

## TECHNICAL SPECIFICATIONS DESCRIPTION: - COOPER COMPRESSOR 2

### Description:

The Cooper 2 compressor is a multi-stage (3-stage) centrifugal air compressor. It has an output of approx 8000m<sup>3</sup>/hr (actual) at 550kPa.

### Major Component Breakdown:

- ✓ Three - stage compressor unit
- ✓ Electric motor
- ✓ Lubrication pump
- ✓ Air dryer and cooler system
- ✓ In-line Water trap
- ✓ Air Inlet Filter including stand
- ✓ Oil pre-lube pump
- ✓ Cooper Controller Motherboard
- ✓ PLC for switchgear interlocking control (Modicon Momentum 171CCC96030-IEC)
- ✓ Electrical Protection Relay ABB REX 521
- ✓ Control panel
- ✓ Switchgear Panel (includes the main breakers)
- ✓ Surge arresting for mA signals
- ✓ HMI Screen for operations and diagnostics display
- ✓ Other auxiliaries
- ✓ The Compressor base

### Other Additional Technical Information:

Multi-stage Centrifugal Compressor:



Figure 1 - Centrifugal Multistage Compressor

Make: Cooper  
Model: Turbo Air 48

Serial: X11592  
Discharge Pressure 115Psig  
Power: 1020 BHP  
Type: C-8  
Stages: 3  
Inlet Actuator Type: Electrical  
BOV Actuator Type: Electrical  
Starter Type: Full Voltage  
Drive Type: Induction Motor

Oil Cooler:

Shell Pressure: 300PSI  
Tubes Pressure: 150PSI  
Temperature: 300°F



Figure 2 - Oil Cooler

Cooper Control Panel:

Part Number: A3794930-11592  
Power: 220Vac  
Amps: 5A, 50Hz  
Control Method: Auto Dual  
Air Pressure Sensor: 160kPa  
Current Sensor: 300A



Figure 3 - Control Panel HMI

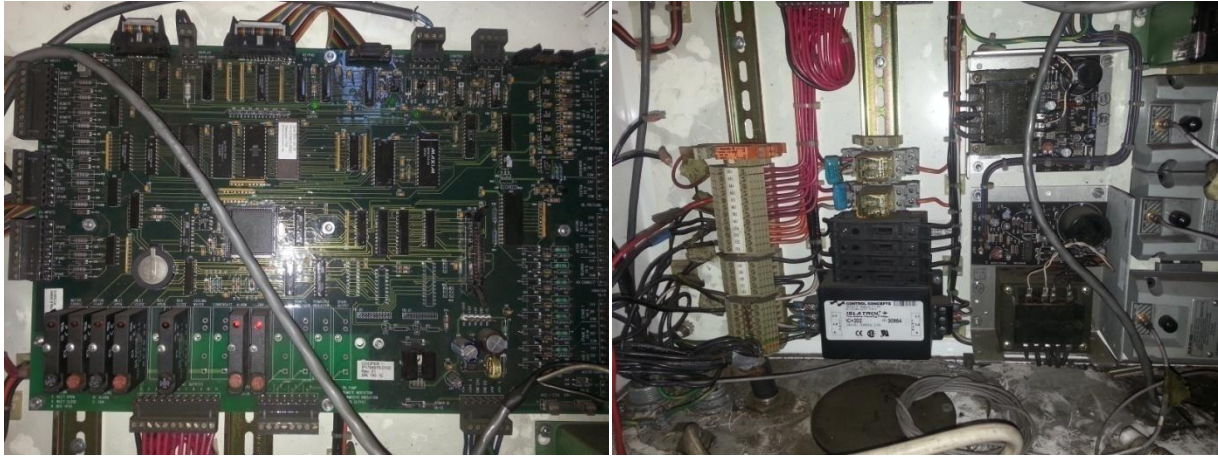


Figure 4 - Control Panel - ControllerBoard

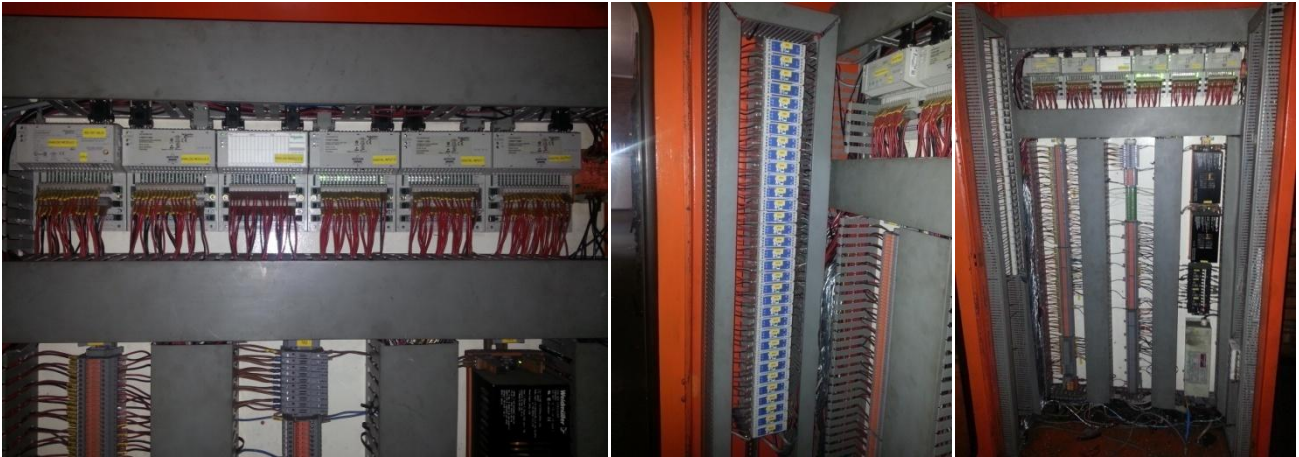
Air Dryer and Cooler System:

Make:	Hiross
Serial Number:	1541650001
Model Number:	512470 sep/liq.21LT
Voltage:	400Vac three phase
Frequency	50Hz
Maximum Amps:	41.5A
Maximum Pressure:	1000kPa
Switching Capacity:	6kA
Refrigerant:	Freon



Figure 5 - Air Dryer and Cooling System

## PLC Control System:



**Figure 6 - Modicon Momentum PLC Controller System**

Make:	Schneider Electric Modicon
Model:	Momentum
CPU Code:	171CCC96030-IEC
IO types:	DI (24Vdc), DO (24Vdc), AI (4-20mA), AO (4-20mA)
IO Modules Map:	170AAI-140-00 x3 170ADI-350-00 x2 170ADO-350-00 x1
Software Compiler:	Concept 2.5
Language Type:	IEC FBD
Communication Protocol:	Modbus Ethernet (Compatible with TCP/IP) (Interbus communication used for interlinking between IO Modules).

## Oil Circulation Pump:



**Figure 7 - Prelube pump**

Voltage:	220Vac/380Vac
Amps:	14.6A @220Vac /8.5A @380Vac
Hertz:	50Hz
Phase:	3
RPM:	1435RPM
Service Factor:	1.15
Max Amb Temp:	40°C
Temp Rise:	75°C
IP:	5
Insulation:	F
Time Rating:	Cont
Nema Design:	B
Nema Code:	J
Nema min Eff:	81.5
Serial code:	U3970110286

LE.Code: TF4230BC  
Frame: 184TC

Air Inlet Filter:



Figure 8 - Air Inlet Filter

Electrical Protection:



Figure 9 - Electrical Protection

Electrical Breaker:

Make:	Toshiba Corporation
Type:	High Voltage Vacuum Contactor
Model:	HA CV-6
Insulation Voltage:	7.2kV
Operational Voltage:	6.6/3.3kV
Operational Current:	400A
Interrupting Current:	6.3kA
Frequency:	50Hz
Control Voltage:	110Vdc
Manufacturing Number:	97X12882



Figure 10 - Electrical Breaker and Switchgear

Compressor Motor:

Make: GEC Alsthom  
Type: Squirrel Cage Induction  
Voltage: 3300Vac  
Frequency: 3phase 50Hz  
Stator Current: 172A  
Size: UC355/112  
Speed: 2978 RPM  
Spec: 355000/39  
Output: 850kW  
Motor Mass: 3000kg  
Cooling: IC01  
Duty Type: S1  
Altitude: 1000m  
Ambient Air Temp: 40°C  
Mounting: IM1001  
Insulation: Class F  
Enclosure: IP23



Figure 11 - Compressor Motor

**Operations Summary;**

This compressor was installed and commissioned along with its twin, Cooper Compressor 1 in 2010. Cooper 2 is considered to be one of the most reliable compressors in terms of stability and volume output. Along with Cooper 1, Cooper 2 has the highest compressed air output at the plant.

This compressor is situated in the Compressor house 2, which is located at the Highveld Steel branch of Afrox. It has been manufactured and assembled in 1998 (its switchgear was assembled in 1997).

This compressor has an approximate running hours amount of 219000.

All periodic services requirements as specified by the OEM have been met apart from the last service. The compressor was maintained solely by CompAir SA (Pty) Limited whom are an accredited agent to work on these types of compressors. As such, the compressor is still in a working condition, but a periodic service is due and required.

It must also be noted that the controller PLC for this compressor is common to Cooper Compressor 1.

In addition, a motor is available as a common spare to Cooper Compressors 1, 2, 3;

**Spare Compressor Motor:**

Make:	GEC Alsthom
Type:	Squirrel Cage Induction
Voltage:	3300Vac
Frequency:	3phase 50Hz
Stator Current:	172A
Size:	UC355/112
Speed:	2978 RPM
Spec:	355000/39
Output:	850kW
Motor Mass:	3000kg
Cooling:	IC01
Duty Type:	S1
Altitude:	1000m
Ambient Air Temp:	40°C
Mounting:	IM1001
Insulation:	Class F
Enclosure:	IP23





Figure 12 – Spare Compressor Motor