4 \times 7000 = 1.204.000 \text{ kWh}$

Automatic operation of two Evaporative condensers with Dahlander motor (two speed)

EC1, EC2 - Evaporative condenser Baltimore VXC S350
with two speed Dahlander motor (30/7,5 kW)

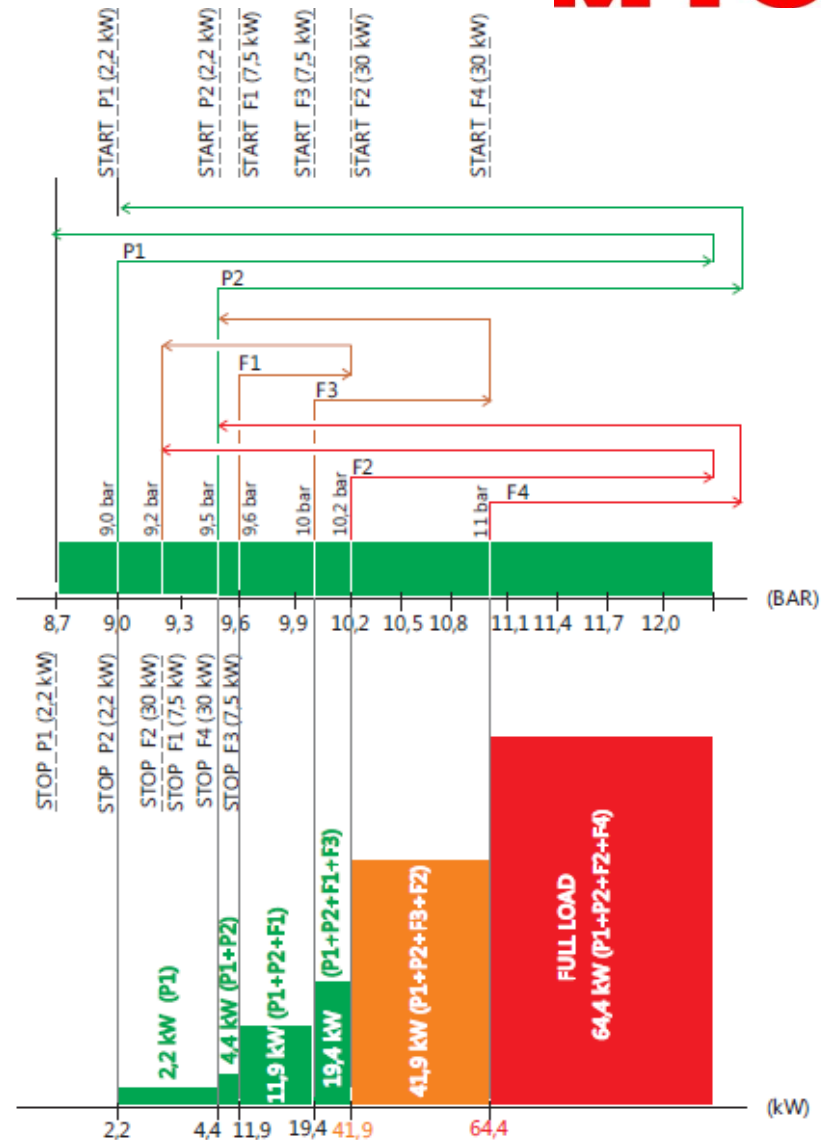
Condensing capacity $Q = 2 \times 1160 \text{ kW}$
 $T_c/T_{wb} = +35^\circ\text{C}/+24^\circ\text{C}$

EC1

P1 - Water pump;
F1 - Fan motor I speed (7,5 kW);
F2 - Fan motor II speed (30 kW)

EC2

P2 - Water pump;
F3 - Fan motor I speed (7,5 kW);
F4 - Fan motor II speed (30 kW)



ENERGY SAVING

THE PLANTS ARE DESIGNED FOR OPTIMAL ENERGY SAVING NOT ONLY FOR CONDENSOR BUT ALSO COMPRESSOR OPERATING AT MUCH REDUCED CONDENSING PRESSURE FOR THE MAJORITY OF THE OPERATION PERIOD

THE DIAGRAM SHOWS THAT ALTHOUGH DESIGN PRESSURE IS AT 12,5 BARG, COMPRESSOR WILL OPERATE FOR 80% BELOW 10,2 BARG RESULTING IN A DRASTIC SAVING OF ENERGY AS INDICATED ON EACH OF THE SHOWN FIELD CASES.

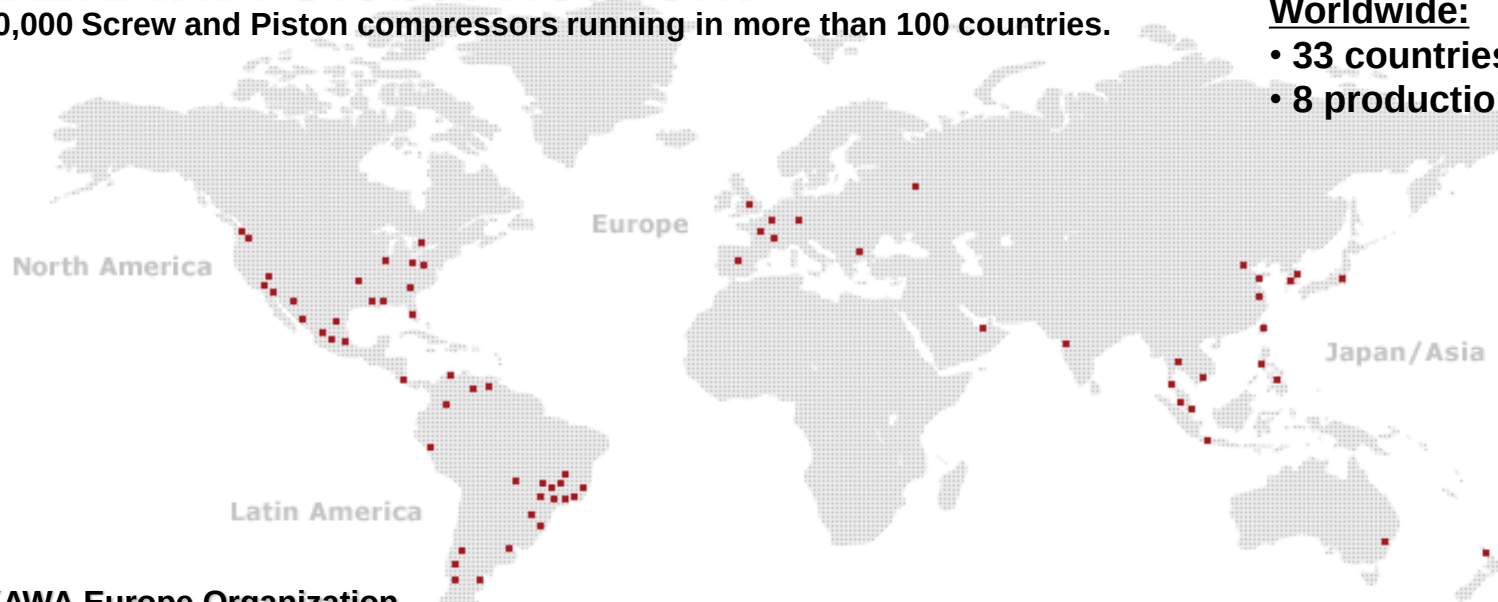
**THANKS FOR YOUR
ATTENTION!**

MAYEKAWA Global Network

Over 70,000 Screw and Piston compressors running in more than 100 countries.

Worldwide:

- 33 countries / 119 offices
- 8 production plants



MAYEKAWA Europe Organization

MAYEKAWA Europe nv/sa

Leuvensesteenweg 605 1930 Zaventem Belgium

Tel.+32 2 757 90 75 Fax.+32 2 757 90 23 URL <http://www.mayekawa.eu> E-mail info@mayekawa.eu

SWITZERLAND	Rosenbergstrasse 31, CH – 6300, Zug Tel.+41 41 726 8626 Fax.+41 41 726 8620
SPAIN	Calle Montevideo 5,Nave 13 POL.Industrial Campoporroso 28806 Alcala de Henares, Madrid Tel.+34 91 830 0392 Fax.+34 91 830 0397
RUSSIA	House 3, Flat 54, Mytnaya St.,Moscow, 119049 Tel.+7 495 230 01 76 Fax.+7 495 230 21 12
GERMANY	Nürnberg Strasse 118, 97076 Würzburg Tel.+49 931 35 93 88-0 Fax.+49 931 35 93 88-20
FRANCE	9, Rue Michael Faraday , 78180 Montigny-Le-Bretonneux, Tel.+33 1 30 58 2600 Fax.+33 1 30 58 1937
United Kingdom	16 Oakhurst Gardens, Bexleyheath, Kent DA7 5JP Tel.+44 1322 433558 Fax.+44 1322 433164
BULGARIA	94, Hristo Botev Str.1202 Sofia Tel/ Fax +359 2 8319002
DUBAI	P.O.Box.61349, LOB. 11. No.126, Jebel Ali Free Zone, Dubai, U.A.E Tel. +971 4 887 2232 Fax.+971 4 887 2238
INDIA	1 st Floor, Balaji House, Nr.Mahalaxmi Heights, Mumbai-Pune Road, Pimpri, Pune-411 018 Maharashtra, India Tel. +91 20 2746 4537 Fax.+91 20 2746 4539
AUSTRALIA	Unit 2,44 McCauley Street Matraville NSW 2036 Australia DOC.2013-539 Vienna Tel. +61 2 9695 7000 Fax.+61 2 9695 7001
NEW ZEALAND	30 Tui Street Othahuhu PO. Box 12106 Auckland New Zealand Tel. +64 9 276 2305 Fax. +64 9 276 2306

Japan Head Office

3-14-15 Botan Koto-ku, Tokyo 135-8482, JAPAN

TEL:(81)-3-3642-8181 FAX:(81)-3-3643-7094

E-mail:e-public@mayekawa.co.jp

Global web site <http://www.mayekawa.com/>