

Dalmia Cement

Presentati on on Intelligent MCC (Go Green)

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M/s Dalmi a Cement (Bharat) Ltd.
 4500 TPD – Kadappa Site




Dalmia Cement



Dalmia Cement (Bharat) Ltd. – Kadappa

Green field Project at Kadappa Completed

Pre Heater Construction by 9.5 Months
 Commissioned the Plant in 18 Months

Latest Technology Adopted :

- ØMedium Voltage AC Drives & LT AC Drives for all Process Fans (Dampertless Plant)
- ØIntelligent MCC with Workstation
- ØRobo Lab & Expert Optimizer for Quality Control
- ØEnergy Management System & Management Information System for all Parameters
- ØIntelligent Fire Alarm System with Graphic Display
- ØAir Conditioned Load Centers



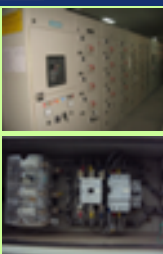



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Conventional MCC

Parts on Conventional MCC Feeders

- ØMain Swith (Switch Fuse Unit / Circuit Breaker)
- ØPower Contactor & Control Contactor
- ØThermal Over Load Relay
- Ø Transducers with Analogue Signals for Measurement (Optional)
- Ø I/O Communication through Hardware (Control Cable)
- ØOutgoing Terminals for Power & Control Cable



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Intelligent MCC

Parts on Intelligent MCC Feeders

- ØMain Swith (Switch Fuse Unit / Circuit Breaker)
- ØPower Contactor & Control Contactor
- ØSIMOCODE pro & Complete Accessories
- Ø I/O Communication through Profibus
- ØOutgoing Terminals for Power Cable



SIMOCODE pro : Sirius Motor Managemnt & Control Devices with a Profibus DP Interface


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Intelligent MCC




90 KW Motor Feeder with Internal Parts





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SIMOCODE & Accessories





<p>Basic Unit</p> <ul style="list-style-type: none"> 4 I / 3 O binary Thermistor PROFIBUS DP 24 V DC / 110 – 240 V AC/DC 	<p>Expansion Modules</p> <ul style="list-style-type: none"> Additional binary I/Os 3 x 0/4 – 20 mA V/Os 3 x sensors Pt100/Pt1000 External earth fault via summation current transformer 
<p>Current Measuring Module</p> <p>0.3 A – 630 A Straight-Through/ Busbar Connection Technology</p> 	




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SIMOCODE & Accessories

<p>Operator Panel with display</p> 	<p>Operator Panel 5 buttons / 10 LEDs</p> 	<p>Connection Cable In various lengths (up to 2.5 m)</p> 
<p>Current/ Voltage Measuring Module 0.3 A – 630 A / 690V Straight-through/ busbar connection technology</p> 		



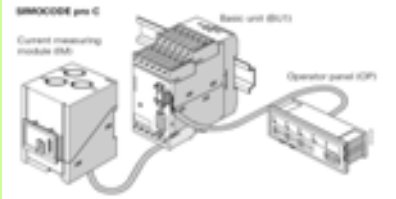

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Intelligent MCC

Sub Divisions of SIMOCODE pro:

SIMOCODE pro C : A Compact System for Direct & Reversing Starter with Monitoring & Communication of Current related Parameter only.

Typical SIMOCODE pro C Hardware Configuration

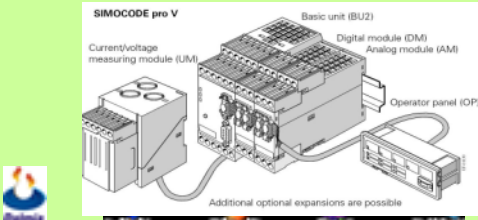



Intelligent MCC

SIMOCODE pro V : A Variable System, which offers numerous in addition to all of the SIMOCODE pro C Functions.

1. Expandable Binary Input / Output Modules
2. Current / Voltage / Power Related Measurements
3. Expandable Analogue Input / Output Modules
4. Earth Fault Detection

Typical SIMOCODE pro V Hardware Configuration



Intelligent MCC

Applications of SIMOCODE / Intelligent MCC Feeder Module

Controlling, Protection, Measurement & Communication for

- Ø Direct Online Starters
- Ø Star Delta Starters
- Ø Pole Changing Starters
- Ø Reversible Starter
- Ø Actuation through Soft Starters



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Functions of SIMOCODE / Intelligent MCC Feeder Module

Protection Functions

- Ø Thermal Over Load
- Ø Unbalance Protection
- Ø Stalled Rotor Protection
- Ø Thermister Protection Based on Actual Temp. Measurement
- Ø Upper Current Limits & Lower Current Limits
- Ø Earth Fault Protection
- Ø Under Voltage / Over Voltage Protection
- Ø External Interlocking Through Digital Inputs



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Functions of SIMOCODE / Intelligent MCC Feeder Module

Measurement Functions

- Ø 3 Phase Voltage
- Ø 3 Phase Current
- Ø Active Power
- Ø Apparent Power
- Ø Power Factor
- Ø Unbalance Current
- Ø Thermal Model Memory
- Ø Drive Operation Hours
- Ø No. of Over Load Trips
- Ø Last Trip Current
- Ø Drive Stop Time



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Simplified Hardware Wiring –By Graphic Editor in the SIMOCODE

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Profibus Networking – Line View

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Profibus Configuration

ØEach Profibus Network shall have Maximum 126 Nodes (SIMOCODES).
DCBL, Kadappa Selected Max. 60 Nodes in a Network as Internal Standard.
ØFor Each 30 Nodes (or) the Cable Length is more than 1500 Mtr., A Profibus Repeater is Essential

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Monitoring of Last Trip Current –498% of the Motor Rated Current

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Monitoring of Measured Values

Measured values

Current			Voltage		
Max Current Line	30	% of Is	Voltage U _{L1}	241	V
Current L ₁₁	38	% of Is	Voltage U _{L2}	241	V
Current L ₁₂	38	% of Is	Voltage U _{L3}	240	V
Current L ₁₃	35	% of Is			
Last Trip Current	0	% of Is			
Phase Unbalance	0	%			

Thermal/Motor Model

Thermal Memory	30	%	Active Power P	6,280	kW
Cooling Down Period	0.0	s	Apparent Power S	13,362	kVA
Time to Trip		s	Co-Pf	47	%

Temperature Model

Max. Temperature		°C	Analogue Input 1	0.0	%
Temperature 1		°C	Analogue Input 2	0.0	%
Temperature 2		°C	Analogue Output	0.0	%
Temperature 3		°C			

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Maintenance Date / Statistical Data

Maintenance Data/ Statistical Data

Make Operating Hours	0	h	Tain	Actual Value	Output
Make Operating Hours >			Tain 1	0	0
Number of Overload Trips	0		Tain 2	0	0
Number of Starts	2044		Tain 3	0	0
Permissible Start - Actual Value	0		Tain 4	0	0
Just one Start possible	<input type="checkbox"/>		Counter	Actual Value	Output
no Start possible	<input type="checkbox"/>		Counter 1	0	0
Make Stop Time	2	h	Counter 2	0	0
Make Stop Time >			Counter 3	0	0
Connected Energy		kWh	Counter 4	0	0

Basic Data

Device Operating Hours	12721	h	Calculation module 1 - output	0
Number of Parametrications	13		Calculation module 2 - output	0

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Events list

Error Buffer/ Error processed

Time (hh:mm:ss)	Error	Action	Type
14/02/2010 12:14	Error	20	Overload
14/02/2010 12:14	Power On	20	Underbalance
14/02/2010 12:17	Error	20	Overbalance
14/02/2010 12:45	Error	20	Overbalance
14/02/2010 12:49	Error	60	UnderPhase
14/02/2010 12:58	Error	60	UnderPhase
14/02/2010 13:01	Error	60	UnderPhase
14/02/2010 13:05	Error	60	UnderPhase
14/02/2010 13:07	Power On	20	Underbalance
14/02/2010 13:40	Error	20	Overbalance
14/02/2010 13:41	Power On	20	Underbalance
14/02/2010 13:42	Power On	20	Underbalance
14/02/2010 13:43	Power On	20	Underbalance
14/02/2010 13:44	Power On	20	Underbalance
14/02/2010 13:45	Power On	20	Underbalance
14/02/2010 13:46	Power On	20	Underbalance
14/02/2010 13:47	Power On	20	Underbalance
14/02/2010 13:48	Power On	20	Underbalance
14/02/2010 13:49	Power On	20	Underbalance
14/02/2010 13:50	Power On	20	Underbalance

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Control Signals / Drive Status Indications & Digital Signals Status

Control Signals / Drive Status Indications & Digital Signals Status

14/02/2010 13:50

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Detailed Fault & Warning Information

Faults Warnings

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Trend View of Measuring Parameters – For Close Monitoring & Detailed Analysis

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Motor Protection Settings

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Merits

- Ø Sensitive Protection to the Motors like Over Current, Unbalance, Earth Fault, Starting Current...
- Ø Direct Communication to DCS & Load Center Workstation by Profibus (Controlling, Measurement & Annunciations). Hence no Instrument I/O Panels required.
- Ø Reduces the Commissioning Time of 4 Weeks due to no I/O Panel and its Cabling / termination
- Ø Online Monitoring of all Motor like Running Status, Current and Power Data at CCR and Load Center Workstation.
- Ø Retrieving of motor Trip Records
- Ø Reduced Hardware wiring and hence reduced Maintenance & Breakdowns.
- Ø Wide Range of Feeder Components, hence reduced inventory.



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Concerns

- Ø High Initial Cost
- Ø Required Air Conditioned Substation
- Ø Required UPS Power Supply for SIMOCODE Aux. Power
- Ø If Profibus Communication Fails, Entire MCC Feeders will be affected.
- Ø Required High Skilled Man Power



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Cost Benefit Analysis – Ordering Stage

Sl. No.	Description	Standard MCC	Intelligent MCC
1	Total cost of the motor control centre in a cement project	487.00 Lacs	567.00 Lacs
2	Total cost of DCS System in complete Cement Plant	903.00 Lacs	886.00 Lacs
A)	Sub Total- I	1390.00 lac	1453.00 lac
1	Cost of cables, cable trays (from MCC panel to I/O panel) , cable glands and other Hardwares	43.58	7.98
B)	Sub Total- II	43.58	7.98
	Total (A+B)	1433.58	1460.98
	Increase in Total Cost		27.41 lac

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Cost Benefit Analysis – Commissioning Stage

Sl. No.	Description	Standard MCC	Intelligent MCC
1	Project Execution Time for Installation, Testing & Commissioning of MCC's and Plant DCS system.	75 days	45 days
2	Per day loss due to delay in Plant commissioning @ 50% Capacity	22 Lacs	
3	Loss due to delay in Plant Commissioning as above	660 lac	0

Hence, it is recommended that we shall go with Intelligent MCC for Cement Plant, which is not impacting the project cost but tendering significant reduction in Execution, Commissioning, Operation and Maintenance Cost



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Problem Faced during Commissioning

- Ø Feedback Fault due to Delayed Communication
 Problem drastically reduced by fine tuning the Execution Time & Feedback Time Settings
- Ø Communication Error
 Solved by Ensuring Earthing Connectivity of Profibus Cable Shield at all Terminals
- Ø Failure of Digital Expansion Modules
 - Solved by Connecting all Earth Terminals of SIMOCODE to separate Earth Pit
 - Solved by Connecting Surge Suppressors to the Power & Control Contactor Coil Terminal and Suppressed the Surges during Switching.
 - Tested all the Digital Modules (Measured Digital Input Energizing Current) and replaced the Defective Digital Expansion Modules

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Intelligent MCC

Case Study

L51SD1 (Shut Off Damper) Motor was Tripping frequently due to Over Load & Stalled Rotor Current (Motor unable to drive the load). We have analysed through SIMOCODE Work Station and Retrieved the following information.

Tripping Current	: 498% of the Motor Rated Current (Nearly 5 Times more than rated)
Motor Operated Hours	: 72 Hours
No. of Over Load Trips	: 207 Times
No. of Starts	: 5044 Times

Action:
Mechanical Dept. took action and found coating formed on the Gate Railings, Which are cleared and taken into operation

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Case Study

As a Routine Activity, we are monitoring the Motor Running Parameters and Maintenance / Statistics Data from the SIMOCODE Work Station and observed that 361HT1 Raw Mill VRM Tension Hydraulic Pump was operating with abnormal No. of starts recorded.

Then, we have closely monitored the Motor during Operation, and found the following

- Ø ON time of the Motor is 2 Second (sometimes operating for 1 second)
- Ø OFF time of the Motor is 2 Second.
- Ø Observed No. of Start Stop of the Motor nearly 30 times / minute (1800 Start Stops per Hour).

Due to the abnormal start stop the Motor Frame Temperature is very high (70 deg C). Informed to Instrumentation & Mechanical Dept and found the Pressure Seal was damaged & the same was replaced.



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Result at Dalmia – Kadapa Site

- Ø Achieved Zero motor Burning after commissioning of Plant
- Ø Power analysis of possible for all motor – Achieved almost zero power loss on account of idler running hours (achieved go green)
- Ø Having facility of logging of run hours for individual motors, unit planned maintenance on this basis, achieved low maintenance cost
- Ø Faster commissioning of plant, saved more than 30 days
- Ø Zero stoppage on account of loose connection of control wiring
- Ø Minimum Inventory

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Any Queries ?




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Thank You

