Set of Exercises

With answers!!

K-Chief 700 Maintenance Course on

KM Drill 8

KONGSBERG

Set of Exercises

Use of this document:
All tag names, terminals etc., which must be adjusted to the delivery, are written in **red** text.
Names of Dialogue boxes, tools etc. that need to be emphasize are written in **blue** text, but usually only once.
Information text are written in **green** text
All exercise answers are written below each question in **green hidden** text.

When converting this document to project specific exercises set:
Remove DMS document no.
Fill in type of course on front page.
Fill in project no and vessel name in header.
Edit date in footer when changing the document.

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Exercise 1. System Status, Maintenance Module XY

1 PS032 is almost always operational
2 Use any operational PS

1. What is the Status of PS054?

   "Operational"
2. When was PS171 started up?
3. Open Station Explorer for PS048. What type of RIO unit is in slot number 7?

   RDIOR420
4. How many configured IO-points on this RIO unit are inputs?

   16 inputs
5. Which OS was the Config Load server for PS046? OS31
6. How can the Net status page be updated?

   Right click in the page, select update statistics
7. Is it possible to see the IP address for the OS's?

   Yes, on the net status page
8. On the "PS Status" page coloured flashing cells indicates alarms. How can you easy see alarm details?

   Right click on wanted PS, select System Events for Node (and Subnodes)

Exercise 2. Station Explorer, Maintenance Module XY

1 PS032 is almost always operational
3 Use a PS with profibus connected
4 Use a PS with both serial lines and profibus is connected

1. Open System Status image, right click on PS201 and open Station Explorer. Can you find Station Explorer window in another way?
   Tools -> Station Explorer
2. How many RIO-units are connected to PS201? What types of RIO-units are connected to this PS?
   6 RMP420 + 1 RDIOR420 + 2 RPC420
3. Change Station Explorer to PS046. How many RIO-units and Profibus slaves are connected?
   12 RIOs + 1 Profibus (HVAC_Hull)
4. Change Station Explorer to PS053. How many serial lines and profibus lines are connected? Is there any connection using NetIO?
   Modbus to MGE_P1 - 1 Profibus DPLS53. 3(PS-241-SIMIO is only for SIMULATION) NetIO connection

Exercise 3. Operation Repetition Module XY

2- Use an analogue measurement connected to IO and to other modules, with alarms configured and shown in a process image

1. Use Station Explorer for PS203 to open RIO unit RMP420 in slot 3.
2. Use the IO Block and find which IO-point is used for MIC-023604/Running?

   IO-point 7
3. Find this module using the Find tag function.
4. Open Alarm Limits window and find all alarms configured on this module. What is the colour code for alarm priority?

   OutFailure, Incons, TimeOut! Low=Yellow, High=Red, Emcy=Magenta
5. Is it possible to find the module in process image?

   Yes
6. Can you find the Max Start/Stop limits in Parameter View of the module?

   Yes, 10 sec
7. Use Show Connection function and find if this module is connected to other modules.

   Yes, 5 connections to other software modules
8. Can you open IO block view by using Show Connection?

   Yes, by clicking the IO-button

Exercise 4. IO-list Module XY

Print out some pages of the actual IO-list. Find one module

You have got information that the Ballast Pump NO. 1, Low Bearing Temperature TIAH-111107 is not read by K-Chief 700.

Use the attached IO-list and find the following information for the signal:

1. Which FS-, and PS-number:
   FS47 / PS47
2. RIO position (slot) and type:
   Position U07, RMP420
3. Channel number:
   Channel 14
4. Loop typical used:
   Loop typical AI-01 X2:17-19
5. Go to the function module TIAH-111107 in KMDrill8. Can you find some of the same information thru the OS?
   Everything, except the loop typical

Exercise 5. FS-400C-R1 Module XY

One question from each chapter. Doc no 330462A

Use the FS-400C-R1 Maintenance Manual in the Reference Manual:

1. How many RIO modules can be mounted in a FS-400C-R1?

   12, 1.1 p.5

2. How many of them shall be grounded?

   The Rio Modules are usually not grounded, 1.5.2 p.8

3. Why is the RBUS connected to P3 connector on RBus Term Card?

   The RBUS is terminated at connector P3, 1.6 p.9

4. One RIO module in this FS-400C-R1 has lost contact with one RCU. Local LED is red. What is the probable error source?

   Defect RIO module or lost connection on RBus for this RCU, 2.4 p.14

5. What is recommended interval for checking connector locks?

   Once year, 3.4 p.17

6. The Power Supply PSU2 is broken. Which circuit breakers should be turned off before the PSU is removed?

   Q1 and Q2, 4.1 p.18

7. What is the current specification of the fuse used in X41:F2-F4?

   6.3A p.22

Exercise 6. Units and wiring on lab rack Module XY

Use Basic power & wiring diagram for FS-400C-R1, two pages

1. Use Power & wiring diagram, drw no 323448, two pages. Identify the different units on the lab rack and check the powering according to the drawing. Is it some components that are missing on the test rack, compare to FS-400C-R1?

   power alarm, power outlet and lamp.

Exercise 7. RCU502 Module XY

Doc no 358190/F

Use the Hardware Module Description of the RCU502 to find the following information.

1. When you start up a RCU the boot sequence stops and the four status LEDs are: ST0 = light (1)
   ST1 = dark (0)
   ST2 = light (1)
   ST3 = dark (0)

   What is wrong?

   FPGA (Field Programmable Gate Array) Test, p.15 .

2. The fan in a RCU is broken. Is it possible to change it?

   Yes. See procedure p.39

3. A RCU is broken and needs to be replaced; you must set the address on the new unit. Where to set it and what to set when the MAC address is 02:41:4C:42:12:29?

   MAC1:2, MAC2:2, MAC3:9, 2.1.4 p.13

4. What are the two colours of the Run/Error LED?

   Green/Red, 2.1.6 p.14

5. Which connectors are used as Serial Link Interface?

   P21 - P26 2.6 p. 18

6. What type of connector is used for the RBUS interfaces on the RCU?

   Shielded female RJ45, P19,P20 p.22

Exercise 8. RHUB200-5 Module XY

Doc no 300994/D

Use the HW Module Descriptions in the Reference Manual:

1. What indicates a fixed green Status LED on the RHUB200-5?

   Module OK, contact with at least one RCU, p.10

2. How many RCUs is it possible to connect "upstream"?

   Three (triple redundant), p.8

3. How many "downstream" connections are possible with the RHUB200-5?

   Five (4 internal and 1 external), p.8

4. If a RHUB200-5 has to be replaced; are there any settings you need to change on the new unit?

   No p.24-26

Exercise 9. RBUS-Term Module XY

Doc no 311167/E

Use the HW Module Descriptions in the Reference Manual:

1. What is the main purpose of the BUS-Term card?

   Termination board for RBUS, p.5
2. Use Figure 3 on page 8 in the Hardware Module Description; which connectors are used on the RBUS-Term when used in a Field Station?

   XP1 (from RCU/HUB), P1 to RIOs, P3 from RIOs, p. 8
3. What is the resistance of the R_T resistor on P3?

   100Ωm, p.7
4. Are there any configuration needed when replacing a BUS-Term?

   No, just use XP1, P1 and P3 or P2 as on the old card, p. 20

Exercise 10. RIO Units General Module XY

Doc no 311163/D and 311165/D

Use the RDIOR420 and RMP420 HW Module Descriptions in the Reference Manual:

1. The RIO units are connected to the RBUS. Which connectors and what type are they?
   P1 and P2 9-pin male D-sub , p.25 (RDIOR)/23 (RMP)
2. What are the power requirements for the RIOs?
   24 VDC, table 2, p. 20/16
3. How many connection points are there for power?
   4 terminals (X1 .. X4), 13 and 26, p. 27/26
4. How many of the power connections must be used?
   One on each side x2 and x4, note on p. 9/8
5. What can happen if only one of the power connections is used?
   The current can be too high. p.9/8
6. If you must replace a RIO unit, are there any settings on the new unit that needs to be configured?
   Yes, the module address (slot no.) must be set. p.30
7. How can you see that a RIO unit is OK and communicate on the RBUS?
   Green LED in front of the RIO unit p.10/9
8. The green LED in front will flash. Can the flashing have different frequency, and can you see anything about that in SW?

Yes, depending on scan task / Yes , p.9, in "Process Bus IO image" (choose detailed view)

9. All channels on RMP420 and 16 on the RDIOR420 have a HSD (High Side Driver) for driving the 24Vdc loop. What is the maximum current for one HSD?
   1 A p. 10
10. What happens if the current exceeds that?

(HSD) is switched off by the firmware, and status is reported to the system operator, p. 10

11. If there has been an HSD overload, what must be done before your system returns to normal?

An operator command in the application system might be necessary; HSD restarts itself. p. 10

Exercise 11. RMP420 Module XY

Doc no 311165/D

Use the RMP420 HW Module Descriptions in the Reference Manual:

An analogue current 2 wire input signal shall be connected to a RMP420 unit.

1. Which channels can be used?

   All channels, figure 3 p. 11

2. What is the maximum range in current of the sensor?

   0-20mA, figure 3 p. 11

3. What types of PT100 can be connected?

   2 and 3 wire, figure 3 p.11

4. How many and which channels can be used for pulse and frequency on a RMP420?

   Ch 31 and 32, p.11

5. Which fail-safe modes can be achieved?

   Configured value and Freeze, p.13

Exercise 12. RDIOR420 Module XY

Doc no 311163/D

Use the RDIOR420 HW Module Descriptions in the Reference Manual:

1. What does the last R in RDIOR420 stands for?

   R stands for Relay, p.5

2. Is it possible to connect a digital output signal to this unit?

   Yes, p. 11

3. If yes, must a specific channel be used?

   9-16. 25-32 (X2, X4), p.28

4. How can you see in software if it is an input or output?

   Look at the arrows in the IO Terminal Block or IO Point Browser

5. What is the maximum switching current on the relay?

   5 A, p.21

6. What is the min/max field loop power for the relay contacts?

   15-300Vdc or 15-250Vac, p.21

Exercise 13. RPC420 Module XY

Doc no 325654/D

Use the RPC420 HW Module Descriptions in the Reference Manual:

1. What is the function of a RPC420 card?

   Interface between a thruster panel (levers, buttons, indications and leds) and the controller (RCU) p. 7

2. What is the communication type between the RPC420 and the controller?

   RBUS (RS485), p.7 and 9

3. If a RPC420 card has to be replaced are there any settings remember?

   Set the correct two digit address + line impedance, p.42

4. Is there any indication on the card if there is an error or not?

   Green led if OK, p. 9, 24 or 44

Exercise 14. Redundancy Module XY

Use K-Chief 700, the Online User Guide and the presentations to find your answers:

1. Open System Status and PS Redundancy; which types of redundancy are used on your vessel?
   1. Single/ HotStandby / 1oo2 /
2. Open Redundant Station Dialog Box and press F1; Can a PS be Master and Offline in a HotStandby system?
   2. No, the Master is always online
3. What is a redundancy group?
   3. Set of PSs working together
4. In the PS Operation dialog box, it is possible to "Set configuration mode"; when do we need to select this mode?
   When making changes in PS configuration mode in a redundant system
5. Where can we find information about errors regarding redundancy?
   Redundant Stations Dialog Box

Exercise 15. IO SW Module XY

1. Use a pump where at least terminals Start, Stop, Running and Remote are connected to IO

Use the OS (KM Drill8):

1. Find tag MIC-111101. Use Show Connection and find how many terminals on this module that are connected to RIO-units?
   8
2. Open the IO Point Browser from the module right click menu and verify that the answer from question 1 is correct.
   Yes, 5!
3. Find tag: MIC-081225. Open IO Terminal Block for the Start terminal. What type of RIO unit is it and which PS is it connected to?
   RMP420 / PS054
4. Which IO Point number is the Start terminal connected to?
   IO-point 12
5. Are all IO signals on this module connected to the same RIO unit?
   Yes
6. On this RIO, how many signals are analogue?
   0
7. How many IO Points are inverted?
   2

Exercise 16. Loop Typical Module XY

4. Use a control valve

Use the Loop Typical list in the Reference Manual and your OS to find:

1. To what type of RIO-unit can an internal powered, 2-wired input field instrument (0-20mA) be connected?
   RMP, RAIC, RMP-S, RAIT, p.9, AI-01
2. If you are using RMP420 and IO Point 11, where to connect the device in question 1?
   To a RMP420, (RAIC420, RAIT420, RAOC420)/ Terminal X2: 7-9
3. What is the difference between loop typical AI-01 and AI-02?
   Int/ext power, p 9 and 10
4. We have a relay output signal. What type of RIO unit to be used?
   RDIOR420, p 14-15
5. You have got an alarm on SOV-112553 that the feedback Position is not responding. Find correct loop typical for this signal and where to look in the HW.
   - FS no: FS47
   - RIO no: 7
   - Loop typical: AI-01
   - IO point/Channel no: 1
   - Terminals no: X1: 1/3

Exercise 17. Changing IO Point Module XY

1. Use a digital input module
2 Use an analogue signal and move it to a terminal of an another type

1. The IO Point for the Remote terminal of MIC-081203 is broken: Change it to another IO Point.
2. On PS053, RIO unit 10, change IO Point 2 to IO Point 5. Remember signal conditioning.

Exercise 18. MP8200 Module XY

Use the MP8200 Maintenance Manual in the Reference Manual:

1. Is it possible to use a standard mouse instead of the trackball? Which connector would you use for the mouse?
   Yes, the mouse connector or an USB,p12
2. How many USB ports are available on a MP8200?
   10(4 in front and 6 on the rear side), p.11
3. The MP8200 is provided with a ground terminal screw on the rear side. Where should this terminal be bonded to?
   PE bar with a short ground wire having a large cross section, p.17
4. Of what type is the Hard Drive in the MP8200?
   Transcend 128 GB SSD drive p 16
5. What is the life cycle specification in MTBF (Mean Time Between Failure)?
   108 206 hours p 18
6. What is the probable error source when the MP8200 unexpectedly crashes or hangs?
   Possible defective RAM memory card, p.19
7. When opening the MP8200, there are many green stickers and green lock levers inside the cabinet. Why do we have these indications inside the cabinet?
   Indication of what is possible/allowed to open/move/remove
8. What is the part number for the Power Supply Unit?
   368464 p 44
9. What spare parts are recommended to have onboard for the computer?
   Power Supply Unit, MICRON C400 128GB 2,5" SSD, Memory, 2GB, PC3–10600, DDR3–1333MHz (In addition some parts for the HS model and H model), p.44

Exercise 19. OS Maintenance Module XY

Use the OS-650-KM05 Maintenance Manual in the Reference Manual:

1. Where are the inputs from the keyboard interfaced?

   Input panel, p.15

2. The Fault lamp on the ALC panel is lit red. What is the cause for the red lamp?

   Panel lost contact with the computer, p.34

3. The trackball needs to be cleaned. What is the procedure for doing it?

   p.44. Refer to COP-05 document, p.18

4. There is no response to the cursor on the screen when operating the trackball. How do you find out what is wrong?

   The unit can be broken, check connection from USB port to input panel, it could also be dirty, clean it.

Exercise 20. BU-AUT panel, Input panel and ALC panel Module XY

Use the BU-AUT HW Module Descriptions in the Reference Manual:

1. What is the power requirement of the BU-AUT panel? Where is the power connected on the panel?
   18-32V DC, p.9, X10 1-3 p.11
2. How does the panel communicate with the controller computer?
   Through a single USB, p.7
3. What address should the panel have if it's only one panel in use?
   0, p.7
4. How many bolts must you remove to replace the panel?
   4, p.13

Use the Input panel HW module descriptions:

5. How does the panel communicate with the controller computer?
   Through a single USB, p.7
6. How many terminals is it on X1?
   Two fourteen-terminal, p.12
7. What is the colour of the status COM LED?
   Green, p.8
8. How do you replace the panel (what page in the HW module descriptions)?
   p.17

Use the ALC panel HW module descriptions:

9. What is the ALC panel used for?
   Command control and alarm control p.5
10. What is the input voltage on the panel?
    5Vdc, p.6
11. What happens if the temperature sensor on the panel rises over the limit?
    A system alarm is given, p.9

Exercise 21. Watch Call Maintenance Module XY

1. The CAN-bus needs termination. Where should the termination be and what is the resistance value?

   On the first OS and the last WCU JB / 120Ω. Drawing 351742

2. What is recommended interval for Lamp and Buzzer test on the Watch Call units? How do you carry out this test?

   Weekly / Press the LAMP TEST button and verify that the LEDs illuminate and the buzzer sounds, p.18.

3. Which parts are you allowed to replace? What is the part number of a Watch Cabin Unit (LCD type) front panel?

   Any item listed in "Replaceable parts" and "Recommended spare parts" / 3900144, p.20

4. What is the power requirements and ambient operating temperature for a watch call panel?

   Voltage Input: 18-32 VDC, Power consumption: 6W
   Ambient operating temperature: 0°C to +70°C
   p.5

Exercise 22. Serial lines connection Module XY

Use Loop Typical SL-100 and RSER200-4 Hardware Module Description:

1. In one FS we discover a bad connection to a RSER200-4. We find that:
   - The TPC cable is connected to connector P22 on RCU B.
   - The field cables are connected to 1, 3 and 4 on X3.

   Find:

   Serial line type: …… RS232

   Serial channel no: …… Channel: 7

2. From an OS we find out that the peripheral equipment connected to ch. 2 on PS45 does not communicate. RS422 is used.

   Where to check the HW?

   FS: …… FS: 45

   Connector on RCU: …… Connector: P21

   RSER200-4 Module No: …… RSER200-4 No. 1

   Terminal Block: …… Terminals on X2

   Terminals used: …… Terminals: 1,2,3,4,5

Exercise 23. RSER200-4 Module XY

Use the RSER200-4 HW Module Descriptions in the Reference Manual:

1. What information do we get from the LEDs on the front panel?

   Status of unit, and data traffic both upstream and downstream, p.12

2. How many serial lines can one RSER200-4 control?

   4 serial lines s.4

3. Is it possible to use both RS232 and RS422 on the same RSER200-4?

   Yes, p.5

4. List all Serial Line interfaces possible on the RSER200-4?

   RS232, RS422, RS485, NMEA 0183, p.5

5. How is the RSER200-4 powered?

   by the RBUS connectors on the “rail”, p.7

Exercise 24. Start of RCU Module XY

Hardware and software needed:
Application: vcXXXX vessel name
Use OS with IP: 172.21.xxx.xx
Rack with two RCU502, RDIOR420 and RMP420
PS n: RC502 address xxx
RIO unit addresses as specified in exercise 2
Set RIO in Exceptional mode NONE
To simulate signals:
Two digital sensors, loop calibrator and "PT100"(resistor)

Before start of exercises:

Set wrong address on RCU A
No RBUS cable connected from RBUS Term to RIO's
Disconnect net cable
Disconnect Running terminal on the SW-module that shall be used (Motor)

1 Find the correct address for selected PS in the Ethers file. Tips: Use a PS that have a pump or motor in manual with terminals "Remote" and "Running" connected to a RMP420, and "Start" to a RDIOR420. There should be an analogue measurement nearby, e.g pump current

1. The RCU 501 to the left on the test rack must have the following MAC addresses to work as PS58:
   Net A: 02:41:4c:42:12:3a and Net B: 02:41:4c:42:22:3a 23a
   (Set the correct address on the RCU using the three last digits)
2. Are there other settings and connections that must be checked on the RCU before starting it up? No
3. Turn on the power to the RCU.
4. In K-Chief 700 check the System Status image that PS58 is operational.
5. Use System Status image: How many RIO units on PS58 configuration have errors? 12
6. Open Station Explorer for PS58. What does a red arrow (↓) indicate?
7. Are there any entries (sub nodes) under Default driver that has active alarms?
8. If yes; what are these alarms?
   Failure in a lower level, no connection on Term card

9. Open "System Events for Node and Sub Nodes" for the section IO Manager and acknowledge the alarms; check for changes in the alarm symbols used in Station Explorer.
   The symbols have changed from bell to circle
10. Log on as user Kongsberg, password: kongsberg.
11. Set PS58 in NONE Exceptional Mode (No simulation algorithm and no Alternative terminal input). (Hint: Operation -> PS Operation).
12. Open the Event List and acknowledge alarms generated from FS58.
13. Open the process image `Bilge System Ballast pump Room` using the Navigator. Find the No.2 Drain Pump.
14. What is the tag name of this module? MIC-081235
15. What does the tag mark beside the pump symbol mean?
    Module description, L=local Control
16. Open Alarm Limits view of the MIC-081235 and find which of the terminals that have defined alarm.
    Outfailure, Error, Incons, Timeout.
17. What are the alarm priorities and texts?
    All pri Low and trigger on high signal.

Exercise 25. Start of RBus and RIOs Module XY

Before start of exercises:

RBUS loop cable disconnected
Wrong addresses on RIOs
All sensors disconnected.

Note: All connections must be done with the power turned off

1. You shall get the RBus A up running in a single system.
   To which connectors should the RBus cable be connected on RCU and Hub?
   P19 and P1
2. Make sure that the RCU is running and that the RBUS Term and RIOs are still powered off; check on Process Bus IO image which types of RIO units that are connected to this RCU
   RIO unit types: ……, ……
   RMP 420, RDIOR 420
3. RIOs connected to PS58 and used in this exercise have the configuration shown in the following table:

Card type	Address
RMP420	2
RMP420	9
RDIOR420	13

4. Connect the cable loop to the correct RIO units.
   Connectors on RBus Term: ……, ……
   Connector on RIOs ……..
   XP1, P1, TERM P3, RBUS A
5. Switch on power for the hub and the term card. How can you see that the power is OK on the hub?
6. How can you see if it is data traffic on the RBUS?
   Flashing LEDS on the HUB.

7. Set the correct addresses on the RIO units and turn power on. How do the RIO units indicate that they have the correct configuration and address?

   Green LED

8. Are there any changes on the RBUS Hub now?

   Flashing

9. Open Station Explorer. Why are all RIO units still in alarm?

   Rbus B is not connected.

Exercise 26. Redundant RCUs

Module XY

You shall now connect and get the RCU B up and running in a redundant system.

1. Redundant pair of: 58 and 158 (Redundancy group FS058)
2. RCU addresses:
   PS58: 02:41:4c:42:12:3a PS158: 02:41:4c:42:12:9e
   Set the correct addresses on the RCUs. Is it necessary to restart the RCU? What about the OS?
   RCU: Yes OS: No
3. Where are the redundancy signals between the two RCUs connected?
   P10 to P11 on both controllers.
4. Check if both RCUs are OK on System Status.
5. Where can you check that they run as a redundant pair? PS Redundancy
6. Which PS is online? Is it possible to see that both in HW and SW?
   Redundant Stations or System status
   Online: ..... One of them
   HW: ..... LED ST4
   SW: ..... Redundant Stations or System status
7. Make sure that the RBUS Cable is connected for RCU B.
8. Check/set RCU A to be Online/Master
9. Check for errors in the Redundant Stations view.
10. What is the capability of the two RCUs? OK
11. Disconnect the RBUS A cable from one of the RIO units, and check alarms and redundant stations dialog box; did it lead to a redundancy switch?
    No

12. Reconnect the RBUS Cable.
13. Disconnect the RBUS connection on TERM CARD for RBUS A? Check alarms and Redundant Stations dialog box; did it lead to a redundancy switch? No
14. Reconnect the term card.
15. Disconnect the connection between RCU A and Hub A. Check alarms and Redundant Stations dialog box; did it lead to a redundancy switch? No
16. Reconnect Hub A.
17. Disconnect the connection between RCU A and ProcessNet A. Check alarms and Redundant Stations dialog box; did it lead to a redundancy switch? Yes
18. Reconnect Net A.
19. Is it possible to switch master manually?

Exercise 27. Digital input signal Module XY

Note: All connections must be done with the RIO power turned off.

Activation of the Remote signal on No.2 Drain Pump.
MIC-081235 will be set in Remote mode to be controlled by K-Chief 700.

1. Find which type of RIO unit and IO Point number the input terminal Remote is using. How is this signal conditioned on the RIO?
   RIO type…… RMP420 IO Point …… 3
2. Do you have such a unit in the rack?
3. What is the address of the RIO?
   Address……
   9, Yes RMP 420
4. Connect a digital switch to the correct IO Point on the RIO. Check connection as recommended in loop typical.
   Loop Typical no: ……
   Terminal number for "Signal" on RMP420: ……
   Terminal number for "Common" on RMP420:……
   DI-01, X1:7/9
5. Set the digital switch to ON.
   Open Terminal View and check the value of the Remote terminal.
   What is happening on Process Image?
6. Can you observe any difference on the Operator Menu?
7. Change the field value to 0. What happens now? (Remember to acknowledge alarm)
   The start and stop signal disappear when Remote is 0, tag mark change between m and L
8. Is it possible to see somewhere on the HW that the signal is high?
   Use a voltmeter and measure the value between the two terminals when the signal is ON and OFF.
   ON value: …… V OFF value: …….V
9. Let the pump be in remote mode.

Set of Exercises

Exercise 28. Analogue input, current signal

Module XY

Note: All connections must be done with the RIO power turned off.

We will measure the current of the No.2 MGEN CURRENT L1 in `DG2S` using module: IIAH-031611A.

1. What type of RIO unit is the ProMeas terminal connected to.
2. Which IO Point is used for this connection?
3. What is the scaling of the signal?

   Unit type: …… RMP420, U02

   IO Point: …… I/O 4

   Sensor max: …… Sensor min: …… 4-20mA

   Eng max: …… Eng min: …… 0-550 A
4. What is the address of this RIO unit?
5. Verify that this address is the one on the RMP420 unit connected.

   Address: ……

   03
6. Open Alarm Limits for module IIAH-031611A and check the alarms configured.
7. Add a Deadband of 5 on the High alarm.
8. Connect the 4-20mA simulator to the terminals on the RIO (3 wired field instrument). Use internal loop power. Check if everything is correct, as recommended in the loop typical.

   Loop Typical no: …… AI-12

   Terminal no for +: …… X1:10

   Terminal no for - : …… X1:11

   Terminal no for Signal: …… X1:12
9. Test connection by changing the value of the simulator. Do the alarms work?

Exercise 29. Digital output signal

Module XY

Note: All connections must be done with the RIO power turned off.

Manual start request of No.2 Drain Pump (MIC-081235).

A manual start request from the operator menu will set output terminal Start to 1 and send this signal to the pump.

1. Find the RIO unit connected to the Start terminal.
   RIO unit type and number: …… RMP420/9
   IO-point used: …… 10
   Loop Typical no: …… DO-01
2. Try to start the pump. What happens on the process image? Why? We will come back to that.
   The pump gets yellow (transient)
3. Check the signal on the IO Terminal Block; what happened on the RIO unit?
4. Use a multimeter and measure DC Voltage on the RIO while trying to start and stop the pump (or connect a lamp to the correct terminals).
   Sensor=24 V. After some seconds going back to 0 V
5. Stop the pump and acknowledge the alarms if there are any. If you now try to start the pump, you will get an alarm after some seconds. Why is this alarm coming?
   No running feedback from the pump
6. What are the start/stop time out limits?
   10 seconds

Exercise 30. Digital input signal - configuration of signal Module XY

Note: All connections must be done with the RIO power turned off

Running feedback from the No.2 Drain Pump (MIC-081235).

1. The running feedback on MIC-081235 is not configured. Because of practical reasons, we want to use the same RIO unit as the Start signal. Is that possible?
2. Which IO Point do you want to use? Configure the Running signal.
   IO point: …….
   Terminals no: …….. ……
   Disconnected Channel 12 on RMP420/09
3. Connect a switch to the RIO. Set the switch to ON and check the signal on the IO Terminal Block.
4. Check the module for alarms, are there any new alarms? If yes; why do you get an alarm?
5. Set the signal back to OFF and acknowledge any alarms on the module.

We will now simulate a start of the pump.

6. Start the pump from the operator menu and verify that the start signal is sent out to the pump. Simulate a Running feedback signal with the switch within the time out limit configured. What happens?
   The pump symbol gets green
7. Stop the pump.

Exercise 31. Analogue input signal, PT100 element

Important: Do not connect any sensor to the RIO without first checking that IO Point has the correct configuration in software.

Module XY

Use a temperature measurement with PT100 sensor

1. Find module TIAH-031621. This is a temperature sensor (PT100). Which RIO unit and IO point (Channel) is this signal connected to?
   RIO: ..... RMP420 /U2
   IO point: ..... IO-point 13

2. Check loop typical and connect a PT100 simulator to the RIO unit to simulate the temperature.
   Loop typical: AI-15
   Terminals no: X2: 13/14/15

3. Open parameter view and terminal view and check that the engineering value is the same as on the IO Terminal Block?

4. What are the alarm limits? Are there connections to the limit terminals of this Function Module?
   Alarm limits: High alarm, 140, priority Low
   HighHigh alarm, 155, priority High
   Actions are connected on H and HH

Exercise 32. OS backup / restore Module XY

1. Make a backup of the Operator Station using a portable USB hard disk. Follow the procedures in the document named "MP8200 Backup/Restore, and XP Installation Procedures" (330249/A)

2. Use the backup file from the previous exercise to restore the Operator Station. Follow the procedures in the document named "MP8200 Backup/Restore, and XP Installation Procedures" (330249/A)