# Quick Start Guide

OxyPro-XT (1 channel) or OxyPro-XT2 (2 channel)

For the 1 channel OxyPro-XT please ignore the 2nd channel. Smart Sensors have their calibration and operating data stored in their M12 plug; the data will be automatically uploaded to OxyPro-XT during operation. Please consult the user manual for more details on how to install, operate and maintain the system.

Installation
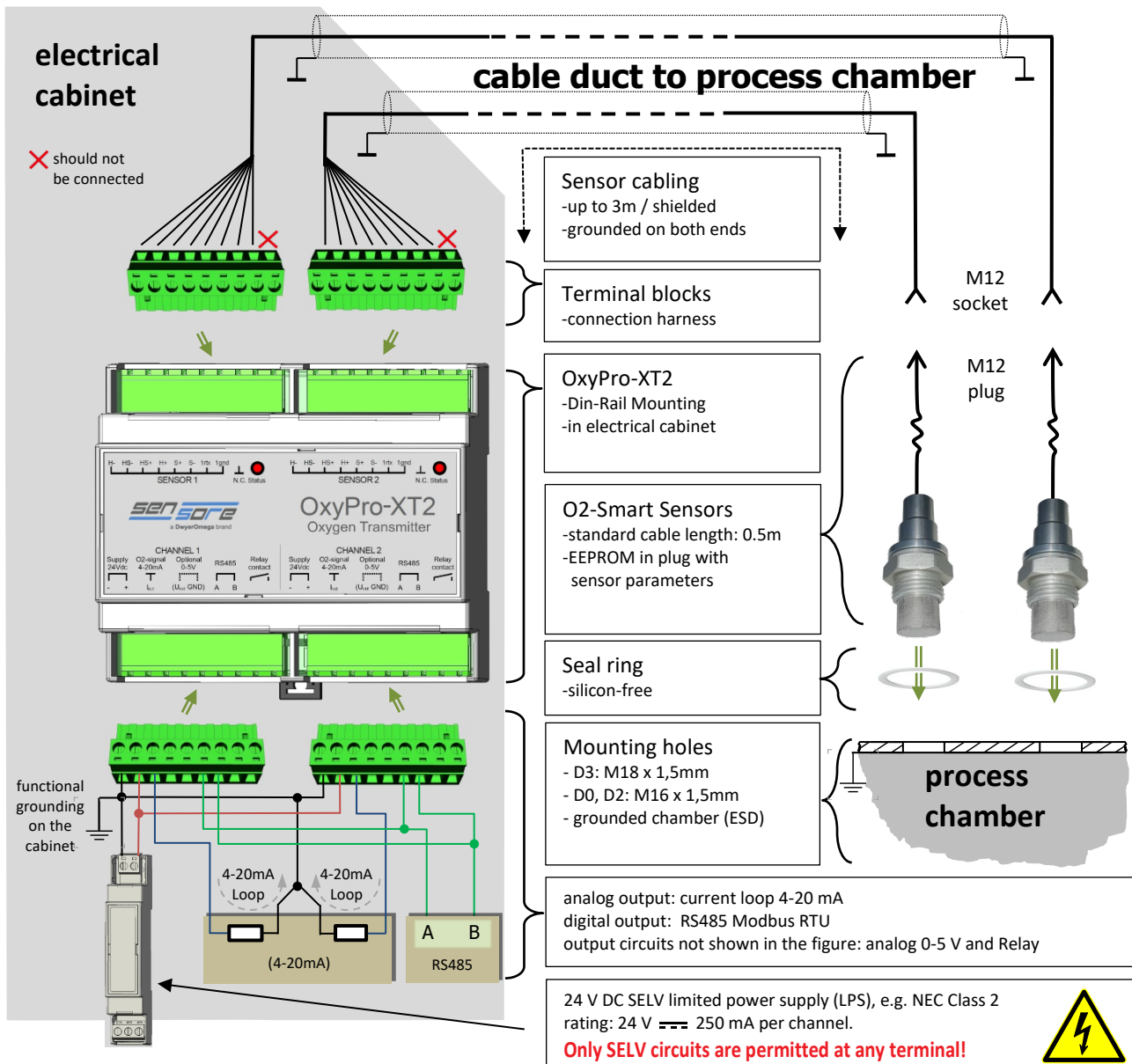
Power-up

- The system will power up as soon as the 24V DC supply voltage is connected.
- System behavior after power up:
  - First ~60 seconds: Sensor contact check, heat-up ramp and temperature stabilization (LED is flashing)
  - After 60 seconds: Permanent measuring mode, digital/analog outputs will display O2-level (LED is permanently on)

Scaling of the analog / digital outputs

Available measurement ranges	O2 concentration in volumetric % or ppm						
Nominal sensor range*	1000 ppm	1.00 %	2.00 %	5 %	25 %	40.0%	96.0 %
full scale output (20mA/5V/RS 485)	1200 ppm	1.25 %	2.5 %	6.25 %	25 %	50 %	100 %
Typical Accuracy	20 ppm	100 ppm	200 ppm	500 ppm	0.25 %	0.40 %	1.0 %
Output Resolution (4...20 mA)	< 1 ppm	< 10 ppm	< 20 ppm	< 50 ppm	<0.025 %	<0.04 %	<0.1%
Lower Detection Limit	10 ppm	100 ppm	100 ppm	500 ppm	0.1 %	0.2 %	1.0 %

*Nominal sensor range is the specified maximal O2 concentration, overrange operation should be avoided

Converting analog / digital output into measured O2

$$\text{Measured } O2 = \frac{Iout\ [mA] - 4mA}{16mA} \times \text{full scale output}$$

$$\text{Measured } O2 = \frac{Uout\ [V]}{5V} \times \text{full scale output}$$

$$\text{Measured } O2 = \frac{Modbus\ Register\ 0x0002}{1000} \times \text{full scale output}$$

> 20...20.5 mA used for special conditions
> heat-up: ~20.15 mA / errors: >20.2 mA

> 5.0 V also used for special conditions
> heat-up: ~5.0 V / errors: ~5.0 V

Digital output RS485 Modbus RTU

Baud Rate	19200
Start Bits	1
Data Bits	8
Stop Bits	1
Parity	None

function code 0x04 "read" registers (counted in byte steps)

Modbus Register	Data Type	Description
0x0000	unsigned int16	LSB: 0... no error, >0... Error code
		MSB: Status Flags, see below
0x0002	unsigned int16	O2 value (digital) normalized (1000)
0x0004-6	unsigned int32	O2 value absolute (in ppm O2)

Modbus device addresses are **101** (ch1) and **102** (ch2), unless otherwise stated on the type number label

Status flags of modbus register 0x0000

Bit 16	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9
Permanent error state	Error over-temperature	Contact check	reserved	Heat-up mode	Measuring mode	Relay status flag	reserved

Recovery from fault/error condition, please try the following:

- Power cycle
- Disconnect and Reconnect Smart Sensor via M12 connector and wait ~2 minutes for complete restart
- Consult user manual

Thermal consideration

The OxyPro-XT(2) is specified to be operated between +10 and +50°C (ambient), ensure reasonable heat exchange to avoid heat buildup around the module. The sensor head can be exposed to gas temperatures up to 100°C.

Warning: during operation sensor casings might reach temperatures, which must be rated as "hot surface".
Consider the placing of a warning (sticker) if the sensor is accessible by the end user.

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