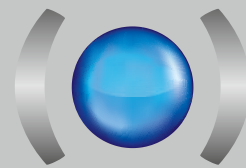




LABEL

The complete solution



**BERNARD[®]
CONTROLS**

//////////////////// Invest in Confidence //////////////////////

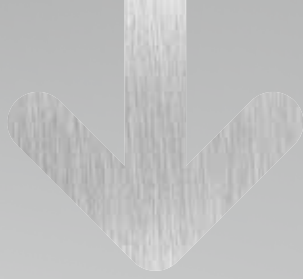


Master Station
Fieldbus Solution

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(R)evolution

When 3 main evolutions increase as much your productivity, we can simply talk about revolution.



Master Station

More than just an evolution...
... a true revolution.

- › **Reliability.** Protect and maximize the availability of your installation with our Master Station, which combines the efficiency of a Programmable Logic Controller with line & system redundancy.
- › **Efficiency.** No more than 3 seconds to scan up to 120 actuators. Keep the control of your installation at every moment.
- › **Flexibility.** BERNARD CONTROLS chooses the open protocol Profibus DPV1 for all its fieldbus solutions, including our Master Station, to allow customers to connect any type of device.

Digital technology

> INTELLI+®

INTELLI+® is a turn-key solution which eases the design and implementation of the actuator control system.

It allows easy commissioning thanks to its user friendly interface and the non-intrusive setting. Numerous functions are available to the users helping them in their diagnostics and to schedule their valve maintenance operations. INTELLI+® also guarantees to the users an optimum availability of their industrial facilities.

Main functions:

- › *Multilingual interface built-in graphical display, laptop or Pocket PC,*
- › *Actuator setting without any tool and without opening any cover (non-intrusive design),*
- › *Monitoring of valve position and real torque transmitted to the valve by absolute sensors (no battery back-up),*
- › *Signalling by 4 configurable relays,*
- › *2 configurable auxiliary controls (example: ESD),*
- › *Automatic phase monitoring,*
- › *Increase of the operating time (to avoid hammer effect),*
- › *Actuator auto-diagnosis, record of actuator activity and display of the alarms.*

For more information about the INTELLI+®, please consult our catalogue A116.

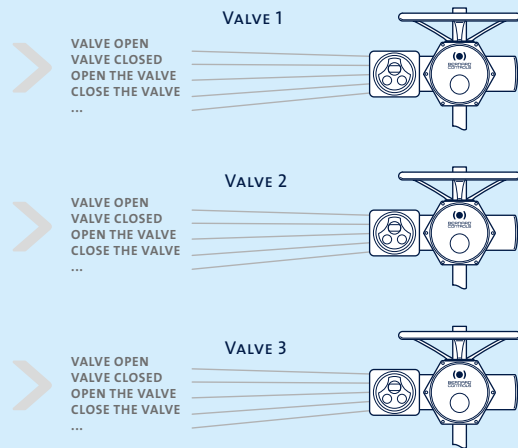


> Fieldbus communication

Whereas standard connection can only supply with a limited amount of information – one command being linked to one pair of wires – fieldbus enables to get lots of information feedback and to command the many actuators of your installation with just a single pair of wires.

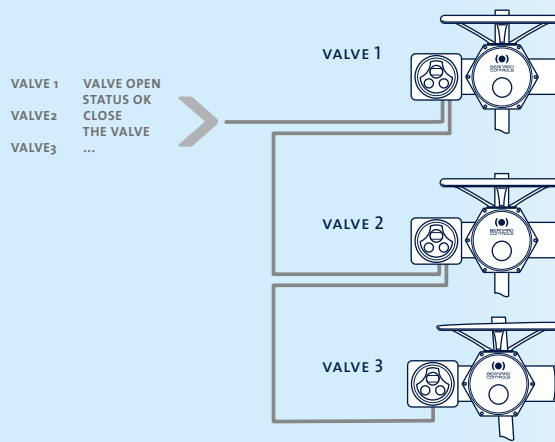
POINT-TO-POINT CONNECTION

EACH ACTUATOR HAS TO BE CONNECTED TO THE CONTROL CABINET



MULTIDROP CONNECTION

MANY UNITS CONNECTED ON A SINGLE PAIR OF WIRES. ALL COMMANDS AND SIGNALS CAN BE TRANSMITTED BY THE BUS

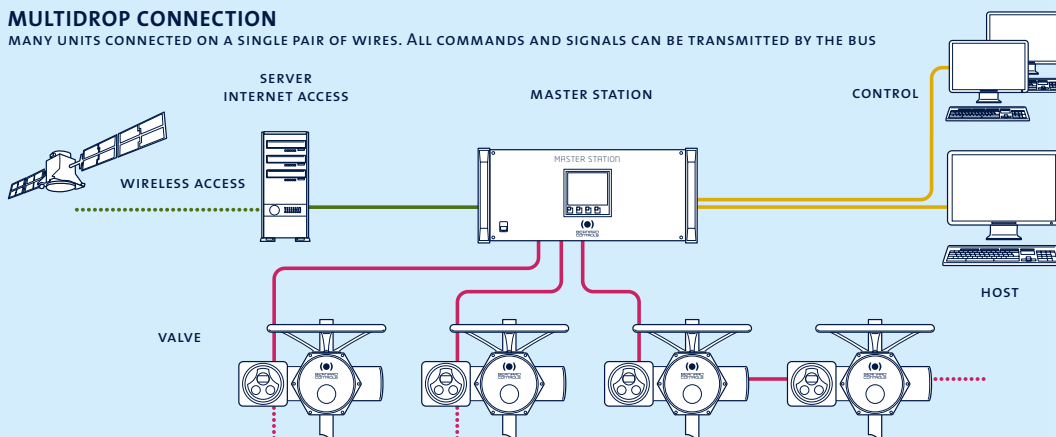


While **optimizing the wiring** of your site and **reducing the cost of installation**, more **information is available from each actuator**.

To manage fieldbus communication, there exist two types of buses: “proprietary” or “open” system. Whereas the first one compels users to use compatible devices supplied by the same manufacturer, an “open” system allows customers to connect several types of actuators or sensors to their fieldbus, and consequently, to choose freely their equipment supplier. BERNARD CONTROLS opts for the “open” system for all its fieldbus solutions, including our Master Station which works with an **open protocol Profibus DPV1¹**.

MULTIDROP CONNECTION

MANY UNITS CONNECTED ON A SINGLE PAIR OF WIRES. ALL COMMANDS AND SIGNALS CAN BE TRANSMITTED BY THE BUS



1- Profibus DPV1 deals with acyclic data whereas DPV0 supports only cyclic communications.

Simplicity & Modularity

The Master Station is also a flexible product which can be adapted to your needs or requirements.

➤ A Turnkey system



Our Master Station is a ready-to-work solution which eases the command and control of large quantities of motor operated valves by the mean of a fieldbus. It will help you saving time and ressources.

Our Master Station is packaged in a **standard 19"** rack, which facilitates its integration in your control room.

It is an interface located between the DCS and the actuators, which can replace your standard industrial computer. Because **BERNARD CONTROLS Master Station is already set up**, you will save precious time during the commissioning phase. Just cable it and the system is quickly¹ ready to work! Overall start up time of your site is now reduced to the minimum.

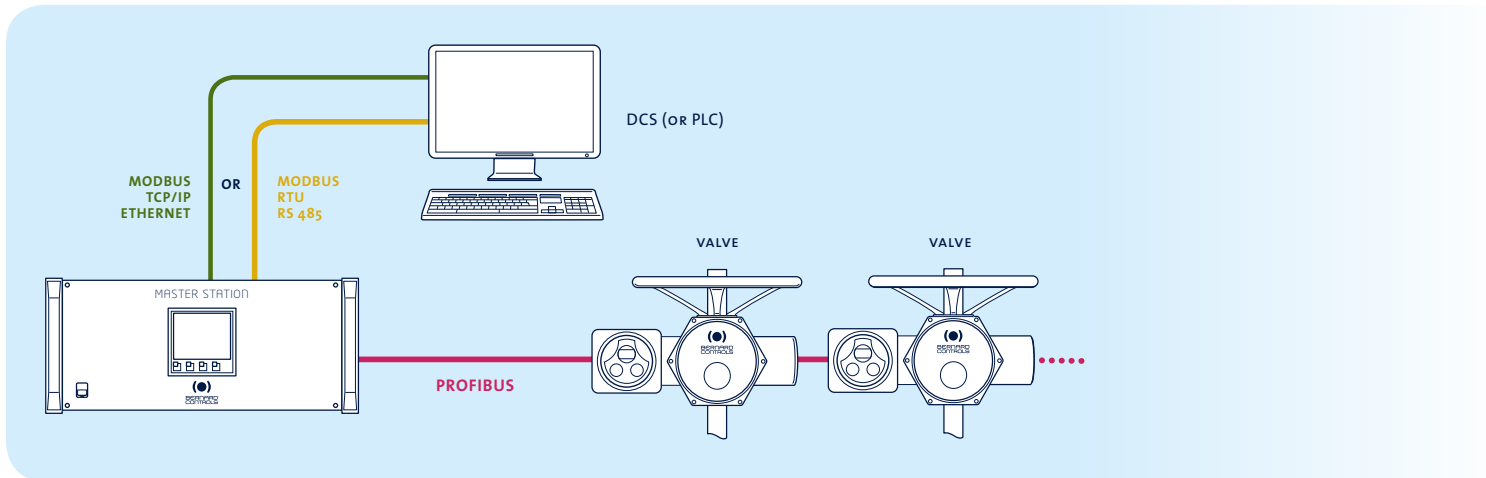
Our Master Station is also able to work without the DCS. In case of default of your DCS or if you do not want to include one in your installation, you can still communicate with your actuators through the Master Station's manual control², from the color touch screen. You can thus keep the control of your valves even if the DCS is on hold or disconnected.

¹ - You will just need to set up IP addresses

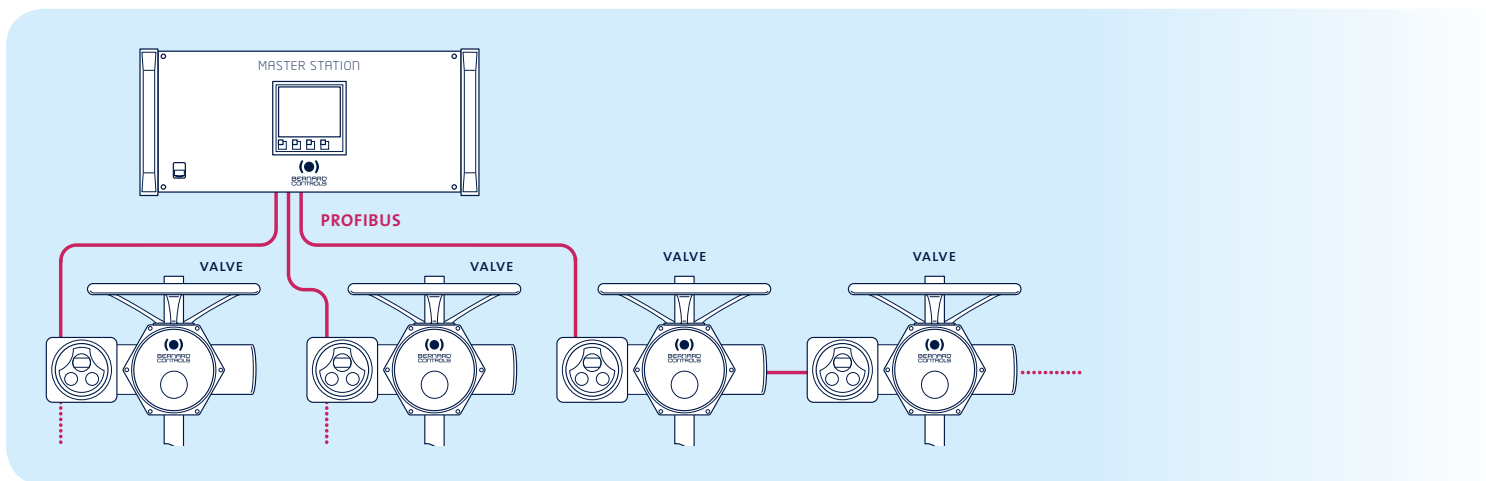
² - You cannot replace the DCS' command sequences, but you can control your MOVs on a one-to-one basis. And, if you choose MS202, you will be able to deal with 2 actuators simultaneously: one for each screen.

> Choice of connection between the DCS and the Master Station

You can choose to link your Master Station to your DCS through an **RS485** connection, working with a Modbus RTU protocol. Or through an **Ethernet** support, with a Modbus TCP/IP protocol¹.



> Easy site management



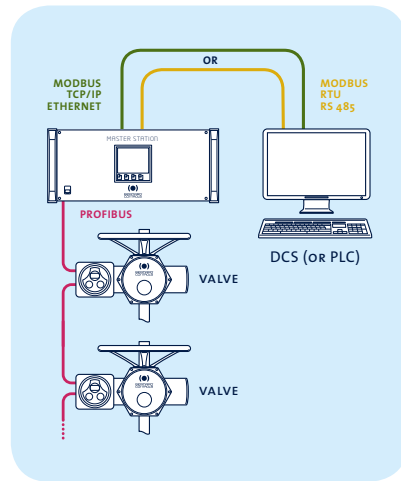
Fieldbus is interesting because it allows getting more information while reducing the overall cost of wiring and commissioning on site. Our Master Station goes further and optimizes the cable length needed to connect your actuators thanks to the **possibility to have 1 to 3 different starts of lines**. Such advantage is especially appreciated if you have 2 or 3 groups of actuators located in opposite directions, and makes you save time and resources.

It is now easier to organize fieldbus communication on site, all the more since **you can add a new actuator on a line without any additional process but just connecting it to the network²**.

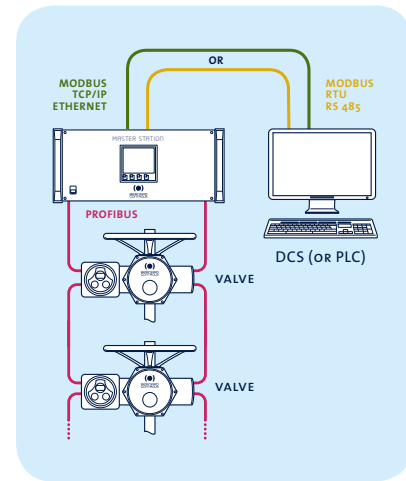
1 - This connection could be redundant.
2 - You will just need to set up its Profibus address.

➤ MS101, MS102, MS202: your needs, our solutions

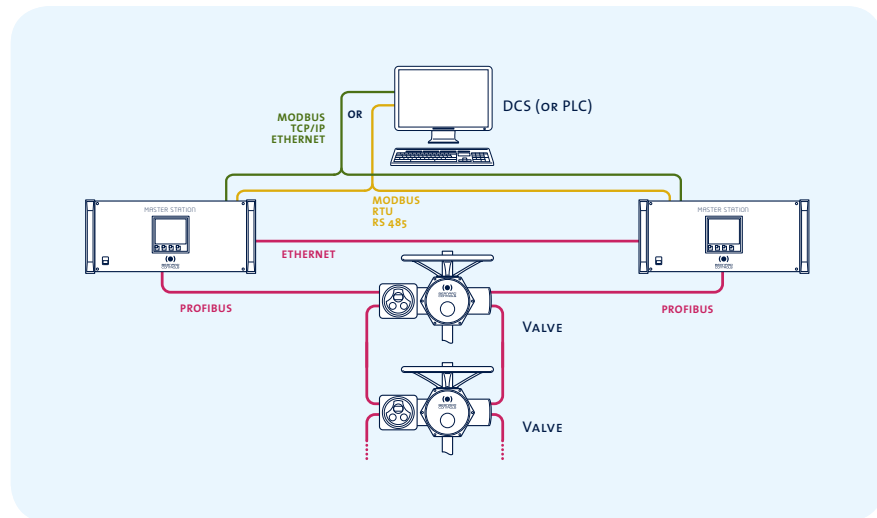
We can supply you with 3 different Master Station configurations to fit at best your requirements. According to the desired level of security, you can opt for MS101, MS102 or MS202.



MS101 – The simple fieldbus solution. One 19" rack to set up, control and command your network of actuators. A single MS, a single line, up to 3 starts of lines.



MS102 – Line redundancy for improved reliability. One 19" rack plus a second cable for line redundancy: more security in case of default of one cable. A single MS, a redundant line, up to 3 starts of lines.



MS202 – System and Line redundancy. Two 19" racks featuring line redundancy. In this configuration, if the first unit is out of service, the second one ensures proper communication with the entire network. Two MS, a redundant line, up to 3 starts of lines.

The differences between the three configurations of Master Station are therefore based on line or system redundancy. Those features determine the level of security that you want to grant to your installation. According to your needs, we are able to deliver the best solution.

MASTER STATION

Motorised valves fieldbus control



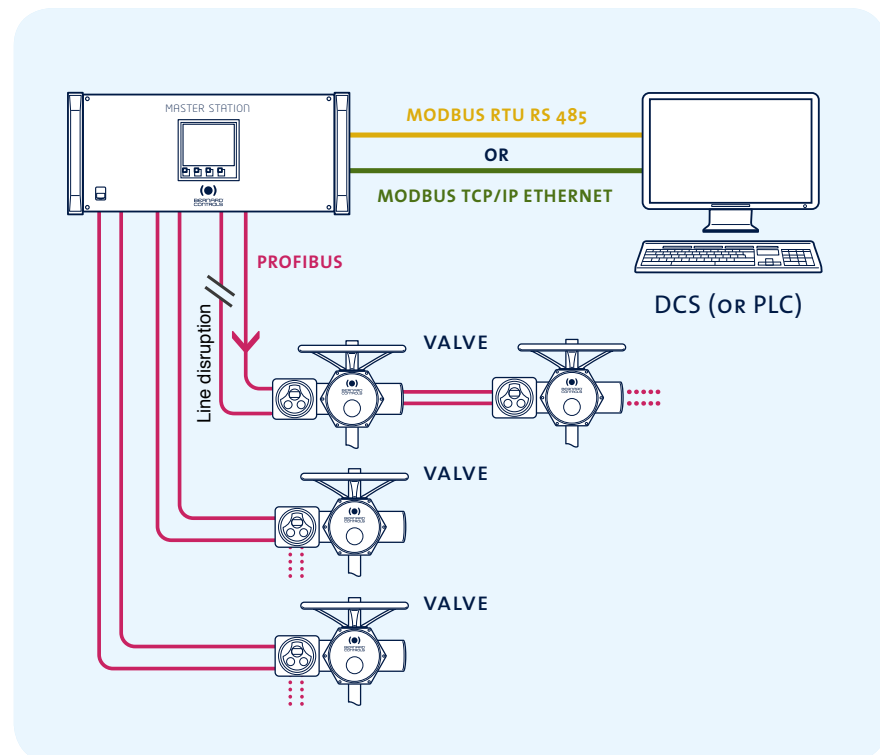
Security and reliability

Our Master Station has also been designed as a reliable system to protect your site, starting with the possibility to divide your network into 3 line segments : because your total number of actuators is split up between 3 separated lines, when one line breaks down, the two others keep working.

> Line redundancy

If you choose MS102 or MS202 you will secure communication throughout your fieldbus in case of a faulty cable. **Line redundancy is a solution which overcomes the risk of cut wires by doubling the line.** If the first line fails, the communication automatically switches to the second one and a fault is reported. Furthermore, redundancy is also ensured at field unit level (INTELLI+® controls) by redundant Profibus interfaces.

In case of main line fault, a back-up line maintains automatically all redundant functions of the Master Station. However, for MS102, some acyclic information and configuration are not available (see table page 19).



➤ System redundancy

MS202 is the most secure version of our Master Station. It helps you to keep in-depth control of your installation. Indeed, in addition to line redundancy which prevents from breakdowns due to cut wires, MS202 is also made up of **two identical units which can take over from each other in case of fault of one of them**. That is to say that if unit 1 breaks down, unit 2 takes immediately in charge the communication of the entire network and a fault is reported.

Redundancy is a key specification ensuring the reliability of your installation. Indeed, thanks to its features of line redundancy and system redundancy, our Master Station is able to achieve a level of availability higher than 99,99 %.

➤ Control hierarchy

In order to ensure secure management of your site, considering the several control units, a control hierarchy is set up. The standard control priority is defined from the closest device to actuators, to the device which is the farthest:

Actuators ➤ MS ➤ PC workstation ➤ DCS

The consequence is that if an opposite order is received at the same moment from the Master Station and from the DCS, the priority order is the one coming from the Master Station. Of course in normal operation, from the DCS, the PC workstation or the Master Station, inhibition of local command can be configured.

➤ A Programmable Logic Controller

Our Master Station is a Programmable Logic Controller (PLC). PLCs are used to automate electromechanical processes in a much more effective way than a standard computer. The main advantages of such device are:

- *Reliability and availability (our Master Station achieves a level of availability higher than 99,99%),*
- *It is designed for multiple input and output arrangements and thus replaces hundreds of relays,*
- *It can work under severe conditions such as heat, cold, vibration, dust... For instance our Master Station is suitable for continuous operation under ambient temperature from 0°C to 50°C, with a corresponding non condensing 5 to 80 % relative humidity rate.*

Furthermore, the Profibus system has proved to be effective and reliable and is now a reference for fieldbus communication.

> Log in access

You can restrict access to the Master Station according to user's profile. Indeed there exist four types of accounts all secured by a password.

- > **User** : *You can only consult information about the Master Station and the actuators connected to it.*
- > **Super-user** : *Like with the user account, you can consult information about the Master Station and the actuators connected to it. But you can also command the actuators.*
- > **Maintenance** : *You can consult information about and set up the Master Station, and have full access to actuators (piloting and setting up).*
- > **Administrator** : *This account is dedicated to the management of users' accounts.*

> Lightning protection

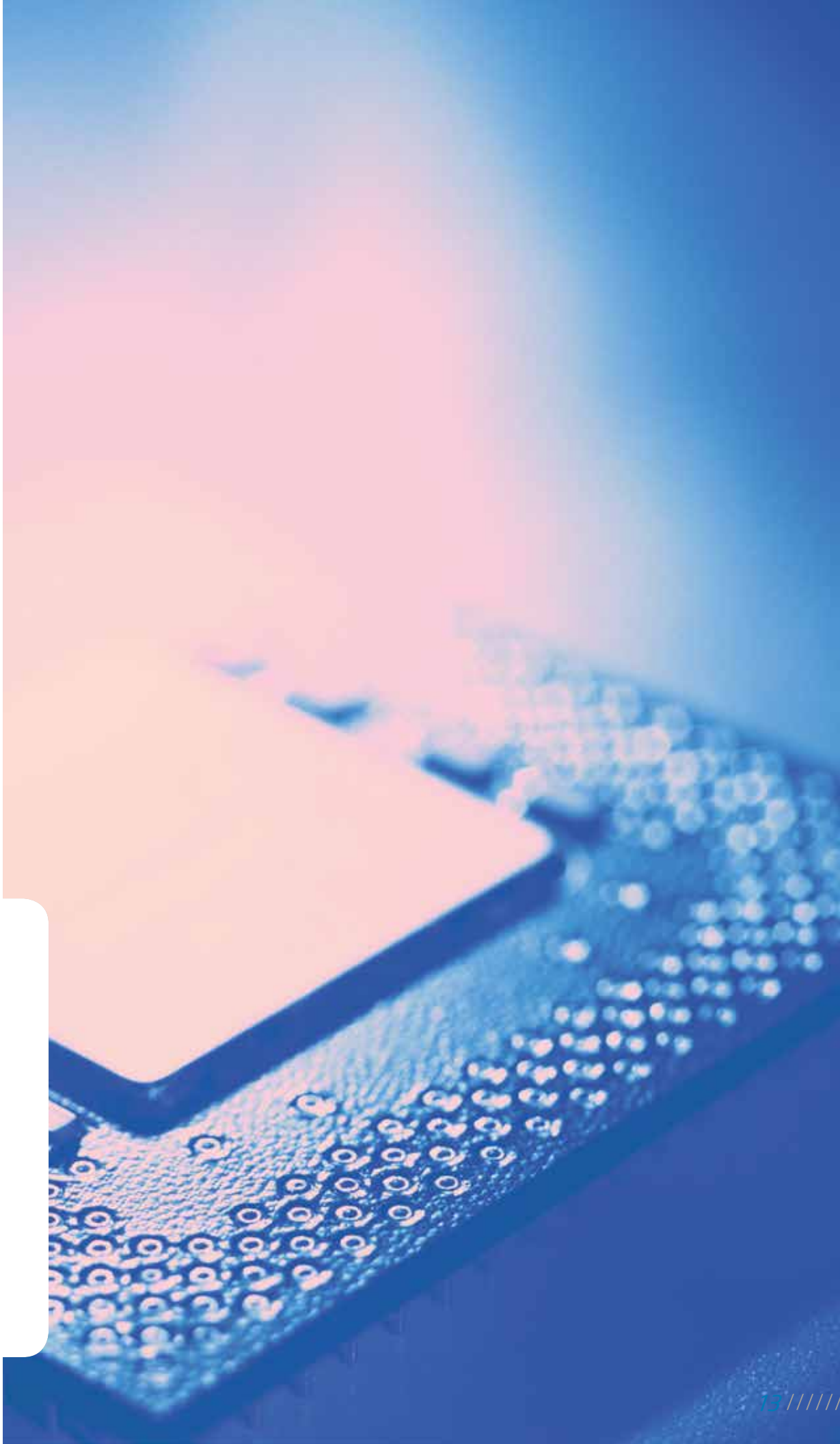
In case of lightning stroke on the line, overvoltage spreads along the line. If your actuators are not protected, some of the electronic components may breakdown and have to be replaced. **The lightning protection included in our actuators¹ and in our Master Station (on option), acts as a shield and discharges overvoltage.** Voltage goes back to standard level and the automation of your valves can resume.

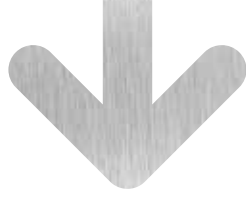
> Non intrusive setting

Our Masterstation works usually with INTELLI+[®] actuators. Thanks to INTELLI+[®], **commissioning is simplified and can be performed in a non-intrusive way.** It can be done automatically or manually by choosing the closed or open positions for the corresponding valves. Moreover, operating parameters can be changed thanks to the local control buttons by following information on the display. Finally, all settings and updates can be done through infrared communication with a laptop computer or a pocket PC. For more information about the INTELLI+[®] technology, please refer to the INTELLI+[®] catalogue.

On the other hand, several parameters can be programmed with the Master Station: **auxiliary command configuration, ESD configuration...** (see table page 19).

1 - Standard on Explosionproof actuators, on request for Waterproof actuators.





User friendliness

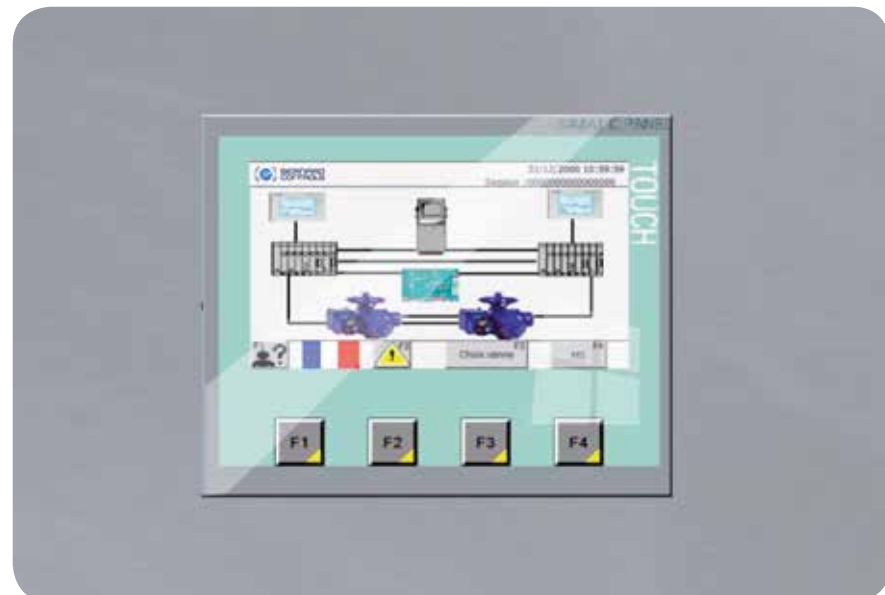
Using our Master Station is easy, starting with its 4 inch color touch screen which can be used for configuring, signalling, and commanding. Language can be chosen amongst the following list : English, French, Chinese, Spanish and Russian.

➤ Intuitive interface

Operating the Master Station is nearly as simple as using a cellular phone. Thanks to its **touch screen**, you just have to press on a box or on the corresponding F1 / F2 / F3 / F4 keys to open a new window with a list of possibilities / parameters. **Drawings** are there to help your understanding (position of the valve, flags for languages...). On each page, **all the options available are listed** on the bottom of the screen and you can find a "return" button. On the "home screen", the status of the system is displayed.

From the home page, you can **access all information and parameters** :

- Press F1 to choose the account and log in.
- Press the flag to choose your language.
- Press F2 to visualize all alarms (date, time, details)
- Press F3 to select a valve and control, configure, command the corresponding actuator and get torque curves.
- Press F4 to get information about and set up the Master Station.



> Optional PC workstation

The Master Station is able to interface with a monitoring computer (optional) to control directly valves' automation. This **PC workstation**, equipped with specific software, allows to operate the MOVs and to retrieve data and alarms from the field units.

By choosing the PC workstation, you opt for greater user friendliness. Indeed, we can work together on demand to **schematize your installation** in the software interface so as to overview all the actuators of your site easily. And for simple use, the software is available in English, French, Chinese, Spanish and Russian like the Master Station; but also in German and Italian.

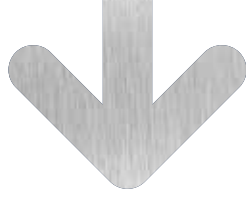


> Remote web connection

Each Master Station is equipped with a web server hosting webpages. Those pages are available from any browser such as Internet Explorer, Mozilla Firefox.... Thus, you can access to the Master Station's information to monitor your actuators as far as your computer is connected to the same network than your Master Station, or remotely thanks to its IP address if your IT Department allows it.

If you want to control your MOVs remotely, you can use a software¹ to get connected to your PC workstation and then control your site from anywhere in the world.

1 - Not supplied by BERNARD CONTROLS.



Fast response time

Signal transmission

Our Master Station is very fast and needs **only one to three second(s)** to scan the entire installation, while being able to send simultaneously multiple orders. It can address **up to 30 actuators per 1200 meter line without repeaters**. Then, in case of 3 starts of lines you can manage up to 90 actuators (30 per each 1200 meter line) without any repeaters.

If you need to set up more actuators on a single line while keeping transmission speed, you can include repeaters¹ in your installation.

In such case, the Master Station can manage up to 120 actuators on a single line. Repeaters are one of the best solutions to maintain signal speed even when it comes to long distances (up to 10 km). Those enable to have similar response time whatever the distance between the actuators and the Master Station.

MS202	Number of actuators		
		30	60
Line length (km)	up to 10,2 km	up to 10,2 km	up to 10,2 km
Standard scan time* (s)	1.125	1.750	3
MS102	Number of actuators		
		30	60
Line length (km)	up to 10,2 km	up to 10,2 km	up to 10,2 km
Standard scan time* (s)	0.625	1.250	2.5
MS101	Number of actuators		
		30	60
Line length (km)	up to 10,2 km	up to 10,2 km	up to 10,2 km
Standard scan time* (s)	0.625	1.250	2.5

* Standard scan time = Standard scan time of the Profibus line + Master Station processing time.

> Fibre optics

If you want to ensure communication on distance higher than 10km, you can opt for hollow fibre. Indeed, **the Profibus protocol allows using fibres** for the wiring of your installation². Compared to metal wires, those plastic or glass cables carry light signals over longer distances and much more efficiently thanks to minimum loss and no sensibility to electromagnetic interference.

1 - We can supply repeaters on request.

2 - A converter (not supplied by BERNARD CONTROLS) is required to link fibres to your equipment.



Easy maintenance

On top of simplicity, security, user friendliness and quickness, the Master Station is also a useful tool for maintenance.

> Preventative maintenance

INTELLI+® provides users with a great deal of information to help with system diagnosis and aid in scheduling valves' preventative maintenance. Combined with the Master Station you benefit then from a system which monitors easily and continuously every actuators of your installation.

See table page 19 for a detailed list of data available from the Master Station.

> Removing an actuator without line interruption

Fieldbus is advantageous because it allows getting more information while reducing the overall wiring on site. However, when you break up the continuity of the line, for instance because of one actuator being retrieved from the field for maintenance, your whole installation is affected since the signal cannot circulate anymore.

BERNARD CONTROLS actuators can host a special Profibus connection board¹. It is located in the cover of the wiring compartment. This cover can simply be removed from the actuator and closed tight by a special type plate. The resulting so-called "BU" type box ensures continuity of signal throughout the line even when the actuator is removed from the field. Maintenance is then facilitated since you can disconnect an actuator for repair or replacement, while maintaining signal transmission.



> Logging data

Maintenance is also easier thanks to the archiving of alarms in the PC workstation (unlimited memory) and in the Master Station itself (up to 2000 alarms). When somebody is working on site for maintenance and repair, one can thus easily find out when was the latest alarm, what was it about, etc. and solve the problem faster.

As soon as a fault is detected, an alarm appears and remains on the screen until someone acknowledges it.

¹ - Standard on Explosionproof actuators, on option for Waterproof actuators.

Master Station

Technical specifications

Weight	MS101: 7kg MS102: 7,6kg MS202: 2 x 7,5kg
Fixing	8 screws M6
Power supply	Voltage: 115V (+10%, -30%) 230V (+10%, -30%) Frequency: 47 to 63Hz
Electrical power consumption	75W for each rack
Temperature	Operation: 0 to 50°C (32 to 122°F) Storage: -20 to 50°C (-4°F to 122°F)
Humidity	5 to 80% without condensing
Start of lines	1 as a standard - Additional 2 as an option
Length of lines	1,2km / Up to 10,2km with repeaters
Ethernet communication between Master Station and DCS	Connectivity: 2 x RJ45 (10Base-T or 100Base-Tx) Protocol: Modbus TCP IP address: Configured by the customer
Serial communication between Master Station and DCS	Connectivity: 1 x SUB-D9, RS485 (2 x SUB-D9 for MS102) Protocol: Modbus RTU Address: Configured by customer Speed: 50 bits/s to 921 Kbits/s Parity: even, odd or without
Profibus communication between Master Station and actuators	Connectivity: Profibus certified cable Protocol: Profibus DPV1 Actuators address: Configured by the customer Speed: 93,75 Kbits/s
Web server	Accessible through Internet Explorer, Mozilla Firefox, Google Chrome... Storage of Website pages
Optional PC workstation	Software: WinCC from Siemens Configuration mini: For XP Pro (mini): Pentium III, 1Ghz, RAM: 1Go For Vista Pro (mini): Pentium IV, 2,5Ghz, RAM: 2Go





Functions

Our Master Station - MS101, MS102 or MS202 - offers the following functions:

	Commands	Signaling		Alarms		Actuator availability	Configu-ration	Access rights
		Actuator	Master Station	Actuator	Master Station			
DCS	√	√	√	√	√	√		
Web		√	√	√	√	√		
List of available data	<ul style="list-style-type: none"> • Open • Close • Stop • Auxiliary command 1 • Auxiliary command 2 • Position setting <p>Details on auxiliary commands can be found in INTELLI+ ® doc</p>	<ul style="list-style-type: none"> • Valve open • Valve closed • Selector in local / remote • Torque limiter action • Moving in the open / close direction (fix ed signal) • Emergency command (ESD) • The handwheel has been activated since the last electrical movement • Too many starts • Battery low • Partial stroking in progress* • Communication with Master 1/2** • Command by DCS** • Current Position • Current Torque 	<ul style="list-style-type: none"> • Rack 1 is Primary or secondary (MS202 only) • Rack 2 is Primary or secondary (MS202 only) 	<ul style="list-style-type: none"> • Thermal motor overload • Lost phase (in three phase actuator) • Jammed valve* • Direction of rotation Open / Close • Position sensor • Torque sensor • Partial stroking in fault* • Lost redundancy on profibus line • Lost communication 	<ul style="list-style-type: none"> • Communication fault between the two racks (MS202 only) • Communication status between web interface and rack 1 • Communication status between web interface and rack 2 (MS202 only) • Profibus communication status on line 1 • Profibus communication status on line 2 (MS202 & MS102 only) 	Actuator available		

	Commands	Signaling		Alarms		Actuator availability	Configuration*	Access rights
		Actuator	Master Station	Actuator	Master Station			
Touch screen	√	√	√	√	√	√	√	√
Maintenance computer	√	√	√	√	√	√	√	√
List of available data	<ul style="list-style-type: none"> • Open • Close • Stop • Auxiliary command 1 • Auxiliary command 2 • Position setting <p>Details on auxiliary commands can be found in INTELLI+ ® doc</p>	<ul style="list-style-type: none"> • Valve open / Valve closed • Torque limiter action in open / close direction • Selector in local / remote / off • Moving in the open / close direction • Emergency command (ESD) • The handwheel has been activated since the last electrical movement • Battery low • Partial stroking in progress* • Current position / Current torque • Close tight max torque in %* • Open breakout max torque in %* • Opening / closing max torque in %* • Starts last 12 hours* • Number of starts* • Running time* • Partial number of starts* • Partial running time* • Operating class* • Motor supply type* • Closing mode* • Stroke unit* • Nut thread* • Locked motor timing* • Reverse delay time* • External gear ratio* • Stroke measured during setup* • Software version* • Manufacture date* • Actuator number* • Opening / closing torque curve* • Profibus slave address* 	<ul style="list-style-type: none"> • Rack 1 is Primary or secondary (MS202 only) • Rack 2 is Primary or secondary (MS202 only) 	<ul style="list-style-type: none"> • Thermal motor overload • Lost phase (in three phase actuator) • Jammed valve* • Direction of rotation Close / Open • Position sensor • Torque sensor • Partial stroking in fault* • Lost redundancy on profibus line • Lost communication • Overtravel • Motor locked in open direction • Motor locked in close direction 	<ul style="list-style-type: none"> • Communication fault between the two racks (MS202 only) • Communication status between web interface and rack 1 • Communication status between web interface and rack 2 (MS202 only) • Profibus communication status on line 1 • Profibus communication status on line 2 (MS202 & MS102 only) • Communication status between the touch screen and the rack 	Actuator available	<ul style="list-style-type: none"> • Alarms configuration • Auxiliary command configuration • ESD configuration • Tag name • Priority • Torque settings • Position in case of lost communication • IP adress • Gateway • Mask • Modbus adress <p>This is done through the acyclic communication</p>	• Access rights management

* Not available when main line fault in MS102 ** Not available through Web interface

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