PLC Architectured Monitoring System for 230/400 KV Interconnecting Transformer Protections And Controls

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Abstract- *It is a BULKY TRANSFORMER located between 230 & 400 KV grid Lines. It is an Auto Transformer having capacity of 250 MVA.A 33 KV tertiary winding is availOur topic deals with the INTER CONNECTING TRANSFORMER shortly called I.C.T.The Power flow will be in either direction depending upon the Grid condition. The purpose of Inter-connecting transformer is to share load between 230kv and 400kv grid systems, according to power demand. PLC is introduced to monitor and control ICT feeder equipment and is own transformer productions with cooling system equipments starting (or) tripping with necessary delays there by ensuring I.C.T for its efficient operation and grid discipline.*

I. OBJECTIVES

More than 80% of physical wiring will be avoided using this intelligent hardware, whose operation purely depends on software. Power consumption is very minimum. User-friendly software – easy to understand. Superior communication standards with computers. Online program edition correction also possible through pc.

II. INTRODUCTION

INTERCONNECTING TRANSFORMER

The Inter-connecting transformer connects 230 KV and 400KV buses. It's a single winding transformer connected in star and the neutral is brought out and earthed. A 33 KV tertiary winding is available and it is delta connected. The transformer has got an on load tap changer with 16 taps.In Thermal Power Station-II, there are two I.C.T's (ICT-I & ICT-II) provided to interconnect 230 KV Systems and 400 KV Systems. The Power flow will be in either direction depending upon the Grid condition. The purpose of Inter-connecting transformer is to share load between 230kv and 400kv grid systems, according to power demand. Thus reduces trouble-shooting time when problem arises

1. TECHNICAL DETAILS FOR TRANSFORMER

Make	: BHEL
Type of cooling	: ONAN/OFAF
Rating of HV winding	:125/250 MVA
Rating of tertiary winding	: 41.65/83.3 MVA
No load voltage	: 400/230/33 KV
Current	: 360.84/627.55/1457.37
Frequency	: 50 HZ
Vector group	: y d 11
No. Of tapping	: 16 of 1.25% each (OLTC)

III. LAYOUT OF INTERCONNECTING TRANSFORMER

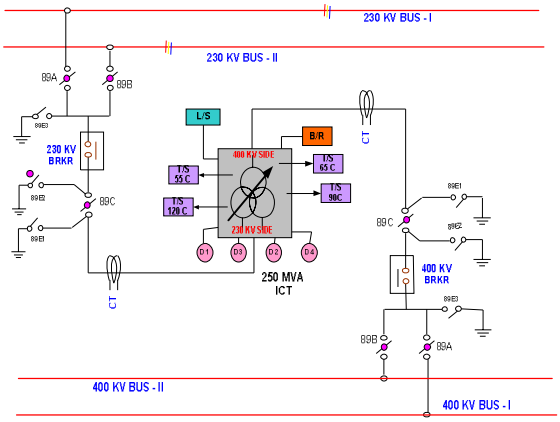

Figure 1. Layout of interconnecting Transformer

IV. FEEDER EQUIPMENT

1. ISOLATOR

Off Load Device. No. of poles 3 and Rated current1600 A. Type Centre post rotating, Pantograph, double end break, Single & gang operated. System voltage Nominal/ Max 400 KV / 450 KV. Systemearthings Effectively grounded Bus Isolators are of Pantograph type and others are Double break type.

2. BREAKER

Circuit breakers are simply Switches, but working with EHT voltage and Currents. Circuit breakers are mechanical devices designed to close or open contact or electrical circuit under normal or abnormal conditions.They are on-load devices. generally will be constructed with suitable Operating mechanism and Arc Quenching methods.SF6 has excellent insulating property. SF6 has high electro-negativity. That means it has high affinity of absorbing free electron. Whenever a free electron collides with the SF6 gas molecule, it is absorbed by that gas molecule and forms a negative ion.

3. EARTH SWITCHES

Safety for the equipment and working person .They are also like disconnectorsthe operating mechanism is similar to that of isolators.Used for earthing the system or feeder to work with. Maunal operated as well as motor operated earth switches are being installed in tps-ii switch yard.Addressed as 89 E1/E2/E3 and so on.

V. PROTECTION OF ICT

Buckhholtz relay protection,Differential relay protection,Overfluxing relay protection,Oil level protection (conservator),E/F protection and Busbar Protections are available to protect and Isolate transformer from faults.

1. COOLING SYSTEM OF ICT

OIL AND WINDING TEMPERATURE :
Winding temperature Fan starting at :55oC
Pump starting at :65oC

2. ALARM AND TRIP FOR ICT FEEDER ARE AS GIVEN BELOW

Oil temperature alarm :75oC
Oil temperature trip at : 85oC
Winding temperature alarm: 95oC
Winding temperature Trip :105oC

3. TYPES COOLING SYSTEMS:

Oil Natural Air natural(ONAN)
Oil Natural Air Forced(ONAF)
Oil Forced Air Forced(OFAF)

4. PLC(PROGRAMMABLE LOGIC CONTROLLER)

A PLC IS A DEVICE THAT WAS INVENTED TO REPLACE NECESSARY SEQUENTIAL RELAY CIRCUITS FOR MACHINE CONTROL.

5. EVALUATION OF PLC

MODICON 084 IN 1964
AMD 2901 & AMD 2903 IN MID-70's
COMMUNICATION ABILITIES IN 1973
MODICON's MODBUS IN 1973
PROTOCOLS DEVELOPMENT (80's-90's)
GENERAL MOTOR's MAP IN 80's
PROGRAMS:- FBD, STL, IL, LAD & C

VI. BLOCK DIAGRAM OF PLC

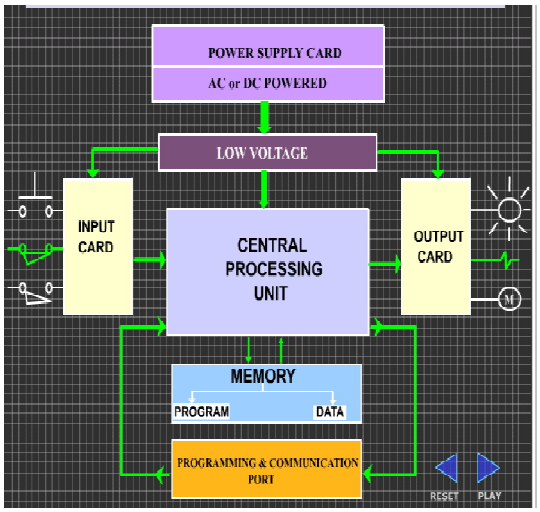

Figure 2. Power supply

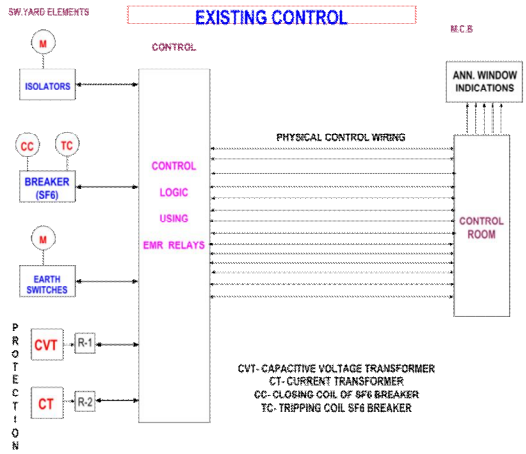

Figure 3. Exiting Control

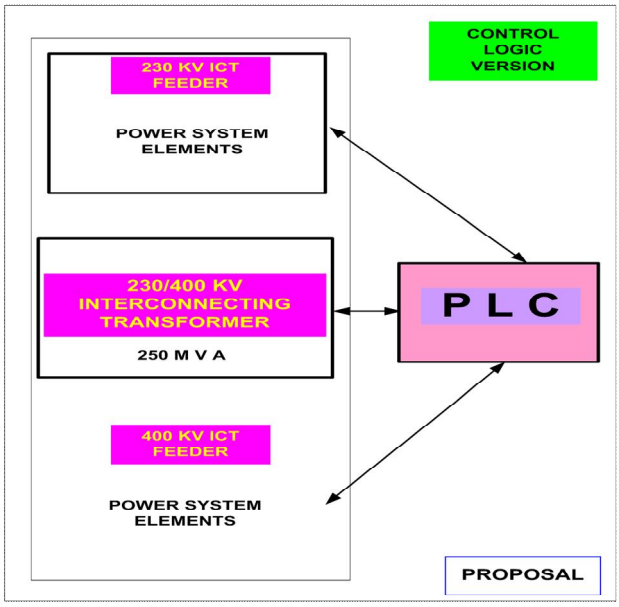

Figure 4. Proposal

VII. CONCLUSION

Hence, Our project deals how PLC may be introduced– to monitor and control ICT feeder equipments and its own transformer protections with cooling system equipments– thereby ensuring I.C.T for its efficient operation and Grid discipline.The Modular PLC can be easily interfaced with other ICTs also from a single master PLC-there by monitoring all ICTs through a simple MASTER is possible.This is compatible and reliable . So we prefer PLC for the real-time monitoring of ICTs cooling techniques than the other conventional control technologies .