NORDcanopy

OZ 4.0 Ozone Cleaning System Automation Guide

ETS NORD

OZ 4.0 building automation

Ozone unit system can be combined with building automation using a PLC. By combining it with building automation, it is possible to receive notifications about alarms from the Master ozone unit and to control the system by giving it permission to work when the ventilation is turned on.

For setup you will need:
1. (Master) Ozone unit
2. PLC
3. Computer

The OZ 4.0 Ozone Cleaning System is intended for commercial kitchen usage, to help clean the ventilation system components by inserting ozone into the canopy exhaust chamber.

Standard delivery includes:

- Selected quantity of OZ 4.0 Ozone units according to the order
- LCD control panel
- Power cables with C13 plugs according to the order

Optional accessories which can be order from ETS NORD include:

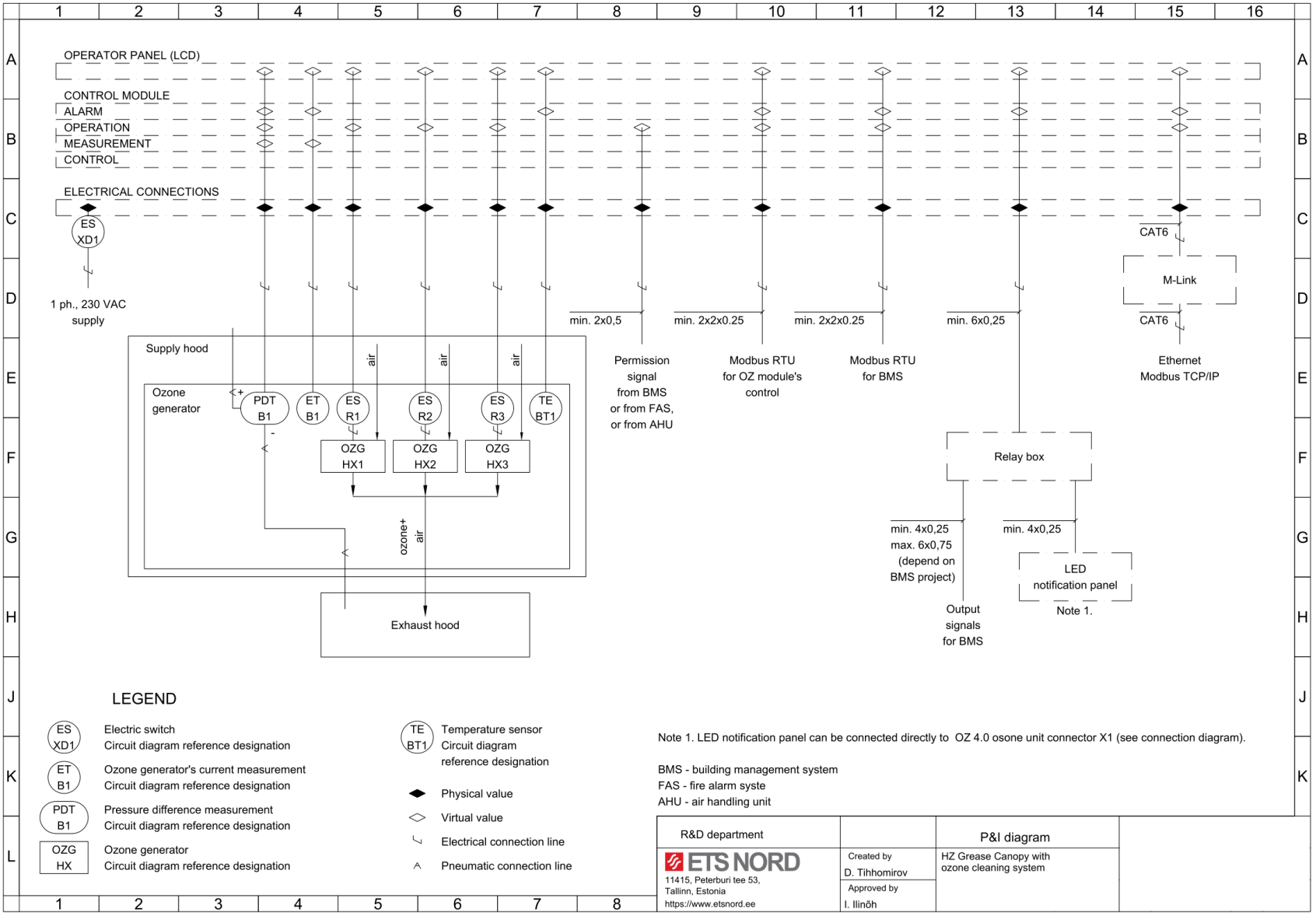
- M-Link with connection cable
- 4G modem if there is no possibility to use the building local network for Internet connection
- External antenna for 4G modem
- LED notification panel indication of OZ 4.0 cleaning system state
- Relay box for distribution of signals between LED notification panel and BMS

Use fire alarm input only with potential-free output!

All electrical installation works must be done by qualified electricians according to the national regulations.

Following connection diagrams:
1. P&I diagram
2. Electrical connection and example circuit breaker configuration
3. OZ 4.0 ozone unit system Modbus connection
4. OZ 4.0 Master ozone unit BMS management
5. OZ 4.0 Master ozone unit output signals
6. OZ 4.0 Master ozone unit alternative management
7. OZ 4.0 Master ozone unit external devices connection diagram 1
8. OZ 4.0 Master ozone unit external devices connection diagram 2
9. OZ 4.0 Master ozone unit external devices connection diagram 3

1. P&I diagram


OPERATOR PANEL (LCD)
CONTROL MODULE
ALARM
OPERATION
MEASUREMENT
CONTROL
ELECTRICAL CONNECTIONS
ES XD1
1 ph., 230 VAC supply
Supply hood
Ozone generator
PDT B1
ET B1
ES R1
ES R2
ES R3
TE BT1
air
OZG HX1
OZG HX2
OZG HX3
ozone+ air
Exhaust hood
min. 2x0,5
Permission signal from BMS or from FAS, or from AHU
min. 2x2x0.25
Modbus RTU for OZ module's control
min. 2x2x0.25
Modbus RTU for BMS
min. 6x0,25
Relay box
min. 4x0,25 max. 6x0,75 (depend on BMS project)
Output signals for BMS
min. 4x0,25
LED notification panel
Note 1.
CAT6
M-Link
CAT6
Ethernet Modbus TCP/IP
LEGEND
ES XD1 Electric switch Circuit diagram reference designation
ET B1 Ozone generator's current measurement Circuit diagram reference designation
PDT B1 Pressure difference measurement Circuit diagram reference designation
OZG HX Ozone generator Circuit diagram reference designation
TE BT1 Temperature sensor Circuit diagram reference designation
Physical value
Virtual value
Electrical connection line
Pneumatic connection line
Note 1. LED notification panel can be connected directly to OZ 4.0 osone unit connector X1 (see connection diagram).
BMS - building management system
FAS - fire alarm syste
AHU - air handling unit
R&D department
ETS NORD
11415, Peterburi tee 53, Tallinn, Estonia
https://www.etsnord.ee
Created by
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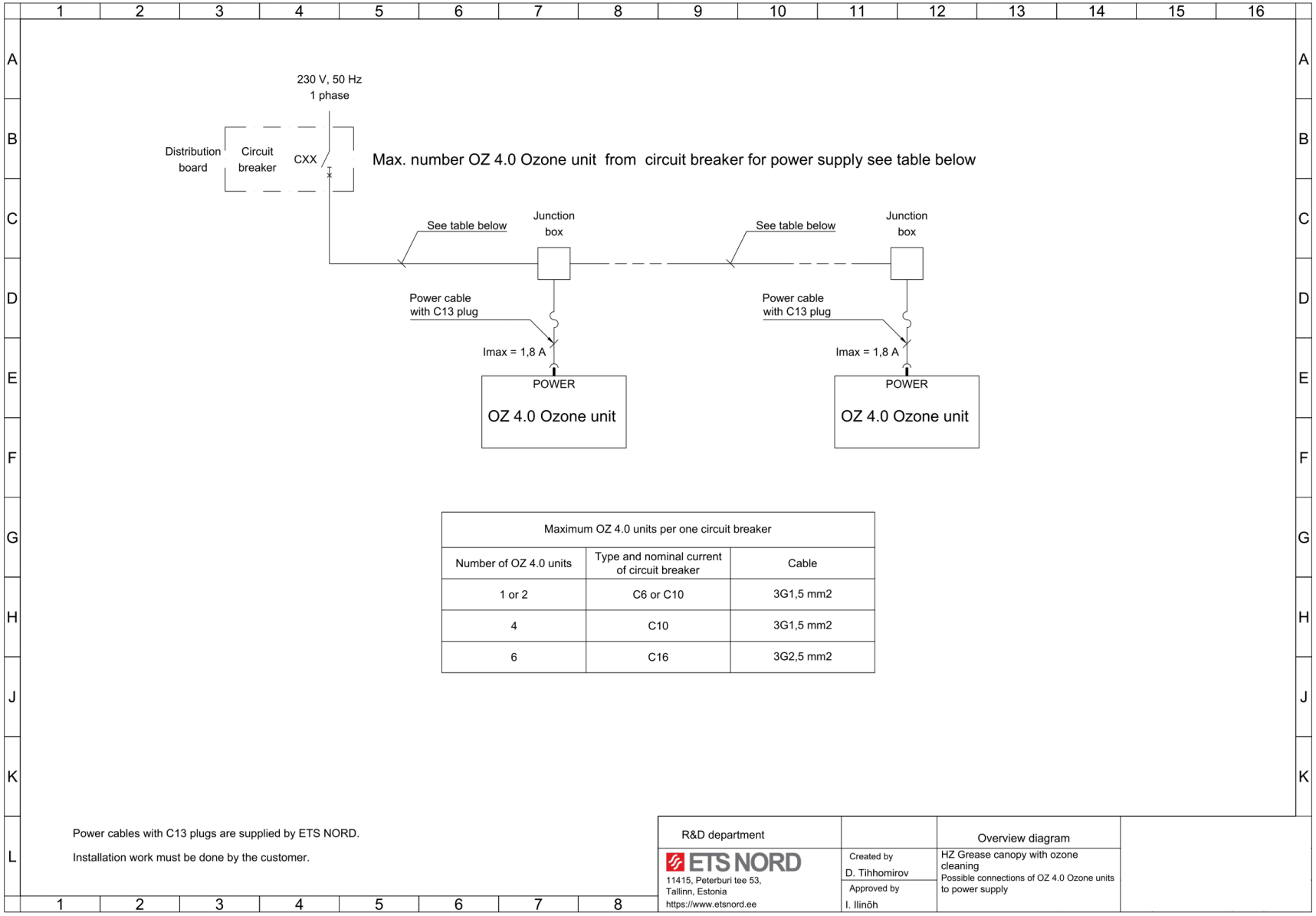
Approved by
I. Ilinõh
P&I diagram
HZ Grease Canopy with ozone cleaning system

2. Electrical connection and example circuit breaker configuration



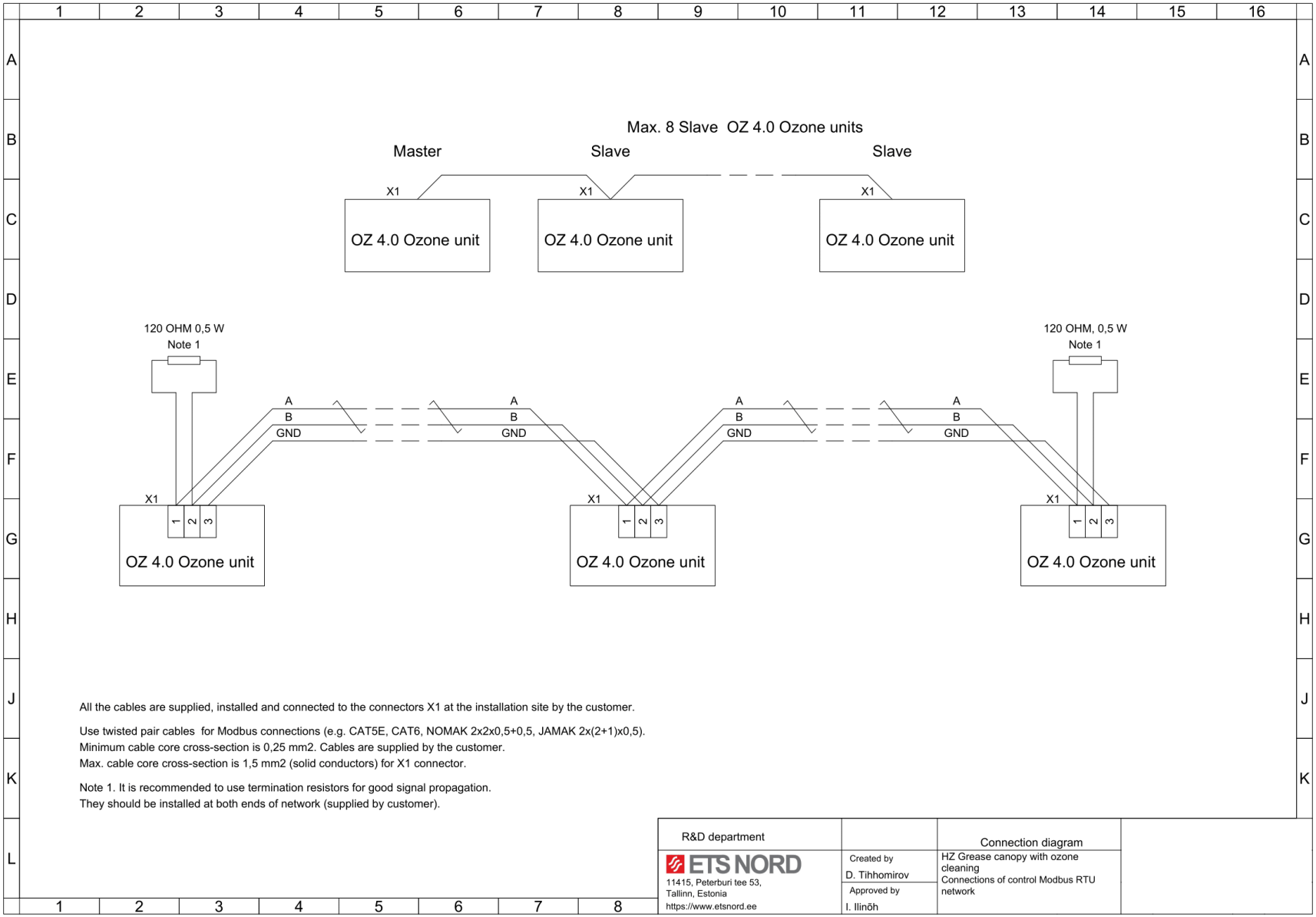
Maximum OZ 4.0 units per one circuit breaker		
Number of OZ 4.0 units	Type and nominal current of circuit breaker	Cable
1 or 2	C6 or C10	3G1,5 mm2
4	C10	3G1,5 mm2
6	C16	3G2,5 mm2

Power cables with C13 plugs are supplied by ETS NORD.

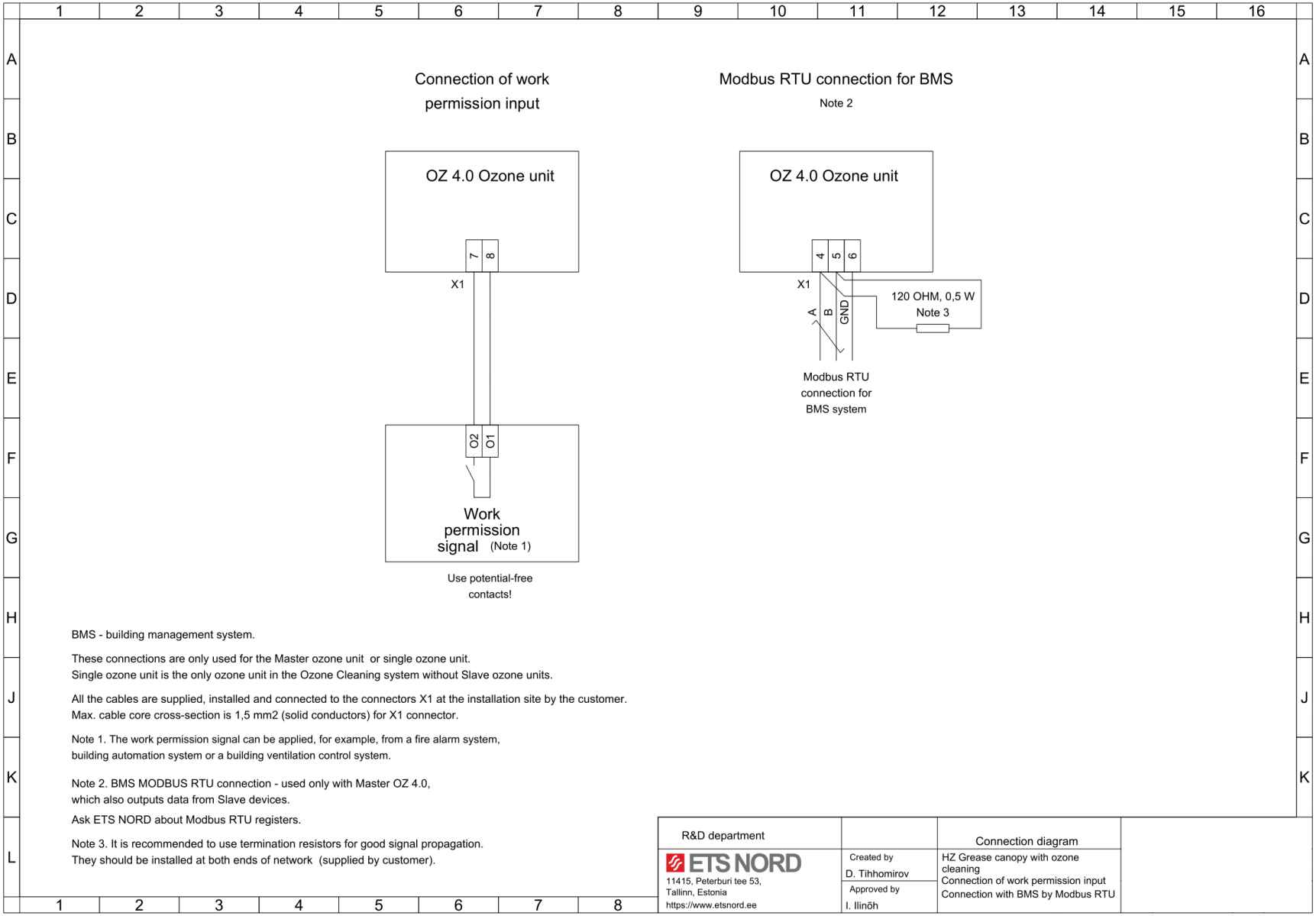
Installation work must be done by the customer.

R&D department		Overview diagram
ETS NORD 11415, Peterburi tee 53, Tallinn, Estonia https://www.etsnord.ee	Created by D. Tihhomirov Approved by I. Ilinõh	HZ Grease canopy with ozone cleaning Possible connections of OZ 4.0 Ozone units to power supply

3. OZ 4.0 ozone unit system Modbus connection



4. OZ 4.0 Master ozone unit BMS management



BMS - building management system.

These connections are only used for the Master ozone unit or single ozone unit.
Single ozone unit is the only ozone unit in the Ozone Cleaning system without Slave ozone units.

All the cables are supplied, installed and connected to the connectors X1 at the installation site by the customer.
Max. cable core cross-section is 1,5 mm2 (solid conductors) for X1 connector.

Note 1. The work permission signal can be applied, for example, from a fire alarm system, building automation system or a building ventilation control system.

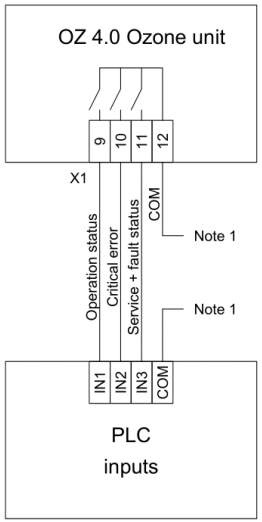
Note 2. BMS MODBUS RTU connection - used only with Master OZ 4.0, which also outputs data from Slave devices.
Ask ETS NORD about Modbus RTU registers.

Note 3. It is recommended to use termination resistors for good signal propagation.
They should be installed at both ends of network (supplied by customer).

R&D department		Connection diagram
ETS NORD 11415, Peterburi tee 53, Tallinn, Estonia https://www.etsnord.ee	Created by D. Tihhomirov Approved by I. Ilinõh	HZ Grease canopy with ozone cleaning Connection of work permission input Connection with BMS by Modbus RTU

5. OZ 4.0 Master ozone unit output signals

Connection of digital outputs
with PLC



PLC - programmable logic controller.

These connections are only used for the Master ozone unit or single ozone unit.
Single ozone unit is the only ozone unit in the Ozone Cleaning system without Slave ozone units.

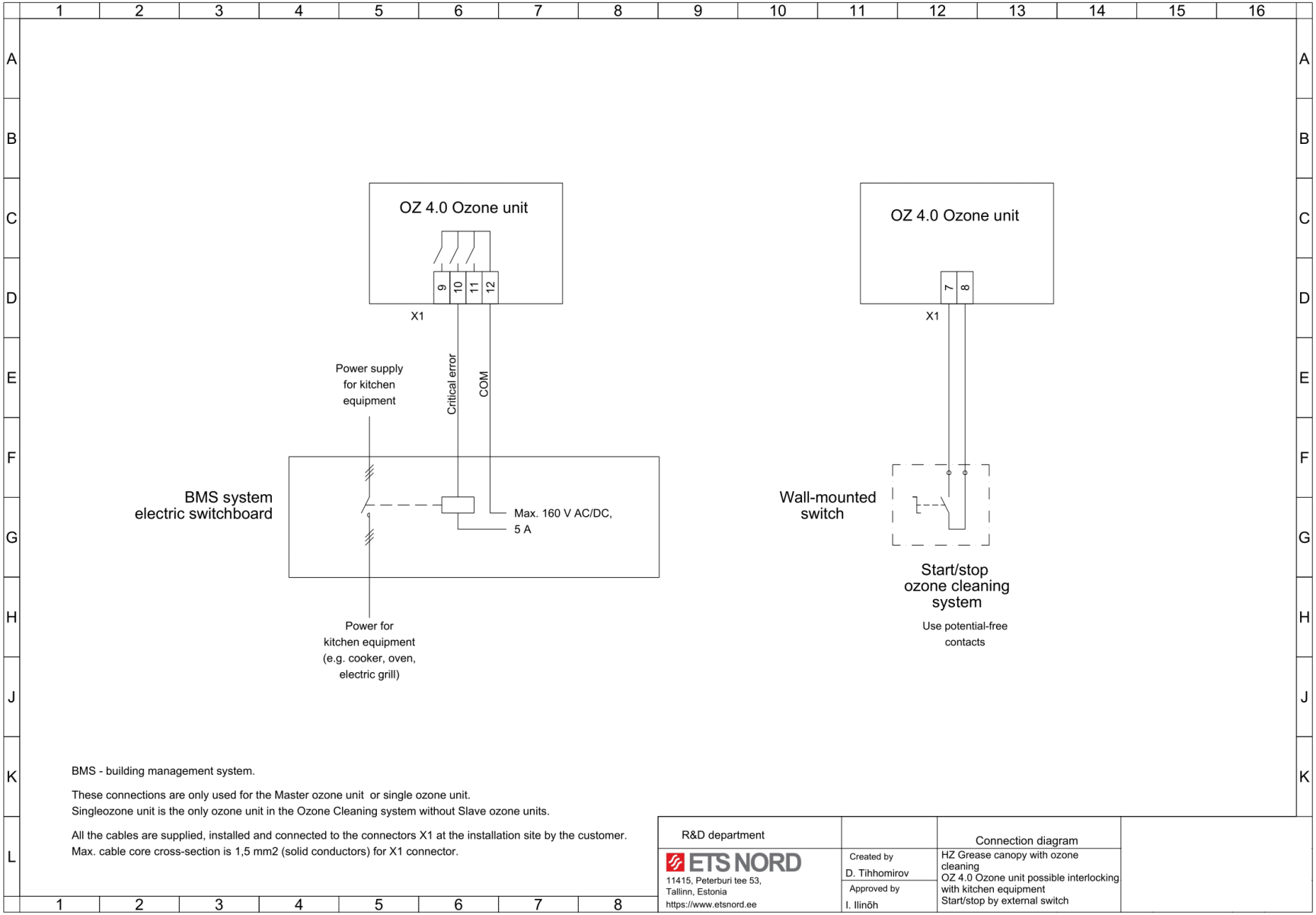
All the cables are supplied, installed and connected to the connectors X1 at the installation site by the customer.
Max. cable core cross-section is 1,5 mm2 (solid conductors) for X1 connector.

Terminals 9 ... 12 are potential-free relay contacts, max. 160 V AC/DC, 5 A.

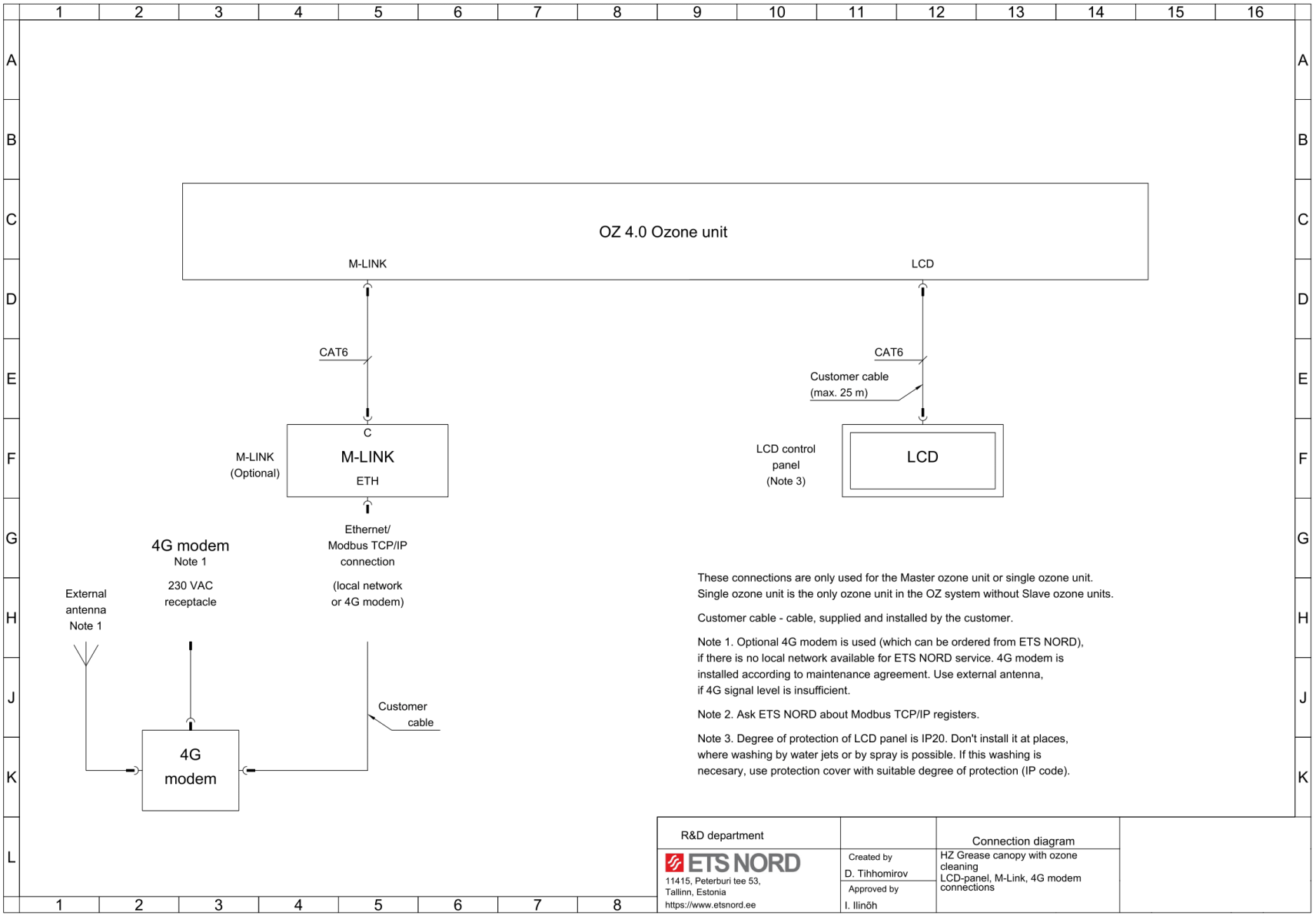
Note 1. 24V or 0V can be used as COM input depending on the control device inputs (PNP or NPN).
In case of questions, consult with ETS NORD SERVICE department.

R&D department		Connection diagram
ETS NORD 11415, Peterburi tee 53, Tallinn, Estonia https://www.etsnord.ee	Created by D. Tihhomirov Approved by I. Ilinõh	HZ Grease canopy with ozone cleaning Connection of digital outputs with PLC

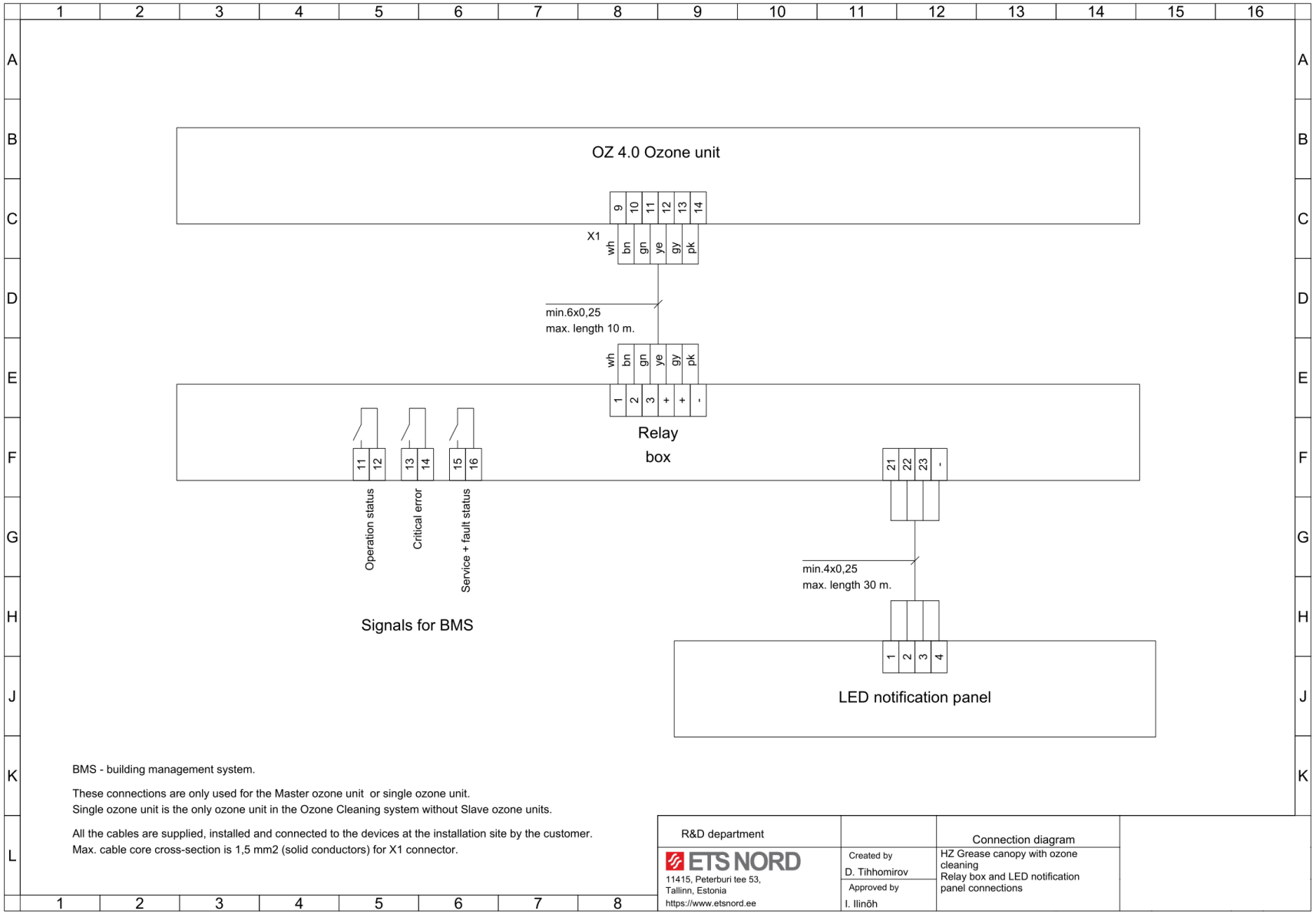
6. OZ 4.0 Master ozone unit alternative management



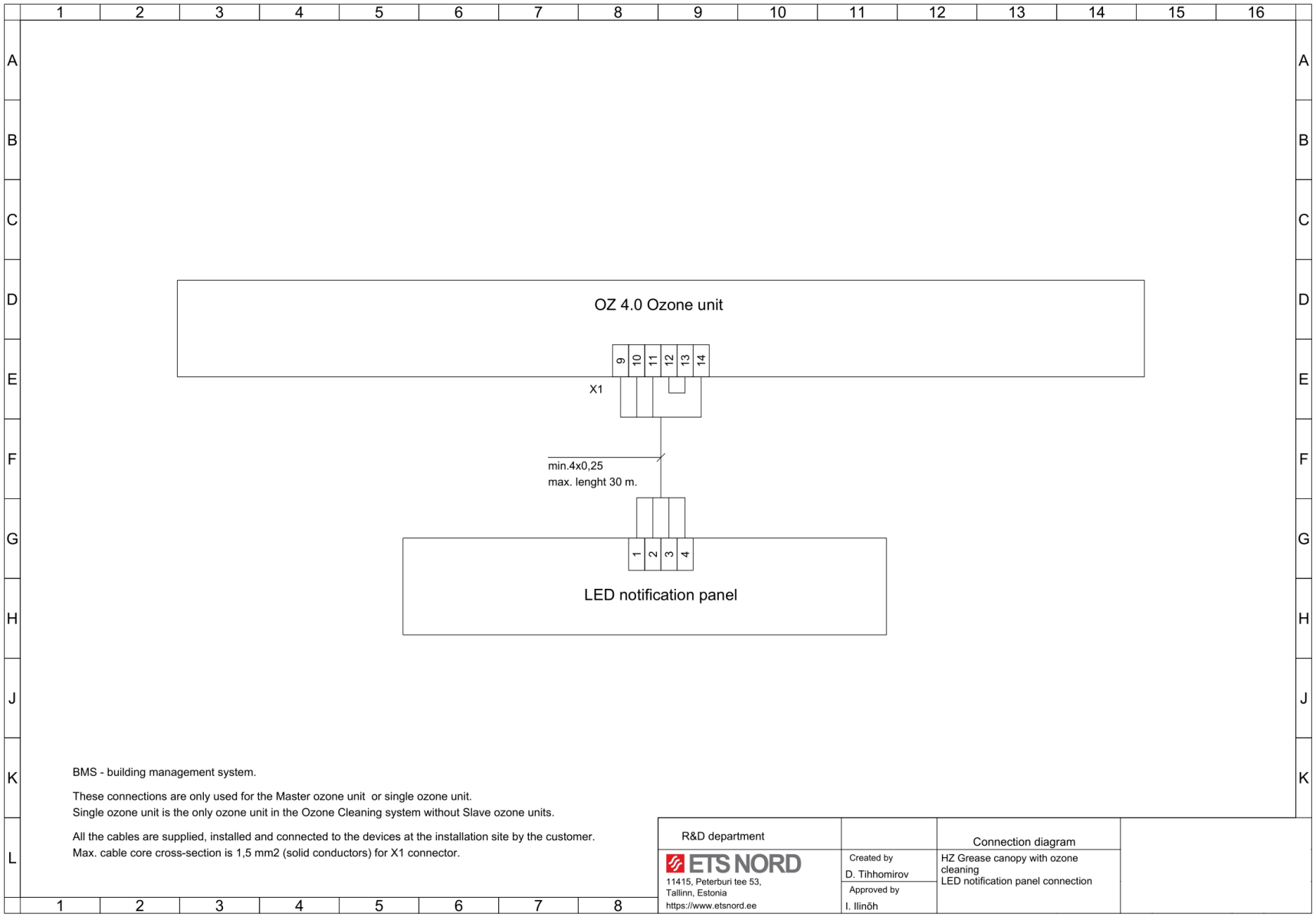
7. OZ 4.0 Master ozone unit external devices connection diagram 1



8. OZ 4.0 Master ozone unit external devices connection diagram 2



9. OZ 4.0 Master ozone unit external devices connection diagram 3



BMS - building management system.

These connections are only used for the Master ozone unit or single ozone unit.
Single ozone unit is the only ozone unit in the Ozone Cleaning system without Slave ozone units.

All the cables are supplied, installed and connected to the devices at the installation site by the customer.
Max. cable core cross-section is 1,5 mm2 (solid conductors) for X1 connector.

R&D department		Connection diagram
ETS NORD 11415, Peterburi tee 53, Tallinn, Estonia https://www.etsnord.ee	Created by D. Tihhomirov Approved by I. Ilinõh	HZ Grease canopy with ozone cleaning LED notification panel connection

OZ 4.0 Modbusi register list

All registers are type HOLDING.
Master OZ 4.0 ozone unit can be scanned through Modbus RTU and TCP/IP network (requires M-Link device).

If the register points listed below are not reflected correctly in the registers, then please contact ETS NORD service technician. At the time of your application, please add the building automation reading result so that we can better understand the situation.

Abbreviation legend:

	D – Digital	A – Analog
R – Read	W – Write	RW – Read & Write

Name	Reg.	Object type	Read/ Write	Unit	Enum	Note
Master ozone unit						
System state	759	D	RW		0 = Off 1 = On 2 = Smart Schedule	Stops/starts ozone generation for all units
Emergency stop input	757	D	RW		0 = Bus 1 = DI 2 = Not used	Connection type used with BMS
Contact function	756	D	RW		0 = NO 1 = NC	Contact type
Modbus work permission	758	D	RW		0 = Disabled 1 = Enabled	Remote Modbus permission used when emergency stop input type is Bus
System work permission	309	D	R		0 = Disabled 1 = Enabled	System permission status
Operation status	223	D	R		0 = Off 1 = On	System is working or not
Critical error	224	D	R		0 = Normal 1 = Alarm	System hardware faults
Service	225	D	R		0 = Normal 1 = Alarm	System maintenance status
Pressure	203	A	R	Pa		The pressure difference between the room and the canopy extraction chamber. This reading shows whether the device with the canopy is under negative pressure or not.
Ozone unit running hours	313	A	R	h		Displays the operating hours of the ozone unit
Time to next service	314	A	R	d		Days left until service A maintenance
2nd Ozone unit						
Pressure	235	A	R	Pa		The pressure difference between the room and the canopy extraction chamber. This reading shows whether the device with the canopy is under negative pressure or not.
Ozone unit running hours	231	A	R	h		Displays how long the ozone unit has been running in hours
Device not responding	744	A	R		0 = Not active 1 = Alarm	Connection status is lost when alarm is active

Name	Reg.	Object type	Read/ Write	Unit	Enum	Note
3nd Ozone unit						
Pressure	241	A	R	Pa		The pressure difference between the room and the canopy extraction chamber. This reading shows whether the device with the canopy is under negative pressure or not.
Ozone unit running hours	240	A	R	h		Displays how long the ozone unit has been running in hours
Device not responding	761	A	R		0 = Not active 1 = Alarm	Connection status is lost when alarm is active
4nd Ozone unit						
Pressure	245	A	R	Pa		The pressure difference between the room and the canopy extraction chamber. This reading shows whether the device with the canopy is under negative pressure or not.
Ozone unit running hours	253	A	R	h		Displays how long the ozone unit has been running in hours
Device not responding	779	A	R		0 = Not active 1 = Alarm	Connection status is lost when alarm is active
5nd Ozone unit						
Pressure	254	A	R	Pa		The pressure difference between the room and the canopy extraction chamber. This reading shows whether the device with the canopy is under negative pressure or not.
Ozone unit running hours	262	A	R	h		Displays how long the ozone unit has been running in hours
Device not responding	791	A	R		0 = Not active 1 = Alarm	Connection status is lost when alarm is active
6nd Ozone unit						
Pressure	263	A	R	Pa		The pressure difference between the room and the canopy extraction chamber. This reading shows whether the device with the canopy is under negative pressure or not.
Ozone unit running hours	272	A	R	h		Displays how long the ozone unit has been running in hours
Device not responding	803	A	R		0 = Not active 1 = Alarm	Connection status is lost when alarm is active
7nd Ozone unit						
Pressure	273	A	R	Pa		The pressure difference between the room and the canopy extraction chamber. This reading shows whether the device with the canopy is under negative pressure or not.
Ozone unit running hours	281	A	R	h		Displays how long the ozone unit has been running in hours
Device not responding	815	A	R		0 = Not active 1 = Alarm	Connection status is lost when alarm is active

Name	Reg.	Object type	Read/ Write	Unit	Enum	Note
8nd Ozone unit						
Pressure	282	A	R	Pa		The pressure difference between the room and the canopy extraction chamber. This reading shows whether the device with the canopy is under negative pressure or not.
Ozone unit running hours	290	A	R	h		Displays how long the ozone unit has been running in hours
Device not responding	827	A	R		0 = Not active 1 = Alarm	Connection status is lost when alarm is active
9nd Ozone unit						
Pressure	291	A	R	Pa		The pressure difference between the room and the canopy extraction chamber. This reading shows whether the device with the canopy is under negative pressure or not.
Ozone unit running hours	299	A	R	h		Displays how long the ozone unit has been running in hours
Device not responding	839	A	R		0 = Not active 1 = Alarm	Connection status is lost when alarm is active

OZ 4.0 Ozone Cleaning System is made up of one Master ozone unit and up to eight Slave ozone units (addresses 2-9).

Using the register ***759 "System state"*** you can turn the entire system on or off. When you wish to use the BMS to provide a work permission to the system that will allow the ozone units to work according to the ventilation schedule, then you need to use the following registers:

- ***757 "Emergency stop input"*** to specify whether it's a cable connection (DI) or not (Bus),
- ***756 "Contact function"*** to specify whether the cable connection is normal open (NO) or normal close (NC),
- ***758 "Modbus work permission"*** to give the disable or enable command when BMS connection is not physical (cable).
- The register ***309 "System work permission"*** indicates whether the OZ 4.0 ozone system has a work permission from the BMS or not.

Example: "System state" value is On, ***"Emergency stop input"*** value is ***DI*** and the ***"Contact function"*** is ***NO***. Now you can operate the system using the work permission.

Register ***223 "Operation status"*** indicates the whole system state. For instance, if ozone unit 2 is not working the system operation status is ***On*** because all other units are operational.

Register ***224 "Critical error"*** indicates whether there is a faulty unit in the system or not. For instance, if ozone unit 2 is experiencing a critical error, then the critical error state is ***Alarm***.

Register ***225 "Service"*** indicates whether a unit needs maintenance or not. For instance, if ozone unit 2 has reached its required maintenance time, then the service state is ***Alarm***.

Register ***314 "Time to next service"*** indicates how many days are left until service type A (days) is needed to be performed on the ozone units. Once the days have reached 0 an alarm will be automatically activated that will notify on this maintenance event. The alarm will be active until maintenance has been performed.

If ozone unit running hours have reached 10 000 hours, then service type B (hours) maintenance needs to be performed on the device. An alarm will be automatically activated that will notify on this maintenance event. The alarm will be active until maintenance has been performed.

If there is a need for BMS to give a more precise overview of the ozone unit maintenance needs, the following example can be used:

Register ***314 "Time to next service"*** shows how many days are left until ozone unit type A maintenance (days 365). When the days have reached zero, an alarm is automatically activated to notify of this event. The alarm is active until maintenance is performed.

365 calendar days – 0% need for maintenance	182 calendar days – 50% need for maintenance
37 calendar days – 90% need for maintenance	
0 calendar days – 100% need for maintenance	-2 calendar days – 100% need for maintenance and over

Etc. that is, the negative time increases until maintenance is performed on the device and a new update is performed on the Master device during maintenance.

Register ***313 „Ozone unit running hours"*** has reached 10,000 hours, the device must have type B maintenance (hours) performed on it. An alarm is automatically activated to inform about this maintenance event. The alarm is active until maintenance is performed - register ***225*** (this register is responsible for the entire ozone unit system).

Each ozone unit has its own working hours - so if the object has more than one ozone unit, BMS can collect their information from the Master ozone unit.

0 h – 0% need for maintenance	5000 h – 50% need for maintenance
9 000 h – 90% need for maintenance	
10 000 h – 100% need for maintenance	12 000 h – 100% need for maintenance and over

Register ***224 „Critical error"*** - Hardware error in the system - if an error has occurred in the system, then one or two devices in the ozone unit system are broken.

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