

1910597

by Joseph WakefieldBaugh

FILE	15364_JOSEPH_WAKEFIELDBAUGH_1910597_178815_348315701.PDF (2.64M)		
TIME SUBMITTED	08-FEB-2021 11:00PM (UTC+0000)	WORD COUNT	2884
SUBMISSION ID	144448074	CHARACTER COUNT	13394

Course: HNC Electrical and Electronic Engineering

Module: SGEE4005 Instrumentation and Integrated Automation Systems

Assignment: Instrumentation for Automation Systems

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Date submitted: 08/02/2021

Word count: 2838 Word Count Exceeded

Good Structure

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Sections should be numbered according to the

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Why is this page blank?

System Investigation

Sections should be numbered according to the

Process Station

Spelling

Below is a list if various instruments used in the process, the flow transmitter listed was not used as part of the assignment, as we could not get access to the instrument, instead we used a flow transmitter from another process rig;

- Flow Meter

A flow meter was used on the process station, but because we could not get to it we had to use another flow meter from another process rig. Below is the photo of that flow meter.

Datasheet - DO NOT include these, read, digest, quote and cite them as a



Attribute	Value
Media Monitored	Liquid
Device Type	Radial Flow Turbine
Minimum Flow Rate	0.25 L/min
Maximum Flow Rate	6.5 L/min
Supply Voltage	4.5 → 16 V dc
Pipe Diameter Range	15 mm
Maximum Pressure	20bar
Material	Acetal Copolymer
Minimum Operating Temperature	-40°C
Maximum Operating Temperature	+70°C
Current Rating	10 mA

Figures should be numbered and in

font

As you can see from above a specification table is present, this was gathered from RS components. It clearly states what flow range it works in (0.25>6.5l/min). This instrument is well suited to operate in this rig as there isn't much flow to work with and it won't be under continuous workload. This flow meter was for the inlet to the filling tank, we used this flow meter for a calibration task later on in the assignment.

Use of 11pt Arial, full justification with 1.5 line spacing allows easier reading and

marking

- Temperature Sensor

The temperature sensor used on the rig is shown below, this was used on the main process station.

Datasheet - DO NOT include these, read, digest, quote and cite them as a



Thermocouple Type	PT 100
Probe Diameter	6mm
Probe Length	500mm
Probe Material	Stainless Steel
Maximum Temperature Sensed	+250°C
Termination Type	Connection Head

Figures should be numbered and in

As you can see from the specifications table above, this temperature sensor has the required specs to be able to handle the temperatures inside the process rig, i could not find a tolerance specification on this product. This will be one of my suggestions on another task.

- Level Sensor

Below is the diagram of the level sensor used in this rig, this sensor was measuring the height of the water in the washing tanks. This was on the side of the tank.



Model: Cerabar PMC 133
1M1F2A6A1S

Process Connection: 1/2 inch

Wetted Parts: Stainless Steel

Calibrated span: Between 3 and
10 Bar Gauge

Output: 4 - 20mA Loop Powered

Citation

Use the third

With this instrument, i could not find a specification sheet from the manufacturer themselves, i had to delve the internet in order to find companies that still sold these. Luckily enough Ebay of all places provided me with the specification of one that was being sold. This instrument is okay for this process, only issue is if you had to order spare parts or a new one.

- Pressure Sensor

Below is the instrument used for the process station, this was measuring the pressures at various points of the process.



For this sensor a specification sheet could not be found online, this could be due to be a discontinued product or a foreign product, however still specifications are shown on the instrument. As you can see the range on there is from 0 to 5 Bar, the supply is 18 > 30 V and the output is 0 > 10 V.

Research task on sensors

Sections should be numbered according to the

Many instruments in industry today could be changed for more up to date ones, many companies rely on old instruments but don't know what new stuff is out there on the market. Industry 4.0 wants to make sensors more than just sensors, they want more practicality from them and more multifunctions. Industry 4.0 also wants to save money for the companies as they can identify problems or maintenance prior to breakdowns, this is where they want smart sensors involved with the process. Also the reduction of any waste to the process comes into it, as the world is more cautious about waste, smarter sensors could help reduce that cost.

Citation

needed

What about an IO link?

Improper Citation

"O-Link is a powerful standard, an increasingly deployed point-to-point serial communication protocol used to communicate with sensors and/or actuators. Extending the globally recognized PLC standard IEC 61131, it allows three types of data to be exchanged – Process data, service data, and events. Major sensor manufacturers and industrial manufacturing companies, including Pepperl+Fuchs Control, have joined the international IO-Link Consortium to promote the IO-Link communication protocol due to its many advantages over standard I/O"

Cited wrongly, this is not the Harvard method

Use the third

Person

Above is a quote provided by [://control.com/io-link-master-gateways/what-is-io-link](http://control.com/io-link-master-gateways/what-is-io-link),

From what i gather from this quote, i think the IO link would be a suitable upgrade to this process station, as it would allow more data to be transferred around the system, this in essence could save time and money as you could have smart instruments that could give feedback whenever they are out of calibration or just need regular maintenance. Also the IO link would help when working with a various amount of valves, levels and meters, so in essence the IO link would work for this process station.

Now for the next part, research will be undertaken to provide new and up to date sensors to replace the existing ones, the specifications for each sensor has been provided in the previous task, If the new sensors work with IO link i will state the reason why i have chosen it.

Use the third

Person

Use the third

Person

Flow Meter



This is the new sensor that could replace the current one, this sensor has a digital display and can communicate through IO Link or through bluetooth, so it is very flexible in what it can do. Below is the specification sheet which shows all the data required, DN15 model is the one being used and that max range is up to 25 L/Min. Also the Voltage is between 18V>30V which is as required.

Citation

Figures should be numbered and in

Measuring principle	Electromagnetic flow measurement	Communication	Via Bluetooth or IO-Link
Fluid	Suited for conductive liquids ($\geq 20 \mu\text{S/cm}$)	Nominal diameter	DN 15 (1/2"), DN 20 (3/4"), DN 25 (1"), DN 50 (2")
Display	1.4" TFT color display, auto-rotatable (dependent on orientation)	Measured variable	Volume flow, temperature
Operation	- SmartBlue App for smartphone or tablet - IO-Link for operation via process control system	Process connections	Standard: external thread (G1/2", G3/4", G1", G2") Optional: adapter sets for internal (G) and external (R, NPT) threads, Tri-clamp, Victaulic
Material	Housing: stainless steel; Measuring tube: PEEK; Process connection: stainless steel; Display: polycarbonate; Seals: FKM	Measuring range	- DN 15: max. 25 l/min (6.6 gal/min) - DN 20: max. 50 l/min (13.2 gal/min) - DN 25: max. 100 l/min (26.4 gal/min) - DN 50: max. 750 l/min (198 gal/min)
Power supply	DC 18 to 30 V	Process pressure	16 bar (232 psi)
Process temperature	-10 to +70 °C (14 to +158 °F)	Max. measured error	Flow: $\pm 2\%$ o.r. $\pm 0.5\%$ o.f.s. (of full scale) Temperature: ± 2.5 °C (± 4.5 °F)
Degree of protection	IP65/67 (Type 4 enclosure)	Repeatability	Flow: $\pm 0.2\%$ o.f.s. Temperature: ± 0.5 °C (± 0.9 °F)
In-/outputs (selectable)	2 freely selectable in-/outputs; current outputs (4–20 mA), pulse/switch output, voltage output (2 to 10 V), IO-Link, status inputs (e.g. for a totalizer reset)	Approvals	Drinking water approval (in prep.), UL listed (Underwriters Laboratories Inc.)

Subject to modification

Datasheet - DO NOT include these, read, digest, quote and cite them as a

Another good thing about this device, is that it has an internal setting where it will send a warning message when going out of tolerance, and can also request a new one from the supplier before you even know it is broken .

Temperature Sensor

JUMO dTRANS T1000 – Temperature Sensor with IO-Link (902915)



Questions regarding this product?

Citation

Need it?

Features

- Small, compact, robust
- Stainless steel, fully welded
- Various process connections
- Hygienic process connections
- Simple startup
- Easy sensor replacement
- High degree of accuracy
- Connection via IO-Link master
- LED status display
- Also available as a pressure sensor with IO-Link

Customer benefits

- IO-Link
 - Multi-vendor point-to-point connection
 - Open standard with maximum transparency to the field level (IEC 61131-9)
 - Inexpensive, pre-fabricated connecting cable (no wiring errors)
 - Simple, uniform wiring and startup thanks to standardized interface
- Industry 4.0: pervasive communication from the control to the sensors
 - Retrieval of process data and diagnostic information
 - Dynamic change to the parameters
- More safety during sensor replacement
 - Automatic parameterization possible
 - Replacement with sensors of same type but with different properties can be detected
- Optimization of the production process due to communication down to the lowest field level
- Reduction of mounting and startup times
- Reduction of maintenance and service costs while plant availability increases at the same time

Datasheet - DO NOT include these, read, digest, quote and cite them as a

Above is the temperature probe that could replace the current sensor, as you can see it can have a IO link connection via the master. The Benefit is that it can retrieve process data and diagnose any information it provides, also a benefit of this being IO link compatible is how easy it is to replace a sensor as there is an automatic parameterization possible. Also it states that due to the low cost and durability it will save money in the long run.

Sensor element	RTD temperature probe Pt1000
Standard	DIN EN 60751
Measuring range	902915/10: -50 to +150 °C 902915/30: -50 to +260 °C
Sensor accuracy	Class A, $\pm(0.15 + 0.002 \times t)$ °C ^a Class AA, $\pm(0.10 + 0.0017 \times t)$ °C ^a
Connection type	Resistance measurement 4-wire
Calibration accuracy of the electronic components	$\leq \pm(0.08 \%)^b$
Ambient temperature influence	$\leq 0.0025 \%/K^{b, c}$
Measuring current	$\leq 500 \mu A$
Sampling rate	160 ms
Input filter	Digital filter, 2nd order; filter constant can be set
Galvanic isolation	to the protection tube; no galvanic isolation between sensor and output

Above is the technical data for the temperature sensor above.

Datasheet - DO NOT include these, read, digest, quote and cite them as a

SOURCE

Level Sensor



Here is a level sensor created by baumer, this is new technology and uses frequency deviation to work out the level of the water, this is what makes it more accurate, also this sensor can operate within an IO link.

Citation

11.000.000

Performance characteristics

Trigger modes	Adaptive trigger Window trigger Analog output
Measuring principle	CleverLevel level switches (Frequency Sweep)
Media characteristics	DC > 1.5
Hysteresis	± 1 mm
Repeatability	± 1 mm
Step response time	< 150 ms
Damping	0 ... 10 s , adjustable

IO-Link interface

IO-Link version	1.1
IO-Link port type	Class A
Baud rate	38,4 kbaud (COM2)
Cycle time	≥ 6.4 ms
SIO-mode	Yes

Datasheet - DO NOT include these, read, digest, quote and cite them as a

Above is the technical data for the sensor.

Pressure Sensor



Here is a pressure sensor from baumer, this make is very reliable and robust. The advantage of this is how small the sensor is and doesn't need much care given to it, which in essence will reduce reactive and maintenance work. This is also compatible with IO link which is another advantage.

Citation

Technical data		ATEX II 1/2G Ex ia IIC T4/T6 Ga/Gb	
Ambient conditions		Please note	For the application in Ex zone you have to respect the conditions mentioned in the ATEX Type Examination Certificate (SEV 11 ATEX 0129). You will find the relevant certificates and instructions at www.baumer.com
Shock (EN 60068-2-27)	50 g / 11 ms, 100 g / 6 ms, 10 impulses per axis and direction	Maximum values for barrier selection, Ui	30 V DC
Vibration (sinusoidal) (EN 60068-2-6)	1.5 mm p-p (10 ... 58 Hz), 10 g (58 Hz ... 2 kHz), 10 cycles (2.5 h) per axis	Maximum values for barrier selection, Ii	100 mA
Vibration, broad-band random (EN 60068-2-64)	0.1 g² / Hz, > 10 gRMS (20 Hz ... 1 kHz), 30 min. per axis	Maximum values for barrier selection, Pi	750 mW
Output signal		Internal capacitance, Ci	31 nF
Current output	4 ... 20 mA, 2-wire 20 ... 4 mA, 2-wire	Internal inductance, Li	3 µH
Voltage output	0 ... 10 V, 3-wire 0 ... 5 V, 3-wire 0.5 ... 4.5 V, 3-wire 1 ... 5 V, 3-wire 10 ... 0 V, 3-wire	ATEX II 1D Ex ia IIC T107°C IP6X Da	
Load resistance	> 5 kΩ, with voltage output R = (U _{ver} - 6 V)/20 mA, with current output	Please note	For the application in Ex zone you have to respect the conditions mentioned in the ATEX Type Examination Certificate (SEV 11 ATEX 0129). You will find the relevant certificates and instructions at www.baumer.com
Insulation resistance	> 100 MΩ, 500 V DC	Voltage supply range, Un	30 V DC
Short circuit protection	Yes	Degree of protection for cable accessories	IP 65
Shunt resistance	Rs ≤ (Vs - 6 V)/0.0205 A Rs ≤ 270 Ω, Vs = 24 V	ATEX II 1G Ex ia IIC T4/T6 Ga	
IO-Link interface		Please note	For the application in Ex zone you have to respect the conditions mentioned in the ATEX Type Examination Certificate (SEV 11 ATEX 0129). You will find the relevant certificates and instructions at www.baumer.com
IO-Link version	1.1	Maximum values for barrier selection, Ui	30 V DC
IO-Link port type	Class A	Maximum values for barrier selection, Ii	100 mA
Baud rate	38.4 kbaud (COM2)	Maximum values for barrier selection, Pi	750 mW
Cycle time	≥ 2.3 ms	Internal capacitance, Ci	31 nF
Process data length	24 bit	Internal inductance, Li	3 µH
SiO-mode	No	Compliance and approvals	
Process data (cyclic)	Process pressure	EMC	EN 61000-6-2 EN 61000-6-3
Diagnostic data (acyclic)	Process temperature	Explosion protection	ATEX II 1/2G Ex ia IIC T4/T6 Ga/Gb ATEX II 1/2G Ex ia IIC T3/T4/T6 Ga/Gb ATEX II 1D Ex ia IIC T107 °C IP6X Da ATEX II 1G Ex ia IIC T4/T6 Ga ATEX II 1G Ex ia IIC T3/T4/T6 Ga
Housing			
Style	Compact transmitter Connection head		
Overall size	Refer to section "Dimensional drawings"		
Material	AISI 316L (1.4404)		
Electrical connection			
Connector	DIN EN 175301-803 A (DIN 43650 A), 4-pin M12-A, 4-pin M12-A, 5-pin, stainless steel, IO-Link output		
Cable gland	Cable Ø 8 ... 10, stainless steel		
Cable outlet	1.5 m, 3-wire, shielded		
Power supply			
Voltage supply range	13 ... 30 V DC, with voltage output 8 ... 30 V DC, with current output 18 ... 30 V DC, with IO-Link		

Datasheet - DO NOT include these, read, digest, quote and cite them as a

Above is the technical data for the instrument.

Environmental, Sustainable Development, Commercial Risk and Codes of Practice

Sections should be numbered according to the

Environmental

When thinking of environmental practises, buying new products that come from manufacturers that reuse and recycle their products is a benefit, as industries have a responsibility to cut down on waste. If there is an option from a company to send faulty or broken sensors back to the supplier then I think that is an option that must be taken. Also choosing sensors that are produced by reputable companies whose goals are to reduce waste and reduce the effects on the environment, at least morally you both have the same objective. When applying it to the process station, i also think that sensors that can run on low voltage would also benefit the environment, as we are not pulling too much energy from the grid from overpowered instruments.

Use of 11pt Arial, full justification with 1.5 line spacing allows easier reading and

Sustainable Development

When it comes to sustainable development, everyone should have the same objective to reduce waste, whether this is to have a system in place where you are not ordering too much or ordering the wrong sensors. Also for sustainability what must be looked at is renewable energy wherever we can, whether that is solar panels, turbines or wind turbines in order to power our industries.

Commercial Risk

With the ever growing need to have up to date and smarter sensors in process, industry must make sure that it is not lagging behind and keeps up with industry 4.0. Every company must strive to hit these standards and make the workplace as efficient as possible. The problem is when we go past industry 4.0 we might leave some older industries behind as they haven't been able to cope with the upgrades needed.

Code of Practise

ISO 17025 instructs us of all the calibration and testing needed for maintenance required in each given country. Examples are (Calibration dates, results and how frequently they should be done on that instrument)

Calibration of Pressure Sensor

For this task a screwdriver and a process multi-meter was required. A reading of voltage was recorded in increments of 0.5 Bar, with a range of 0 – 5. The results from this calibration were put into table form and also a graph was made from the results. The practical side of this was done as group work. So a table of results will be the same between us.

First we had to make sure that the zero and the span to start were accurate, so at zero bar, we tested the voltage and it was showing 0.03V. In order to get this down to zero. We adjusted the zero screw with a screwdriver until the multimeter showed zero. We also did this with the span which was 9.93V we repeated this process and the only difference was we had to adjust the span screw with a screwdriver.

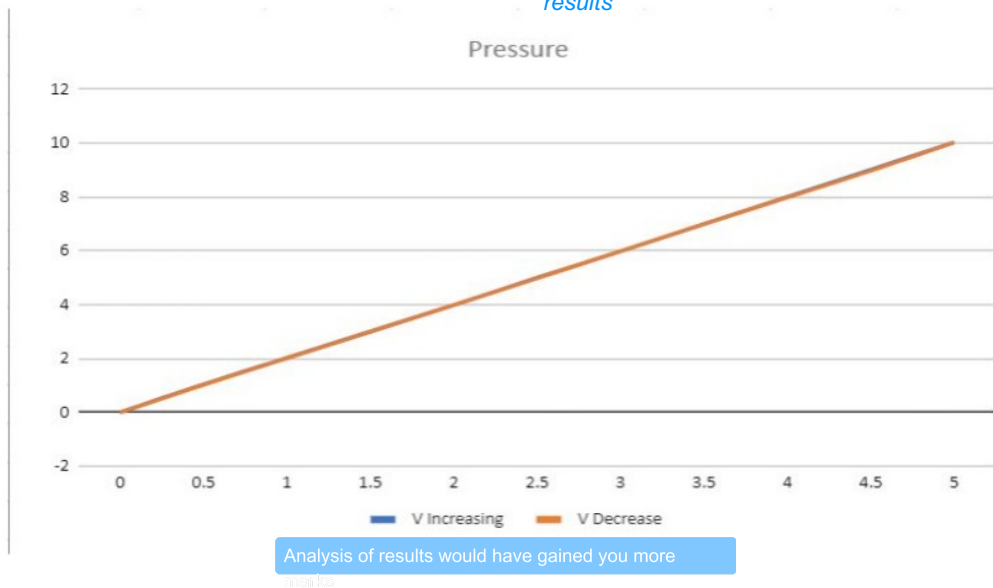


Here is the image of the calibration been carried out by our group

Below is the table of results from the calibration and the graph that was made from the results of the calibration.

Pressure Calibration						
Bar	V Increasing	V Decrease	Linear	Diff Increase	Diff Decrease	Hysteresis
0	-0.01	-0.02	0.01	0.02	0.03	-0.01
0.5	1.03	1.01	1.013	-0.017	0.003	-0.02
1	2.01	2	2.016	0.006	0.016	-0.01
1.5	2.99	2.98	3.019	0.029	0.039	-0.01
2	3.97	3.97	4.022	0.052	0.052	0
2.5	4.99	4.97	5.025	0.035	0.055	-0.02
3	5.97	5.97	6.028	0.058	0.058	0
3.5	6.98	6.98	7.031	0.051	0.051	0
4	7.99	7.97	8.034	0.044	0.064	-0.02
4.5	9	8.96	9.037	0.037	0.077	-0.04
5	10.02	10.02	10.04	0.02	0.02	0

Good set of
results



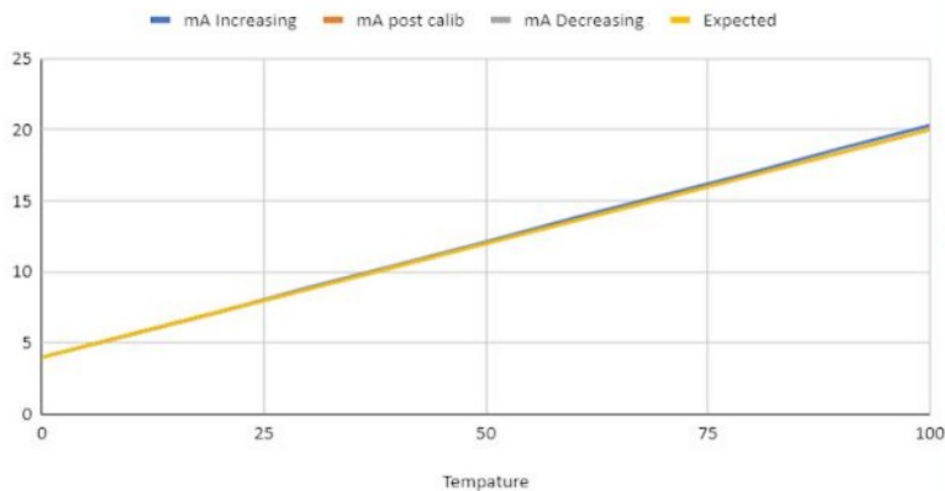
What are your conclusions from analysing this graph?

Calibration of Temperature Sensor

For the temperature sensor calibration, two multimeters were needed in order to carry out the task. A milliamp signal had to be generated on one of the multimeters in order to get a reading from the sensor, the other multimeter then read the milliamp value. For the calibration of the milliamp value the temperature was taken from 0 degrees to 100 degrees on 10degrees celsius increments. And then took reading from 100 degrees back down to 0 degrees celsius. Below is the table made for the results.

Tempature Calibration				
Tempature	mA Increasing	mA post calib	mA Decreasing	Expected
0	4	4	4	4
10	5.6	5.6	5.6	5.6
20	7.2	7.2	7.2	7.2
30	8.9	8.8	8.8	8.8
40	10.5	10.4	10.4	10.4
50	12.1	12	12	12
60	13.8	13.6	13.6	13.6
70	15.4	15.2	15.2	15.2
80	17	16.8	16.8	16.8
90	18.7	18.4	18.4	18.4
100	20.3	20	20	20

Temperature Calibration

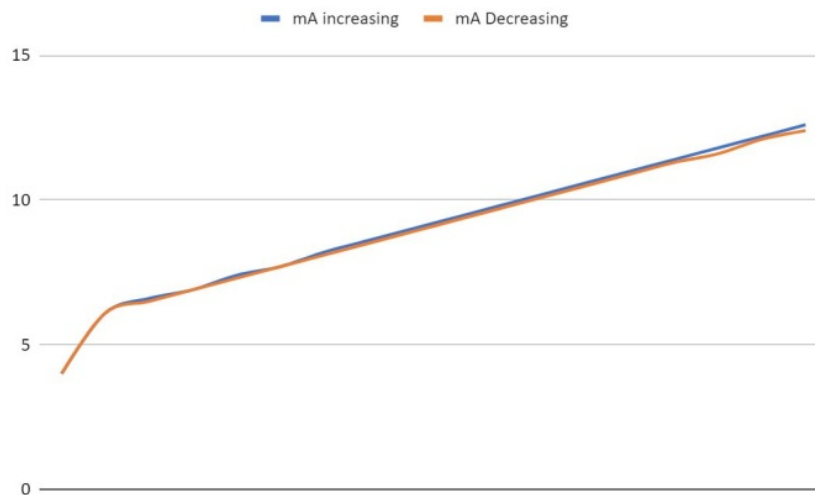


Above is the chart made from the results, as you can see they are pretty accurate, not much error between them . This has passed calibration.

Calibration of Level Sensor

For this task, the level sensor for the process station (water tanks) had to be calibrated. In order to do this, the tank had to be full at different levels. For the calibration the tank was measured from 0 to 23cm (this was measured prior), in increments of one. A Zero reading was obtained which gave us 4 milliamp. From 1cm to 7cm it would ignore as there was a setting on there to ignore it. Once the tank hit 7cm we had a milliamp reading. Once 23cm was hit, reading from 23cm down to 0cm were performed. Below is the table and graph created for this calibration.

Level Calibration						
Level (cm)	mA increasing	mA Decreasing	Linear Value	Diff Increase	Diff Decrease	Hysteresis
0	4	4	4			
1			3.67			
2			4.07			
3			4.48			
4			4.89			
5			5.29			
6			5.70			
7	6.1	6.1	6.10	0	0	0.00
8	6.6	6.5	6.51	0.09	0.00	0.09
9	6.9	6.9	6.92	0.02	-0.01	0.03
10	7.4	7.3	7.32	0.08	-0.02	0.10
11	7.7	7.7	7.73	0.03	-0.02	0.05
12	8.2	8.1	8.14	0.06	-0.03	0.09
13	8.6	8.5	8.54	0.06	-0.04	0.10
14	9	8.9	8.95	0.05	-0.04	0.09
15	9.4	9.3	9.35	0.05	-0.05	0.10
16	9.8	9.7	9.76	0.04	-0.05	0.09
17	10.2	10.1	10.17	0.03	-0.06	0.09
18	10.6	10.5	10.57	0.03	-0.07	0.10
19	11	10.9	10.98	0.02	-0.07	0.09
20	11.4	11.3	11.39	0.01	-0.08	0.09
21	11.8	11.6	11.79	0.01	-0.08	0.09
22	12.2	12.1	12.20	0	-0.19	0.19
23	12.6	12.4	12.60	0	-0.10	0.10



Analysis of results would have gained you more

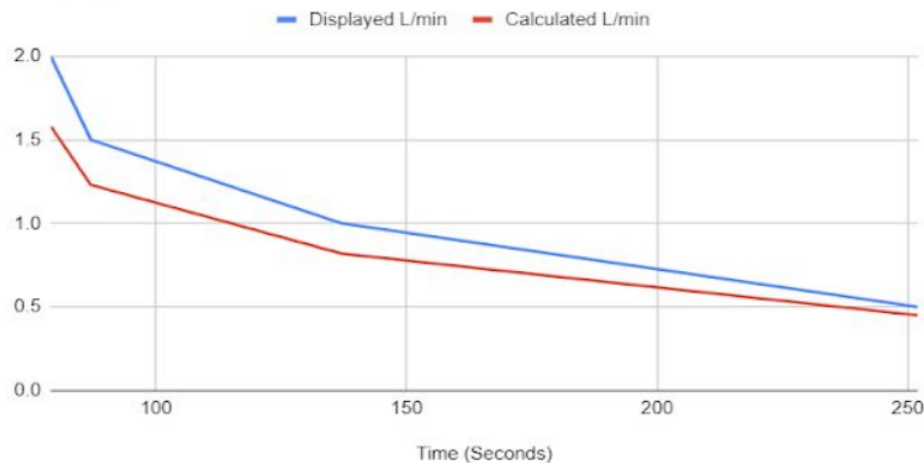
marks

Calibration of Flow Sensor

For this task, a different process station had to be used, as access was restricted to the flowmeter on the previous process station. A photo below has been supplied of the new process rig used for this task. For this calibration, the water cooling tank had to be measured, this was measured in m³. From there we could work out the litres a second and the litres a minute. To get results for the graph, the flow displayed on the sensor and the calculated flow was given, the seconds is the amount of time it took to fill the tank on that given flow. From the flow and measurement of the tank we could work out the calculated flow.

1	Displayed L/min	Time (Seconds)	Calculated L/min
2	0.5	252	0.45
3	1	137	0.82
4	1.5	87	1.23
5	2	79	1.58

Displayed L/min and Calculated L/min



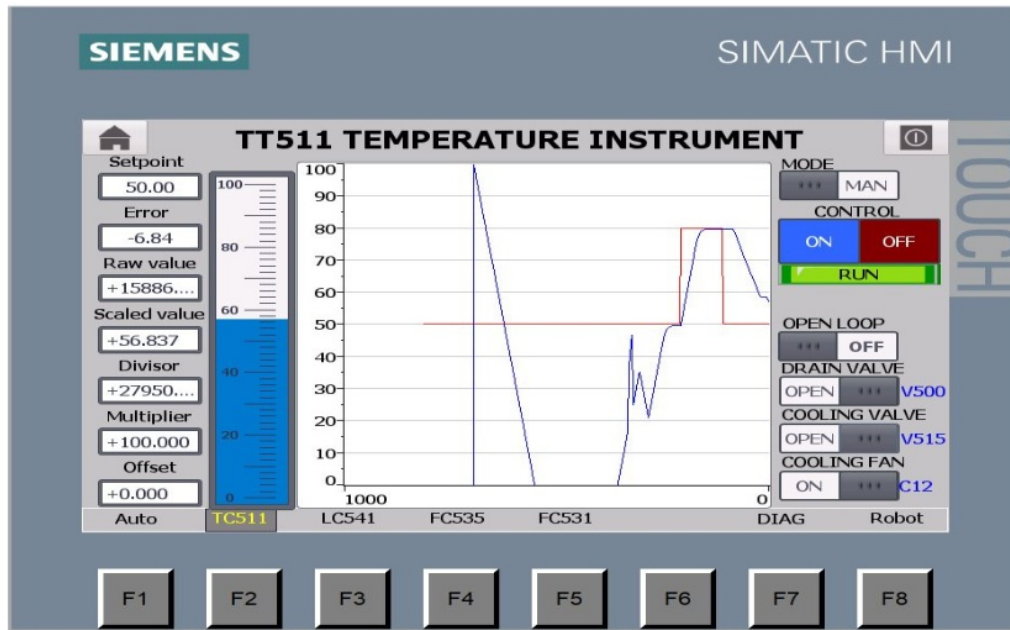
As you can see from the graph above, there is some error between the displayed flow and the calculated flow. This could mean that the flow sensor is faulty and needs maintenance or needs to be replaced.

Design Adaptation for Maintenance and Reliability

Sections should be numbered according to the

For this task, a HMI was needed for each of the instruments that had been tested or calibrated on. For example flow, pressure, level and temperature. It had to be operator friendly and simple and easy to use and integrate. The HMI monitored the sensors at all stages of the process.

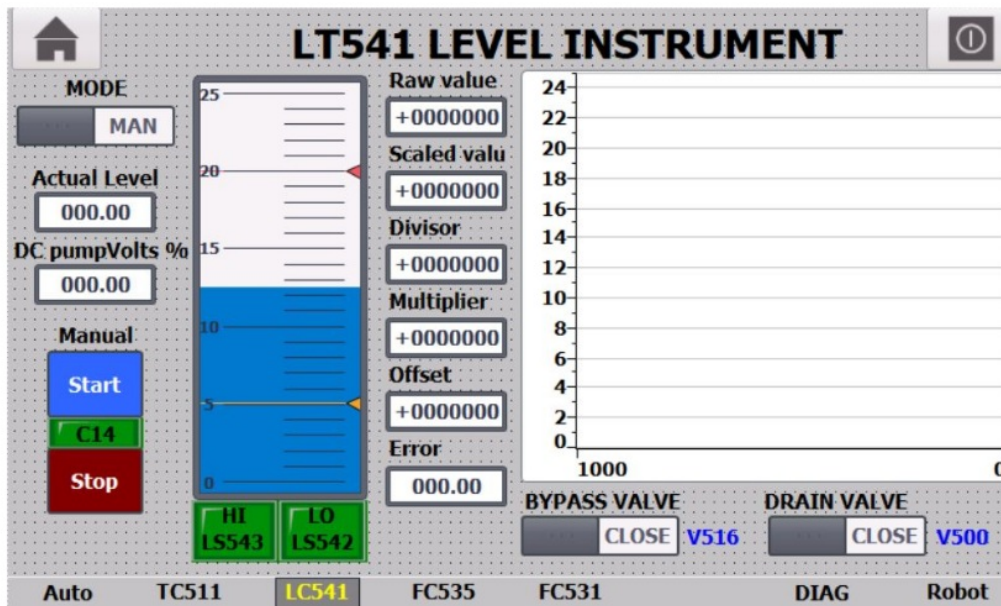
Temperature HMI



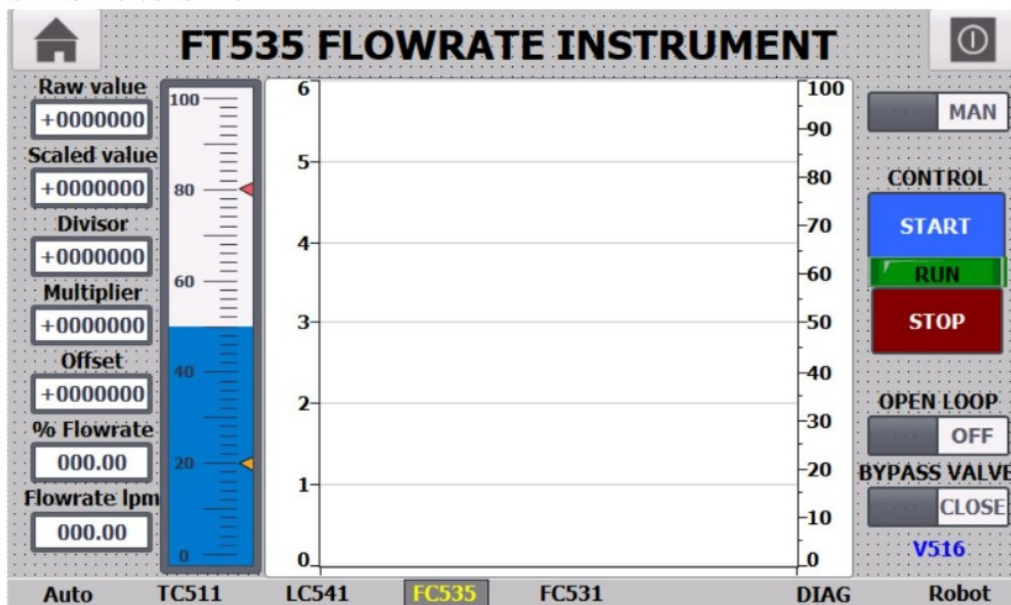
Above is the HMI that was made for the temperature sensor, as you can see it has a manual and auto button, a on and off button with a light to show if it is running or not. Plus manual button for all of the valves so the operator can operate them while in manual. Also a graph was put into the HMI so that the operator could monitor the values throughout the different stages of the process. The Level on the side shows the level of the tank that the temperature is reading.

Use of 11pt Arial, full justification with 1.5 line spacing allows easier reading and making

Level Instrument



Above is the HMI made for the level sensor, its basic and practical, as you can see from the photo, a manual and auto button was added, a start and stop button and also a graph that showed the level reading throughout. Also the manual buttons for the valves at the bottom. The HMI also shows the voltage of the pump from the top tank to the bottom tank.

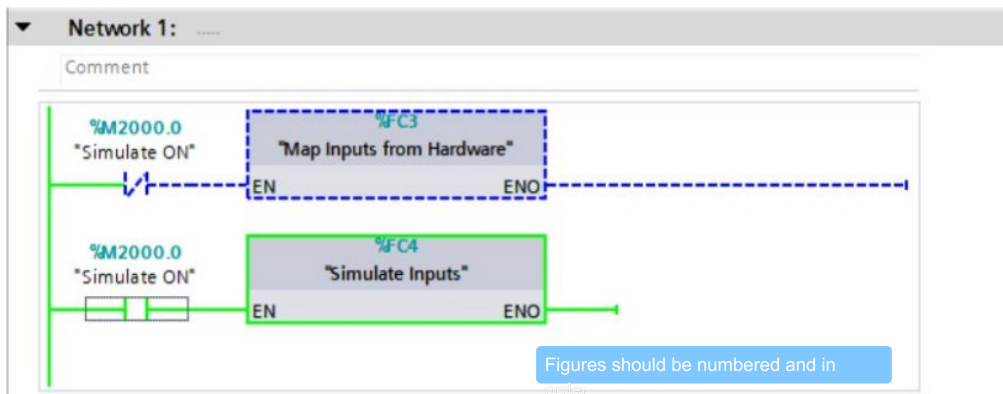


Figures should be numbered and in

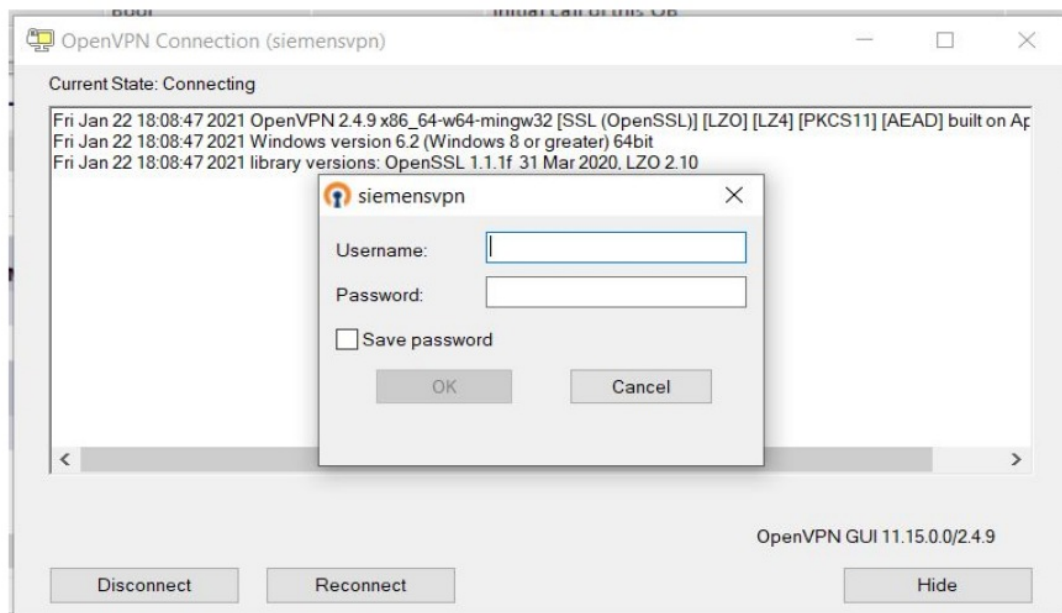
0-100%

Above is the HMI made for the flowmeter, as shown it has a manual/auto switch, a start and stop button, and buttons to operate the valves. Graphs were added to show the readings of the sensors.

The HMI had to be tested to see if they were functioning properly, and to make sure if there were any errors we could correct them for this the HMI had to be simulated in college on the sub system, to do this a connection to the machine via VPN had to be done. To do this connection to TIA portal had to be made in order to carry it out, below is a photo of the networks made in order for the simulations to take place;



This network was added so that the inputs from the instruments could be added and that simulation would take place so that readings could enter the HMI and testing could take place.



Figures should be numbered and in

The above image is a photo of the access page to the VPN, due to covid restrictions simulation could not take place in college, so students had to get access to TIA portal from home and VPN was used for students to get access to the software.

Conclusion and Recommendations

To conclude the assignment, every aspect was looked at when looking at the sensors in the process station. Investigations into the existing were undertaken, finding specification sheets and information provided for the instruments. Then to complete research and how to improve and find better sensors for the process, provided evidence of better sensors that could work with IO links and had various other benefits that would benefit the process. For recommendations on this part of the assignment, to be in conjunction with industry 4.0, the process needs to be updated with new and improved sensors, this also ties in with the next task, the benefits of upgrading the system is it will save on cost and maintenance, this was discussed in the environmental and sustainability task.

Next calibration tasks were provided for each of the instruments in the process, evidence was provided where possible, and descriptions of the task were added. Tables and graphs were provided for each calibration with opinions at the end of each one.

For the Design adaptation task, photo evidence was provided to show the HMI screens that were built for the operator to carry out maintenance tasks. These were built user friendly and were easy to navigate.

Other recommendations to make the calibrations easier to have a flow meter which is easier to access and easier to calibrate. Overall the whole system could do with new sensors.

Team Working

Before starting these tasks, groups were made in order to carry out the calibration and to make the HMI screens for the sensors. Prior to this the group set clear instructions on what jobs each of us had, Kieran and Evan carried out the calibration tasks, and the author created the tables and the graphs to correlate with the maintenance activities. All of the group took photo evidence to make sure that we had not missed any piece of evidence. Evan had to carry out the HMI work, as due to COVID restrictions I could not attend some of the lessons.

Where is your citation list?

1910597

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

Instructor

45/100

PAGE 1

QM

Word Count Exceeded

PAGE 2

QM

Good Structure

Report is structured exactly as stated in the assignment brief.

QM

Sections should be numbered according to the brief

PAGE 3

Text Comment. Why is this page blank?

PAGE 4

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Sections should be numbered according to the brief

QM

Spelling

Spelling error

QM

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Figures should be numbered and in order

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Your presentation could be improved making the text easier to read and mark. Your tutor will then be able to add comments between lines

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You are referring to first or second persons (I, we, you, us etc) whereas you should use the third person thus depersonalising it.

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Cited wrongly, this is not the Harvard method

Use the Harvard method of citing and listing

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Your presentation could be improved making the text easier to read and mark. Your tutor will then be able to add comments between lines

Text Comment. Good set of results

QM

Analysis of results would have gained you more marks

Don't simply present results, you must analyse them and draw conclusions from them. Did you expect them to look like this?

Text Comment. What are your conclusions from analysing this graph?

QM

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Text Comment. Where is your citation list?

GRADING FORM: NEW CSG-RUBRIC

JOSEPH
WAKEFIELD BAUGH

45

1. ENGAGEMENT WITH LITERATURE

 Poor engagement with essential reading. No evidence of wider reading. Reliance on inappropriate sources, and/or indiscriminate use of sources. Heavily reliant on information gained through class contact. Inconsistent and weak use of referencing.. No list of sources provided and Harvard method completely ignored. Do not include datasheets, read them, extract information and cite your source. (7/20)

7

2. KNOWLEDGE AND UNDERSTANDING

 Limited knowledge and understanding of the basic underlying concepts and principles within the subject area. Some elements may be missing. (9/20)

9

3. COGNITIVE AND INTELLECTUAL

 Limited attempt at evaluation of the underlying concepts and principles, tending towards description. Can interpret qualitative and quantitative data but with some errors. Some evidence to support emerging arguments and judgements but these may be underdeveloped or with a little inconsistency / mis-interpretation. (9/20)

9

4. PRACTICAL APPLICATION



A very good application of a range of basic methods, materials, tools and/or techniques. Very good consideration of the context of the application. Very good evidence of different approaches to problem-solving in particular contexts and proposes appropriate solutions (12/20)

12

5. TRANSFERABLE SKILLS



Mostly ordered presentation and structure in which relevant ideas / concepts are reasonably expressed. Work may lack coherence and/or accuracy in places. Can work as part of a group, meeting most obligations to others but perhaps with limited involvement in group activities. Demonstrates the basic skills for employment requiring the exercise of some personal responsibility, with some areas of minor weakness (8/20)

8