TECHNICAL NOTE NO. 10

2003-07-25

Cable monitoring with the M3000

This note has been prepared for Martek Marine in the UK. It describes how the SELCO M3000 now can be configured for automatic cable monitoring.

Alarms with reference to inputs with cable faults will not be reported as alarms, but the display will indicate "Cable error" rather than a level. When performing averaging of a number of inputs, invalid data (data with cable errors) will now be omitted in the average.

The information about the cable errors can be reported as a separate alarm, indicated on a separate LED and on a separate output. Also, when doing this, the alarm output and the siren output will be activated.

This is possible if the M3000 has an EPROM Date of 250303 (25th March, 2003) or newer.

The lower and upper setting for the limits of cable faults should be entered in the M3000 in two general constant in terms of mA or V. For a 4 - 20mA transmitter the limits could e. g. be set to 3mA and 21mA, as a short circuit or a cable break at the transmitter will cause a current outside the normal range of 4 - 20mA.

For the alarms, where the associated inputs should be monitored for cable errors, a "Cable Monitor" flag should be set. This will activate the cable monitoring for the input in question.

Inside the M3000 one of the "Logical Inputs" (Input 8C) will be set to a high value at any cable error. This "Logical Input" can be used to define a separate alarm associated with an LED and / or an output, in order to indicate the cable error.

The M3092 Programmer does not yet support this new feature, so for the time being the cable monitoring option has to be set up from the front panel as described in details in the following. It is expected that the next version of the M3092 Programmer will support cable monitoring.

Setting up the normal parameters with the M3092 Programmer:

In our example we have 6 inputs from 4 - 20mA transmitters. We have defined 4 alarms for high temperature and 2 alarms for low pressure. The last alarm is a little special. This is the alarm for cable error. The M3092 Programmer does not allow us to define an alarm with reference to Logical Input 8C, because it assumes that Input 8C is non-existing. Therefore we define it with reference to Input 11 in the program and change it later from the front panel to Input 8C.

Alarms	InpRef	DynRef	<>±	SetPoir	LCD Text	Delay	LED	Outp	InputT	LCDU	InpLo	LCDLo	InpUp	LCDUp
1 (A11)	IN 11	OFF	>	80	Hi temp 1	2	1	1	20 mA	°C	4	0	20	100
2 (A12)	IN 12	OFF	>	80	Hi temp 2	2	2	2	20 mA	°C	4	0	20	100
3 (A13)	IN 13	OFF	>	250	Hi temp 3	2	3	3	20 mA	°C	4	0	20	300
4 (A14)	IN 21	OFF	>	250	Hi temp 4	2	4	4	20 mA	°C	4	0	20	300
5 (A15)	IN 22	OFF	<	2.0	Low pres 1	2	5	5	20 mA	bar	4	0.0	20	6.0
6 (A16)	IN 23	OFF	<	2.0	Low pres 2	2	6	6	20 mA	bar	4	0.0	20	6.0
7 (A21)	IN 11	OFF	>	5	Cable err.	1	24	14	20 mA	°C	4	0	20	100
8 (A22)	OFF	OFF	<	0		0.3	OFF	OFF						

Martek.m3g - Selco M3092 Programmer
File Edit View Tools Help
General | Physical Input | Logical Input | Alarm
Ready   NUM

Setting up "General Constants" from the front panel:

Two "General Constants" A16 and A17 should be entered in the M3000. A16 is the upper limit for cable error and A17 is the lower limit.

In 10V range: 170.6*InpUp and 170.6*InpLo.
                      Example 5V: 170.6*5 = 853

In 24V range: 60.2*InpUp and 60.2*InpLo.
                      Example 10V: 60.2*10 = 602

In 20mA range: 93.0*InpUp and 93.0*InpLo.
                      Example 3mA: 93.0*3 = 279
                      Example 20mA: 93.0*21 = 1953

Step-by-step procedure:

1. On the rear side, switch from alarm mode to programming mode ("PROG"). The LEDs on the front will now all go on steady light.

2. Press the M key on the front. The unit is now in programming mode. The display will now read:

        Prg   Gr:1   Inp:1
        InpTp   10V

3. Press the ↓ key on the front in order to go from group 1 to group A. The unit is now in a configuration mode, where you can alter various configuration parameters of the M3000. This configuration will be stored in the E²PROM:

        Prg Gr:<u>A</u> Const
        No:00 +   0.

4. Use the C key in order to go to the Number field:

        Prg Gr:A Const
        <u>N</u>o:00 +   0.

5. Press the ↑ key a number of times in order to go to "Const No 16":

        Prg Gr:A Const
        <u>N</u>o:16 +   0.

6. Use the C key in order to go to the next field:

        Prg Gr:A Const
        No:16 <u> </u> +   0.

7. Use the numeric keys in order to change the constant to 1953 (for 21mA):

        Prg Gr:A Const
        No:16 <u> </u> + 1953.

8. Use the C key in order to go to the Number field:

        Prg Gr:A Const
        <u>N</u>o:16 + 1953.

9. Press the ↑ key in order to go to "Const No 17":

        Prg Gr:A Const
        <u>N</u>o:17 +   0.

10. Use the C key in order to go to the next field:

        Prg Gr:A Const
        No:17 <u> </u> +   0.

11. Use the numeric keys in order to change the constant to 279 (for 3mA):

        Prg Gr:A Const
        No:17 <u> </u> +   279.

Setting up "Cable Flags" from the front panel:

Now cable error indication can be activated for the individual alarms by setting a flag bit in the alarms. When this bit is set, there will be no alarm if the input is outside the limits set in Constant A16 and A17, but the display will read "Cable error" for the equivalent alarm.

Step-by-step procedure:

1. Press the M key twice. The display will now read:

>   Prg   Gr:<u>1</u>   Inp: 1
>   InpTp   20mA

2. Use the C key in order to go to the Input field:

>   Prg   Gr:1   Inp:<u>1</u>
>   InpTp   20mA

3. Press the ↑ key a number of times until the display reads:

>   Prg   Gr:1   Alr:<u>1</u>
>   Text: Hi temp 1

4. Use the C key in order to go to the Parameter field:

>   Prg   Gr:1   Alr:1
>   <u>T</u>ext: Hi temp 1

5. Press the ↑ key a number of times until the display reads:

>   Prg   Gr:1   Alr:1
>   <u>F</u>lags 00000000

6. Use the C key in order to go to the Flag bits:

>   Prg   Gr:1   Alr:1
>   Flags <u>0</u>0000000

7. Use the ← key in order to go to bit 4:

>   Prg   Gr:1   Alr:1
>   Flags 000<u>0</u>0000

8. Press the ↑ key in order to change bit 4:

>   Prg   Gr:1   Alr:1
>   Flags 000<u>1</u>0000

9. Use the C key in order to go to the Alarm field:

>   Prg   Gr:1   Alr:<u>1</u>
>   Flags 00010000

10. Press the ↑ key in order to go to alarm 2:

>   Prg   Gr:1   Alr:<u>2</u>
>   Flags 00000000

11. Use the C key in order to go to the Flag bits:

>   Prg   Gr:1   Alr:2
>   Flags <u>0</u>0000000

12. Etc.

Setting up a special alarm for cable errors from the front panel:

We want an indication for cable error on LED 24. We can do this by changing alarm 7 (A21) to refer to the logical input 8C, which automatically will be set to a high value at any cable fault (if the cable fault flag is enabled in the alarms).

Step-by-step procedure:

1.   Press the M key twice. The display will now read:

>   Prg   Gr:<u>1</u>   Inp:1
>   InpTp   20ma

2. Press the ↑ key:

>   Prg   Gr:<u>2</u> Inp:1
>   InpTp   20ma

3. Use the C key in order to go to the Input field:

>   Prg   Gr:2 Inp:<u>1</u>
>   InpTp   20ma

4. Press the ↑ key a number of times until the display reads:

>   Prg   Gr:2   Alr:<u>1</u>
>   Text: Cable err.

5. Use the C key in order to go to the Parameter field:

>   Prg   Gr:2   Alr:1
>   <u>T</u>ext: Cable err.

6. Press the ↑ key:

> Prg   Gr:2   Alr:1
> InpRf 11

7. Use the C key in order to go to the Input Reference field:

> Prg   Gr:2   Alr:1
> InpRf 11

8. Press the ↑ key a number of times until the display reads:

> Prg   Gr:8   Alr:1
> InpRf 8C

9. On the rear side of the unit now switch back to alarm mode ("ALARM"). The LEDs on the front will now go off.

10. On the front, press the M key twice. The unit is now back in alarm mode.

The M3000 is now ready for use with the cable monitoring feature.

Important Note: At the moment there is a conflict in using the cable alarm feature with the General Constant "Reset Function" set to "RESET 1" or "RESET 2". This General Constant at the moment has to be set to to "DEFAULT". However, this will of course be changed in the next version of the M3000.

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