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Turkish Scientific and Technical Research Council
Turkish Technology Development Fund
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“Grand Technology Award”



Control Engineering Magazine, US
40 Best Products
“Editor’s Choice Award”



IET
The Institution of Engineering, UK
“Technology Innovation Award”

MCM

Troubleshooting

April 2010

Q1. MCM gives error / alarm what should I do?

There are several reasons to get alarm or error from MCM. When you get alarm / error please press left /right arrow key to get explanation of it. You can also check the error/alarm with its code.

Format : First byte Minor code - Second byte Error type

Error types			Alarm conditions		
Error no.	Error type	Description	Alarm no.	Alarm type	Description
0x010000	Memory allocation error	The dynamic memory manager failed in a request to allocate a block of memory	0x0001	Voltage balance	Voltage phase imbalance exceeds the set threshold
0x020000	General error	An unexpected or general error occurred	0x0002	Current balance	Current phase imbalance exceeds the set threshold
0x040000	Zero division	The algorithm attempted to perform a division by zero	0x0004	Voltage range Ch 1	Voltage greater than the upper threshold
0x080000	Flash Write	There was an error attempting to write to flash	0x0008	Voltage range Ch 2	Voltage greater than the upper threshold
0x100000	Illegal square root	The algorithm attempted to form the square root of a negative number	0x0010	Voltage range Ch 3	Voltage greater than the upper threshold
0x200000	Initialization error	Initialization was not properly finished, or an error occurred	0x0020	No voltage Ch 1	Voltage less than acceptable (No voltage) limit
0x400000	No data error	There is no data present	0x0040	No voltage Ch 2	Voltage less than acceptable (No voltage) limit
0x800000	Data acquisition error	An error occurred during data acquisition causing insufficient data to be acquired	0x0080	No voltage Ch 3	Voltage less than acceptable (No voltage) limit
0x01000000	Parameter error	An illegal value was calculated for an algorithm parameter	0x0100	High current Ch 1	Current exceeds upper threshold limit
0x02000000	Flash error	An attempt to read or write from the flash RAM gave an error indicating a faulty flash. The device can only be restarted by removing power and performing a general reset	0x0200	High current Ch 2	Current exceeds upper threshold limit
0x04000000	Cluster error	An illegal cluster value was detected.	0x0400	High current Ch 3	Current exceeds upper threshold limit
0x08000000	Flash data error	Data stored in the flash RAM is corrupted and cannot be used. This error is generated during both learn and test modes following an attempt by the algorithm to recover from another fault	0x0800	Motor not running	All currents were measured below their acceptable (No current) limits
0x10000000	Stability error	Clusters used by the algorithm are inherently unstable	0x1000	Motor connection fault	One or more currents were measured below their acceptable limits
0x20000000	Voltage range error	An illegal voltage value was detected			

Q1. MCM gives error / alarm what should I do?

Alarm no.	Alarm type	Description
0x2000	Line fault	One or two voltage phases were compatible with zero (below No voltage limit)
0x4000	Power fault	All the voltage phases were compatible with zero (below No voltage limit)
0x8000	Unstable line	The power lines were not sufficiently stable to allow the algorithm to obtain data (amplitude and frequency variations of current and voltage were excessive)
0x10000	General fault	General fault consisting of one or more of: No data obtained, no zero crossings detected, perfect phase balance (voltage or current)
0x20000	Phase ordering	The phase ordering used by MCM is incorrect and must be rectified.
0x40000	Phase fault	Voltage phase angles incompatible with 120° were detected
0x80000	Phase angle	The measured phase angle between corresponding voltage and current channels was not in the range: $0 \leq \varphi \leq \pi/2$
0x100000	Current phase fault	The ordering of the current phases was different to that of the voltage phases or that the angle between two phases was not 120°
0x200000	Data acquisition fault	Division by zero was attempted during data acquisition
0x400000	Range error	An illegal value was detected for one or more of the following quantities during data acquisition: Calibration constants, balance values, admittance, estimated physical parameters
0x800000	Frequency range	(CHECK MOTOR and LEARN only). The measured frequency differed from the nominal value. During the learning period, MCM learns the motor only at the dominant frequency. In inverter driven systems, it is important to set the nominal frequency to this dominant frequency otherwise, MCM may never complete the learning period. This condition is relaxed during normal monitoring (IMPROVE and UPDATE) where unlearned frequencies are updated automatically
0x1000000	Frequency tolerance	Illegal value for the mean frequency (IMPROVE, UPDATE and MONITOR)
0x2000000	Noisy data	The estimated admittance is inconsistent with the measured RMS values for voltage and current. This usually indicates excessive of noise in the data

Warning conditions		
Warning no.	Warning type	Description
0x01	Test frequency range	(MONITOR, IMPROVE, UPDATE only) The measured frequency was different to (i.e. outside the threshold of) the LEARN frequency
0x02	Residual error	An unexpectedly large value was calculated for the modeling error. This is generally an indication of an unstable line condition and will usually pass
0x04	Data size reset	Values for some quantities were checked and found to be outside their allowable limits. The values were reset to the upper or lower limits
0x08	Phase ordering	Phase ordering is different from the values set
0x10	Unstable system	Instability was detected for the system

Q2. MCM gives 0x0001 Voltage balance what should I do?

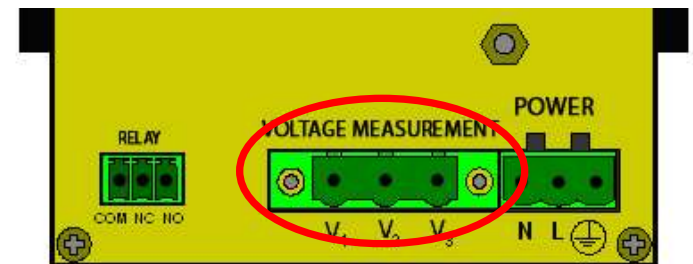
You get this error if voltage phase imbalance exceeds the set threshold. Default value for voltage imbalance is 10%. Voltage imbalance is calculated by following formula in MCM.

% NEMA Imbalance formula

$$v_{\max} = \max([\text{abs}(v_r(1) - \text{mean}(v_r)) \text{ abs}(v_r(2) - \text{mean}(v_r)) \text{ abs}(v_r(3) - \text{mean}(v_r))]);$$
$$\text{nema} = 100 * v_{\max} / \text{mean}(v_r)$$

Solution :

1. Please check calibration ratios of Voltage transformers. (on site & on MCM)
Edit Settings > Password 'm' > Calibration > *V channel 1 – V channel 2 – V channel 3*
If the voltage measurement transformer connected to MCM is 6600 /120, you need to set calibration ratio as 55 for each channel.
2. Please check voltage measurement connections .This may indicate a problem on motor supply voltage. Please measure actual voltages with a multimeter.
3. You can increase voltage unbalance threshold. Edit Settings > Password > Alarm thresholds > Voltage Balance > Press "ENTER" twice > Set the value > Press "ENTER" twice > Press "CLEAR" 4 times to reach "IDLE" mode than send MCM to "CHECK" to control if it's OK.



Q3. MCM gives 0x0002 Current balance what should I do?

You get this error if current phase imbalance exceeds the set threshold. Default value for current imbalance is 20%. Current imbalance is calculated by following formula in MCM.

% NEMA Imbalance formula

$$\text{imax} = \max([\text{abs}(\text{ir}(1) - \text{mean}(\text{ir})) \text{abs}(\text{ir}(2) - \text{mean}(\text{ir})) \text{abs}(\text{ir}(3) - \text{mean}(\text{ir}))]);$$
$$\text{nema} = 100 * \text{imax} / \text{mean}(\text{ir})$$

Solution :

1. Please check calibration ratios of Current transformers. (on site & on MCM)
Edit Settings > Password 'm' > Calibration > *Ichannel 1 – Ichannel 2 – Ichannel 3*

If the current measurement transformer connected to MCM is 600 /5, you need to set calibration ratio as 30 for each channel.

2. *You can increase current imbalance threshold. Edit Settings > Password 'm' > Alarm thresholds >Current Balance> Press "ENTER" twice > Set the value > Press "ENTER" twice > Press "CLEAR" 4 times to reach "IDLE" mode than send MCM to "CHECK" to control if it's OK.*
3. *Voltage unbalance can create a current unbalance 6 to 10 times the magnitude of voltage unbalance. Please check actual voltage & current unbalance with a multimeter. Please check current unbalance, stator failure and internal electrical failure parameters trend on MCMScada. If there is an increasing trend of it, this may indicate a stator failure problem.*

Q4. MCM gives 0x0020/0x0040/0x0080 No voltage what should I do?

You get this error if motor voltage is less than acceptable limit set threshold. Default value for Low voltage is 20% of the motor nominal voltage. Minimum acceptable level below which voltage is considered to be zero for line and power fault alarms. If motor is not running getting this error is a normal condition since actual motor supply voltage is 0 (Zero).

Solution :

1. Please check fuses on MCM voltage connections.
2. Please check calibration ratios of voltage transformers (on site & on MCM) Edit Settings > Password 'm' > Calibration > *Vchannel 1 – Vchannel 2 – Vchannel 3 (If it's a medium voltage motor)*

If the voltage measurement transformer connected to MCM is 6600 /120, you need to set calibration ratio as 55 for each channel.

2. *If motor is driven by a frequency converter and motor speed is very low, you may get this error since motor supply voltage is too low. You can decrease the threshold. Edit Settings > Password 'm' > Alarm thresholds >Low Voltage> Press "ENTER" twice > Set the value > Press "ENTER" twice > Press "CLEAR" 4 times to reach "IDLE" mode than send MCM to "CHECK" to control if it's OK.*

Q5. MCM gives 0x0800 Motor not running what should I do?

You get this error if motor current is less than low current set threshold. Default value for Low current is 20% of motor nominal. All currents were measured below their acceptable (No current) limits. While motor is not running, getting this error is a normal condition since actual motor current is 0 (Zero). If you get this error although motor is running, please check following issues.

Solution :

1. Please check calibration ratios of current transformers (on site & on MCM) Edit Settings > Password 'm' > Calibration > *Ichannel 1 – Ichannel 2 – Ichannel 3*

If the current measurement transformer connected to MCM is 600 /5, you need to set calibration ratio as 120 for each channel.

2. *If motor is running with no load, motor current may be lower than MCM low current threshold. Then, you may consider to decrease "Low Current" threshold. Edit Settings > Password 'm' > Alarm thresholds > Low Current > Press "ENTER" twice > Set the value > Press "ENTER" twice > Press "CLEAR" 4 times to reach "IDLE" mode than send MCM to "CHECK" to control if it's OK.*

Q6. MCM gives 0x800000 Frequency range what should I do?

You get this error if the measured frequency differed from the nominal value. You can get that error only CHECK MOTOR and LEARN modes. During the learning period, MCM learns the motor only at the dominant frequency. In inverter driven systems, it is important to set the nominal frequency to this dominant frequency otherwise, MCM may never complete the learning period. This condition is relaxed during normal monitoring (IMPROVE and UPDATE) where unlearned frequencies are updated automatically.

Solution :

1. Frequency converters change motor supply voltage and frequency to control motor speed and torque. It's a normal condition if the motor supply actual frequency is different then set value. MCM does not continue learn period at that time. When supply frequency back to MCM set value, MCM stops to give frequency range error and continues to learn. That's why, set frequency is very important regarding learning period duration. If it is not selected correctly, MCM learning period could take forever.
2. If you want to reduce number of learning iterations due to supply frequency changes , you can decrease "Learn Iterations" parameter. Please check following path *Edit Settings > Password 'm' > Run Settings > Learn Iterations > Press "ENTER" twice > Set the value > Press "ENTER" twice > Press "CLEAR" 4 times to reach "IDLE" mode than send MCM to "CHECK" to control if it's OK.*

Q7. MCM gives 0x0100/0x0200/0x0400 High Current what should I do?

You get this error if the measured current exceeds upper threshold limit. Maximum current threshold is defined by a parameter regarding a certain percentage of motor nominal current.

Solution :

1. Please check motor nominal current, actual current and calibration ratios of I channels and CTs. Default value for maximum permitted current upper limit is 50% of its nominal. It's not recommended to increase this value since over current may damage motor insulation.

Q8. MCM gives 0x08000 Unstable Line what should I do?

You get this error if the power lines were not sufficiently stable to allow the algorithm to obtain data (amplitude and frequency variations of current and voltage were excessive) Although It's not a healthy condition for the motor, you may want to start / continue MCM running.

Solution :

1. You may increase allowed current instability limit. Default threshold for current variation during data acquisition is 15%. Please check following path to change it *Edit Settings > Password 'm' > Alarm thresholds > Current Instability > Press "ENTER" twice > Set the value > Press "ENTER" twice > Press "CLEAR" 4 times to reach "IDLE" mode than send MCM to "CHECK" to control if it's OK.*
2. You may change sampling time and / or sampling frequency to get over it. Please check following path to change it *Edit Settings > Password 'mcm' > Alg. Settings > Press "ENTER" twice > change Freq.. Instability / Min. SS time / Subsampling > Press "ENTER" twice > Press "CLEAR" 4 times to reach "IDLE" mode than send MCM to "CHECK" to control if it's OK.* Changing sampling freq. or time may change PSD resolution which may effect MCM performance.

Sampling Freq. / Duration	1 sec [0]	2 sec [1]	3 sec [3]
2500 [0]	256	512	1024
2500/2 [1]	256	512	1024
2500/3 [2]	256	512	1024
2500/4 [3]	256	512	512

Q9. MCM gives 0x80000 Phase angle what should I do?

You get this error when the measured phase angle between corresponding voltage and current channels was not in the range: $0 \leq \phi \leq \pi/2$. The three motor power voltages should be connected to the corresponding measurement terminals on the MCM rear panel (R phase to V1, S phase to V2, and T phase to V3) using the connectors provided. Similarly, the I_R , I_S , I_T connections from the current sensors should be made to the appropriate current terminal pairs, I_{11} - I_{12} , I_{21} - I_{22} , I_{31} - I_{32} , on the upper part of the rear panel. It is not essential that the all three sets of phases have the correct phase relationship as the phase ordering is determined by MCM. The order of these voltage and current pairs is not important as MCM determines the correct ordering when CHECK MOTOR is first run on the device. Sometime MCM could not find the correct phase order by itself then ,it's needed to do this manually.

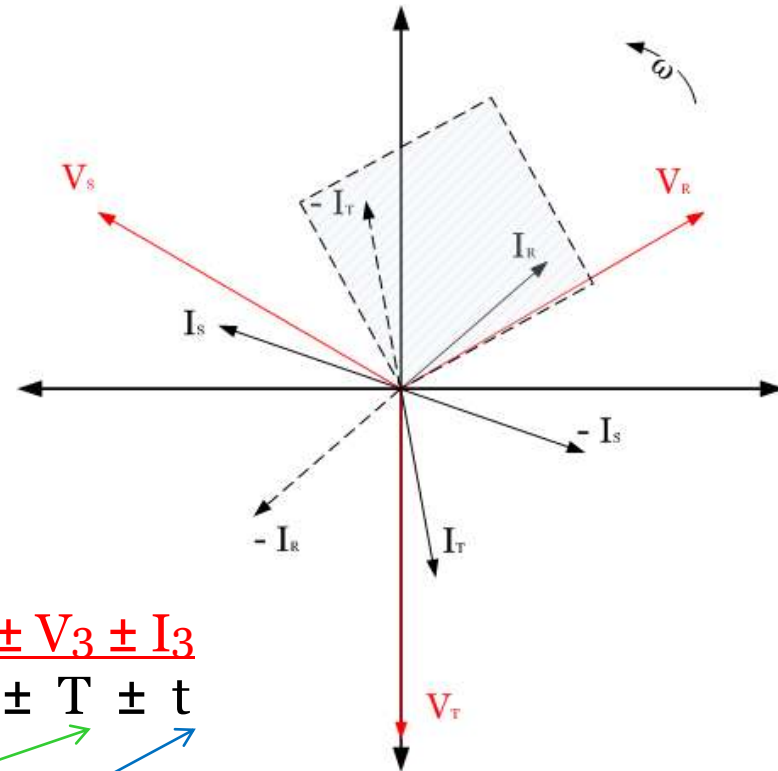
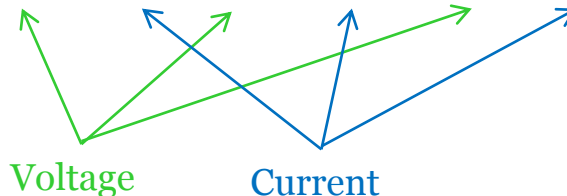
Solution :

1. Power factor or phase angle of induction motor is related with its load. When motor run no – load condition (or at light loads) phase angle will be bigger then loaded. MCM needed to know about load condition to pick correct phase ordering. Used by the phase ordering algorithm to set the loading threshold. If the ratio of actual current to nominal current is more than the value of the Load threshold (in %) then the motor is considered to be working under load and the appropriate phase ordering selected. Otherwise the motor is assumed to be unloaded. You may consider to change load threshold parameter
2. It's possible to arrange phase ordering manually. To do this please check following path :

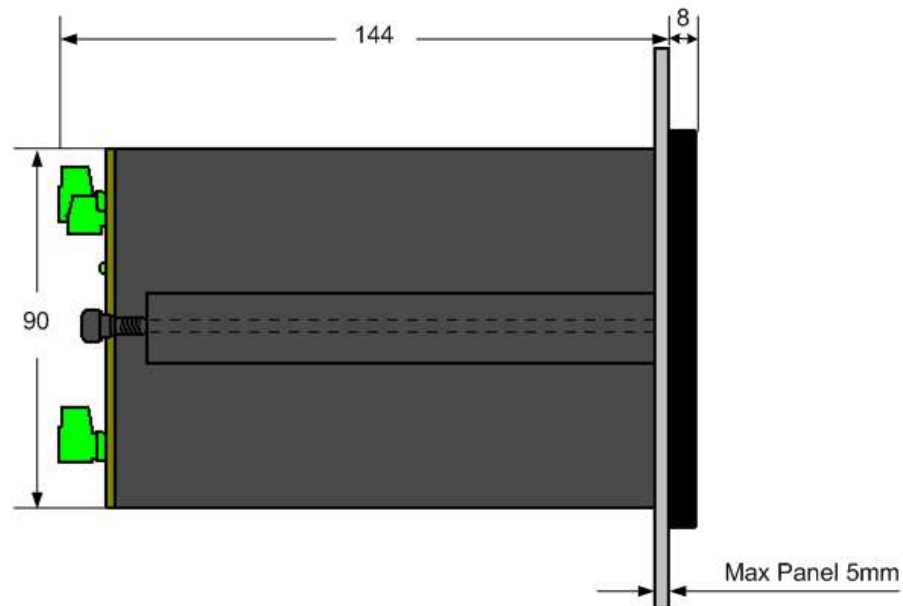
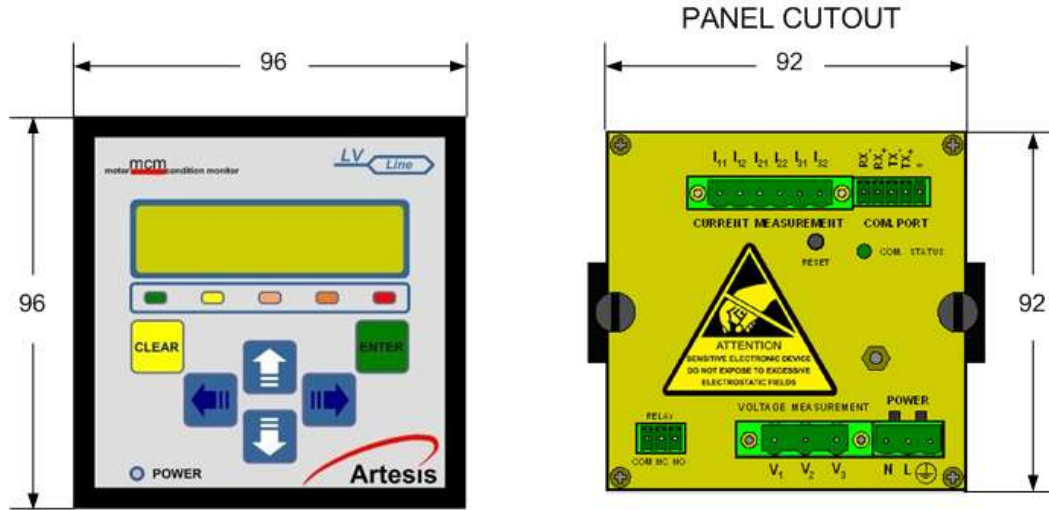
Edit Settings > Password 'm' > Phase Ordering >Order Override> Press "ENTER" twice > Set the value > Press "ENTER" twice > Press "CLEAR" 4 times to reach "IDLE" mode than send MCM to "CHECK" to control if it's OK.

$V_1 \pm I_1 \pm V_2 \pm I_2 \pm V_3 \pm I_3$

R \pm r \pm S \pm s \pm T \pm t



Q10. I'd like to have a panel for MCM, what is the dimension of MCM?



Q11. I have done some maintenance. Do I need to do something on MCM

Solution :

1. If you did a **MINOR** maintenance just like replacing bearing or tightening some bolts etc, it's enough to run MCM by "UPDATE" mode. Please check the following path to do this : *Menu> Update> Press "ENTER" twice . After this operation MCM will start to run by "UPDATE" mode and update its model without deleting old model info. Default number of iterations for "UPDATE" mode is 1500.*
2. If you did a **MAJOR** maintenance just like rewinding or replacing it with a new motor, it's required to start learning period again. Please check the following path to do this : Press "CLEAR" twice and check MCM is in "IDLE" mode> Make sure motor is running>Select "RUN" > Press "ENTER" twice > You will lose data CLEAR or EXIT > Press "ENTER" twice> "LEARN Iteration 1"> Press "CLEAR" twice >You'll see "Writing to flash" and then "IDLE" > "RUN" > Press "ENTER" twice> You'll see "Writing to flash" and then "LEARN" Iteration 1 > Just for a while to see "Iteration 2. Learning iteration will take 4000 iteration for MCM line and 400 iteration for MCM Inverter type.

* For further information please apply MCM quick installation guide.

Q12. Is it possible to lock keypad on MCM ?

Solution :

1. Yes it has. If you activate keypad lock all operations on site requires password. To activate keypad lock please check following path : *Edit Settings > Password 'm' > Run Settings >Local Lockout> Press "ENTER" twice > Set the value "ON" > Press "ENTER" twice > Press "CLEAR" 4 times to reach "IDLE" mode than send MCM to "RESUME" mode to continue its normal operation.*

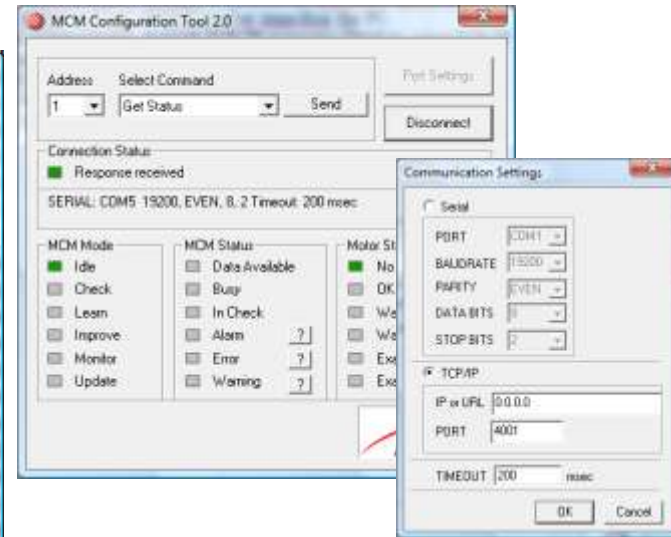
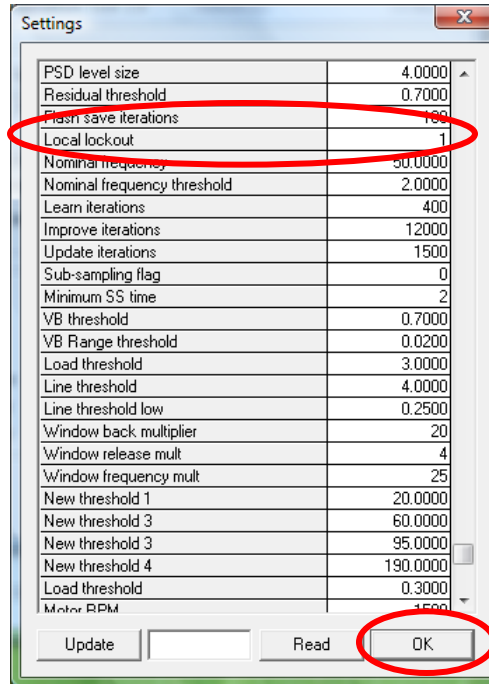
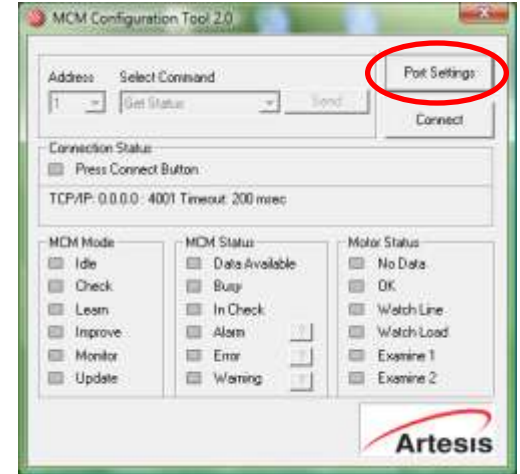
* Local lockout can only disable by MCMconfig (software) again.

Q13. Is it possible to deactivate locking keypad on MCM ?

Solution :

To deactivate local lockout please check following steps :

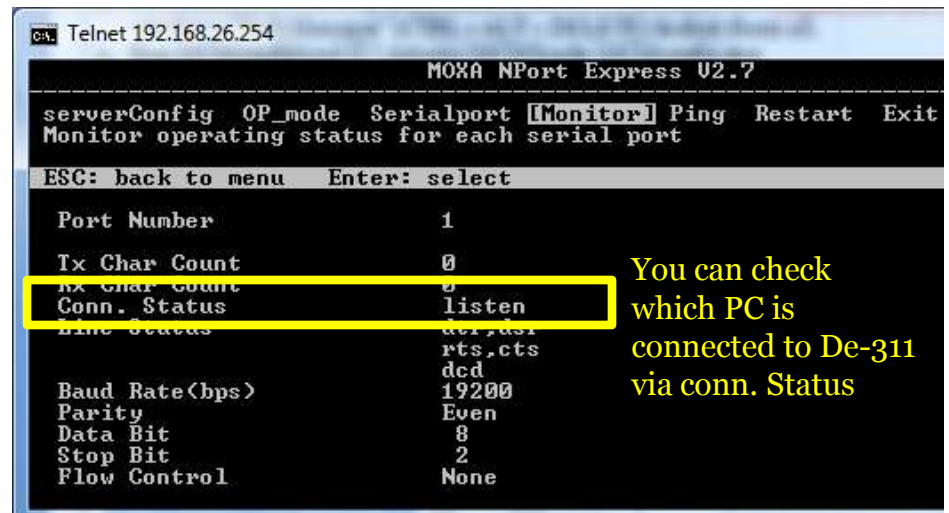
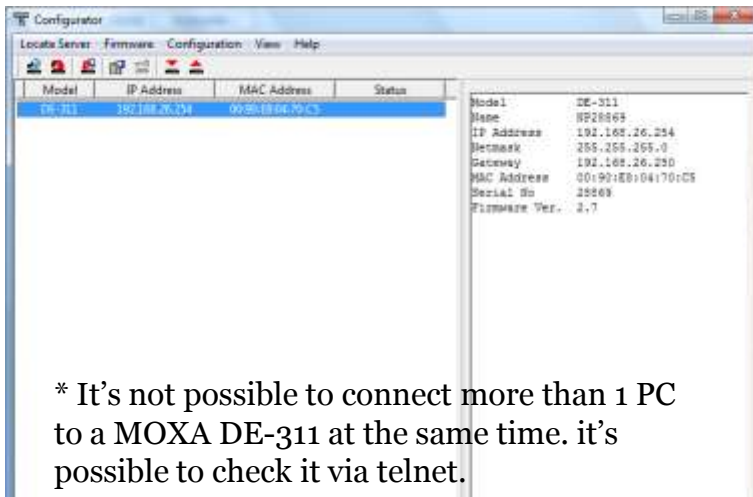
1. Run MCMconfig tool (C:\Artesis\MCMScada\MCMconfig.exe)
2. Click “Port Settings” and set communication parameters. There are two options Serial & TCP/IP
 1. If MCM communicates through RS422/RS232 converter (green box) select “Serial” and just set port number regarding the PC.
 2. If MCM communicates through TCP/IP converter (MOXA) select TCP/IP and enter MOXA IP to “IP or URL” and its port to “Port” Increasing timeout may be required.
3. Click “OK” and then click “CONNECT”
4. Check connection status and see “ Response Received” message
5. Change “Local Lockout” parameter to “0” & click “OK”



Q14. I'm unable to communicate with MCM, what should I do?

Solution : If MCMScada can not communicate with MCM on site, you'll see "OFF" mode of MCM. Please check following steps :

1. If MCMScada is running, please shut it down. Please check also MCMNode.exe, MCMMainNode .exe image names on windows "Task Manager" (CTRL + ALT + DELETE) & shut them all.
2. Run MCMconfig tool (C:\Artesis\MCMScada\MCMconfig.exe)
3. Click "Port Settings" and set communication parameters. There are two options Serial & TCP/IP
 - a. If MCM communicates through RS422/RS232 converter (green box) select "Serial" and just set port number regarding the PC.
 - b. If MCM communicates through TCP/IP converter (MOXA) select TCP/IP and enter MOXA IP to "IP or URL" and its port to "Port" Increasing timeout may be required.
 - i. If MOXA is used, please check it is accessible. You can use "Configurator" or telnet. It's possible to download configurator software from following link. http://www.moxa.com/support/search_result.aspx?prod_id=357
 - ii. When you click "Broadcast Search" button, Configurator needs to find DE - 311 IP & MAC address. If you can not see it, you need to check MOXA communication and power connections. Please check "Communication_Info_Pack_for_MCM" presentation for further information.
 - iii. It's possible to check DE-311 via telnet. (If you have MS Windows Vista, you need to activate "telnet" first. Please check following link to get help. <http://www.youtube.com/watch?v=-n9KStoN4wY>
 - iv. type "telnet" on command prompt & type "open 192.168.XXX.XXX" (MOXA Ip address).

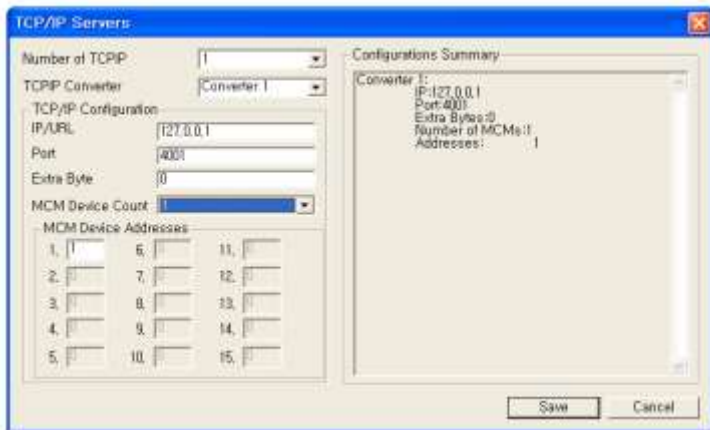
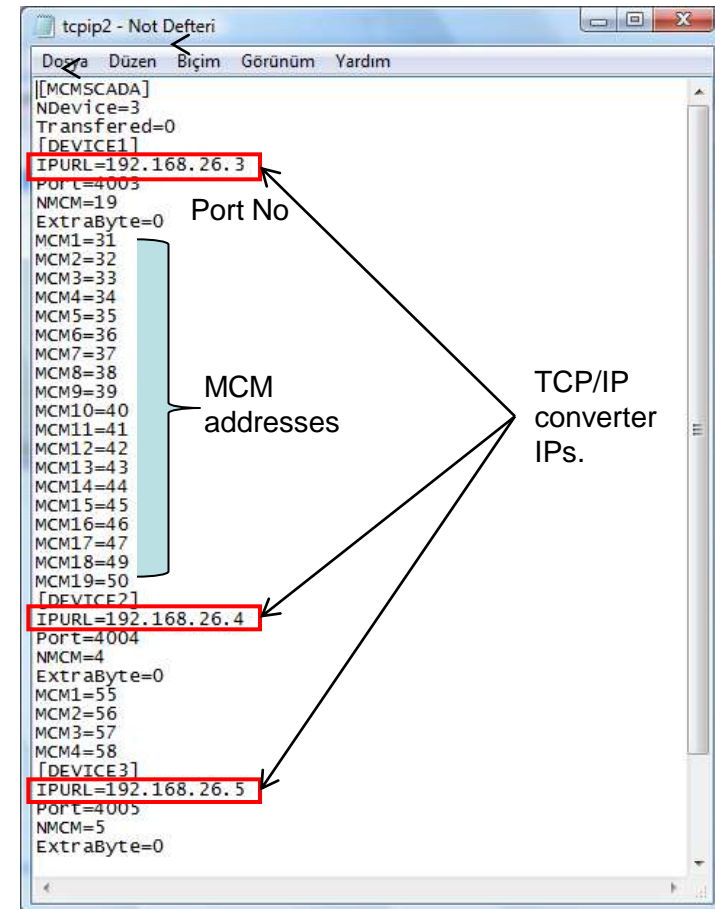
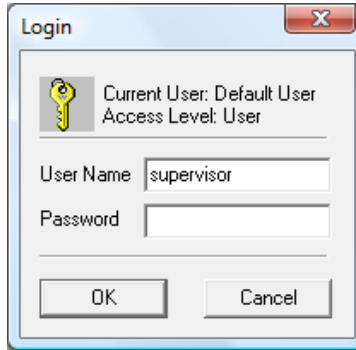
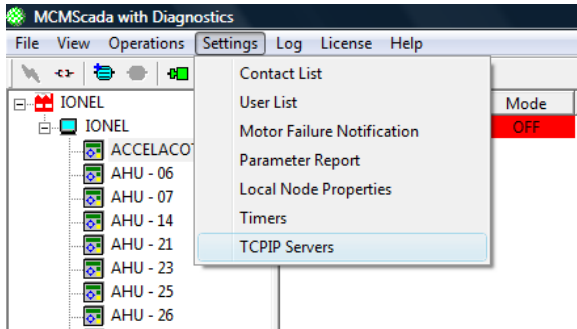


Q14. I'm unable to communicate with MCM, what should I do?

4. If you can connect MOXA DE-311, that means there is something wrong with MCMScada.
5. Please check that TCP/IP converter has already defined in MCMScada. Please apply following steps : MCMScada > Settings > TCP/IP Servers.

Username : supervisor, Password : (Left Blank)

6. Please make sure MOXA IP and MCM address is defined MCMScada TCP/IP Servers.
7. All TCP/IP server information is saved in tcpip2.txt file in following path "C:\Artesis\MCMScada\" It's also possible to revise it via notepad.
8. MAC address of MOXA converters are needed to defined to allow communicate with PCs in some networks . Please contact with IT supervisor while installing MOXA converters to get static IP & define MAC address to network.

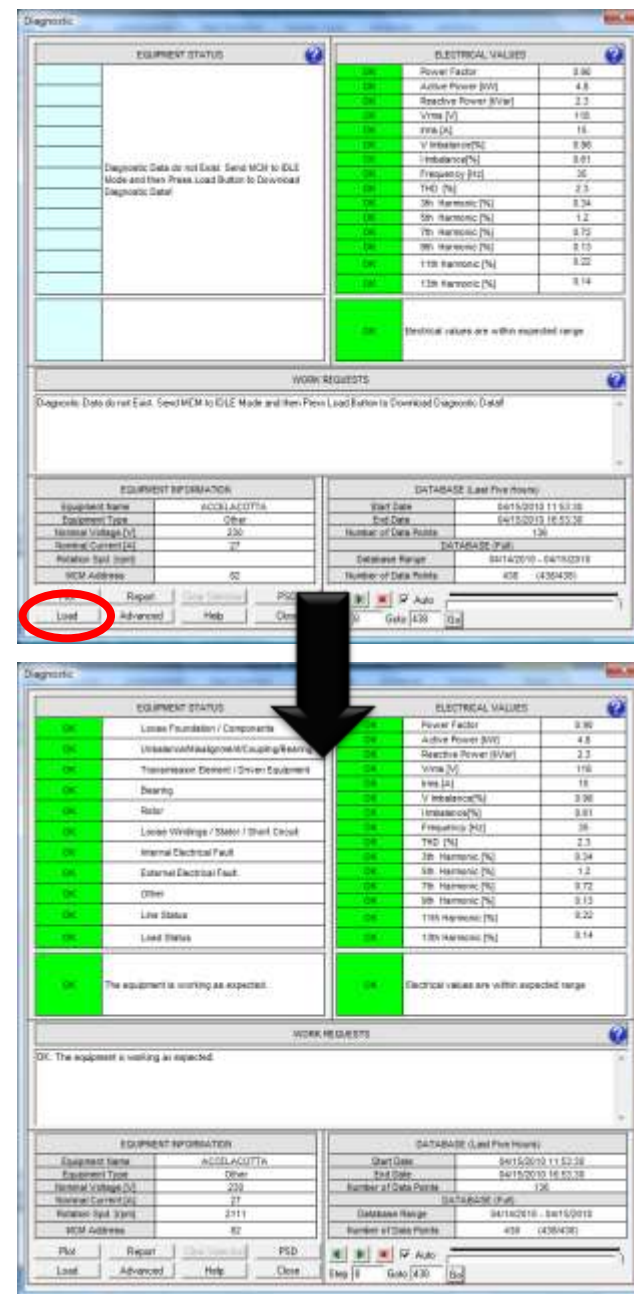


Q15. MCM has finished learning period and start to run in “Improve” mode but I’m unable to see any information on diagnostic screen what should I do?

In order to make analysis on Diagnostics window, Diagnostic information has to be downloaded from MCM. MCM diagnostic information can be downloaded by pressing “LOAD” button. In order to download Diagnostic information, MCM must be in “IDLE” mode and learning phase of MCM has to be completed. Otherwise MCMSCADA will not be able to access diagnostic information and it will display below message. Please follow the instructions below to download diagnostic information from the MCM unit.

- 1) Run MCMSCADA software
- 2) Log in as supervisor from Operations > Login menu (Username : supervisor, Password: ([blank])). Password section should be left blank.
- 3) Right click on the motor and select Commands > Go Idle to send MCM unit to “IDLE” mode.
- 4) Right click on the same motor and select “Diagnostic”.
- 5) Press “LOAD” button.
- 6) Once the diagnostic information downloaded diagnostic window will be updated.
- 7) Close the diagnostic window and right click on the motor and select Commands > Go Resume to send MCM unit back to Monitor or Improve mode.

When you download model information to PC, it is saved as DQPhasePSD_XX.txt to following path “C:\Artensis\MCMScada\Database” XX : Address of MCM



Q16. May I extract MCMScada Database to MS Excel?

Solution : Yes, It's possible to extract MCMScada long term and short term database to MS Excel or any other software. MCMScada uses MS Access for database Please check following steps :

1. All trend information is stored in C:\Artesis\MCMScada\Database folder.
 1. MCMSTData.mdb contains Short Term Data
 2. MCMLTData.mdb contains Long Term Data
2. It's possible to get parameter list from MCMInfo.mdb



		ShortTermTrend					
Address	Date	P23 [Vr]	P24 [Ir]	P25 [Vs]	P26 [Is]	P27 [Vt]	P28 [It]
61	14.04.2010 21:50:00	218,2855	13,10948	217,8203	13,22026	218,2002	13,17158
61	14.04.2010 21:51:48	218,7648	13,12214	218,2718	13,24553	218,6311	13,17903
61	14.04.2010 21:53:23	218,4555	13,14088	218,0404	13,24888	218,3345	13,19239
61	14.04.2010 21:54:59	218,4379	13,08483	218,0137	13,20459	218,3226	13,14664
61	14.04.2010 21:56:02	218,192	13,10514	217,747	13,21139	218,1342	13,16862
61	14.04.2010 21:57:37	217,2444	13,1221	216,7846	13,25192	217,0498	13,18678
61	14.04.2010 21:59:12	217,9837	13,09136	217,5159	13,20365	217,8426	13,14153
61	14.04.2010 22:01:07	217,7582	13,11374	217,3635	13,20995	217,6962	13,15952
61	14.04.2010 22:02:41	218,4987	13,12067	218,0457	13,22729	218,4049	13,17396
61	14.04.2010 22:03:44	218,2801	13,11871	217,8452	13,22128	218,2029	13,16507
61	14.04.2010 22:05:49	217,3673	13,11842	216,9559	13,21991	217,2503	13,17357
61	14.04.2010 22:07:22	217,3373	13,09891	216,8857	13,23306	217,226	13,1644

MotorParameters		
Name	Parameter	Description
P23	Vr	V rms R phase
P24	Ir	I rms R phase
P25	Vs	V rms S phase
P26	Is	I rms S phase
P27	Vt	V rms T phase
P28	It	I rms T phase
P29	Voltage balance	Voltage Balance %
P30	Current balance	Current Balance %
P31	Gain	Admittance
P32	Power factor	Power factor
P33	Active power	Active power R phase
P34	Signal frequency	Signal frequency
P35	Motor status 1	Motor Status 1
P36	Motor status 2	Motor Status 2
P37	Load-Line status	Load-Line Status
P38	THD	Total Harmonic distortion
P39	3rd harmonic	3rd harmonic
P40	5th harmonic	5th harmonic
P41	7th harmonic	7th harmonic
P42	9th harmonic	9th harmonic
P43	11th harmonic	11th harmonic
P44	13th harmonic	13th harmonic