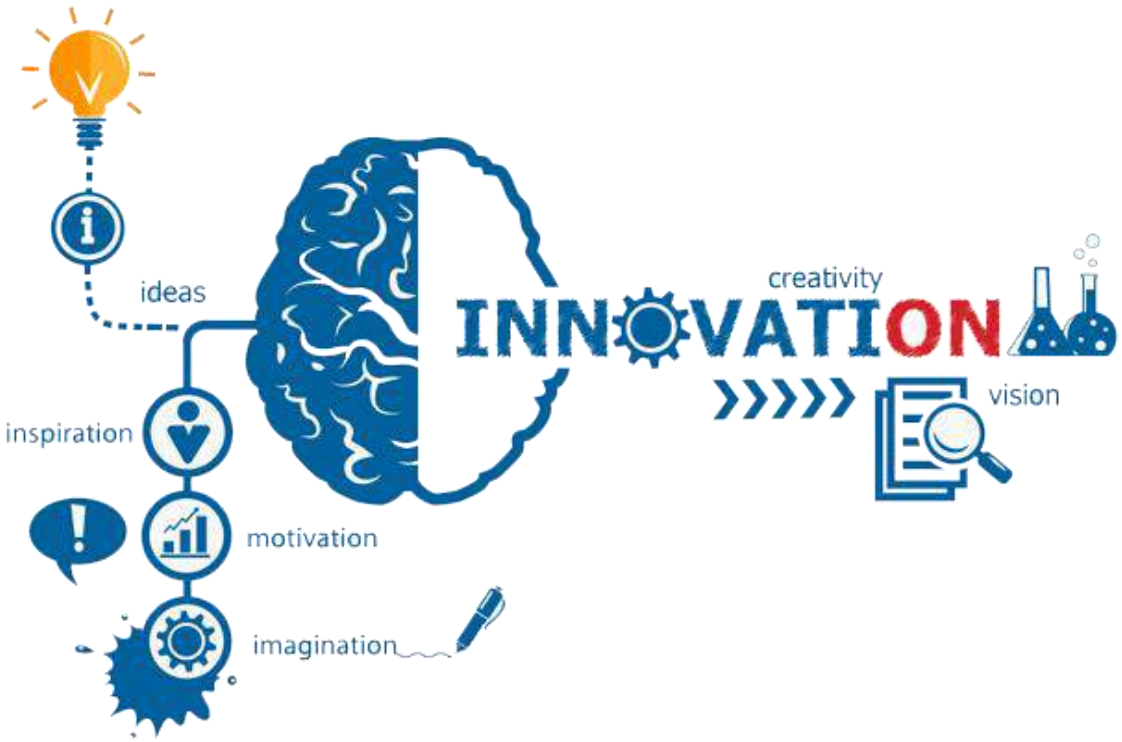
balief CORPORATION
An ISO 9001:2015 Certified Company

PDPU IIC INNOVATION & INCUBATION CENTRE NIDHI TBI

PANDIT DEENDAYAL ENERGY UNIVERSITY
A RESERVOIR OF KNOWLEDGE

VARIABLE VAPOUR COMPRESSION REFRIGERATION (VCR) SYSTEM TEST RIG

About Us



Balief Corporation is an ISO 9001:2015 certified company engaged in Special purpose machine manufacturing and R&D sector. Balief caters to special and unique requirements in the field of Thermal engineering, power, HVAC, water & air treatment and laboratory equipment by offering design, R&D and manufacturing solutions. These expertise helps you fulfil your requirements that hard to accomplish with current market offerings. Balief has a diverse product portfolio. To meet unique requirements, Balief offers R&D, design and testing services to innovate and create new products. **This has led to filing of 10 patents till date.**

The Balief team is a small yet focused group of people with domain specific knowledge and expertise. The team consists of both young and enterprising technocrats and industry and academic experts with decades of experience in their respective fields. Which led to develop good product for HVAC segment like Heat pump, chiller, Air cooler, Dehumidifier etc.… Balief Corporation also has products like ETP plant, Dry & wet scrubber, Bag filter, conical vacuum dryer etc.

Balief Corporation Patent Details

Sr. No.	Patent Reference Number	Type of Patent	Title of Patent
01	202021043090	Provisional Patent	Humidification - Dehumidification (HDH) water Desalination System
02	333806-001	Design Patent	Water Chiller
03	333806-002	Design Patent	Venturi Wet and Dry Scrubber
04	333806-003	Design Patent	Wet Scrubber
05	333807-001	Design Patent	Humidification - Dehumidification (HDH) water Disallination System
06	333807-002	Design Patent	Heat Pump for Water Heating
07	333807-003	Design Patent	Compact Heat Pump for Water Heating and Cooling
08	333807-004	Design Patent	Humidifier for ETP Plant
09	333807-005	Design Patent	Conical Vacuum Dryer
10	335018-001	Design Patent	Humidification-Dehumidification and Flash Chamber Desalination System

Balief Corporation Team

Name	Pratik Patel
Designation	Founder and Director at ‘BALIEF CORPORATION’

Mr. Devansh Patel
Operational Head

Mr. Vishal Prajapati
Production In charge

Mr. Saurabh Patel
Design Engineer

Mr. Priyank Sharma
Business Development Manager

PDEU Mentors

Dr. Vivek Patel
Associate Professor
Mechanical Department

Dr. Rajesh Patel
Associate Professor
Mechanical Department

Dr. Jatin Patel
Associate Professor
Mechanical Department

Existing Refrigeration Lab Equipment and Its Challenges

Cold Water Test Rig (Chiller)

Hot Water Test Rig (Heat pump)

Expansion devices Comparison

Challanges of These Equipment			
1	Fixed compressor capacity	5	Only Natural Convection by submerged coil
2	No data acquisition	6	Only Capillary and TXV expansion comparison is available
3	Performance changes with time as tank condition changes	7	Controlled expansion is not possible
4	System can only be used for chilling or Heating Purpose	8	Only one condenser and evaporator possibility

Technological Challenges of HVACR lab equipment

✓ Domestic HVACR units come with variable inverter technology.

X Students still learn concepts of HVACR on fixed capacity units.

✓ Latest HVAR equipment comes with Building Management System (BMS) technology for controlling, operation and trouble shooting.

X Laboratory equipment lack these features, and at best come with basic data loggers or temperature scanners.

Balief Variable VCR System Test Rig

❑ A variable VCR system is designed to be “variable” in true sense.

✓ **It consists of**

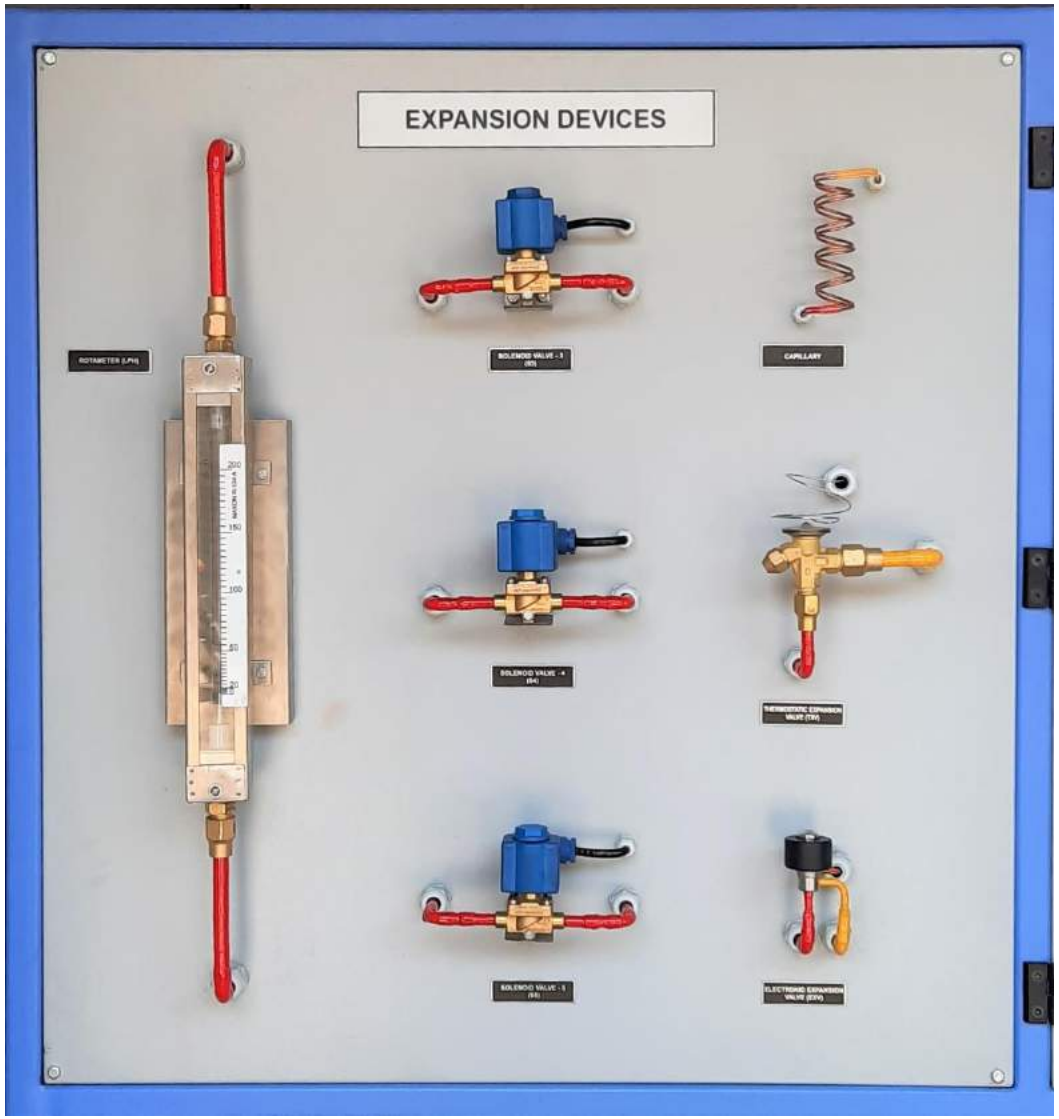
1. Variable speed compressor
2. Two options for cooling load
3. Two types of condenser
4. Three types of expansion device
5. Variable Speed Water Pump

✓ It gives flexibility of operating 12 different VCR systems in a single setup.

✓ Demonstrates latest technological advancements in HVACR field.

✓ Data acquisition and controlling is made seamless with the use of HMI. The entire operation of the VCR system is automated with PLC controls and data logging via USB. The system can also be remotely operated by an Ethernet connection or wireless.

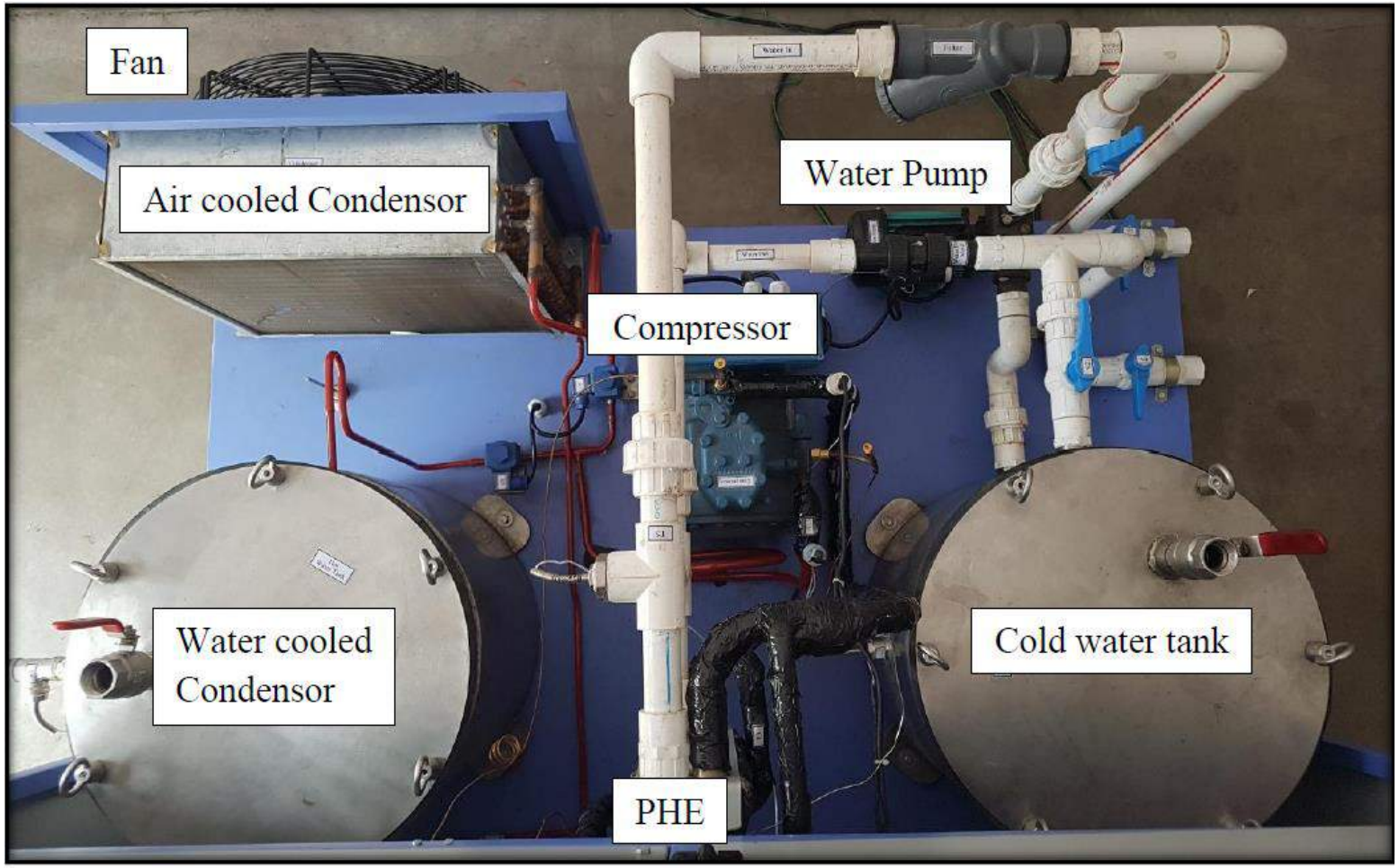
Balief Variable VCR System Test Rig



Expansion Devices

Panel Box

Balief Variable VCR System Test Rig

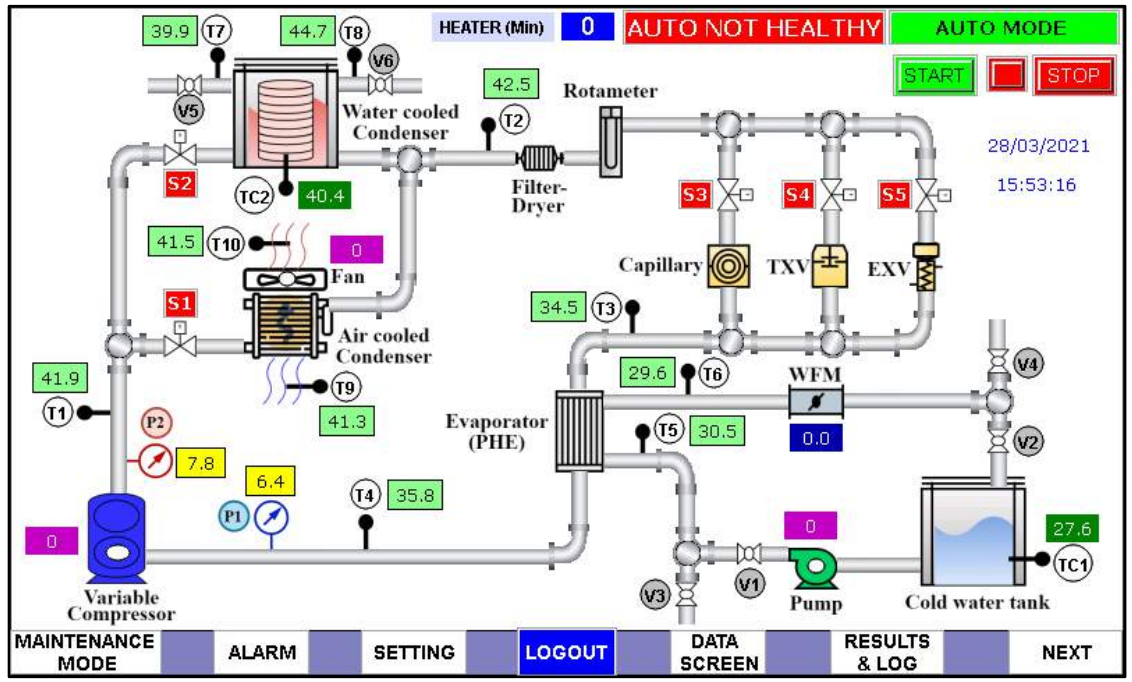


System Components View

Variable Compressor

Electronic Expansion Valve (EXV) and Controller

System Layout (HMI Home Screen) and Operating Combinations



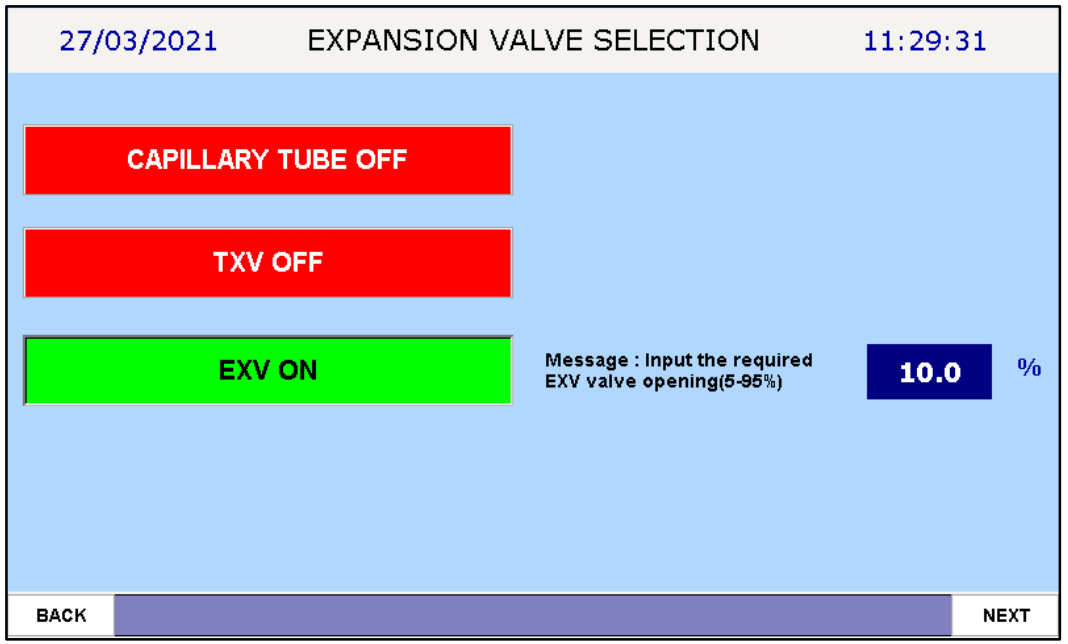
System Layout (HMI Home Screen)

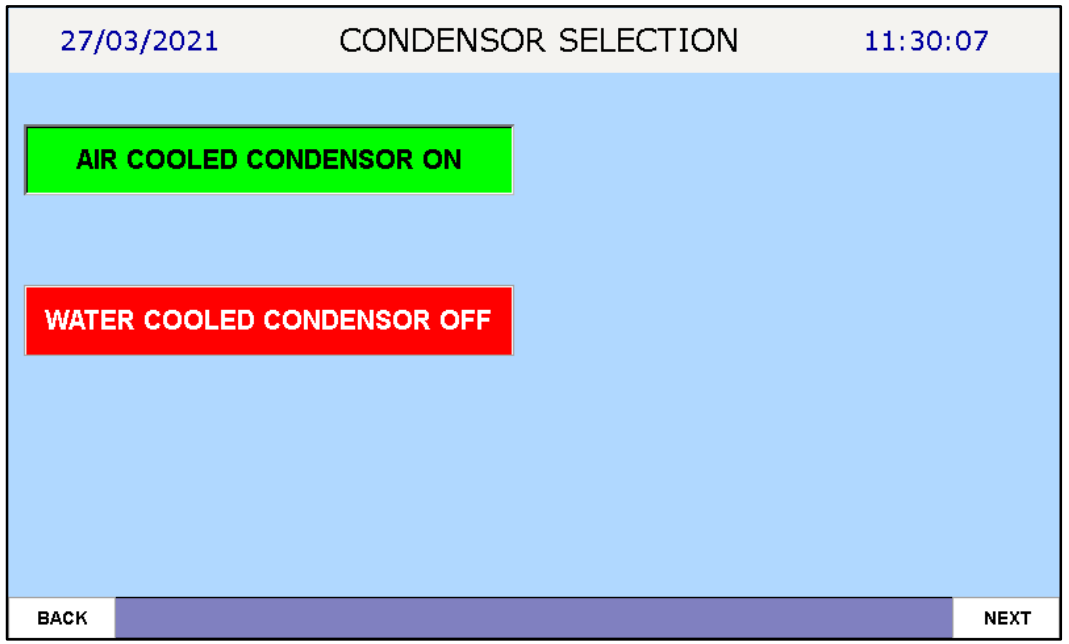
- In all these combinations compressor RPM and Electronic Expansion valve (EXV) opening is in operator's hand. So it will creates many operating possibilities.

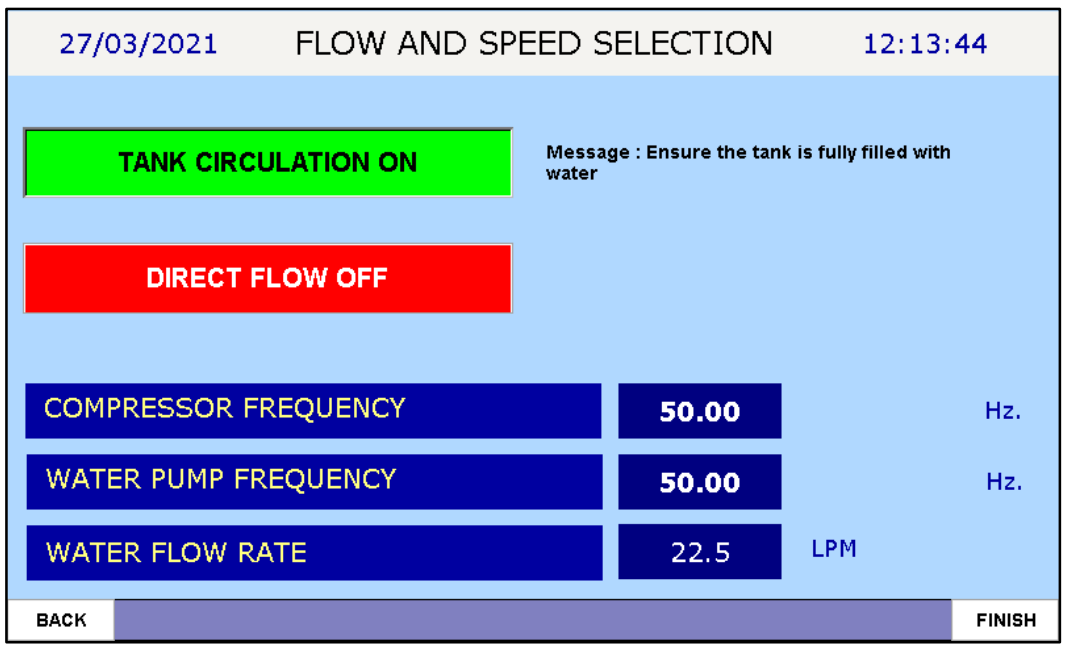
Sr. No.	Evaporator type	Condenser Type	Expansion device
1	Tank Circulation	Air Cooled Condenser	Capillary
2	Tank Circulation	Air Cooled Condenser	TXV
3	Tank Circulation	Air Cooled Condenser	EXV
4	Tank Circulation	Water Cooled Condenser	Capillary
5	Tank Circulation	Water Cooled Condenser	TXV
6	Tank Circulation	Water Cooled Condenser	EXV
7	Direct flow	Air Cooled Condenser	Capillary
8	Direct flow	Air Cooled Condenser	TXV
9	Direct flow	Air Cooled Condenser	EXV
10	Direct flow	Water Cooled Condenser	Capillary
11	Direct flow	Water Cooled Condenser	TXV
12	Direct flow	Water Cooled Condenser	EXV

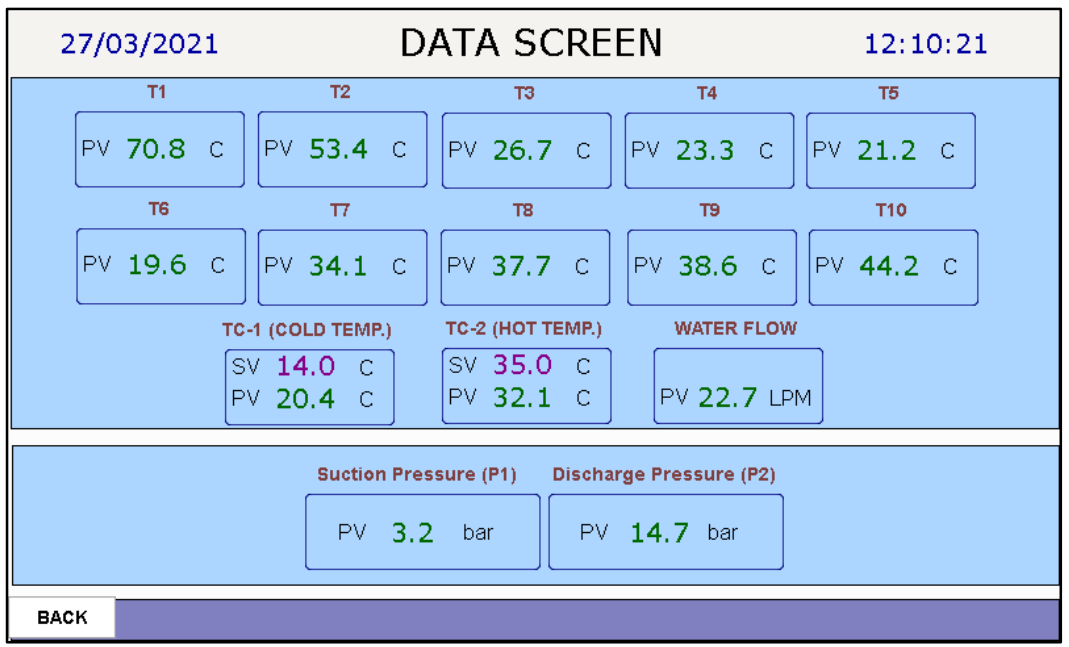
System Operating Combinations

System operating combination Selection

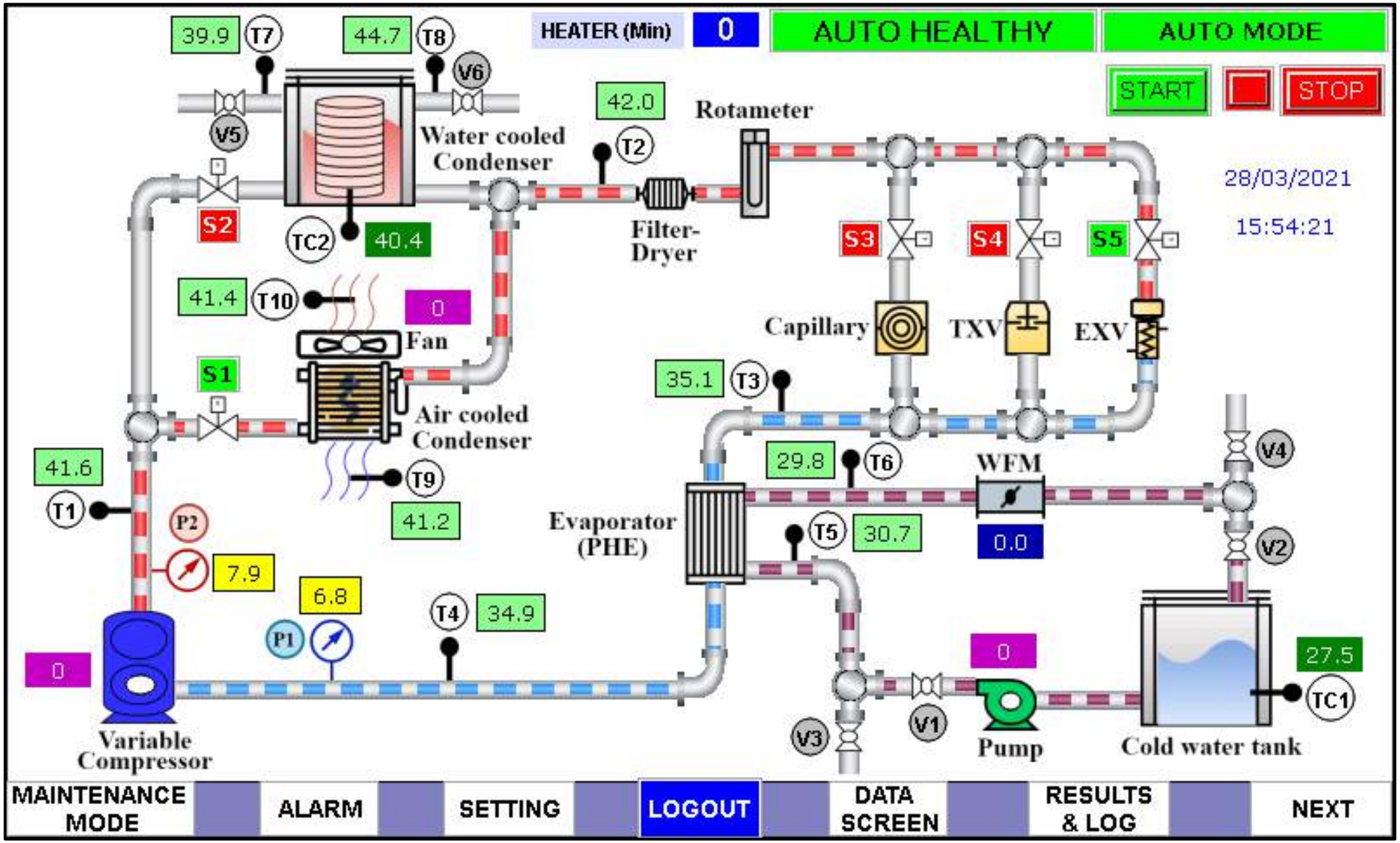




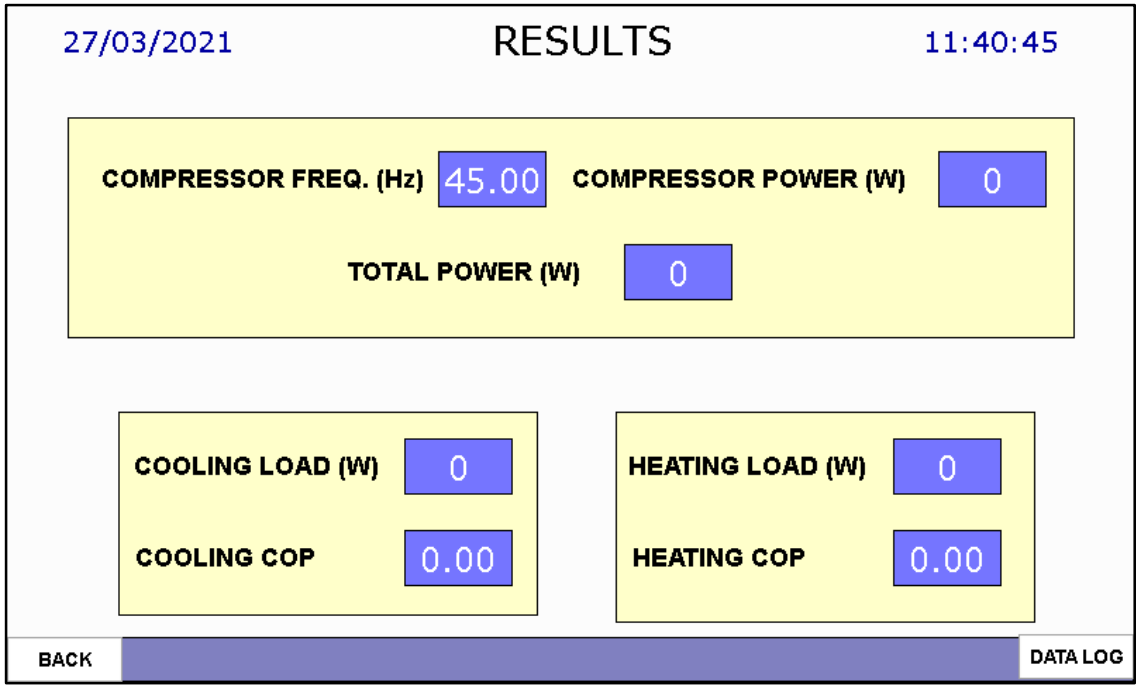


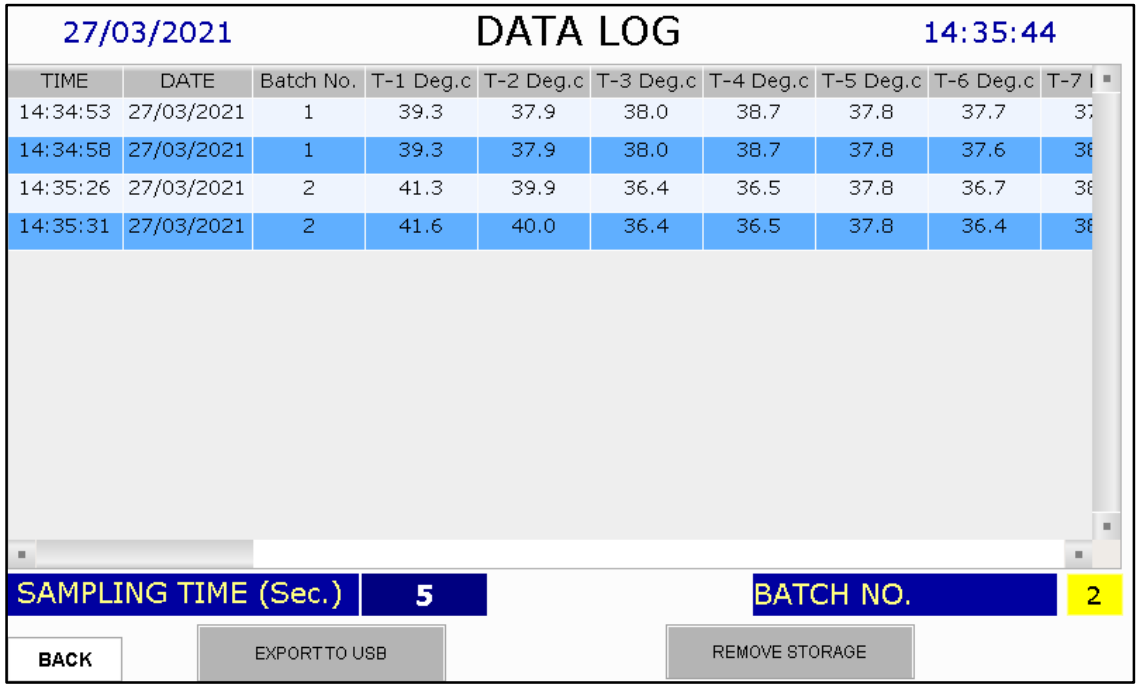


Dynamic screen update

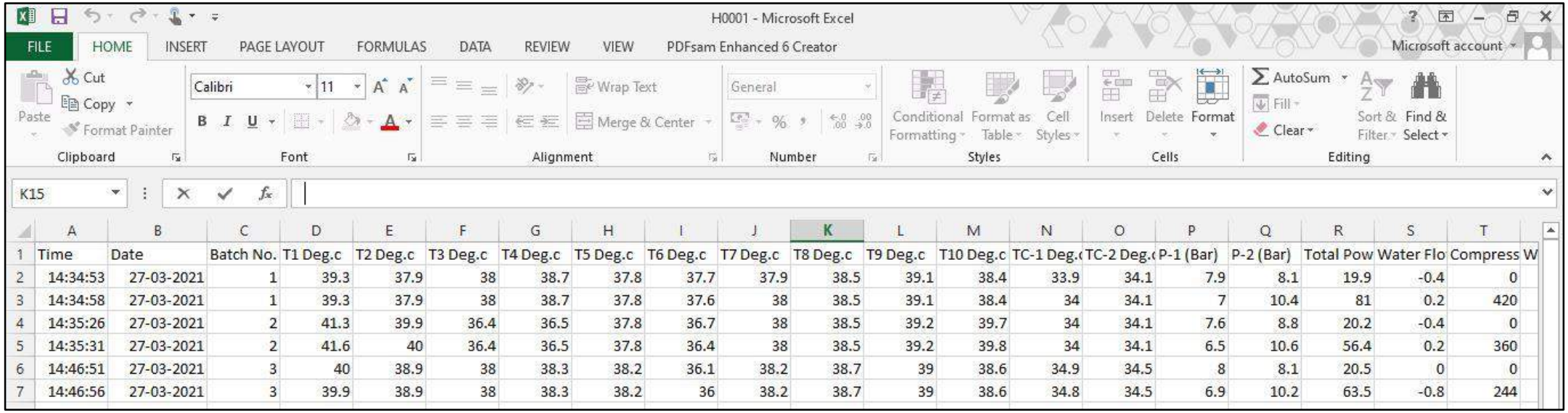


Data Acquisition





TIME	DATE	Batch No.	T-1 Deg.c	T-2 Deg.c	T-3 Deg.c	T-4 Deg.c	T-5 Deg.c	T-6 Deg.c	T-7
14:34:53	27/03/2021	1	39.3	37.9	38.0	38.7	37.8	37.7	37
14:34:58	27/03/2021	1	39.3	37.9	38.0	38.7	37.8	37.6	38
14:35:26	27/03/2021	2	41.3	39.9	36.4	36.5	37.8	36.7	38
14:35:31	27/03/2021	2	41.6	40.0	36.4	36.5	37.8	36.4	38



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	Time	Date	Batch No.	T1 Deg.c	T2 Deg.c	T3 Deg.c	T4 Deg.c	T5 Deg.c	T6 Deg.c	T7 Deg.c	T8 Deg.c	T9 Deg.c	T10 Deg.c	TC-1 Deg.c	TC-2 Deg.c	P-1 (Bar)	P-2 (Bar)	Total Pow	Water Flo	Compress	W
2	14:34:53	27-03-2021	1	39.3	37.9	38	38.7	37.8	37.7	37.9	38.5	39.1	38.4	33.9	34.1	7.9	8.1	19.9	-0.4	0	
3	14:34:58	27-03-2021	1	39.3	37.9	38	38.7	37.8	37.6	38	38.5	39.1	38.4	34	34.1	7	10.4	81	0.2	420	
4	14:35:26	27-03-2021	2	41.3	39.9	36.4	36.5	37.8	36.7	38	38.5	39.2	39.7	34	34.1	7.6	8.8	20.2	-0.4	0	
5	14:35:31	27-03-2021	2	41.6	40	36.4	36.5	37.8	36.4	38	38.5	39.2	39.8	34	34.1	6.5	10.6	56.4	0.2	360	
6	14:46:51	27-03-2021	3	40	38.9	38	38.3	38.2	36.1	38.2	38.7	39	38.6	34.9	34.5	8	8.1	20.5	0	0	
7	14:46:56	27-03-2021	3	39.9	38.9	38	38.3	38.2	36	38.2	38.7	39	38.6	34.8	34.5	6.9	10.2	63.5	-0.8	244	

Installation and Demonstration

Installed at Pandit Deendayal Petroleum University (PDPU), Gandhinagar

Installed at Nirma University, Ahmedabad

THANK YOU

ADDRESS

BALIEF CORPORATION
Shed No – 126, Abhishree Industrial Park,
B/H Grand Vishala, Nr. S P Ring Road
Odhav, Ahmedabad – 382415
Gujarat, India

CONTACT US

www.baliefcorporation.com
baliefcorporation@gmail.com
+91-8200890851