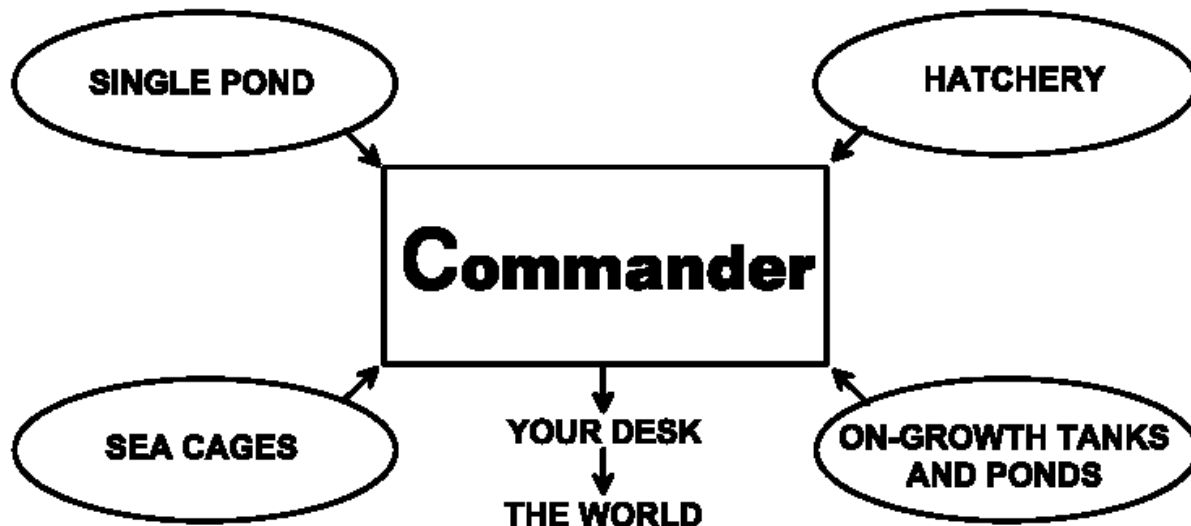


Measuring, Monitoring, Control & Alarm System for Total Control

Dissolved Oxygen - Temperature - pH - Redox



A new concept for measurement and control:

- * **Unsurpassed overview and security.**
the system can function without a PC and can be divided into independant sections.
- * **Total Control - oxygen injection, heating, pumping - everything!**
there are special programs for feed control, lighting control, sea cage operation etc.
- * **Easy to optimize operation -**
both of daily production and strategic operation.
- * **Add measurement and control anywhere, any time**
just plug a new unit into the data link!
- * **Access the system from anywhere!**
*If you're in the field just connect a PC to the data link -
If you're in the office just use the nearest PC - If you're further away use the internet!*
- * **Only a single data cable for all signals**
right up to the point of measurement!
- * **Radio link for even more freedom and flexibility**
and it can run on solar cells!
- * **Range of units for easy system construction**
just add a unit for more measurement and control.
- * **Easy integration with other systems**
farm management systems etc.

Main Functions:

Dissolved Oxygen measurement & control.
Temperature measurement & control.
pH measurement & control*.
ORP (redox) measurement & control*.
Water Level measurement & control*.
Pressure measurement & control*.
Flow measurement & control*.
Level detection and control*.
Alarm functions.
Data logging measurements and alarms.
Interfaces with office computer system.

*with appropriate meter.

System Features:

Easy installation: Place input and output units where needed.
Just one thin cable between all units.

Easy configuration: The system can be divided into independent sections as desired.
Sectioning does not have to be dependent on the physical lay-out.
Input-output linking is made via software.
Functions can be changed and units can be added as needed.

Easy to use: All measurements and functions are shown on a graphical representation of the installation on the PC screen. Alarms appear in bright colours for instant recognition.

Fault-tolerant: You can remove parts and the rest keeps on working!

Versatile: You can connect instruments with P-net interface directly, and other items meters, switches, pumps, valves etc. to the various input and output units.
There is no practical size limit.

The OxyGuard Commander is a process control system specially designed to perform the functions necessary in a fish farm. Water quality metering, monitoring and control is the main task, but Commander has practically unlimited capabilities. Commander combines newly designed input and output units and software with a tried-and-tested bus network to provide both small and large users with a very economic solution that is easily and precisely adapted to their exact needs.

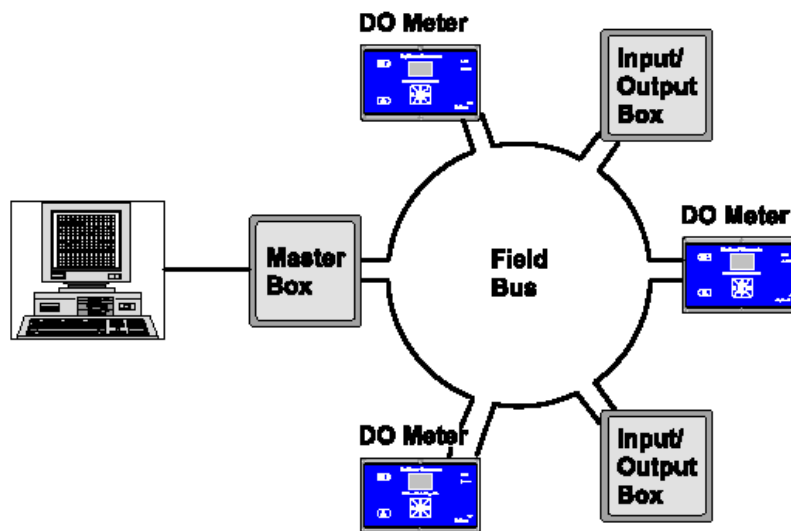
Commander Systems can, just like the traditional OxyGuard multi-channel systems, be extended and adapted, but the Commander provides possibilities far beyond the scope of any traditional system. There is no limit to the number of channels that can be incorporated - just add the units you need - and the system can be divided into sections that will function alone even if connection to the rest of the bus network is broken. Wiring is greatly reduced since input and output units can be placed close to where the actual measurements are made or to where control is effected.

Via a PC running the main Commander program connection is possible both to other fieldbus systems and other computers. The latter can be performed through the office network or through the internet. A Commander System can thus become a part of the overall data system of the fish farm or mother company, enabling operation to be finely tuned to market demand trends to give a strategic advantage.

A Commander system is made up of one or more sections. It is often not necessary to divide the system up - one section is sufficient for many fish farms. A section consists of up to 125 units, of which up to 32 can be Master Units.

Master Units can perform various control functions, according to the software program that is loaded into them. Examples of such functions are data logging, control of inputs and outputs, control of the switching on and off of illumination, control of dissolved oxygen and temperature etc. and feed control.

Input/Output units are Slave Units, and since these each can contain several channels the number of inputs and outputs that one Commander section can handle is very large. Examples of slave units are the OxyGuard DO meter, which performs up to six dissolved oxygen measurements and six temperature measurements, as well as the input and output units for analogue signals, switched (on/off or relay contact) signals etc. Some of these slave units can perform some fairly advanced functions (i.e. are "intelligent" in themselves) but they are still slave units - it is the Master Units that determine how everything is interconnected and how it all functions.

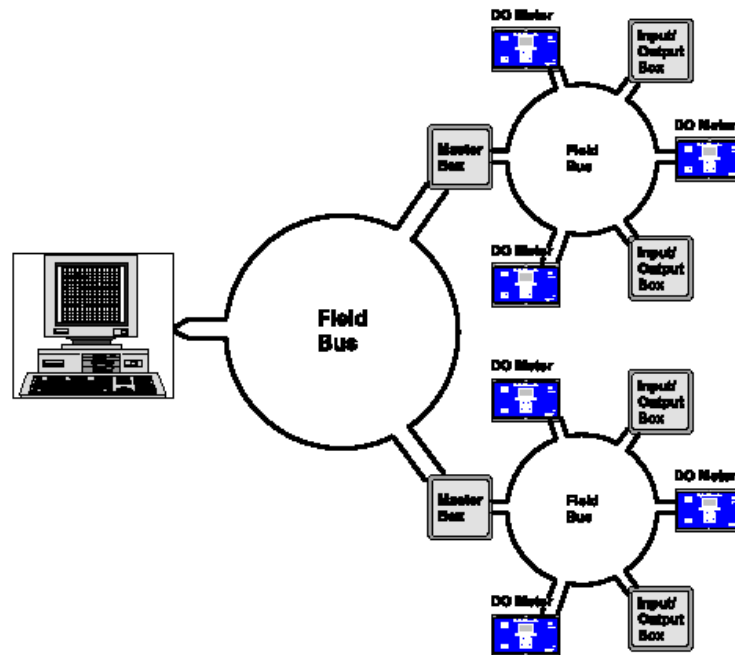


The above illustration shows how a Commander system with one section might look. The Field Bus is connected in a ring, so that the system will function even if there is a break in the cable (a short-circuit between the two wires of the data cable will, of course, stop the system). Master Boxes and Input/Output boxes are cabinets that contain the basic units used in all systems as well as units particular to the actual system.

Another feature that ensures reliable, accurate measurements is the galvanic isolation that OxyGuard uses. In wet environments with a fair amount of machinery there can be potential differences between different places in the installation - e.g. between tanks or ponds in a fish farm. This can disturb sensitive measurements, so OxyGuard input circuits for DO and pH probes and similar are galvanically isolated. The field bus also incorporates galvanic isolation, so that a fault in one of the connected units will not halt the operation of the entire system.

Larger systems can be divided into sections with between 30 and 60 DO measurements or similar. If there is a large physical distance between the sections they can be much smaller. There is galvanic isolation between the various sections.

Typically each section will have its own Master Unit that controls the operation of the section. Sections will thus continue to function even if cut off from the rest of the system. Minor errors of communication in the field bus data link are corrected automatically - data is re-transmitted until correct transmission is ensured, but a serious fault will result in an error message "System Fault" and an alarm signal.



The Commander Probe

The Commander Probe is new. It represents all OxyGuard's experience in making oxygen probes.

It is a probe that is more versatile, more robust and even easier to use and maintain than its predecessor.

- You no longer need to choose between mg/l and % saturation - the **Commander** gives you both.
- You no longer need separate temperature probes - the **Commander** also measures temperature.
- The **Commander** Probe is fitted with a membrane that is virtually unbreakable.
- The **Commander** probe is as near to maintenance-free as modern technology can make it.

The units of the **Commander** system include barometric pressure sensors and automatic calibration routines. This not only makes the **Commander** Probe even easier to calibrate, but makes the high stability inherent in all OxyGuard probes clearly evident.

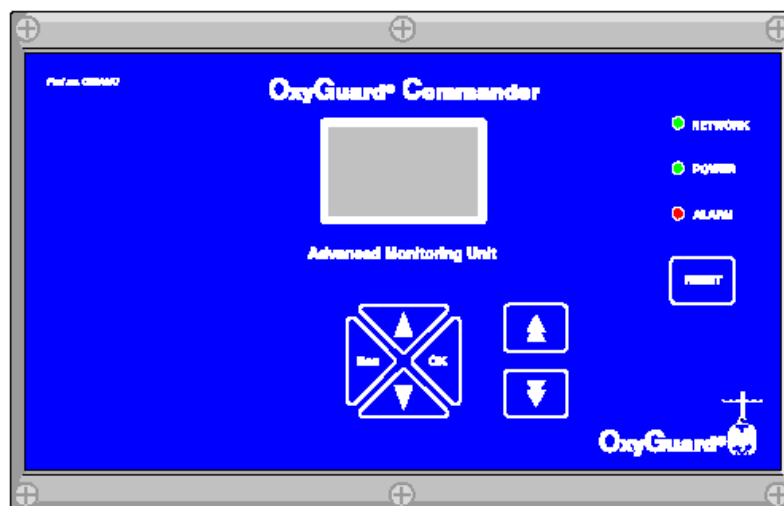
The Commander Probe brings a new dimension to the OxyGuard's philosophy of No-Nonsense Measurement!

The Dissolved Oxygen Meter

Dissolved oxygen is measured using the Commander DO Meter. This unit does not just measure dissolved oxygen, but measures dissolved oxygen in mg/l (ppm), dissolved oxygen in % saturation, temperature and barometric pressure.

Up to 6 Commander probes, that measure both dissolved oxygen and temperature, can be connected to a unit. One, two or three input modules ("input amplifiers") are inserted according to the number of probes connected - each module can treat the signals from one or two probes. Onward connection is by P-NET field bus. Measured values can be observed on the display of the unit. Green LED indicators show when the unit is powered and when there is connection to the P-NET. A red LED indicator shows when there is an alarm condition.

The unit can measure DO even if connection to the rest of the system is broken



Input from other meters and equipment

Input can be made from any other equipment with voltage or milliamp output. Any meter with a standard current loop (4-20 mA) or voltage output (e.g. pH meters, flowmeters etc.) can therefore be incorporated into the Commander system.

Control of these parameters is also performed by the Commander system - the software can be set up to perform advanced control functions if needed.

Contact input units enable the direct connection of any equipment with a contact or on/off output. Level switches, pressure switches and alarm contacts are the most common examples of this.

Radio Link

The **Commander** radio communication system transfers data, not just simple measurement values. This opens a whole new range of possibilities for fish farmers, especially where the farm extends over a large area, since sections of the farm can be coupled to the **Commander** system without having to install cables over long distances.

The Radio Link units - Transmitter and Receiver - are fitted with rechargeable batteries that will ensure operation for up to 3 months. The units will, however, normally be connected to a permanent source of power, which can be the mains, a low voltage source or solar cells.

The Radio Link meets any local radio transmission regulation. The transmission range depends on the topography of the actual use and on the maximum permitted radiated effect. Extended range can be obtained either by using repeater stations or by obtaining local approval for the use of greater transmission power.

The Radio Link is very useful in transmitting information from sea cages to shore stations, so that unmanned cage sites can be continuously monitored.

Output Units

Data Output:

The ease with which precise and extensive water quality data can be transferred from the **Commander** makes data one of its most important outputs. It is easier to adjust feeding to achieve the desired fish size at the desired point of time and gain a strategic advantage.

Commander's easy access to this data also gives increased security - you can check conditions from the nearest PC - or even via the internet. You don't have to worry about the cost or bother of inspecting the ponds or site - just log on to the **Commander** system to see what's going on.

Proportional Controller Output

Straightforward switching of successive valves, using the several set points that **Commander** has built into each DO measurement, will give reasonable control of oxygen levels. However a PID function, that varies the "on" time of a pulse-pause relay, gives even closer control and more constant dissolved oxygen values, so **Commander** has a PID function for every DO measurement.

Contact outputs for Control and Alarm

Contact outputs are used to give alarm output in the form of alarm horns and flashing lights and to switch a supply of extra oxygen or water on. Switching takes place when the appropriate measured value crosses a set point value.

The set points that trigger switching are set for each input measurement channel. The software set-up in the Master Unit determines which contact is activated by which set point. Each channel has low DO alarm,



J+J AUTOMATYCY Janusz Mazan

80-388 Gdańsk ul. Beniowskiego 2E5

BIURO TECHNICZNO-HANDLOWE

80-259 Gdańsk ul. Obywatelska 1

tel./fax: +48 (058) 520-27-26

NIP: 584-165-64-40

REGON:192813850

www.jjautomatycy.pl

jjautomatycy@jjautomatycy.pl