



Installation Manual



SLURRY DENSITY ANALYSER

Doc No: KWR-7QA03-921-20231031-EN

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Preface

Symbols and conventions

	<p><i>Caution! This sign indicates that failure to follow directions could result in damage to the equipment or loss of information.</i></p>
	<p><i>Warning! This sign indicates that failure to follow directions in the warning could result in bodily harm.</i></p>
	<p><i>Important! This word indicates that the text that follows contains clarifying information or specific instructions.</i></p>

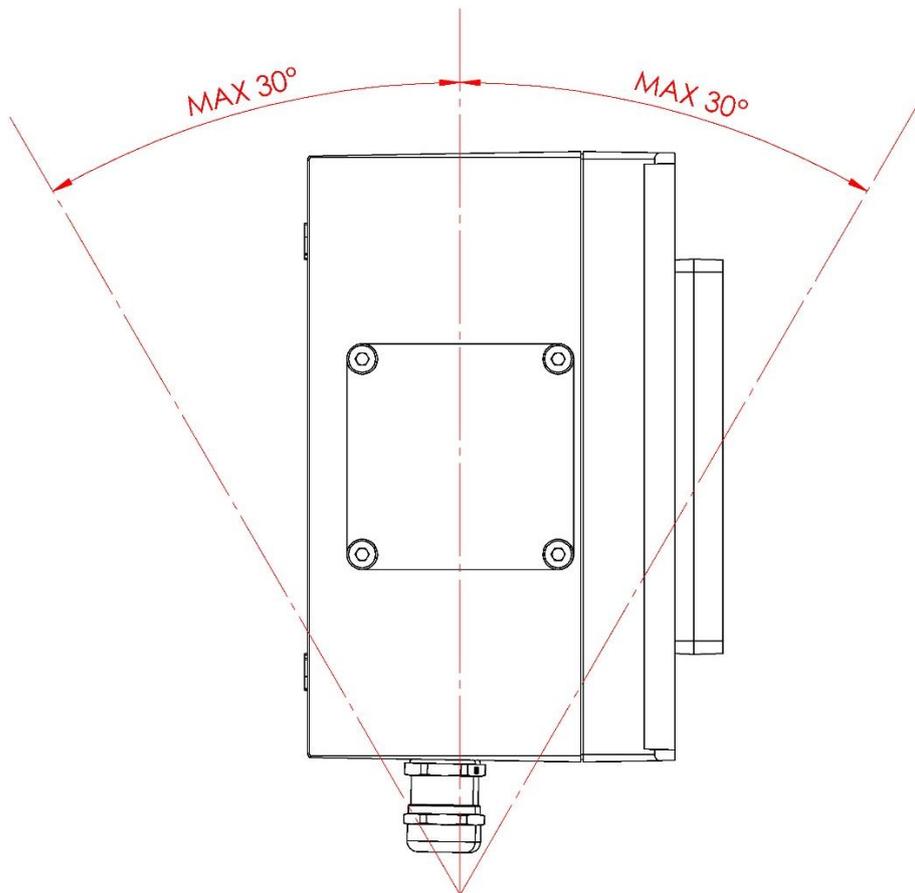
STEP 1. ANALYSER Installation

1.1 Mounting locations

For IP66 built analyser inside canopy

Temperature	Operating: 0-50 degC; Storage: -10°C to +60°C
Relative humidity	10-90% (non condensing)

1.2 Mounting angle



1.3 Mounting to the wall

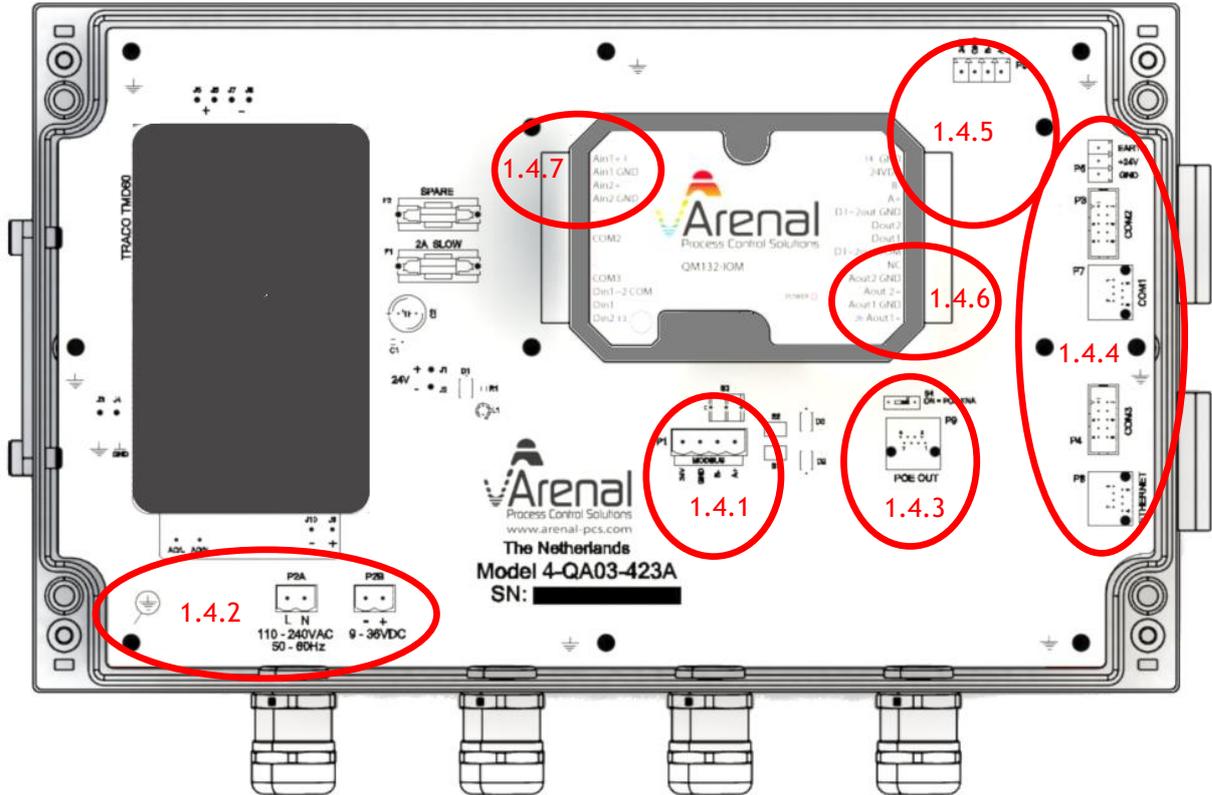
Remove the aluminum cover plates to mount the analyser to the wall
Use the "4-Mounting set" screws and bolts to mount the analyser to the wall

1.4 Electrical cables installation

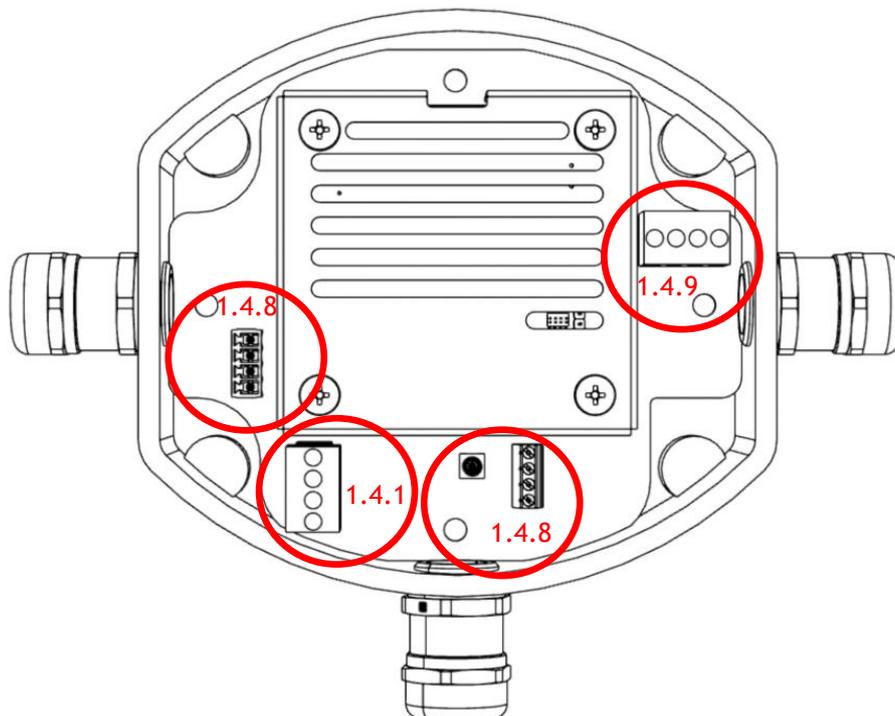
Before working on electrical cables always make sure power is off.

For electrical schematics of all modules see Appendix.

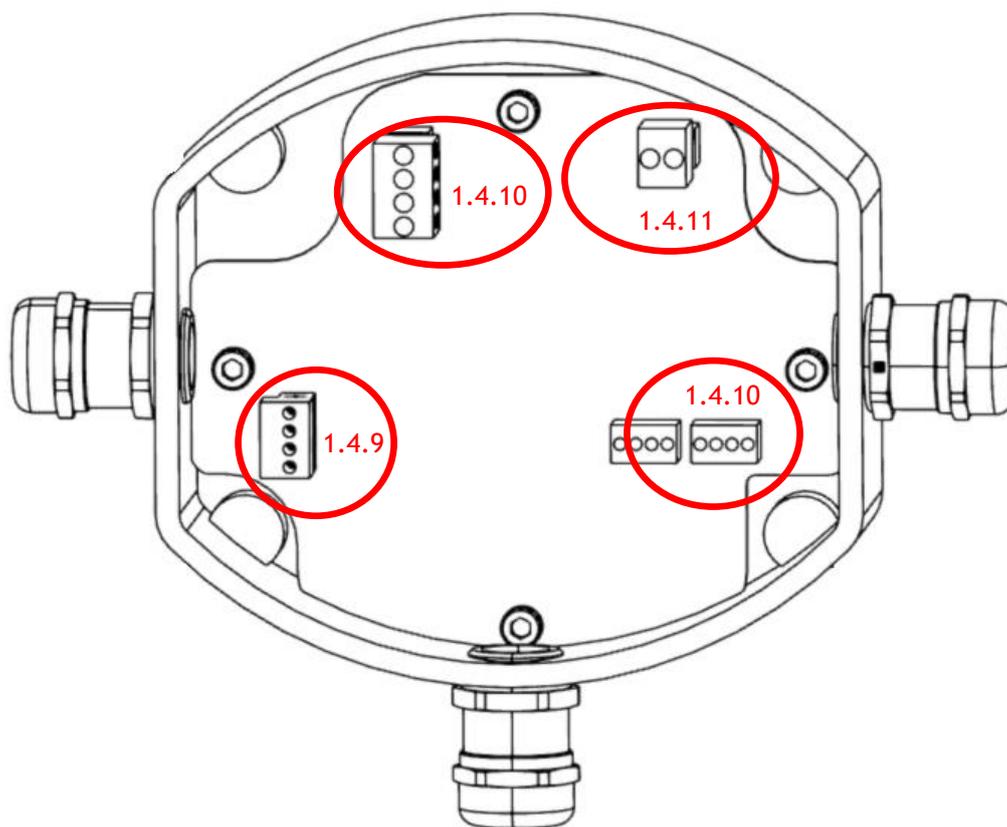
Analyser connections:



UDT connections:



TMT connections (optional):



1.4.1 To connect the Analyser to UDT

Name in Analyser	Name in UDT	Explanation	Cable Wire numbers	Cable Wire Colour
P1 Modbus RTU	P1 Modbus RTU			
24VDC	24VDC	24Vdc +	1	Brown
GND	0VDC	0 Vdc	2	White
B-	B-	Modbus RTU	3	Green
A+	A+	Modbus RTU	4	Yellow



To prevent unwanted influences from external influences it is advised to use the EMC cable gland. One EMC cable gland is provided with the analyser and can be identified by 4 spring arms inside the gland. The cable spring arms need to be placed on the braided shield of the cable. After this the cable gland must be tightened fully to prevent leakage.

1.4.2 Power supply of the QA03-SDA

The analyser is sold in AC and DC version. It is not possible to switch between versions because of PCB mounted power supply unit.

Connection AC version:

90-263 Vac 50-60 Hz	Power cable (not provided)
L	Brown
N	Blue
Earth	Yellow/Green

Connection of DC version:

9-36VDC	Power cable (not provided)
+	Red
-	Black
Earth	Yellow/Green



In all cases always make sure earth of the power cable is connected to the stance in the lower left corner of the analyser.

1.4.3 Ethernet connection

The P9 ethernet connection can be made with a RJ45 connector. A switch above the connector allows to change the connection from ethernet only to Power over Ethernet (POE). The analyser will then also provide 24V on the Ethernet connection.



Please note we provide this POE for use with our Remote Monitoring Module. Only enable POE for this use.

Not all 3rd party equipment is compatible with 24V POE. Enabling POE might damage connected equipment.

1.4.4 Onboard connection PCB to HMI

The HMI is already wired and connected out of factory.

PCB connector / name	HMI C7E (Cimon)	Explanation	Cable Wire Colour
P6 Earth +24V GND	DC24V FG + -	Power supply to HMI	Green Brown White
P4 COM3	COM1 / COM 2	The communication cable	Gray flat 10p cable
8 Ethernet	LAN	Ethernet communication	Black RJ45 to RJ45 ethernet cable

1.4.5 Onboard connection PCB to IOM

The IOM is already wired and connected out of factory.

PCB connector / name	QM132-IOM	Explanation	Cable Wire Colour
P5 24V GND B- A+	15) 24VDC 14) GND 16) A+ 17) B-	Modbus RTU to IOM	Brown White Green Yellow

1.4.6 mA wiring output

The Arenal QM132-IOM has 2x 4-20 mA outputs. The outputs are active.

On QM132-IOM Module	Parameter	Terminal on QM132	
mA-1 common ground mA-1 + mA-2 common ground mA-2 +	SG Temperature	25) Aout1 GND 26) Aout 1+ 23) Aout2 GND 24) Aout 2+	

The mA out parameters can be altered to customer preference in the analyser menu.

1.4.7 mA wiring input

Ma input of for instance an external flometer can be provided to the internal IOM module. The Arenal QM132-IOM has 2x 4-20 mA inputs. The inputs are passive (inactive).It means that our system is only working with active mA sources. If the external transmitter is passive, you need an external power supply to make it active.

Input	Terminal on QM132
4-20 mA input 1+	1) Ain1+
4-20 mA input 1-	2) Ain1 GND
4-20 mA input 2+	3) Ain2+
4-20 mA input 2-	4) Ain2 GND

1.4.8 UDT sensor connection

PCB connector / name	Explanation	Cable Wire Colour
P9 COAX sensor	Sensor coax connector for ultrasonic signal	Copper color coax with gold color connector
P4 PT1000 connection +F +S -S -F	PT1000 signal cables (4 wire)	Brown White Green Yellow
EMC cable gland	The cable needs to be grounded to case	Braided shield of cable



The measurement of the ultrasonic sensor can be sensitive to external influences if EMC cable gland is not correctly used. Please make sure the EMC cable gland is used for sensor cable. One EMC cable gland is provided with the UDT, and can be identified by 4 spring arms inside the gland. The cable spring arms need to be placed on the braided shield of the cable. After this the cable gland must be tightened fully to prevent leakage.

1.4.9 To connect the UDT to TMT (optional)

The TMT can be directly connected to UDT.

Name in UDT	Name in TMT	Explanation	Cable Wire numbers	Cable Wire Colour
P1 Modbus RTU	P1 Modbus RTU			
24VDC	24VDC	24Vdc +	1	Brown
GND	0VDC	0 Vdc	2	White
B-	B-	Modbus RTU	3	Green
A+	A+	Modbus RTU	4	Yellow



To prevent unwanted influences from external influences it is advised to use the EMC cable gland. One EMC cable gland is provided with the TMT and can be identified by 4 spring arms inside the gland. The cable spring arms need to be placed on the braided shield of the cable. After this the cable gland must be tightened fully to prevent leakage.

1.4.10 TMT sensor connection (optional)

PCB connector / name	Explanation	Cable Wire Colour
P3 PROBE HEATER Force N Sense N Sense P Force P	Sensor power cable for internal heater	White (Thin cable) White (Thick cable) Red (Thick cable) Red (Thin cable)
P5 PT1000 CH2 Force P Sense P Sense N Force N	Sensor PT1000 cable for temperature	Black cable Black cable Gray cable Gray cable
P2 POWER 12VDC GND	Power cable from external PSU	Red Black

1.4.11 TMT external power for TMP (optional)

PCB connector / name	Explanation	Cable Wire Colour
P2 POWER 12VDC GND	Power cable from external PSU	Red Black

STEP 2. Spool piece/wafer/weldolet Installation



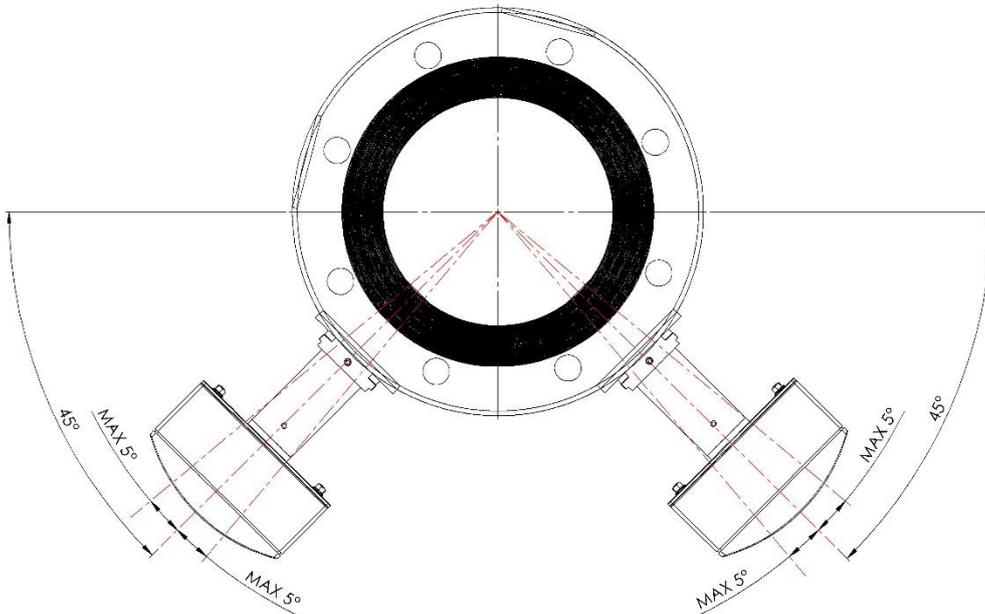
Before installation measure internal diameter (ID) of existing pipe. Non matching ID of existing system and installed spoolpiece / wafer will increase the wear and will result in loss of warranty.

Install the wafer, weldolet(s) or spoolpiece in the system.

2.1 Mounting position

The mounting position can have a great influence on the correct functioning of the system. To provide the best measurement mounting must be as follows.

- In vertical pipe, mounting position is not relevant (mounting location can be relevant, see next paragraph!)*
- In horizontal pipe, mounting position must be between 4-5 or between 7-8 o'clock as in the illustration:*



2.2 mounting location

The mounting location can have a great influence on the correct functioning of the system. To provide the best measurement mounting must be as follows. Following two points must be taken into account.

- Mounting 7x pipe diameter after last obstruction (pump, bend, narrowing, valve)*
- Mounting 5x pipe diameter before next obstruction (pump, bend, narrowing, valve)*

STEP 3. Start up



Start up and commissioning by unauthorised personnel is at own risk.

3.1 Density

1. Start up.

- If desired; connect 4-20mA signal out to the IO module in the analyser. Standard setting: A1out = SG+, A1out GND= SG GND, A2out = TEMP+, A2out GND= TEMP GND.
- Turn on the analyser (Only after approval of Arenal or Arenal appointed service provider)
- Press  -> system settings -> user settings. Set your personal settings and time. (In case of password prompt use ID: "service" with password: "26")

2. Water calibration

- In  (main screen) press  -> Water calibration. (In case of password prompt use ID: "service" with password: "26")
- Water calibration: Run clear process water until reference temperature is stable. Wait for at least 15 minutes after start-up if you wish to perform calibration.
- Press  (calibrate) . Press confirm. Check if SG moves to 1.000 in home screen.
- In case of a thermal massflow probe, the water calibration for flow can also be performed now. Continue to steps 8, 9 and 10 of this guide to do this. Then continue with step 5.*

3. Field calibration

- Start pumping the process slurry until a stable measurement of SG is given.
- In  (main screen) press  -> slurry calibration (In case of password prompt use ID: "service" with password: "26")
- Calibrate by setting the high Online and high Lab value. Use the slurry measurement at time of sample for online and the Lab value for the lab result of the taken sample. 
- The last action to complete the calibration (Important) is to save  all new settings.
- In case of a thermal massflow probe, the slurry calibration for flow can also be performed now. Make sure step 8, 9 and 10 have already been performed and continue to step 11 to do this. Then continue with step 7.*

4. Configure the digital and analog outputs

- Standard settings for 4-20mA SG output are 4mA = SG 1 and 20mA = SG 2. To set own values in  (main screen) press  -> slurry calibration -> click  (next page). Here settings may be changed.
- Standard settings for 4-20mA Temperature output are 4mA = 0°C and 20mA = 50°C. To set own values in main screen press  -> click  (next page). Here settings may be changed.
- The ultrasonic density analyser is now calibrated!

5. For full manual please see <https://www.arenal-pcs.com/downloads>

3.2 Additional steps in case of Thermal Massflow Probe:

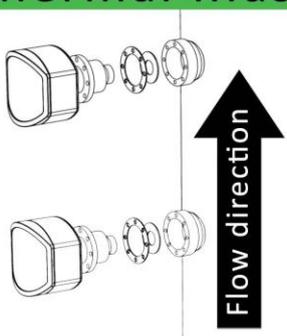
6. Power off system and install Massflow probe:

Thermal Massflow Probe

1

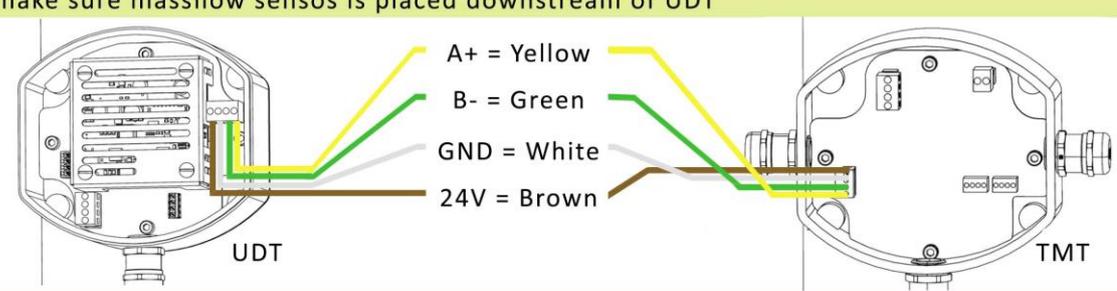
TMT with Thermal Massflow Probe

UDT with Ultrasonic Density Probe



make sure massflow sensor is placed downstream of UDT

2



A+ = Yellow

B- = Green

GND = White

24V = Brown

remove covers of transmitters and connect 2nd Modbus cable according to above scheme

3

To Probe Heater :

Force N= White (Thick)

Sense N = White (Thin)

Sense P = Red (Thin)

Force P= Red (Thick)

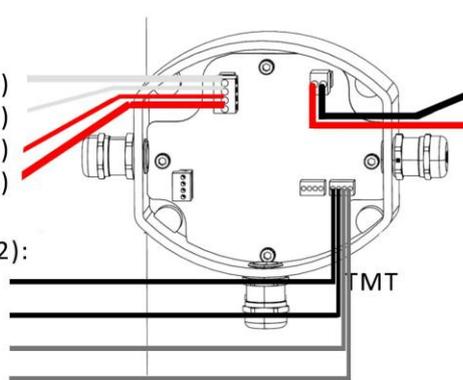
To Probe (PT1000 CH2):

Force P = Black

Sense P = Black

Sense N = Gray

Force N = Gray



From TMT PSU:

POWER GND = 12V-

POWER 12VDC = 12V+

in case TMP probe is not connected: connect according to above scheme



IMPORTANT:
Before You Continue...

- Always unplug power when working on a system!
- In case of weldolet drill hole 36mm. See installation guide for info.
- Make sure probe is mounted flush with pipe ID.
- Thermal Massflow Probe requires its own additional 12VDC 60W PSU.
- Use 12VDC:DC converter when not using Arenal PSU.
- Thermal Massflow Transmitter PCB uses 24VDC from Modbus cable.
- Make sure all cable glands, lids and screws are tightened to prevent moisture damage.

7. Setup of the Thermal Massflow Analyser (Make sure that steps 3 to 8 are completed first) :

- a. Turn on the analyser (Only after approval of Arenal or Arenal appointed service provider)

- b. In  (main screen) press . From the pulldown menu select Flow source: TMT -> Close. Set ID of the pipe. Click  and set desired output unit and mA range. Standard settings for 4-20mA Flow output range are 4mA = 0 m/s and 20mA = 10m/s. (In case of password prompt use ID: "service" with password: "26")

- c. Click the save  button.

- d. Make sure TMT communication is set on (Green color). Press  -> Thermal Massflow Transmitter -> Modbus RTU communication. In case TMT is OFF -> click Switch ON. Green color will confirm on.

8. Temperature calibration with UDT

- a. To temperature calibrate the sensors together: Press  -> Thermal Massflow Transmitter -> Temperature Calibration. PWM needs to be turned off for the calibration. Controller of the probe must be off to calibrate. If Regulator is ON press the button to turn it OFF. Red color will confirm off. (In case of password prompt use ID: "service" with password: "26")
- b. Wait for at least 15 minutes to let temperature stabilize while pumping water.
- c. Press Calibrate PT1000. ΔT should move to 0°C.
- d. Turn regulator on by pressing the Regulator button. Green color will confirm on. Click the save  button.

9. Field calibration.

- a. Note that water calibration of density (steps 5) must be correct before starting this procedure. Both water and field calibration must be performed before system works properly.
- b. Start pumping clear process water until a stable measurement of SG/density is given .
- c. Press  -> Thermal Massflow Transmitter -> Field Calibration, in this screen the field calibration can be set.
- d. Manually copy the the SG model value shown at top left in the in 1st Water field (SG column). This value should be approximately 0,997 to 1.
- e. Enter the result from model value in field Water - Online Value column. For Water - Lab Value column enter the value provided by reference meter.
- f. Start pumping high density slurry until a stable measurement of SG/density is given.
- g. Fill in the SG model value shown at top left under in 1st Slurry field (SG column).
- h. Enter the result from model value in field Slurry - Online Value column. For Slurry - Lab Value column enter the value provided by reference meter.
- i. The last action to complete the calibration procedure is to save  all the new settings.

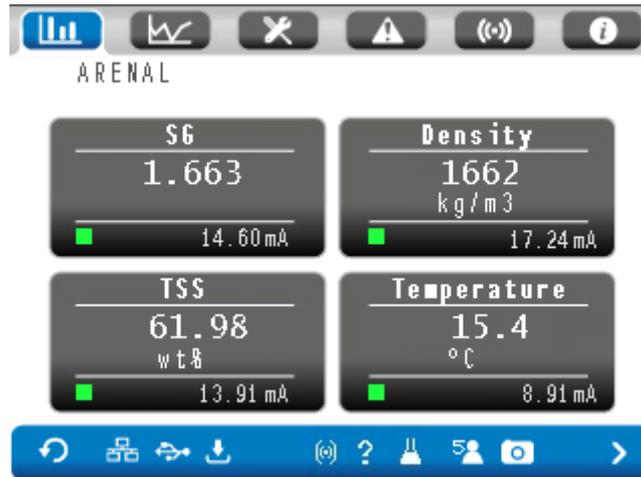
10. Re-configure the digital and analog outputs.

- a. Step 9b already set correct range for mA. To put a flow measurement to a mA output for IO module press  -> IO module -> mA out settings. Set parameter 2 to desired output.
- b. Click the save  button.
- c. The Thermal Massflow Analyser is now calibrated!

11. For manual please see <https://www.arenal-pcs.com/downloads>

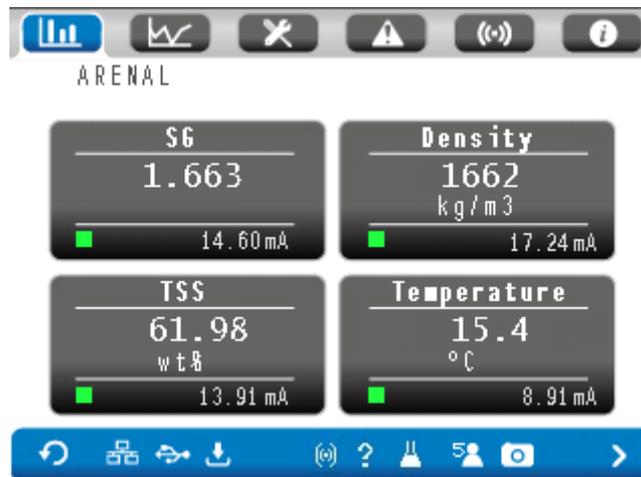
STEP 4. Correcting mA outputs

SG:



- To set mA output of the SG; If not already in home screen press  tab icon.
- Press the SG box in above picture,
- In case of password prompt use ID: “service” with password: “26”) and press SG box once more to enter.
- Click on box slurry calibration
- Click  (next page). Here settings may be changed.
- Standard settings for 4-20mA SG output are 4mA = SG 1 and 20mA = SG 2.
- To set own values change settings to desired output and click  the save button. (Right bottom of the screen.)

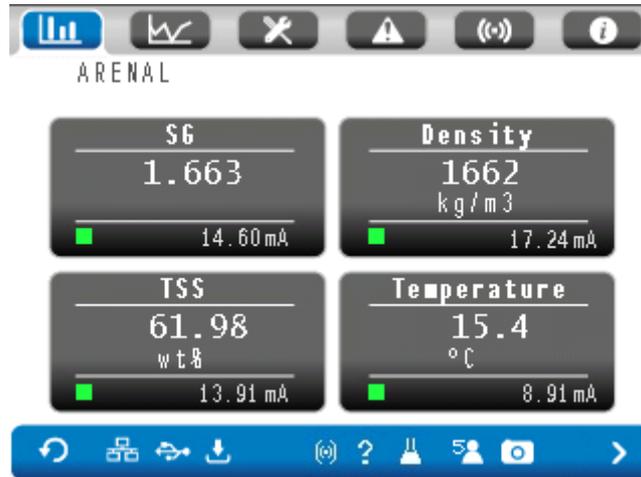
Density:



- To set mA output of the Density; If not already in home screen press  tab icon.
- Press the Density box in above picture,
- In case of password prompt use ID: “service” with password: “26”) and press SG box once more to enter.
- Click on box slurry calibration
- Click  (next page). Here settings may be changed.

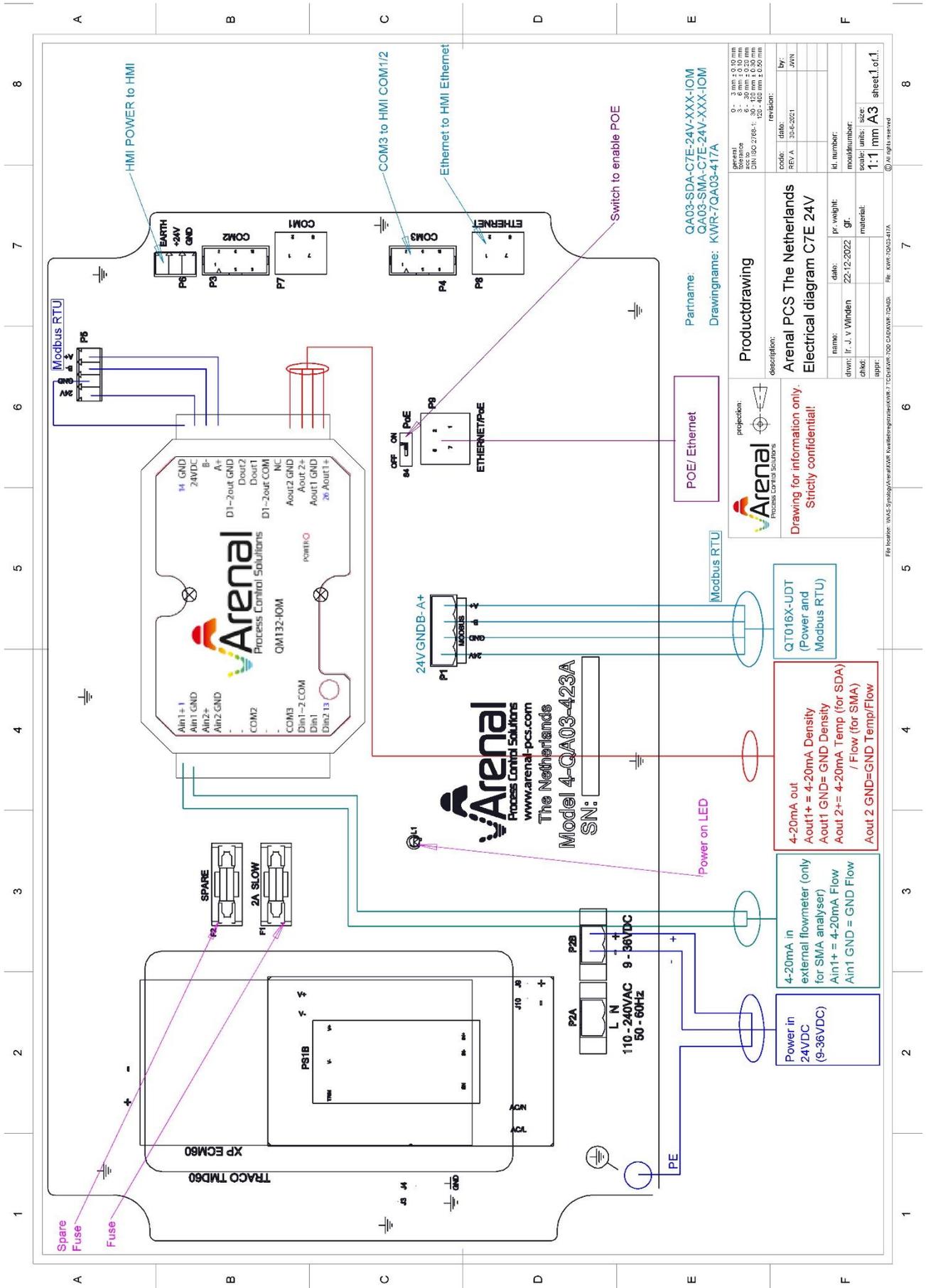
- f) Standard settings for 4-20mA Density output are 4mA = Density 1000kg/m³ and 20mA = Density 2000 kg/m³.
- g) To set own values change settings to desired output and click  the save button. (Right bottom of the screen.)

Temperature:



- a) To set mA output of the Density; If not already in home screen press  tab icon.
- b) Press the Temperature box in above picture,
- c) In case of password prompt use ID: "service" with password: "26") and press Temperature box once more to enter.
- d) Click on Temperature calibration
- e) Click  (next page). Here settings may be changed.
- f) Standard settings for 4-20mA Temperature output are 4mA = Temperature = 0°C and 20mA = Temperature 50°C.
- g) To set own values change settings to desired output and click  the save button. (Right bottom of the screen.)

A2 Electrical diagram QA03-SDA-7CE-24V-XXX-IOM / QA03-SMA-7CE-24V-XXX-IOM



general	0 - 3 mm ± 0.10 mm	by:	JPH
tolerance	3 - 6 mm ± 0.10 mm	date:	23-05-2021
min. hole diameter	30 - 102 mm ± 0.30 mm	id. number:	
min. hole diameter	103 - 400 mm ± 0.50 mm	module number:	
revision:		serial units:	500
CS&S:	REV A	sheet:	1 of 1
REF A:		material:	1-1 mm A3

Productdrawing

Partname: QA03-SDA-C7E-24V-XXX-IOM
QA03-SMA-C7E-24V-XXX-IOM
Drawingname: KWR-7QA03-417A

description:
Arenal PCS The Netherlands
Electrical diagram C7E-24V

name: Ir. J. V. Winden
date: 22-12-2022
pr. weight:
modulnumber:
serial units: 500
sheet: 1 of 1

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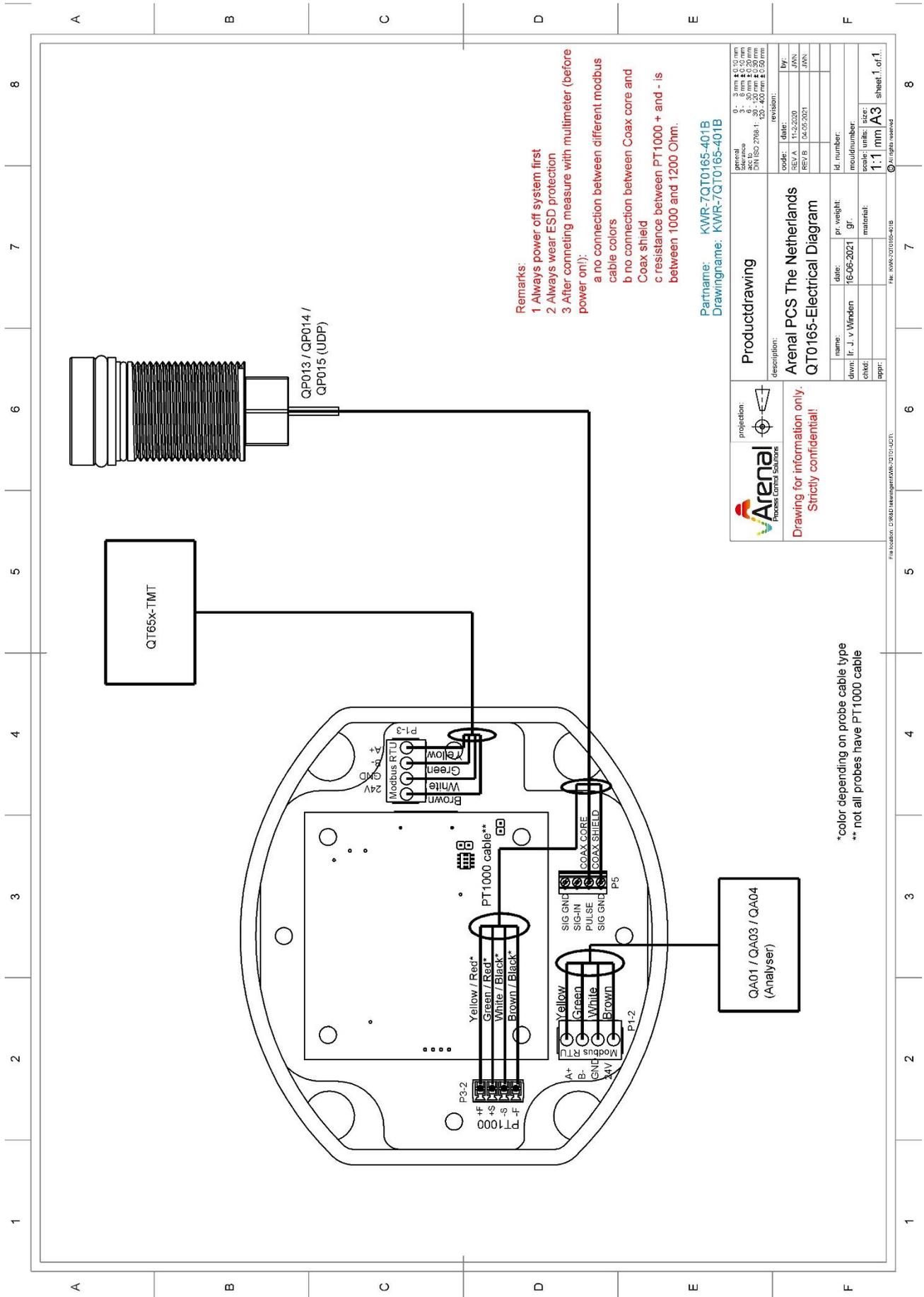
projection:

Drawing for information only.
Strictly confidential!

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A5 Electrical diagram QT016(5) UDT (with or without QT65x TMT)



A6 Electrical diagram QT065x TMT

