



Micro-control Radio Remote Control System

The Cavotec Group

Cavotec is the name of a group of companies specialized in power supply technology for cranes and other industrial equipment. It is formed by 6 manufacturing companies located in Australia, France, Germany, Italy, Sweden and U.S.A., as well as by 18 Cavotec sales companies which, together with a network of Distributors, serve more than 30 countries in five continents. Each manufacturing company, no matter where it is located, aims at being a market leader in its field by providing innovative and reliable products to Group customers. Although they manufacture different products in different countries, they are globally supported and coordinated by the Cavotec Group in their product development and marketing activities. Each sales company, and each distributor, has a policy aiming at better serving its local market with the full support of the Cavotec Group.

Our fields of activity are



**Mining,
tunnelling**



Steel Mills



Forestry



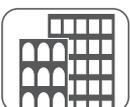
**Ports,
Terminals**



**Robots,
Automation**



Offshore



Constructions



Auto workshops

Our aim is to be local everywhere

Great emphasis is put in providing the highest quality not only in the selected products, but also in service and backing to our customers. Our philosophy in fact is to be local everywhere.

Cavotec and Micro-control partnership

The partnership between Micro-control and Cavotec was formed in 2001. Micro-control with high quality, high technological radio remote control systems, is market leader in its home market. Cavotec with its existing worldwide Cavotec sales & service organisation, is fully supporting Micro-control in becoming a global leading manufacturer of Radio Remote Controls. The Cavotec Group and Micro-control form a perfect team in the field of Radio Remote Control systems.



Micro-control aim is to provide the highest quality as confirmed by the ISO 9001 and by the ATEX approval for explosion-proof radio remote controls.

The Micro-control Company

The company *Micro-control* as was founded in 1984. The business idea was to develop, produce and market own electronic products. The first product from the company was a radio remote control for controlling chain hoists in the Norwegian agricultural market.

The business idea is still the same, but many things have evolved since 1984. This is true both for the company, as well as for the electronic business. In Micro-control we have constantly developed our products with one aim: To be a technological leading supplier in our field.

Today we have a solid base in a standard range of products, covering most requirements for remote controls within industry, offshore, maritime and the process industry. All our products are highly flexible, and made up by standard range of modules. This gives Micro-control the possibility to meet most customer requirements, in a quick and cost effective way.

"Custom made solutions" is our strength and most important competitive edge. Our aim has always been to deliver quality products, on time, to competitive prices. Fast service and close contact with our customers are other values we strongly believe in.

Former mother company of Micro-control, "Microplast" built its present factory in 1991 in Stjørdal, Norway. From this time Micro-control and Microplast have been co-located. Micro-control has the advantage of having its supplier of injection-moulded plastics "in House".



Radio Remote Control MC-2000

MC-2000 is the radio control, which has the functionality covering most applications.

The MC-2000 transmitter is easy to operate and has an elegant design.

MC-2000 is robust for operation in demanding environment.



MC-2000

Up to 20 functions push-button pad with full simultaneousness. Built-in antenna and plug-in batteries. Delivered with a carrier case. Modular system for simple customer adjustment and service.

- Possibility of proportional control
- Timing functions
- Log file
- Configurable

Options

- Co-ordination makes it possible to control one machine from several transmitters and several machines from one transmitter.
- Selectable radio frequency prevents interruption if several machines uses the same radio frequency.
- Duplicated and monitored safety relay.
- Serial communication directly between receiver and PLC.

Built-in PLC

The receiver has a built-in PLC functionality.

In this all types of functions may be programmed, which otherwise would require PLC or relay connections, like sequences, interlocking and timing functions.

In addition to relay outputs the receiver may be equipped with digital inputs and analog outputs.

The transmitter comes with a practical holster and belt that may be used when the unit is not operated. Two batteries and a fast charger secure constant operation.



Menu system

The receiver has a built-in menu system with a text display of 2x16 characters and menu buttons.

At normal operation the display shows the operational state. Using the menu system it is possible to view all the configuring parameters and all the historical data.

Authorized personnel may also change the configuring parameters using the menu system.



Area of application:

- Overhead cranes
- Salvage vehicle
- Fish farming
- Chain hoist
- Winches
- Sludge-pump trucks
- Concrete pumps
- Container trucks
- etc.



Technical data

General Data

Functions:

8 function buttons 2 step
4 selector buttons
Built in SOFT PLC technology

Frequency Range:

418 MHz – 474 MHz

Operating distance:

Minimum 200 m
650 ft

Safety functions:

Unique ID code for each system

Protection class:

IP 65 Standard
IP 66/67 Option

Ambient temperature:

-25°C + 50°C
-13°F + 122°F

Transmitter:

Output power:

< 50 mW
< 10 mW ISM

Sensitivity:

<1uV

Transmission format:

FSK, 2400 BPS

Transmitter weight:

Approx: 400g
0.9 lbs

Transmitter size:

70 x 40 x 250 mm
2.8 x 1.6 x 9.9 inch

Receiver:

Supply voltage receiver:

12 / 24 VDC
110-240 / 380 VAC 50/60Hz

Receiver size:

IRX: 255 x 180 x 115 mm
10 x 7.1 x 4.5 inch
MRX: Upon request

Battery:

Battery data:
Default battery package
6V / 700mAh

Operating time battery:

8 hours operation time

Recharge time:

1 hour

Remote control operates overhead cranes.

Radio Remote Control MC-3-5

Radio remote control MC-3-5 with features covering most applications.

The MC-3-5 transmitter is easy to operate, and has a modern design.

MC-3-5 is robust for operation in demanding surroundings.



MC-3-5 DIGITAL AND ANALOG RADIO REMOTE CONTROL

A quality product produced and designed by Micro-control as.

MC-3-5

- A new quality product in the Micro-control family, with a modern and practical design.
- The unit is equally well controlled when installed in the carrier belt as carried by hand.
- A special ergonomic design.
- Everything - from simple control tasks to complete process supervision - may take place in the same system.

MC-3-5 is delivered at the most competitive prices.

Options

- Co-ordination makes it possible to control one machine from several transmitters and several machines from one transmitter.
- Radio frequency selector makes it possible to change frequency, when several machines use the same radio frequency.
- Serial communication directly between receiver and PLC.
- Duplex communication with feedback to LEDs or LED/LCD display.
- Soft start/stop of the analog functions.
- Good possibility for adjustments regarding operator control and features.

The elegantly designed MC-3-5 transmitter is delivered with two batteries and a carrier belt. The 1 hour charger secures constant operation of the unit.



Built-in PLC

The receiver has a built-in PLC-functionality.

In this all types of functions may be programmed, which otherwise would require PLC or relay connections, like sequences, interlocking and timing functions.

MC-3-5 can be delivered with the MRX or the IRX receiver depending on the application. The IRX may feature PLC functionality while the MRX can give up to 64 digital I/O and 13 channel proportional I/O. Even serial communication may be provided.



Menu system

The receiver has a built-in menu system with a text display of 2 x 16 characters and menu buttons. At normal operation the display shows the operational state.

By using the menu system, it is possible to view all the configuration parameters and historical data. Authorized personnel may also change the configuration parameters using the menu system.

Technical data

General Data:

Digital functions: 32 / 64

Analogue functions: 13

Frequency Range:

418 MHz – 474 MHz

Operating distance:

Minimum 200 m
650 ft

Safety functions:

Unique ID code for each system

Protection class:

IP 65 Standard

IP 66/67 Option

Ambient temperature:

-25°C + 50°C

-13°F + 122°F

Transmitter:

Output power:

< 50 mW

< 10 mW ISM

Sensitivity:

<1uV

Transmission format:

FSK, 2400 BPS / 9600 BPS

Output Power:

< 100 mW

< 50 mW

< 10 mW ISM

Transmitter weight:

Approx: 2.2kg

4.8 lbs

Transmitter size:

230 x 175 x 160 mm

9.0 x 6.9 x 6.3 inch

Feedback to LED or LCD display:

Option

Receiver:

Supply voltage receiver:

12 / 24 VDC

110-240 / 380 VAC 50/60Hz

Receiver size:

According to requirements

Cable control:

4 wire RS-485 option

Battery:

Battery data:

Default battery package

7.2V / 1800mAh

Operating time battery:

> 10 hours operation time

Recharge time:

< 3 hours



Picture courtesy of MacGregor Cranes

Most maritime cranes are today remote operated, above a ship with MacGregor Cranes. The cranes can be tandem operated increasing the maximum load that can be carried.

Seismic Survey Vessel uses a large number of winches and cranes in order to operate and control the seismic sonds dragged behind the vessel in the sea.



Picture courtesy of PGS

Radio Remote Control MC-3000

Flexible and safe control with extreme precision of:

- Mobile cranes
- Overhead cranes
- Concrete pumps
- Fish farming
- Tower cranes
- Maritime cranes
- Maritime winches
- Etc.



The MC-3000 family is the product family with highest flexibility and is well proven from operation in harsh environments.



MC-3000

Is one of the most flexible radio remote control systems in the market. Everything - from simple control functions to complete process supervision may take place in the same system. MC-3000 can solve most of the direct hydraulic and electric control functions, and also communicate serially with the most known PLC and frequency converters. A new feature is communication using the TCP/IP protocol. Included in the family are both MC-3000 EEx, which is used in EEx zone, and MC-3000 Extreme, and is developed to stand up to the most extreme environmental influences. Everything can be delivered to most competitive prices.

Options

- Duplex communication with feedback to lamps or display.
- Co-ordination, makes it possible to control one machine from several transmitters and several machines from one transmitter.
- Serial communication directly between the receiver and PLC.
- Soft start/stop of the analog functions.
- Programmable output characteristics for analog functions
- A wide range of control components and functions are available.
- Selectable radio frequency prevents interruption if several machines uses the same radio frequency

MC-3000 DIGITAL AND ANALOG RADIO REMOTE CONTROL

A quality product produced and developed by *Micro-control as.*

MC-3000 Extreme is a version, which is developed for tough maritime environment.

It meets the air tightness class IP66/67 both regarding encapsulation and operator control.

The electronics are encapsulated to avoid internal condensation.

Plug-in battery, battery charger and extra battery ensure continuous operation.

The MC-3000 and MC-3000+ transmitter units are made of impact resisting and acid proof plastic, which stand up to rough treatment.

MC-3000 can be delivered with the MRX or the IRX receiver depending on the application. The IRX may feature PLC functionality while the MRX can give up to 64 digital I/O and 13 channel proportional I/O. Even serial communication may be provided.



Picture courtesy of PGS



An intelligent remote control enables the operator to handle the large number of winches synchronously, increasing the operational time of the vessel significantly.

Micro-control has supplied BMH Marine with Radio Remote Controls for all their ship unloaders, starting from the early nineties.

Technical data

General Data:

Digital functions: 64

Analogue functions: 13

Frequency Range:

418 MHz - 474 MHz

Operating distance:

Minimum 200 m

650 ft

Safety functions:

Unique ID code for each system

Protection class:

IP 65 Standard

IP 66 Option

Ambient temperature:

-25°C + 50°C

-13°F + 122°F

Transmitter:

Output power:

< 50 mW

< 10 mW ISM

Sensitivity:

<1uV

Transmission format:

FSK, 2400 BPS / 9600 BPS

Output Power:

< 100 mW

< 50 mW

< 10 mW ISM

Transmitter weight:

Approx: 2.2kg

4.8 lbs

Transmitter size:

MC3000

250 x 158 x 180 mm

9.85x 6.22x 7.09 inch

MC3000+

305 x 200 x 190 mm

12.0x 7.87x 7.48 inch

Feedback to LED or LCD display:

Option

Receiver:

Supply voltage receiver:

12 / 24 VDC

110-240 / 380 VAC 50/60Hz

Receiver size:

According to requirements

Cable control:

4 wire RS-485 option

Battery:

Battery data:

Default battery package

7.2V / 1300mAh

Operating time battery:

8 hours operation time

Recharge time:

1 hour

Remote Control approved for use in explosive areas MC-3000-EX

Types of communication

Cable control RS-422, RS-485

Radio control 433-443 MHz

Examples of controlled
objects:

- Maritime cranes
- Maritime winches
- Other machines where
the operator needs to be free
to move around.



Functionality

MC-3000-EX gives a secure and flexible control of machines. To a wide extent it has the same functionality as MC-3000.

A radio controlled system may in addition have the possibility to use cable control. This gives an extra security against shutdown if a fault occurs in one of the types of communication.

The system can be delivered with simplex or duplex communication. With duplex communication the operator can receive messages (alarm messages, status indications, etc.) via light emitting diodes, display, indicator instruments, etc.

In addition the base unit can be delivered with a serial interface with the most common bus standards on the market today.

MC-3000 EEx is the first ever EEx radio remote control to obtain an ATEX approval.



The most versatile EEx radio remote control system on the market today. Full flexibility, full freedom and full security.

The base unit can be delivered without explosion proof and increased safety encapsulation if it is to be used in areas where such encapsulation is not necessary.

The battery that is used in the terminal is intrinsically safe. Consequently, exchanging the battery can be done in explosive area.



Description	Terminal (Transmitter)	Base unit (Receiver)
Zone	I	I
Gas group	IIB	IIB/IIC
Temperature class	T4	T6
Protection method	Intrinsically safe EEx ib	Explosion proof encapsulation EEx d Increased safety encapsulation EEx e Intrinsically safe EEx ib



Many deck cranes are today controlled by radio remote controls. Above a Stena Supply Ship with two Hydralift cranes in Norway.

Micro-control RRC are used in mining and tunneling applications, both for normal and EEx environment. The intelligence of Micro-control equipment can in some cases replace a PLC on the machine.



Technical data

General Data:

Digital functions: 64

Analogue functions: 13

Frequency Range:
418 MHz – 474 MHz

Operating distance:
Minimum 200 m
650 ft

Safety functions:
Unique ID code for each system

Protection class:
IP 65 Standard; IP 66 Option

Ambient temperature:
-25°C + 50°C
-13°F + 122°F

Transmitter:

Output power:
< 50 mW; < 10 mW ISM

Sensitivity:
< 1µV

Transmission format:
FSK, 2400 BPS / 9600 BPS

Output Power:
< 100 mW; < 50 mW; < 10 mW ISM

Transmitter weight:
Approx: 2.2kg
4.8 lbs

Transmitter size:

MC3000
250 x 158 x 180 mm
9.85x 6.22x 7.09 inch

MC3000+
305 x 200 x 190 mm
12.0x 7.87x 7.48 inch

Feedback to LED or LCD display:
Option

Receiver:

Supply voltage receiver:
12 / 24 VDC
110-240 / 380 VAC 50/60Hz

Receiver size in EEx d / EEx e:
Painted Steel:
330 x 580 x 300 mm
13 x 23 x 12 inch
Stainless Steel:
380 x 570 x 270 mm
15 x 22.5 x 10.6 inch

Cable control:
4 wire RS-485 option

Battery:

Battery data:
Default battery package
7.2V / 1500mAh, Intrinsically safe

Operating time battery:
8 hours operation time

Recharge time:
1 hour

Approvals:

Radio:
Approved by national authorities (i.e. PT, BAPT, ART, FCC) in most countries. For complete list please contact your local Cavotec company

ATEX approval through DNV -Nemko:
Zone 1,
Transmitter IIB, T4
Receiver IIB/IIC, T6

Radio communication between machines MC-NET

MC-NET - communication
between machines through
radio.

This gives great benefits if:

- Mobile machines make cable laying difficult.
- Cable laying is expensive.
- Cable is complex, and the machines are often moved.



The MC-NET systems can be divided into two groups:

MC-NET nodes with parallel I/O

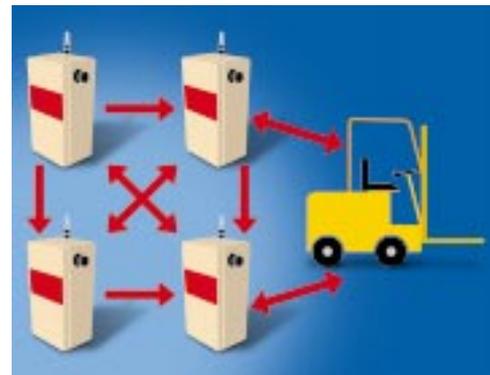
Make it possible to exchange analog and digital signals between two or more nodes via radio.

MC-NET nodes with serial I/O

Make it possible to exchange data serially between two or more nodes via radio.

MC-NET with parallel I/O

This system consists of two or more MC-NET nodes. All the nodes have duplex radio communication with each other. The system is configured to achieve that an input signal at one of the nodes is available as an output signal at one or more of the other nodes.



*Standard housing of MC-Net is IP 65.
The units display shows operational status.*

Technical data for input and output

Digital input: A separate relay adjusted to the signal voltage is installed. The default delivery is 5, 12, 24, 48VDC, 24, 110, 220, 380VAC. Maximum 64 inputs per node.

Digital output: A relay output with change-over contact. 10A, 30VDC / 250VAC, resistive. Duplicated controlled contact (safety relay) can be delivered.

Maximum 64 outputs per node.

Analog input: 256 steps. Galvanic separated input signal of $\pm 100\text{mV}$, $\pm 200\text{mV}$, $\pm 500\text{mV}$, $\pm 1\text{V}$, $\pm 2\text{V}$, $\pm 5\text{V}$, $\pm 10\text{V}$, $\pm 20\text{V}$, 0-100mV, 0-200mV, 0-500mV, 0-1V, 0-2V, 0-5V, 0-10V, 0-20V, 1-5V, 0-20mA or 4-20mA. Maximum 13 inputs per node.

Analog output: 256 steps. Galvanic separated output signal of $\pm 5\text{V}$, $\pm 10\text{V}$, 0-5V, 0-10V, 1-5V, 0-20mA or 4-20mA. In addition signals adjusted to directly running hydraulic valves can be delivered. Maximum 16 outputs per node.

MC-NET with serial I/O

This system consists of two or more MC-NET nodes. All the nodes have duplex radio communication with each other. The system is configured to achieve that data, which is received serially at one node, can be read serially at one or more of the other nodes.

MC-NET can be delivered with various communication protocols. Consequently it can be connected to most available equipment.

It is also possible to mix serial and parallel I/O in the same system. In that way MC-NET can be used as a distributed I/O system with radio communication between the units. Further more it is possible to mix MC-NET nodes with various protocols in the same network.

A default system can be delivered with a maximum of 5 nodes. If more than 5 nodes or special data processing in the nodes is required, please contact Cavotec.



Micro-control RRC's are used in airplane maintenance operations and for remote control of drilling equipment in open pit mines.



Technical data

General Data:

Size:

360 x 260 x 170 mm
14 x 10 x 6.6 inch

Frequency Range:

418 MHz – 474 MHz

Output power:

< 100 mW
< 50 mW

Operating distance:

Minimum 200 m
650 ft

Greater operating distance can be achieved for permanently installed equipment

Safety functions:

Unique ID code for each system

Protection class:

IP 65 Standard

Ambient temperature:

-25°C + 50°C
-13°F + 122°F

Sensitivity:

<1 μ V

Transmission format:

FSK, 2400 BPS / 9600 BPS

Supply voltage:

12 / 24 VDC
110-240 / 380 VAC 50/60Hz

Protocols:

Standard protocols available from stock:

Profibus-DP
Modbus RTU
Siemens 3964R
DeviceNet

Other standard protocols available:

Ethernet
CANOpen
Interbus
LonWorks
Modbus Plus
Allen Bradley remote I/O

Future protocols:

P-Net
Sattbus
ControlNet

MC-NET can be delivered with various communication protocols, and can consequently be connected to almost all equipment.

Radio remote controls with serial communication MC-LINK

MC-LINK is a product in the MC-3000 family that makes it simple to connect radio controls to PLC units and other equipment that can communicate serially.



MC-LINK uses duplex communication with the radio remote controls. Each MC-LINK can communicate simultaneously with maximum four radio remote controls.

In a distributed I/O network the radio remote controls are seen as ordinary I/O units. This means that remote control switches are read as digital inputs, while analog joysticks are read as analog inputs.

Radio remote control LEDs and display are controlled in the same way by configuring the I/O unit outputs. All the units are delivered completely

with documentation, configuration files and other necessary equipment. In addition Profibus-DP can be delivered as DP-master. This means that the radio control can control frequency converters, I/O units and other Profibus-DP slaves directly via Profibus-DP.

Protocol:

See separate overview of available protocols. All the protocols are fully supported in accordance with the current standards and specifications.

Serial connection:

Depends on the selected protocol. Normally the connection methods and data speeds, which the standard specifications allow, are supported. Any detailed questions about available protocols should be put to *Micro-control as*, through your local Cavotec office.



Mobile Harbour Cranes.

At times it is necessary for the crane drivers to place themselves near the cargo. RRC's from Micro-control makes handling of goods in these cases both simpler and safer.



Telescopic mobile cranes are operated with radio remote controls

Technical data

General Data:

Size:

360 x 260 x 170 mm
14 x 10 x 6.6 inch

Frequency Range:

418 MHz – 474 MHz

Output power:

< 100 mW
< 50 mW

Operating distance:

Minimum 200 m
650 ft

Greater operating distance can be achieved for permanently installed equipment

Safety functions:

Unique ID code for each system

Protection class:

IP 65 Standard

Ambient temperature:

-25°C + 50°C
-13°F + 122°F

Sensitivity:

<1 μ V

Transmission format:

FSK, 2400 BPS / 9600 BPS

Supply voltage:

12 / 24 VDC
110-240 / 380 VAC 50/60Hz

Protocols:

Standard protocols available from stock:

Profibus-DP
Modbus RTU
Siemens 3964R
DeviceNet

Other standard protocols available:

Ethernet
CANOpen
Interbus
LonWorks
Modbus Plus
Allen Bradley remote I/O

Future protocols:

P-Net
Sattbus
ControlNet

MC-NET can be delivered with various communication protocols, and can consequently be connected to almost all equipment.

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www.cavotec.com

E-commerce sites:
www.cavotecshop.com
www.flexiblecables.com

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