Electrical Fault Diagnostic System
<DSP-EFDS/"Samdspdb">

SamWha DSP Ltd.

Order

○ **Proposal background**

○ **Required condition to realize preventive maintenance**

○ **Electrical Fault Diagnostic System(EFDS)**

- **Abstraction**
- **System diagram**
- **Technical specification**

○ **HMI interface : “Samdspdb”**

Electrical Fault Diagnostic System

<DSP-EFDS/"samdspdb">

○ Proposal background

- The most of **t**he factory with the great scale which employs a lot of low voltage motor from a few to thousands is adopting a central control system called DCS(Distributed Control System)

- But the most of the factory under the medium scale is not seemed to use DCS system like the case of the factory with the great scale, furthermore DCS is mainly focused to manage a high voltage motor and even for a few of low voltage motor with specific duty

- On the other hand, the majority of operated motor in any factory is low voltage class,not high voltage motor,also strong factor that is possible to call a production loss is the majority,it is low voltage motor.

- The most of manufacturer tends to go a new trend which the production loss caused by the damage from the faulty motor due to over current,phase loss, reverse phase, ground fault current and temperature,etc should be considered with the production cost compared with the repair cost for faulty motor. Hence, the concept of network motor management is possible to raise a production efficiency as realizing a preventive maintenance before the motor is happened to be damaged.
  That is why Samwha DSP recommends EFDS

○ Necessary condition for realizing preventive maintenance

- The job of terminated unit in the relationship with master–slave in EFDS is not only to create a necessary data for the running motor,but also to send a data to a master(PC) whenever a master requires for, as doing protection job for a motor in the same time while a motor is working. There are four kind of protection relay as followed :

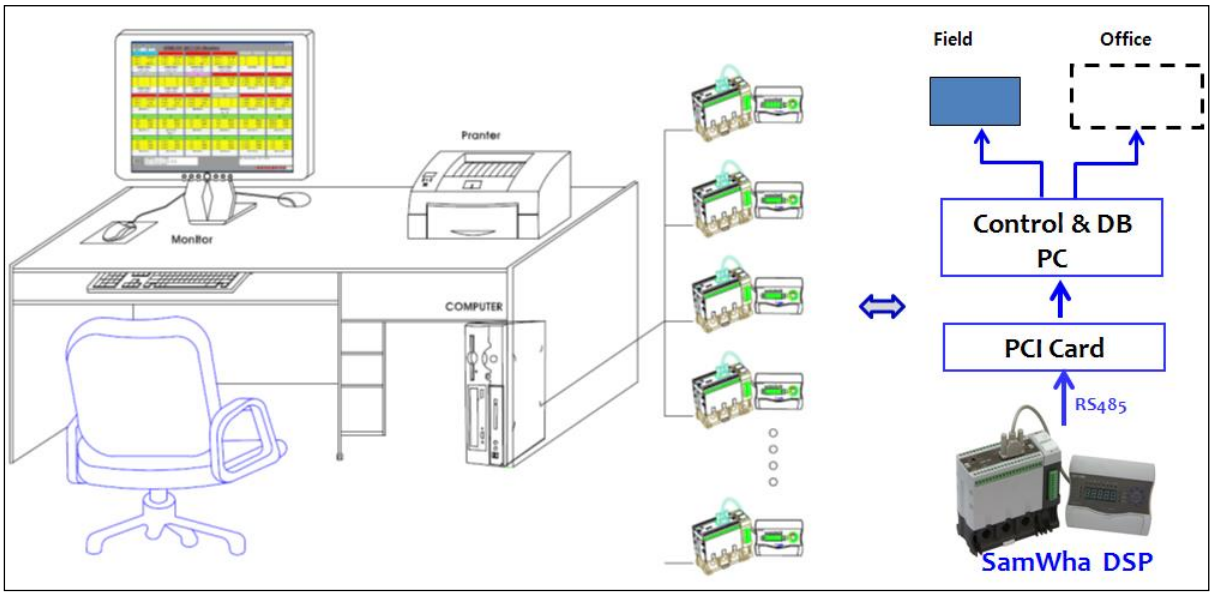
Item	Protection	Communication
VIP-PM/PL	**Over/Under voltage,Over/Under current[load],Phase loss,Reverse phase,Locked rotor, Shock/Stall ,Current/Voltage unbalance, Ground fault,Short Circuit , Temperature**	***MWR-S: 485 *CM-44:485/422**
VIP-RTM/RTL VIP-RM/RL	**• Motor working : Over/Under current,Phase loss,Reverse phase,Locked rotor, Shock/Stall ,Current unbalance,Ground fault**	

	,Temperature •Motor stopping : insulation resistance measurement for incoming power line	
VIP-5CM	**Over/Under current, Phase loss ,Reverse phase,Locked rotor, Shock/Stall,Current unbalance ,Ground Fault**	**485**
DSP-CCM	**Over/Under current, Phase loss ,Reverse phase,Locked rotor, Shock/Stall,Current unbalance ,Ground Fault**	**485**

○ EFDS(Electrical Fault Diagnostic System)

- **Abstraction**
  - ✓ Created data for motor protection :Voltage,Current/KW,Earth current, Insulation resistance,Temperature,Power factor,Unbalance
  - ✓ Building data base(DB) up based on 485/Modbus network
  - ✓ Analyzing and managing DB DATA in order to check the motor condition and to make alarm in case of unstable condition : able to preset alarm level for each factor
  - ✓ Possible to analyze accurate trip cause through stored data of trip instant in MWR-S(Motor Working Recorder) connected with converter directly

- **System Block Diagram**



- **Technical specification**

1. Master

a. PC

> HDD 500Gb
> Memory 4Gb
> Monitor 21”
> Client : Standard/1 point
> Embeded PCI Card : 485 Device Server, Combo 8 Port

b. OS

> Window 7 Pro
> Office 2010
>*.net framework 4.0(dotnetfx40_full_setup.exe) for MS Window

c. HMI Interface

> “Samdspdb” Program

2. Slave

a. Terminated unit/protection + communication

> DSP-VIP-PM,PL
> DSP-VIP-RTM/RM, RTL/RL
> DSP-VIP-5CM,5CL
> DSP-CCM,CCL,CSM

b. MWR-S

> Available for DSP-PM,PL,RTM/RM,RTL/RL Type
> 485 communication & data recorder
> Memory : 1 Gbyte
> Embeded Calendar : year-day-hour-minute-second
> 9.6Kbps~230.4Kbps

c. CM-44

> Available for PM,PL,RTM/RM,RTL/RL Type
> 485/422 communication
> 9.6Kbps~38.4Kbps

○ HMI interface : “Samdspdb”

Down load for compressed file,“samdspdb”,inside PC from CD provided by Samwha DSP Co.and decompress this ZIP file , then check if c://samdspdb is created.

> How to connect with PC

***D-Sub of PCI card**

Enter into control panel >> system>> hardware>> device manager>> port(com1) and change com1 into com3.

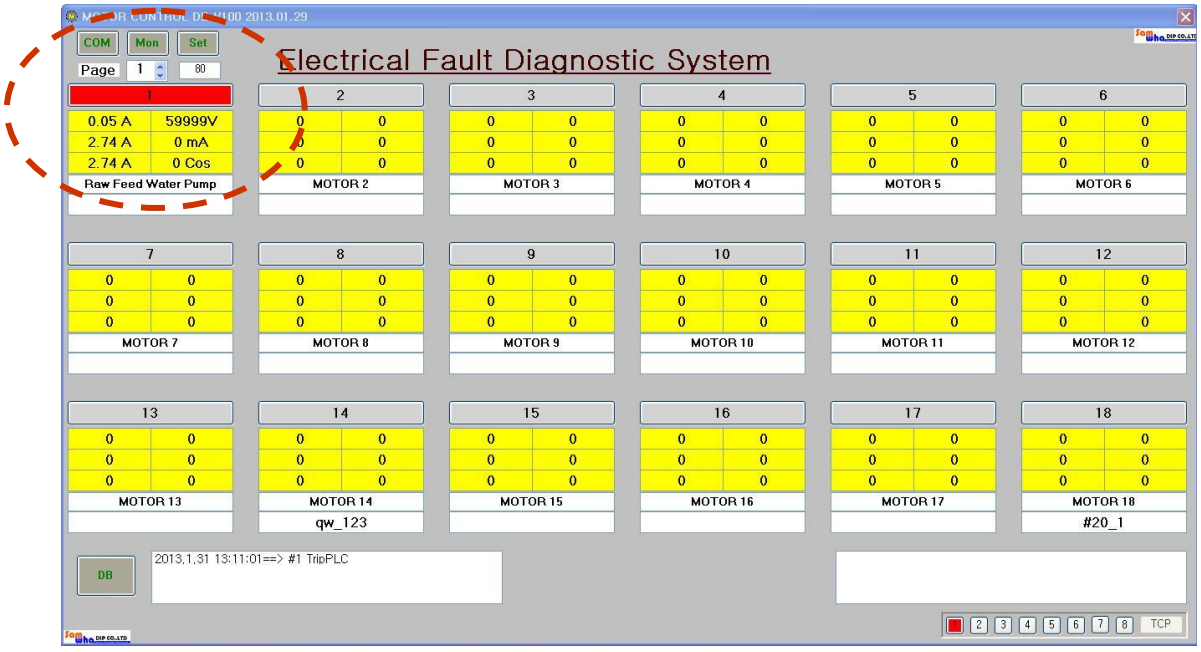
In case total number of D-Sub port in PCI card is 8, all of 8 port should be matched from com3 to com10

***USB port**

Enter into control panel >> system>> hardware>> device manager>> Port and change into one of com3~com10,but com3 is recommended

> Main Window

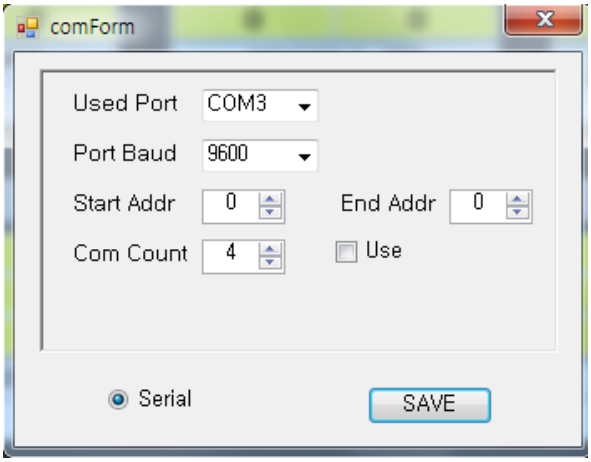
The followed main window is shown as clicking executive file “**Samdspdb**” (SAMDSPDB WindowsApplication1), which is created naturally in the folder,”samdspdb”,in C://



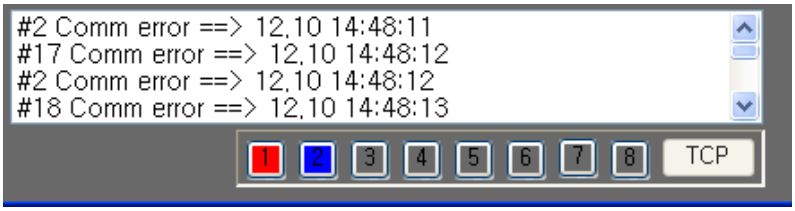
1.Common view

- **COM**

  *The followed Pop-up window is shown as clicking “COM” in order to preset connection port with PC, communication speed, upper and lower address of serial terminated unit and allowable number for communication error.



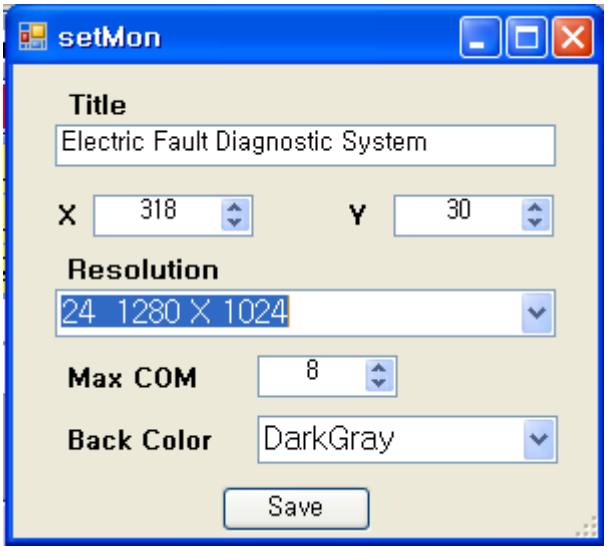
  *Com Count : This number is how many times of the error the user allows while the communication between PC and slave is executed. So if the comunication error over allowed number is occurred,the followed such message with the address of errored unit is shown in the right bottom.



- **Mon**

  *The followed Pop-up window is shown as clicking “Mon” in order to edit a title and a position of main title, monitor solution, maximum quantity of terminated unit able to be communicated in serial connection state and background colour of main window.

  *The maximum allowable quantity of terminated unit is 240 Set.



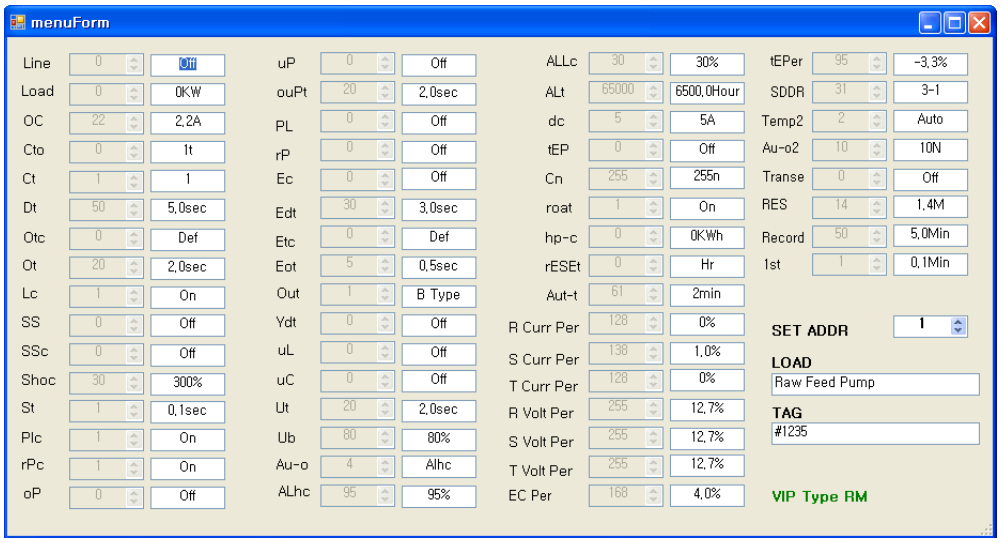
- **Scan**

  *This “Scan” is not shown in the ordinary preset state,so “Scan” is activated as pressing F1 key of PC. This menu is not shown after 10sec naturally as scaning all information for terminated unit in serial connection state.

- **SET**

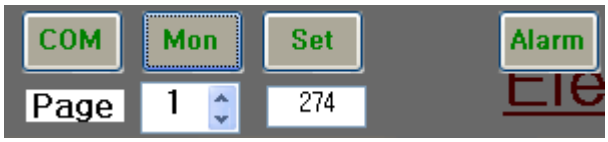
  * The followed Pop-up window is shown as clicking “SET” in order to show preset information of each unit.

  *The operator must activate this “SET” function after “Scan” is disappeared

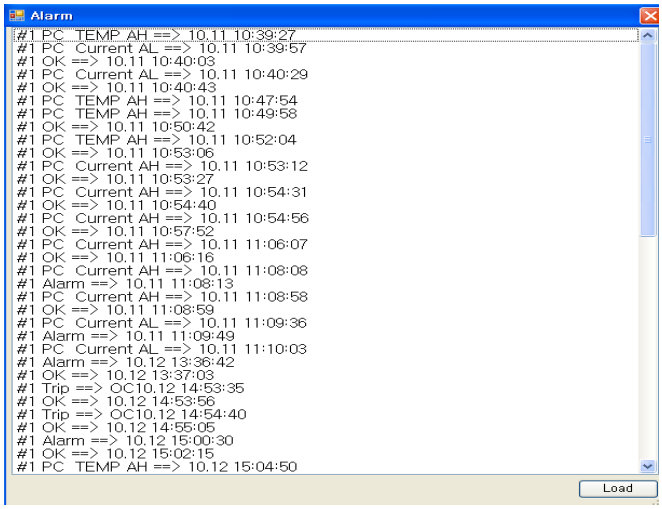


*Reversely, the operator is able to change existed preset value or new preset value as activating another monitoring software “samdsp” ,but some of value according to product type is not matched completely with this “samdsp”

- Alarm



Alarm is shown as pressing F2 key,then the “alarm1” file in the folder in C>samdspdb>DATA is created naturally.
There are all of alarmed state condition (load,ocuured time and cause) in this file while was happened

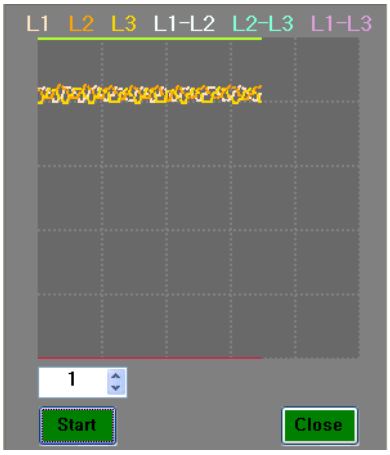


- **Port Check**

The number in “TCP” indicates the order of communication port which is matched currently with port #3 , also red colour means normal communication and blue colour is abnormal.eg:if port “COM3” is matched with “red 1”, then port “COM4” is matched with “blue 2 ”
→ ”COM 3” of PC is the normal gate to communicate , but “COM 4” is closed.

- **Real Time Monitoring**

  The followed pop_up window is shown on the graphic chart as pressing F9 as followed,then put an address of unit to be checked and press “start” to check actual running state.



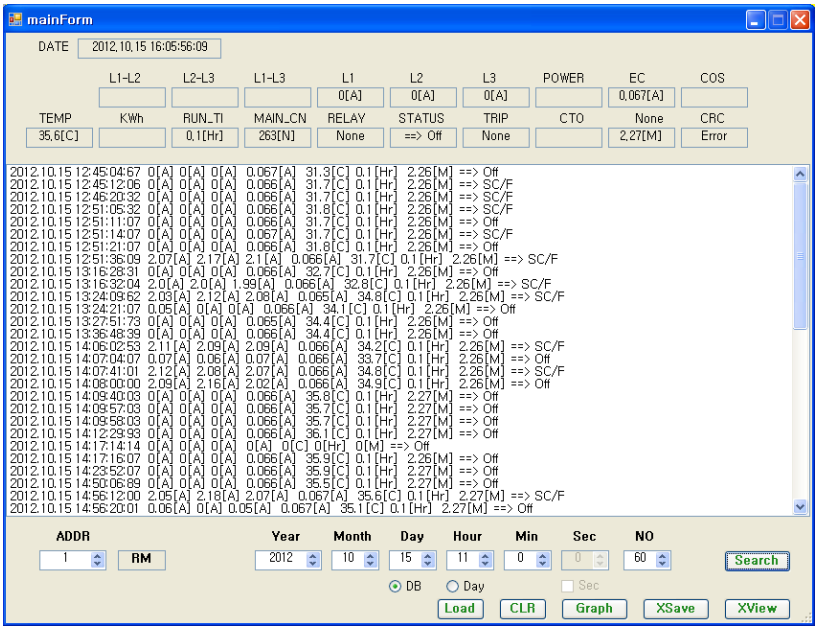
- **TCP in the right bottom**

  * How many unit is normally operating in this network is shown with red colour number

  * How many unit is errored in this network is shown with blue colour number

- **DB**

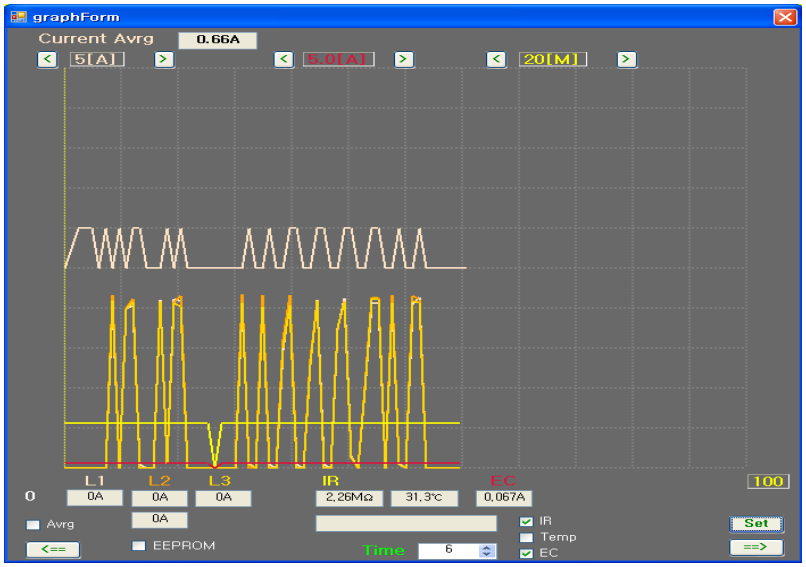
  * The followed Pop-up window is shown as clicking “DB” in order to search a data arranged in data base inside PC ,also the searched data can be transformed into excel format or typical graphic to look at transient state



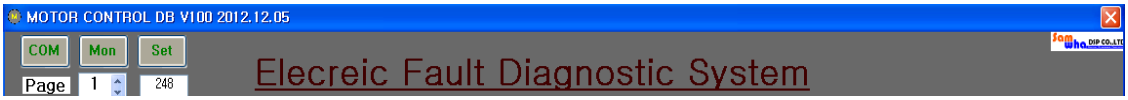
* **“DB” :** able to search for all of stored data
* **“Day” :** able to search for stored data for a day pointed by preset condition.
* **“Load”** : able to call a stored data in C:/DBDATA of PC
* **“CLR”** :able to clear a searched data
* **“XView”** : able to transform a searched data into Excel format.

Date	L1[A]	L2[A]	L3[A]	EC[A]	Temp[C]	Run Time[Hr]	Main Cn[N]	Run(RM)	IR[M]
2012.10.15 12:45:04:67	0	0	0	0.067	31.3	0.100000001	250	0	2.26
2012.10.15 12:45:12:06	0	0	0	0.066	31.7	0.100000001	250	2	2.26
2012.10.15 12:46:20:32	0	0	0	0.066	31.7	0.100000001	250	2	2.26
2012.10.15 12:51:05:32	0	0	0	0.066	31.8	0.100000001	250	2	2.26
2012.10.15 12:51:11:07	0	0	0	0.066	31.7	0.100000001	250	0	2.26
2012.10.15 12:51:14:07	0	0	0	0.067	31.7	0.100000001	250	2	2.26
2012.10.15 12:51:21:07	0	0	0	0.066	31.8	0.100000001	250	0	2.26
2012.10.15 12:51:36:09	2.07	2.17	2.1	0.066	31.7	0.100000001	251	2	2.26
2012.10.15 13:16:28:31	0	0	0	0.066	32.7	0.100000001	251	0	2.26
2012.10.15 13:16:32:04	2	2	1.99	0.066	32.8	0.100000001	252	2	2.26
2012.10.15 13:24:09:62	2.03	2.12	2.08	0.065	34.8	0.100000001	253	2	2.26
2012.10.15 13:24:21:07	0.05	0	0	0.066	34.1	0.100000001	253	0	2.26
2012.10.15 13:27:51:73	0	0	0	0.065	34.4	0.100000001	253	0	2.26
2012.10.15 13:36:48:39	0	0	0	0.066	34.4	0.100000001	253	0	2.26
2012.10.15 14:06:02:53	2.11	2.09	2.09	0.066	34.2	0.100000001	254	34	2.26
2012.10.15 14:07:04:07	0.07	0.06	0.07	0.066	33.7	0.100000001	254	0	2.26
2012.10.15 14:07:41:01	2.12	2.08	2.07	0.066	34.8	0.100000001	255	2	2.26
2012.10.15 14:08:00:00	2.09	2.16	2.02	0.066	34.9	0.100000001	255	0	2.26
2012.10.15 14:09:40:03	0	0	0	0.066	35.8	0.100000001	255	0	2.27
2012.10.15 14:09:57:03	0	0	0	0.066	35.7	0.100000001	255	0	2.27

* **“Graph” :** able to transform a searched data into typical graphic form



• Customer's Logo



*Customer is able to put its logo on the position of "SamWha DSP" in the right upper corner as followed:

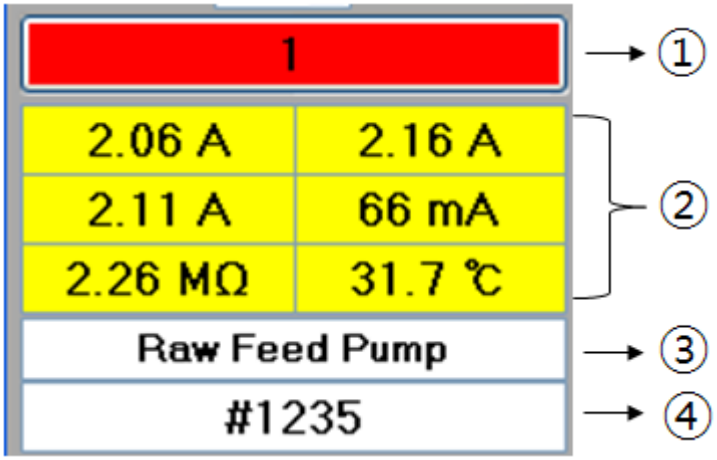
> make proper logo with extension .jpg

> change this file with extension .bmp

> store .bmp file by the name of "mainlogo.bmp" in c://samdspdb

> adjust a size of logo in the state of .bmp file until the proper size is shown.

2.Each terminated unit



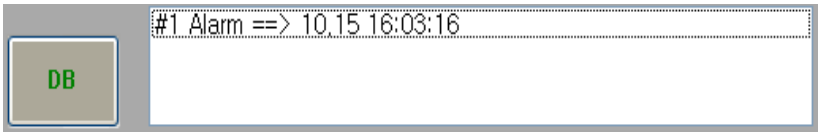
• ①

***** Colour indication for 485 communication state and trip state

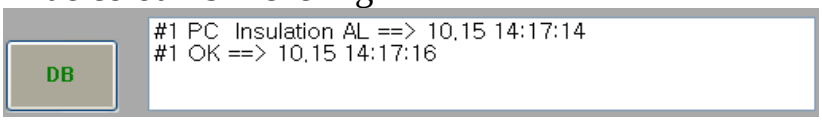
Indication colour	Description
Grey	485 communication is unstable
Green	485 communication is stable
Red	Motor normal operation
Pink	Alarm/flickering by the preset condition of protection relay
Blue	Alarm/flickering by the preset condition of DB data in PC
Yellow	Alarm/flickering by protection relay trip

***** The followed message is shown according to each of above condition in the left bottom

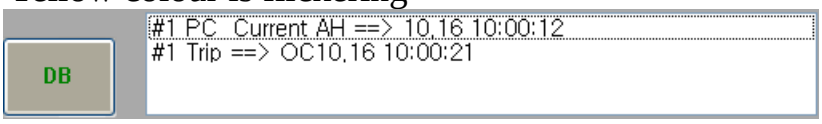
→Pink colour is flickering



→ Blue colour is flickering

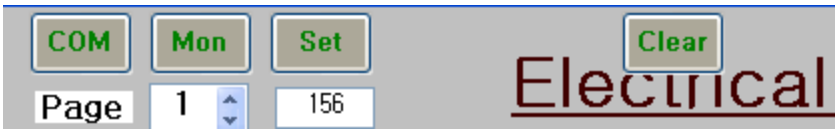


→ Yellow colour is flickering

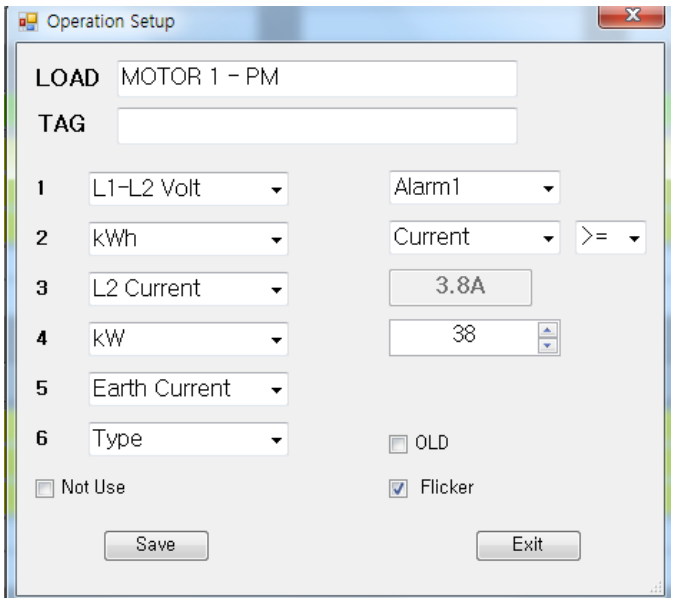


→ How to clear a shown message

"Clear" box is shown as pressing F3 key of operator's PC,then make click this "Clear" box.



* The followed Pop-up window is shown as clicking this box(①) in order to preset alarm level for selected factor, load name and tag number, factor selection to be stored in DB,preset for factor and value for 4 step alarm level



*The kind of alarm factor is over/under current,unbalance current,earth current,power[KW],power factor(cos phi)h unit in system

- ② **:**the actual value of each preset factor is shown according to the preset order
- ③ **:**Load name
- ④ **:**Tag Number
- Not use : to preset a removal such unit from a serial communication state as clicking this box.
- Available product selection

  * Selection for “OLD” : DSP-VIP-5CM/5CL

  * Not selection for “OLD” : DSP-VIP-RTM/RM, RTL/RL, DSP-CCM,CCL

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