

# Instructions

for

## Profile Meter

&

## Water Cut Meter



Document Number: 48030-MA-Ex-001 Rev.04

## Revision history

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Revision	Date	Details or purpose of revision	Made by	Checked by	Approved by
01	12.02.2014	Document established	ED	NM	TG
02	14.03.2014	Changed the Ta from 70 to 60 after heat-transfer calculations, due to additional requirements in the IECEX certificate.	ED	NM	TG
03	30.03.2016	New company name and logo. Drawings put in Certificate Schedule. Certificate updated to issue 4 to implement High Temperature instrument types. High temperature Instructions manual established as a separate document.	ED	NM	TG
04	14.04.2020	New company address. Added "Specific Conditions of Use" from certificate. Removed section 3.4. Renamed "Junction Box" to "Sentech Controller Unit".	ED	TG	TG

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## 1. General

The Sentech Profile Meter and Water Cut Meter instruments are certified intrinsically safe apparatus. The customer must make sure that the ambient conditions in which the instrument is placed are suitable for the degree of protection of the instrument specified in chapter 1.1. For the instrument to be safe to use, only the installation setup defined in these instructions can be used. Only a complete installation containing Barriers, Controller Card and sensors, placed in appropriate ambient conditions for each, according to the drawings in this document, will make it safe to use.

### Barrier Module

Placed in a safe area without any explosion hazard, providing power to and communicating with the Controller Card.

### Controller Card

Mounted in the Sentech Controller Unit encapsulation with a degree of protection  $\geq$  IP54 and connected to the specified Barrier Module only. Ambient temperature tolerance is  $-40^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ , and outside of these temperatures it will no longer be safe to use.

### Sensors

Connected to the Controller Card with internal wiring, it can be used safely in the ambient temperature range  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

## 1.1 Environmental conditions for which the instrument is suitable

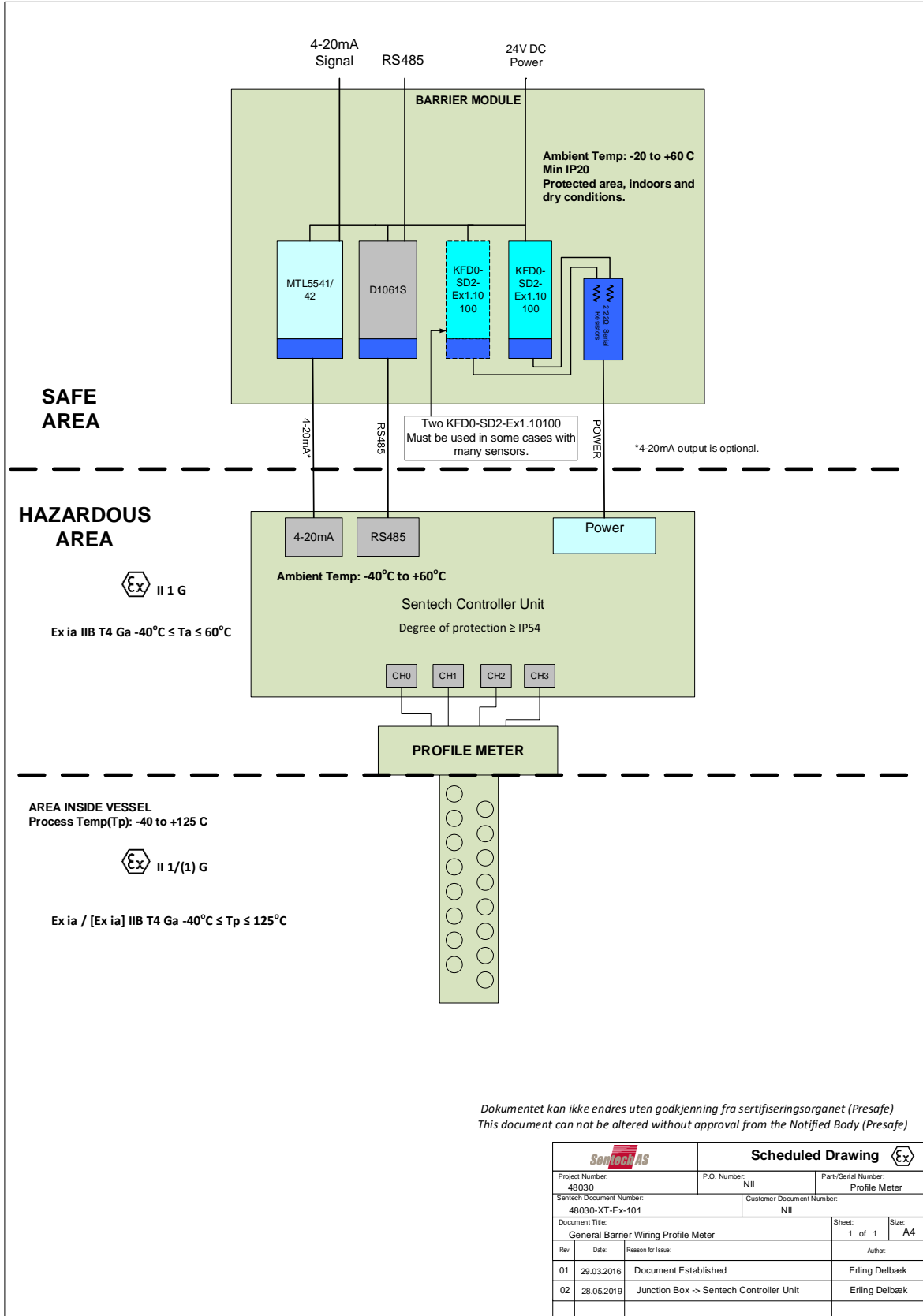


Type of Protection: **Ex ia IIB T4 Ga**  $-40^{\circ}\text{C} \leq \text{Ta} \leq 60^{\circ}\text{C}$

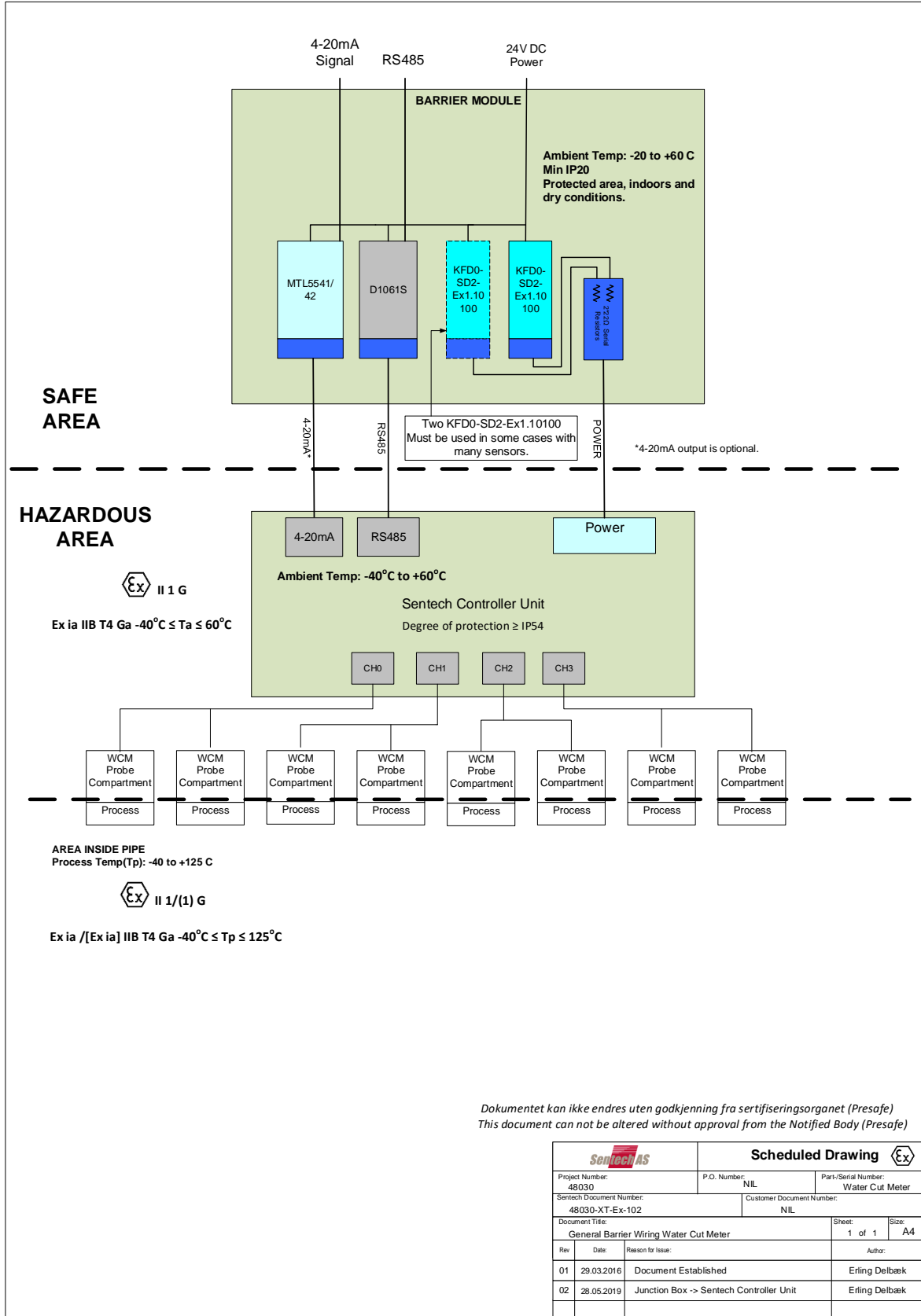


**IECEX PRE 14.0004X**

### 1.1.2 Ambient Conditions and IP Rating for the Profile Meter



### 1.1.3 Ambient Conditions and IP Rating for the Water Cut Meter



## 1.2 Specific Conditions of Use

As stated in the Certificate. This manual is valid for instrument types PM and WCM only (Max Tp 125°C).

1. *Ambient temperature range is  $-40^{\circ}\text{C} \leq T_a \leq 60^{\circ}\text{C}$  for all types. Process temperature range is  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$  for PM and WCM types and  $-40^{\circ}\text{C}$  to  $225^{\circ}\text{C}$  for HTPM and HTWCM.*
2. *All external power and signal connection shall be carried out according to the instructions and specifications in "Instructions Profile meter & Water Cut meter" Document number 48030-MA-001, dated 25.09.2019, revision 4 and .High temperature Profile meter & High Temperature Water Cut meter " Document number 480001-MA-Ex-703, dated 25.09.2019, revision 02 contains date for intrinsic safe connections. The separate "Serial Resistor" unit with 2 \* 22 ohm resistors shall be used with the isolator safety barriers KFD0-SD2-Ex1.10100 . All circuits shall be supplied using isolator safety barriers providing galvanic separation from the supply circuits as specified in the mentioned manual.*
3. *The sensor part contains detail of the external surface made of Titanium metal. Hazard related to impact and friction by foreign objects shall be observed.*
4. *The ratio L/R for cable connection all meters the power supply safety barriers shall not exceed  $82 \mu\text{H}/\Omega$*

### 1.3 Controller Unit Name Plate

Each instrument has a unique Name Plate mounted.

Name plate on the Controller Unit

**Instrument types:**

- Profile Meter (PM)
- Water Cut Meter (WCM)
- HT Profile Meter (HTPM)
- HT Water Cut Meter (HTWCM)

Senlect AS		Scheduled Drawing	
Project Number: 48030	P.O. Number: NIL	Part /Serial Number: PM,WCM,HTPM,HTWCM	
Senlect Document Number: 48030-XX-Ex-001		Customer Document Number: NIL	
Document Title: Ex Controller Unit Name Plate		Sheet: 1 of 1	Size: A4
Rev	Date	Reason for Issue	Author
05	19.06.2019	Upd factory adr. P.O and Tag removed. Add IP.	Erling Delbæk
04	27.07.2016	Changed Doc.name, Unit type. New ATEX no.	Erling Delbæk
03	17.03.2014	Scheduled Drawing in Issue 3	Erling Delbæk

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### 1.4 Sensor Unit Name plate

Three Types of Name Plates used on the instruments

**Instrument types:**

- Profile Meter (PM)
- Water Cut Meter (WCM)
- HT Profile Meter (HTPM)
- HT Water Cut Meter (HTWCM)

**Example:**  
If the max Process Temperature (Tp) is 150°C, the temperature classification will be T3 Ga, since the process temperature is above maximum surface temperature for T4 Ga (135°C).

Senlect AS		Scheduled Drawing	
Project Number: 48030	P.O. Number: NIL	Part /Serial Number: PM,WCM,HTPM,HTWCM	
Senlect Document Number: 48030-XX-Ex-001		Customer Document Number: NIL	
Document Title: Ex Sensor Unit Name Plate		Sheet: 1 of 1	Size: A3
Rev	Date	Reason for Issue	Author
02	19.06.2019	Replaced Taggr with IP. Updated factory adr.	Erling Delbæk
01	27.07.2016	Issued for Certification	Erling Delbæk

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## 2 Installation

### 2.1 Mounting the instrument to a vessel or pipe

When installing the Profile Meter or Water Cut Meter into a vessel or pipe, make sure not to damage or scratch the sensor ceramic windows. Verify that the flanges on the instrument have the correct pressure class for use in your system. Gaskets, installation and torque must be chosen according to the national and site regulations. The instrument comes in different sizes, materials and pressure-classes. Please see the instrument name plate and the mechanical GA drawing for more information.

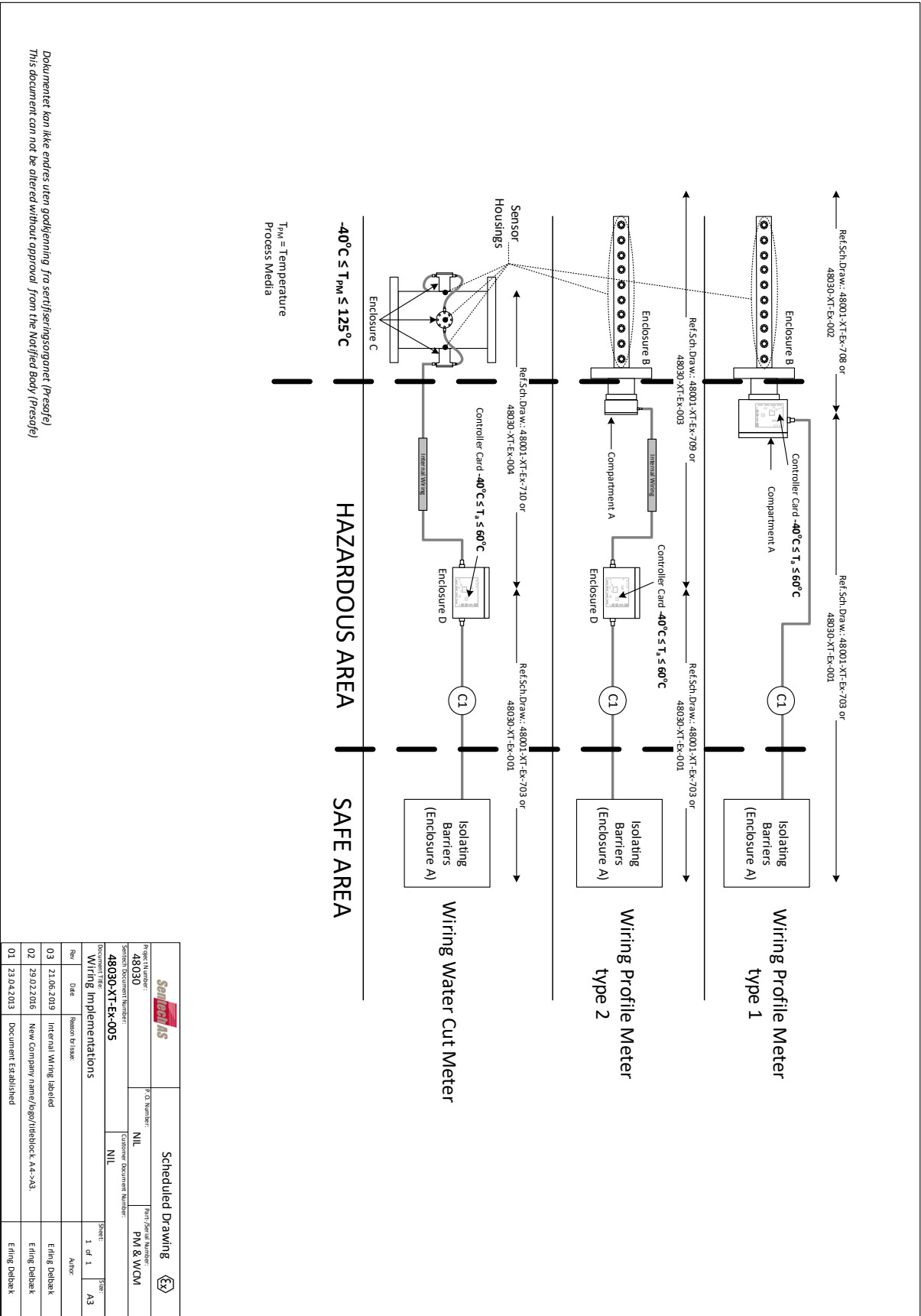
### 2.2 Electrical installation

If the cable between the instrument and the isolation barriers is not supplied, the customer must make sure to use a cable that fulfills parameters in section 2.2.2 and 2.2.3. Depending on your instrument type, the Sentech Controller Unit containing the Controller Card could be mounted in two different ways: Directly on the Profile Meter instrument or mounted away from the instrument with an Extension Cord.

Only the Sentech Controller Unit delivered with the instrument are allowed to use, and any modifications (drilling, cutting, etc) on this will cause warranty void and invalidate the certificate. Many types of glands for the cable C1 can be used, but the customer must specify this prior to shipment from the factory.

#### Internal Wiring

The cable between the Sentech Controller Unit and the sensor compartment (Profile Meter type 2 and Water cut Meter) is internal wiring, and must not be disconnected or modified by the customer. Doing so could affect the safety of the instrument and will cause warranty void and invalidate the certificate.



		<b>Scheduled Drawing</b>	
Project Number:	48030	P.O. Number:	NIL
Customer Document Number:	48030-XT-Ex-005	Part/Serial Number:	PM & WCM
Document Title:	Wiring Implementations	Sheet:	1 of 1
Rev:	Date:	Reason for Issue:	Author:
03	21.06.2019	Internal Wiring labeled	Erling Dalbak
02	29.02.2016	New Company name/logo/techcode, A4->A3	Erling Dalbak
01	23.04.2013	Document Established	Erling Dalbak

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### 2.2.2 Cable C1 Minimum Safety Parameters (Copper)

<b>C<sub>c</sub></b>	<b>≤ 200 pF/m</b>
<b>*L<sub>c</sub>/R<sub>c</sub></b>	<b>≤ 82 μH/Ω</b>
<b>*L<sub>c</sub></b>	<b>≤ 1 μH/m</b>
<b>Test Voltage</b>	<b>≥ 500VAC</b>
<b>Wire Cross Section</b>	<b>&lt; 6mm<sup>2</sup></b>
<b>Wire Insulation</b>	<b>0,25 mm</b>
<b>Cable Insulation</b>	<b>0,25 mm</b>

\*Whichever information given by the cable manufacturer

### 2.2.3 Cable C1 Minimum Functional Parameters (Copper)

The total resistance of the two wires (+ to -) powering the instrument must not exceed: **5 Ω**

<b>Wire cross section AWG/mm<sup>2</sup> **</b>	<b>Cable max length in meters ***</b>
<b>24 / 0,25</b>	<b>30</b>
<b>20 / 0,5</b>	<b>60</b>
<b>18 / 0,75</b>	<b>90</b>
<b>17 / 1</b>	<b>125</b>
<b>16 / 1,5</b>	<b>200</b>
<b>14 / 2,5</b>	<b>300</b>
<b>12 / 4</b>	<b>500</b>

\*\* The Cross section specification only applies to the two wires powering the instrument, mixed cross-section cables are allowed, given that 2.2.2 safety parameters are fulfilled.

\*\*\* Length given for the total Cable length including loop considerations.

### 2.2.4 Shielded Cable

The shield must not be connected to the instrument chassis or earth under any circumstances.

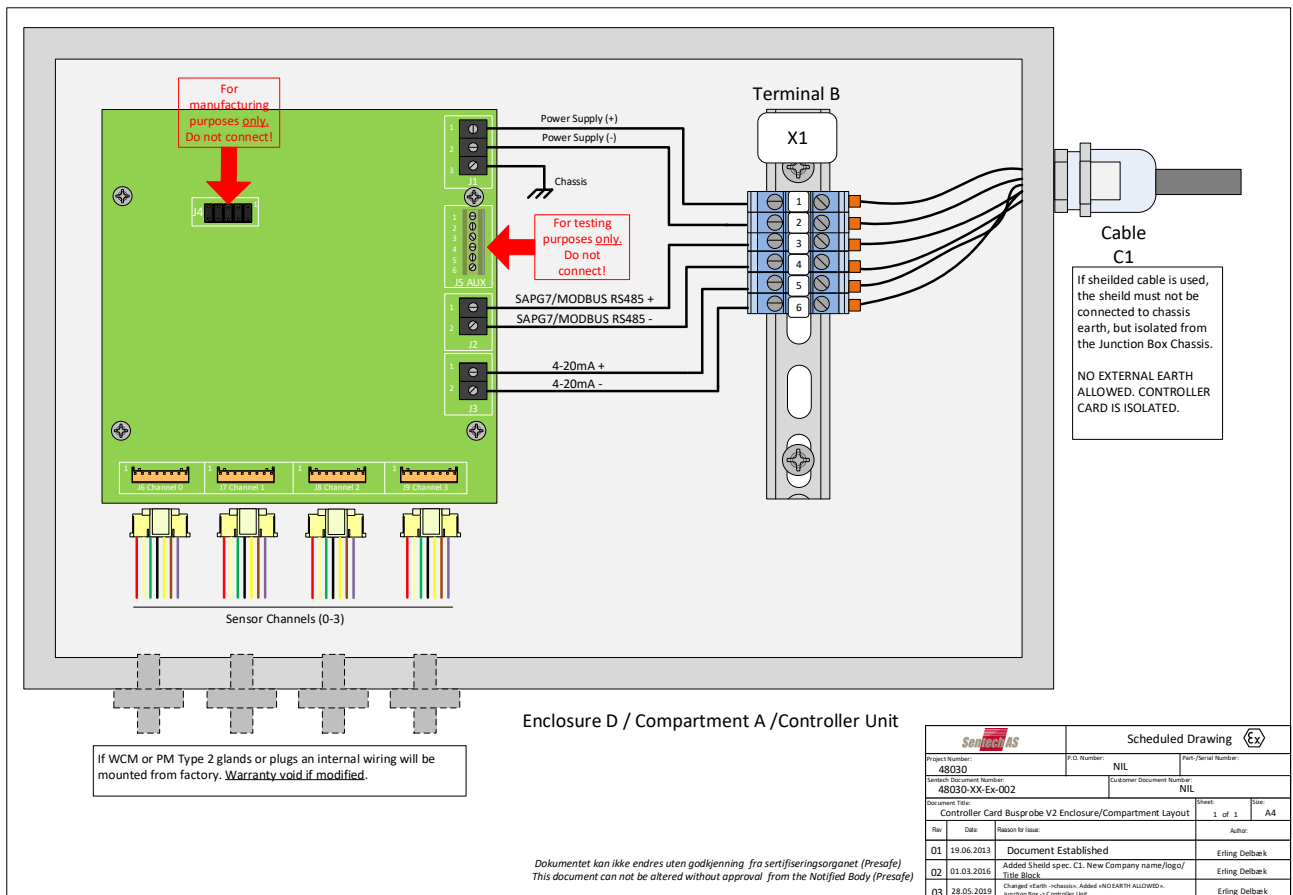
If a shielded C1 cable is used, the solid isolation between the wires and the shield must be ≥ 0,5mm as a minimum.

**NO EARTH CONNECTION FROM OUTSIDE ALLOWED IN THE SENTECH CONTROLLER UNIT**

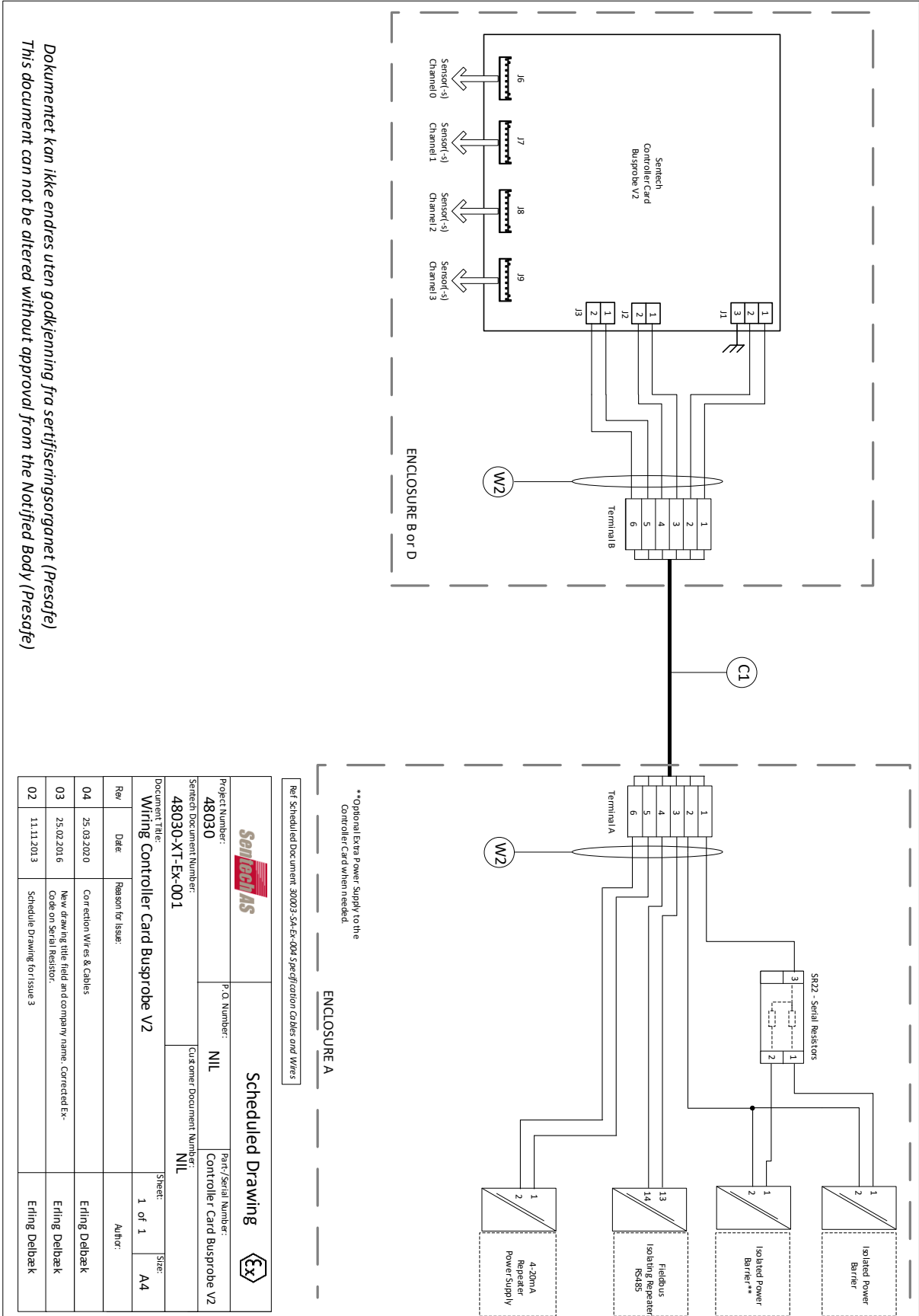
## 2.3 Connecting the Instrument

It is mandatory that the cable C1 is connected to the instrument end first. This is to prevent discharge-sparks that can cause an explosion in the Hazardous area. After connecting the instrument to the terminal X1 in the Sentech Controller Unit, you can connect it to the blue side of the barrier modules (Drawing 48030-XT-Ex-001). More detailed information on your installation can be found in the delivery specific documentation that follows each instrument.

### 2.3.2 Connecting the instrument cable to the Controller Card



### 2.3.1 Connecting the instrument cable (C1) to the Barrier Module



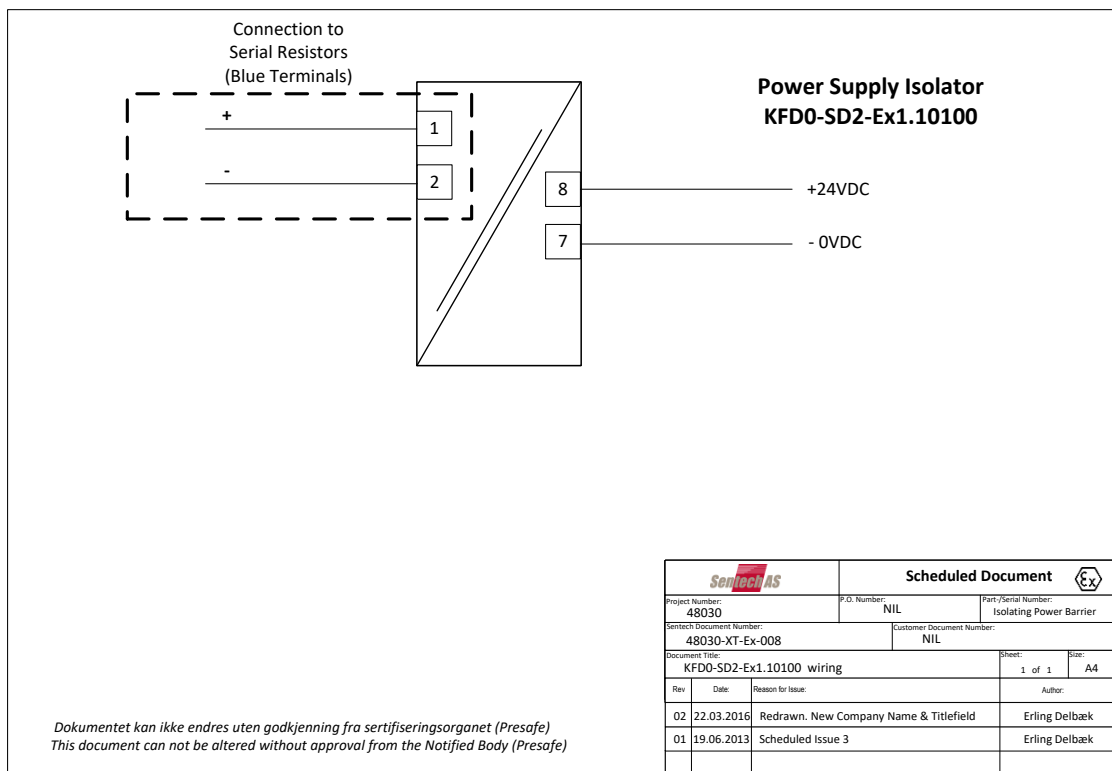
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## 2.4 Isolating barriers

All wires connecting the instrument must go through specific isolating barriers. The barriers are provided together with the instrument when delivered. The serial number of the barrier unit are registered to the specific instrument serial number. Do not replace any of the barriers without contacting Sentech AS. Separation distances between intrinsically safe circuit (Including terminals), and Non-safe circuits must be maintained throughout the whole installation. To ensure this, make sure the minimum distance between the bare conducting parts of a Non-safe circuit (Non-IS) and the Safe circuit (IS) is > 50 mm.

### 2.4.2 Isolating Power Barrier

This isolation barrier is feeding the instrument the power it needs to function. Two possible setups are allowed, depending on the number of sensors. In both setups the 2\*22 Ohm Serial Resistor Pack is required on the output. See section 2.4.5.



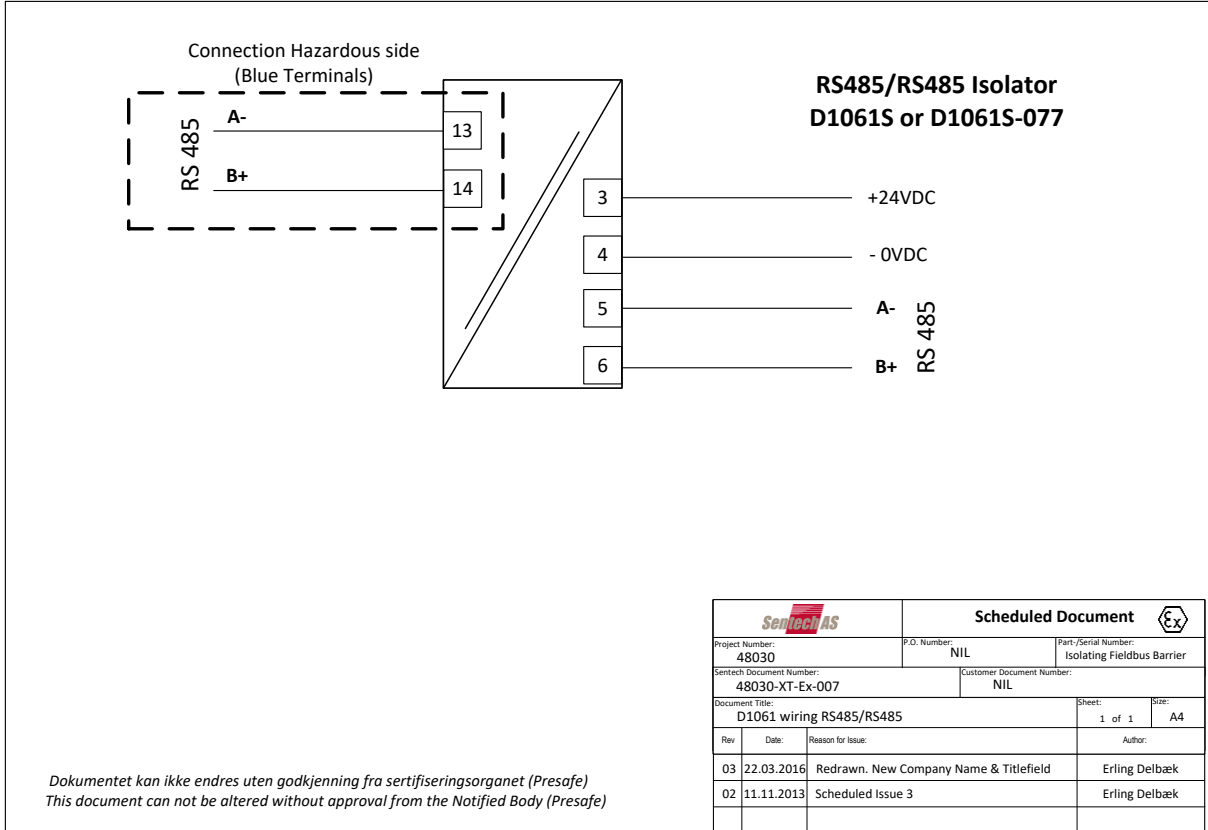
#### 2.4.2.1 Isolating Power Barrier Parameters

Manufacturer	Type	Drawing reference	Model
<b>Pepperl+Fuchs</b>	<b>Solenoid Driver</b>	<b>Isolating Power Barrier</b>	<b>KFD0-SD2-Ex1.10100</b>
Galvanic Isolation		Vp 375V	EN50020
Ex Protection		TÜV 99 ATEX 1499X	<b>II 3G Ex nA II T4</b>
		BASEEFA 06 ATEX 0252	<b>II(1)G [Ex ia Ga] IIC</b>
		IECEX BAS 06.0058	<b>[Ex ia] IIC / IIB [Ex ia] I</b>
Input (Safe Side)	U	20 .. 35V	
	I	150 .. 100mA	
	Um	250V	
	T <sub>A</sub>	-20 .. 60°C	

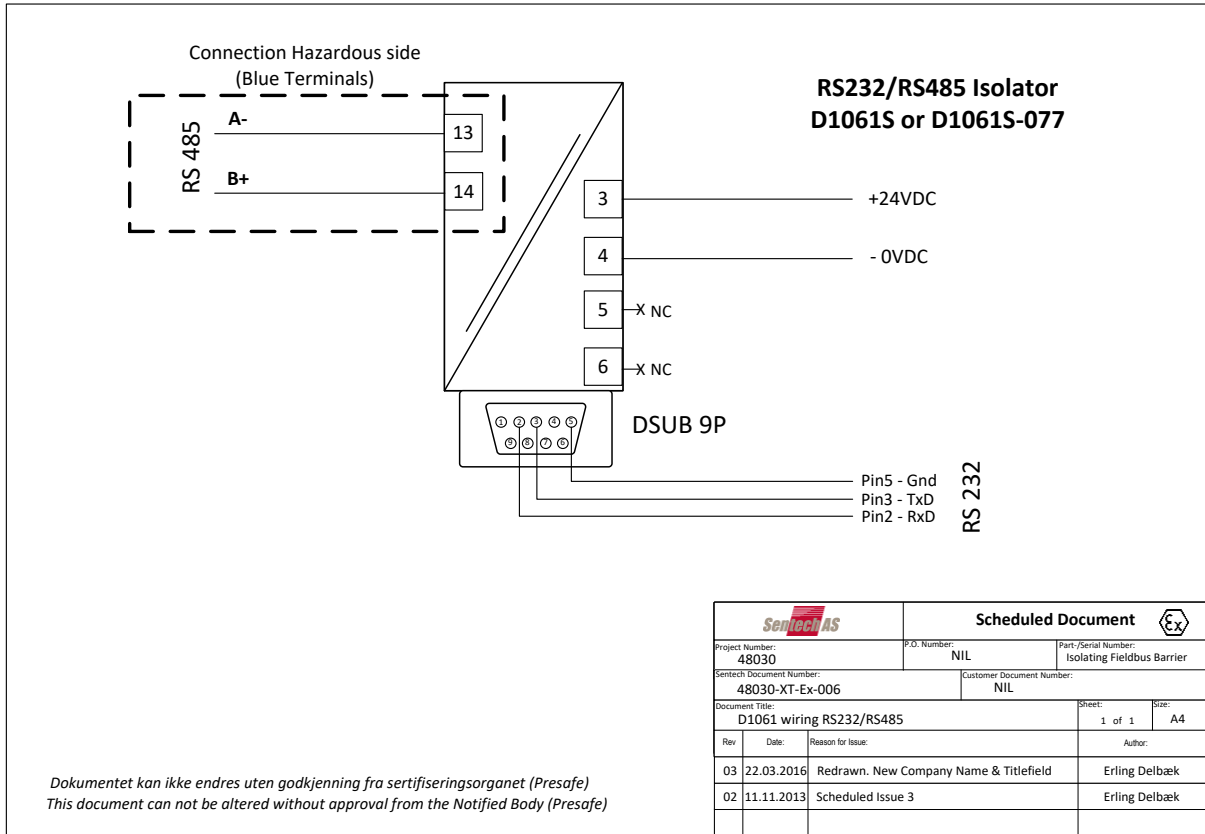
### 2.4.3 Fieldbus Isolating Barrier

This isolation barrier enables communication with the instrument via Fieldbus RS485. Two different models can be used in two different communication setups. Please see the Electrical Schematics provided with delivery for more information on your system setup.

#### 2.4.3.1 RS485 – RS485 Setup



### 2.4.3.2 RS232 – RS485 Setup



### 2.4.2.3 Fieldbus Isolation Barrier D1061S-077 Parameters

Manufacturer	Type	Drawing reference	Model
<b>GM International</b>	<b>Isolation Repeater</b>	<b>Fieldbus Isolating repeater RS485</b>	<b>D1061S-077</b>
Galvanic Isolation		Vp 1.5KV	
Ex Protection		DMT 01 ATEX E 042 X	II 3(1) G Ex nA [ia Ga] IIC T4 Gc
		IECEX BVS 07.0027X	Ex nA [ia Ga] IIC T4 Gc
Input (Safe Side)	U	20 .. 30V	
	I	100mA@24V	
	Um	250Vrms	
	Ta	-20 .. 60°C	

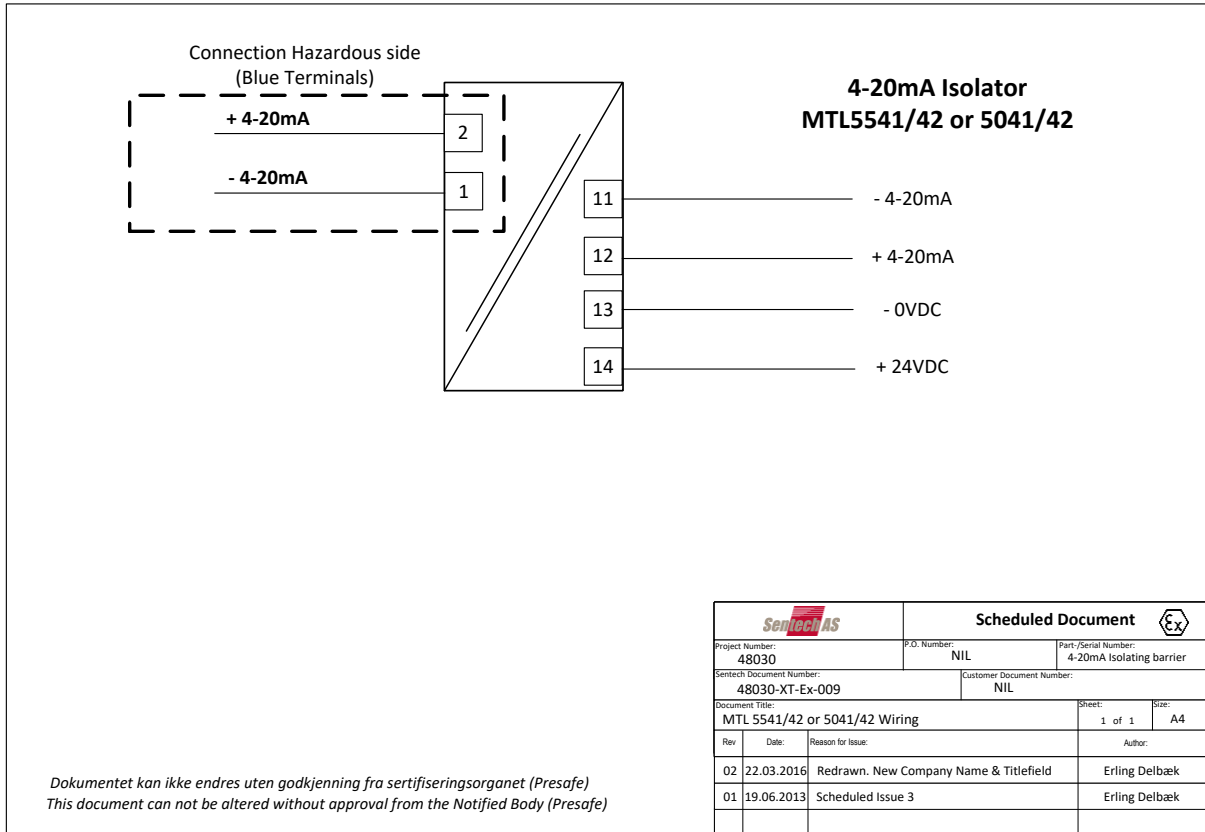
### 2.4.2.4 Fieldbus Isolation Barrier D1061S Parameters

Manufacturer	Type	Drawing reference	Model
<b>GM International</b>	<b>Isolation Repeater</b>	<b>Fieldbus Isolating repeater RS485</b>	<b>D1061S</b>
Galvanic Isolation		Vp 1.5KV	
Ex Protection		IMQ 09 ATEX 013 X	II 3G Ex nA IIC T4 Gc/ II 3G Ex nAC IIC T4 Gc
		IECEX IMQ 13.0011X	Ex nA IIC T4 Gc/Ex nAC IIC T4 Gc
Input (Safe Side)	U	20 .. 30V	
	I	100mA@24V	
	Um	250Vrms	
	Ta	-20 .. 60°C	



### 2.4.4 4-20mA Repeater Power Supply

This isolation barrier enables reading the measurements from the instrument via a 4-20mA loop. Not all installations have this output, it depends on your system. Two different models can be used.



#### 2.4.4.1 4-20mA Repeater Power Supply MTL5041/42 Parameters

Manufacturer	Type	Drawing reference	Model
<b>MTL</b>	<b>Repeater Power Supply</b>	<b>4-20mA Repeater Power Supply</b>	<b>MTL5041/42</b>
Galvanic Isolation		Vp 1.5KV	
Ex Protection		II (1) GD [Ex ia] IIC	
Input (Safe Side)	U	20 ... 35V	
	Um	250Vrms	
	Ta	-20 .. 60°C	

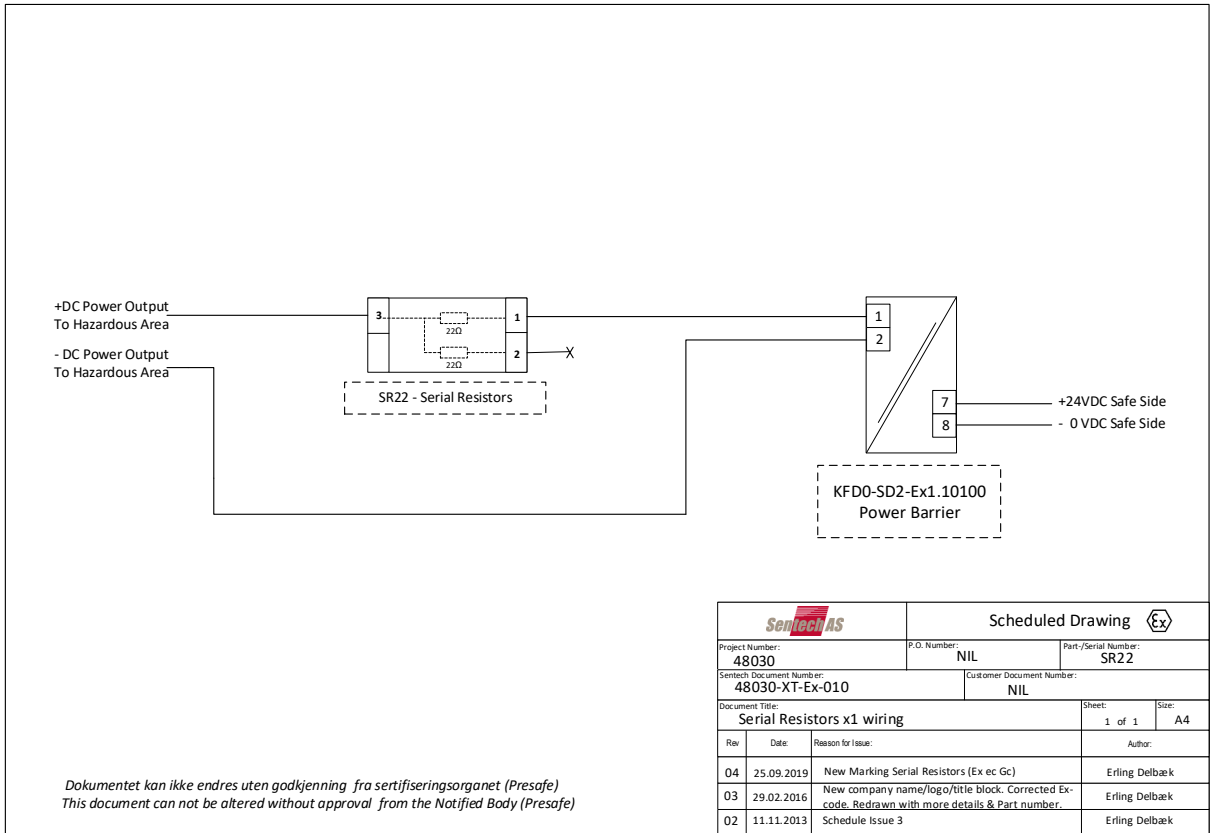
#### 2.4.4.2 4-20mA Repeater Power Supply MTL5541/42 Parameters

Manufacturer	Type	Drawing reference	Model
<b>MTL</b>	<b>Repeater Power Supply</b>	<b>4-20mA Repeater Power Supply</b>	<b>MTL5541/42</b>
Galvanic Isolation		Vp 1.5KV	
Ex Protection		II (1) GD [Ex ia] IIC [Ex iaD]	
Input (Safe Side)	U	20 ... 35V	
	Um	253Vrms	
	Ta	-20 .. 60°C	

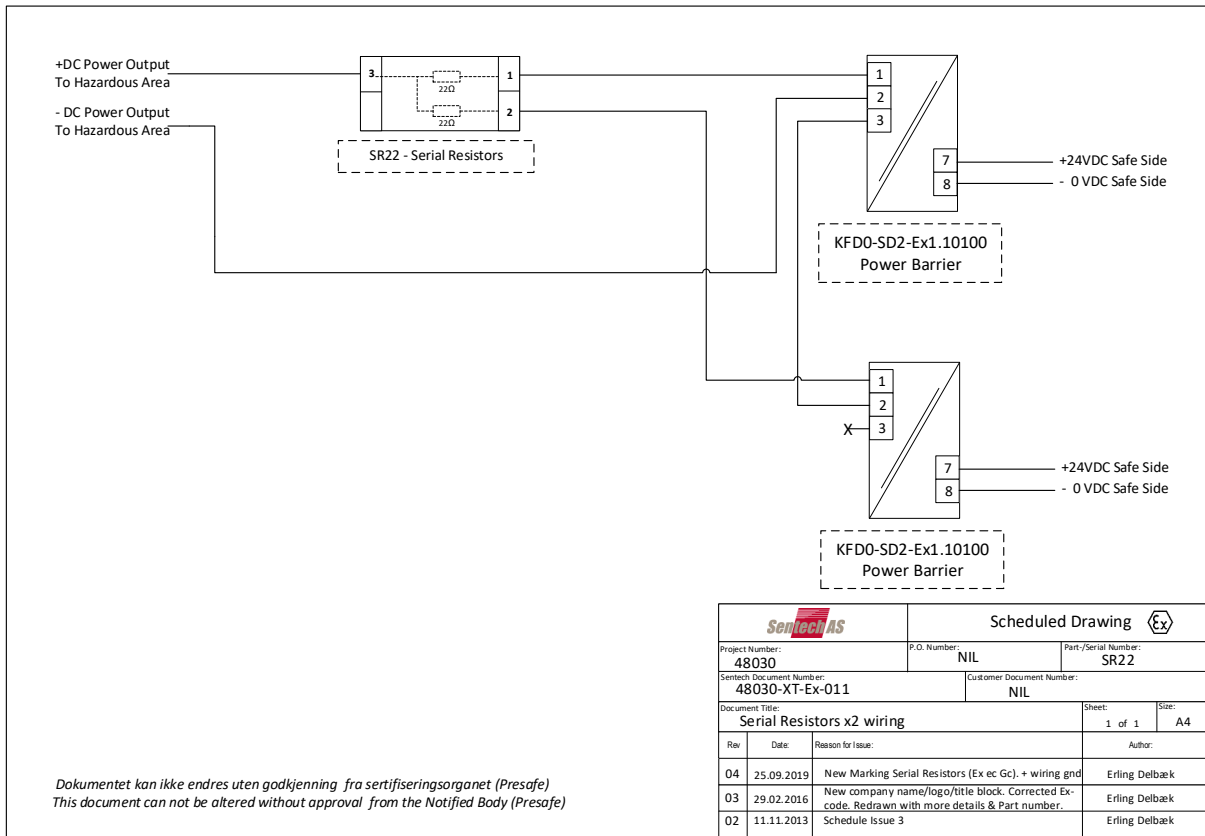
### 2.4.5 Serial Resistors

These resistors are produced and provided by the manufacturer, and no other resistors can be used to replace them. Two different setups are allowed depending on the number of sensors on your instrument. Please see the supplied Electrical Schematics for info in your system.

#### 2.4.5.1 Connection using one Isolating Power Supply



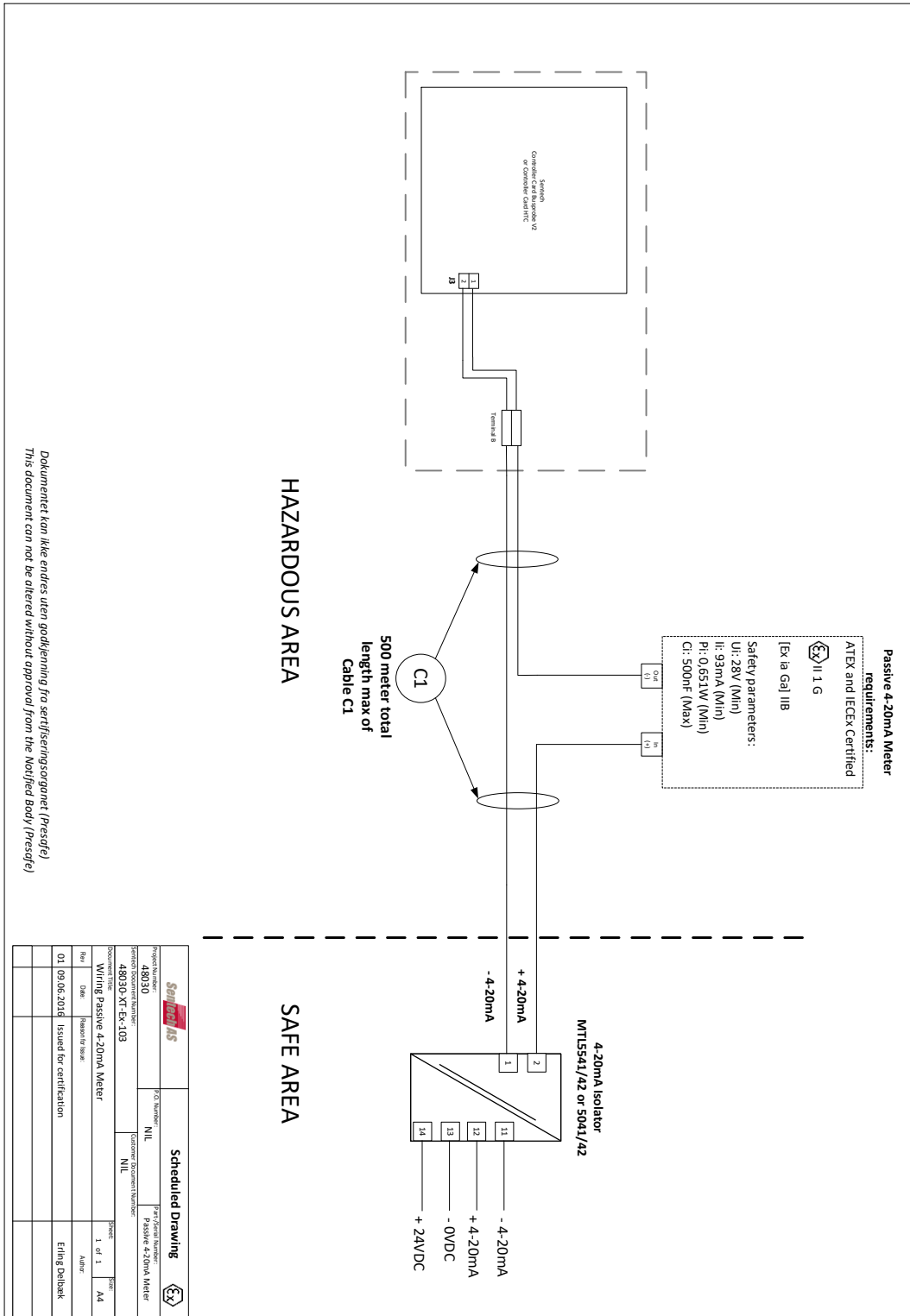
### 2.4.5.2 Connection using two isolation Power Supplies



### 2.4.6 Passive 4-20mA Meter

If the customer requires a local reading of the 4-20mA loop located in the Hazardous area, the meter must be placed on the positive (+) wire from the 4-20mA Repeater Power Supply described in Section 2.4.3. The meter must be connected as described in section 2.4.5.1.

#### 2.4.6.1 Passive 4-20mA Meter



## 3 Maintenance

### 3.1 Leading Particulars

The Sentech Profile Meters and Water Cut Meters Are Solid State Systems, and have no moving parts. Therefore the instruments don't require much maintenance. However, some maintenance can be done to extend the lifetime of the instrument. This section describes how to perform maintenance. The maintenance should normally be scheduled to once a year, depending on the ambient conditions where the instrument is installed.

### 3.2 Electrical Maintenance

- Inspect all Electrical Terminal Connections. Make sure that no terminals are corroded or damaged.
- Do a visual inspection of the enclosures, to see that nothing has been modified or damaged.
- Visually inspect the Instrument Junction box (Enclosure D or Compartment A) for leakages. Check that eventual leakages have not damaged the PCB or the Terminals. If so, change or repair of the damaged parts is needed. This repair must be performed by authorized personnel only, or the instrument can be damaged beyond repair.

### 3.3 Mechanical Maintenance

- Go to the instrument and visually inspect the mechanical hook-up for leakages and damages.
- If the Instrument doesn't provide as good measurement data as it did when it was new, there might be a build-up of sediments on the probe ceramic windows. If your instrument is equipped with the SCS (Smart Cleaning System), use this to clean your instrument sensor windows.
- The cleaning can also be performed from the inside of the vessel, if conditions and site regulations allows it. If the instrument has to be extracted from the vessel in order to clean it, be careful not to damage the probes while extracting it. The Probe Ceramic Windows can be carefully cleaned using LOCTITE Super clean and a rug or a high pressured water jet. Be careful not to damage the Instrument and its ceramic windows while cleaning and make sure that the Instrument Junction Box is covered up while washing.

## 4 Service and Repair Guidelines

Due to the complexity of the Sentech High Temperature Profile Meter or High Temperature Water Cut Meter instruments, only technical personnel that has been trained and approved by Sentech AS can perform Service and Repair on these instruments. Service and repair done by untrained personnel can impact the Intrinsic Safety of the apparatus, and is therefore forbidden. The customer may have to send the instrument back to Sentech AS workshop for repairs.

## 5 Supplier Contact Info



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