Remote Radio Control

M880 Radio Control for Hydraulic Cranes

Application
Radio Remote Controls are fast becoming the control method of choice for the vast majority of hydraulic crane manufacturers and operators. The use of a remote control system allows the operator to move around the workspace and therefore find the safest and most convenient position from which to carry out the operation resulting in improved productivity in addition to greater operator safety.

M880 Advantages

Compact transmitters – All M880 transmitters are compact and lightweight making life more comfortable for the operator and allowing greater freedom of movement.
Extreme Environments – Transmitters & Receivers are constructed from high impact resistant materials and are suitable for operating temperatures from –25 up to +70 deg C.
Automatic Frequency change – New 'AFA' technology effectively kills off the problem of interference as the M880 system continuously searches for, and logs on to the 'cleanest' channel within the operating frequency band.
Contactless optical joysticks – Designed & manufactured in house, our joysticks guarantee precise handling throughout the life of the radio system, available in both stepless and stepped format.
Certified Safety – The STOP circuit on all M880 units (with exception of ARES 2C) complies with the highest European & International standards (ISO13849–1 PLe / SIL3 / Cat 4)

Transmitters for Hydraulic Cranes

M880 KRON M4

The M880 KRON M4 is the latest addition to our range of joystick style transmitters, designed to provide a competitive solution for 4 function cranes the KRON M4 features four single axis proportional joysticks in addition to standard start & E–Stop buttons. KRON M4 is available in 3 versions – basic, standard & plus. Details of each are shown in the transmitter selection section on the following pages.

M880 ZEUS2

The M880 ZEUS2 M offers great flexibility with sufficient space on the transmitter panel to allow for as many as 8 additional auxiliary commands in addition to six single axis proportional joysticks and start and E–Stop buttons.
ZEUS2 can also be configured with two double axis joysticks (ZEUS2 B2) for operators who prefer this layout to the traditional single axis layout

M880 THOR2

The M880 THOR2 is our largest and most flexible transmitter for hydraulic cranes, the THOR2 model has space for up to eight single axis proportional joysticks and up to ten additional auxiliary commands in addition to standard start and E–Stop buttons. THOR2 is also available with 3 or 4 double axis joysticks for operators who prefer that configuration.

Other standard features on all of our joystick transmitters include LED's to report on status of radio link & battery condition, these LED's are also used to transmit error codes for fault diagnosis enabling us to help get you working again quickly in the unlikely event of a system failure.Please see below for specific information on which transmitter is best suited to your application.

Radio Remote Control for 4 Function Cranes

SIMBAL offer 7 different models for the control of 4 function hydraulic cranes depending on your requirement, the smallest & most cost effective solution is the KRON M4 transmitter which is available in 3 formats – Basic, Standard & Plus. If you need more flexibility then the ZEUS2 is a larger unit with space for additional auxiliary commands and is available with either single or double axis joysticks in Standard & Plus formats.

KRON M4

ZEUS2 M4

ZEUS2 B2

Basic	Rabbit / Snail (available on KRON M4 only)
Standard	DSC IN–SLOW, Rabbit / Snail, RPM +/–, Motor On/Off
Plus	DSC IN–SLOW, Rabbit / Snail, RPM +/–, Motor On/Off, Lights On/Off, Load Indication 90/100% by LED

Radio Remote Control for 5 Function Cranes

SIMBAL offer 4 different models for the control of 5 function hydraulic cranes depending on your requirement, the smallest & most cost effective solution is the KRON M4 transmitter with an auxiliary command for selection of the 5th function which is available in either Standard or Plus format. If you prefer 5 individual joysticks or need more space for additional auxiliary commands then the ZEUS2 M5 is a larger unit also available in standard or plus formats.

KRON M4

ZEUS2 M5

Standard	DSC IN–SLOW, Rabbit / Snail, RPM +/–, Motor On/Off
Plus	DSC IN–SLOW, Rabbit / Snail, RPM +/–, Motor On/Off, Lights On/Off, Load Indication 90/100% by LED

Radio Remote Control for 6 Function Cranes

SIMBAL offer 6 different models for the control of 6 function hydraulic cranes depending on your requirement, the smallest & most cost effective solution is the ZEUS2 M6 transmitter which is available in either Standard or Plus format. If you need more flexibility then the THOR2 is a larger unit with space for additional auxiliary commands and is available with either single or double axis joysticks in Standard & Plus formats.

ZEUS2 M6

THOR2 M6

THOR2 B3

Standard	DSC IN–SLOW, Rabbit / Snail, RPM +/–, Motor On/Off
Plus	DSC IN–SLOW, Rabbit / Snail, RPM +/–, Motor On/Off, Lights On/Off, Load Indication 90/100% by LED

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Radio Remote Control for 7/8 Function Cranes

SIMBAL offer 3 different models for the control of 7 & 8 function hydraulic cranes depending on your requirement, the smallest & most cost effective solution is the ZEUS2 M6+2 transmitter fitted with a selector switch to enable the 7th & 8th functions. ZEUS2 M6+2s is available in either Standard or Plus format. If you need more flexibility then the THOR2 M8 is a larger unit with 8 single axis joysticks and space for additional auxiliary commands.

ZEUS2 M6+2

THOR2 M8

Standard	DSC IN–SLOW, Rabbit / Snail, RPM +/–, Motor On/Off
Plus	DSC IN–SLOW, Rabbit / Snail, RPM +/–, Motor On/Off, Lights On/Off, Load Indication 90/100% by LED

Radio Remote Control for 9/10 Function Cranes

SIMBAL offer just one model for the control of 9 & 10 function hydraulic cranes the THOR2 M9 is a large unit with 9 single axis joysticks and space for additional auxiliary commands. For 10 function cranes a selector switch is incorporated to change the function of the 9th joystick.

THOR2 M9

Standard	DSC IN–SLOW, Rabbit / Snail, RPM +/–, Motor On/Off
Plus	DSC IN–SLOW, Rabbit / Snail, RPM +/–, Motor On/Off, Lights On/Off, Load Indication 90/100% by LED

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M880 KRON / ZEUS2 / THOR2 – Standard Features

Rechargeable NiMh Batteries

Extractable, rechargeable NiMh batteries for extra long operating duration up to 22 hours continuous use between charges.

Status LED's

Coloured LED's report the status of the radio link, battery charge level and error diagnostics

PIN Code

Access PIN code can be programmed in to the transmitter to restrict use to authorised personnel

Legends

Standard arrow legends or fully customised legends with symbols or text

Emergency STOP

Mushroom Head E–Stop button featuring functional safety level PLe/SIL3/Cat4

Carrying Strap

Waist belts or shoulder straps are available for all joystick transmitters

M880 KRON / ZEUS2 / THOR2 – Options

Auxilliary commands

All KRON, ZEUS2, THOR2 & G4 joystick transmitters have space available to accommodate additional commands in the form off rotary switches, toggle switches, key switch, pushbutton or potentiometers. The number of commands which can be fitted depends on the transmitter type selected.

Load indication LED's

A standard requirement for many crane applications, particularly tower cranes, load indication LED's are a popular option, normally set to indicate 90% & 100% load status.

Add Box display

The add box display is available with all ZEUS2 & THOR2 transmitters and can be used to house additional commands or as a display screen to show load & status data received through a digital feedback link from the radio receiver.

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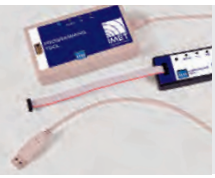
M880 KRON / ZEUS2 / THOR2 – Options (continued)

I–READY Infra Red Start up

An infra–red directional START operation, requires line of site between transmitter and receiver to start the system increasing safety by reducing the possibility of accidental operation.

MTRS Multi machine control

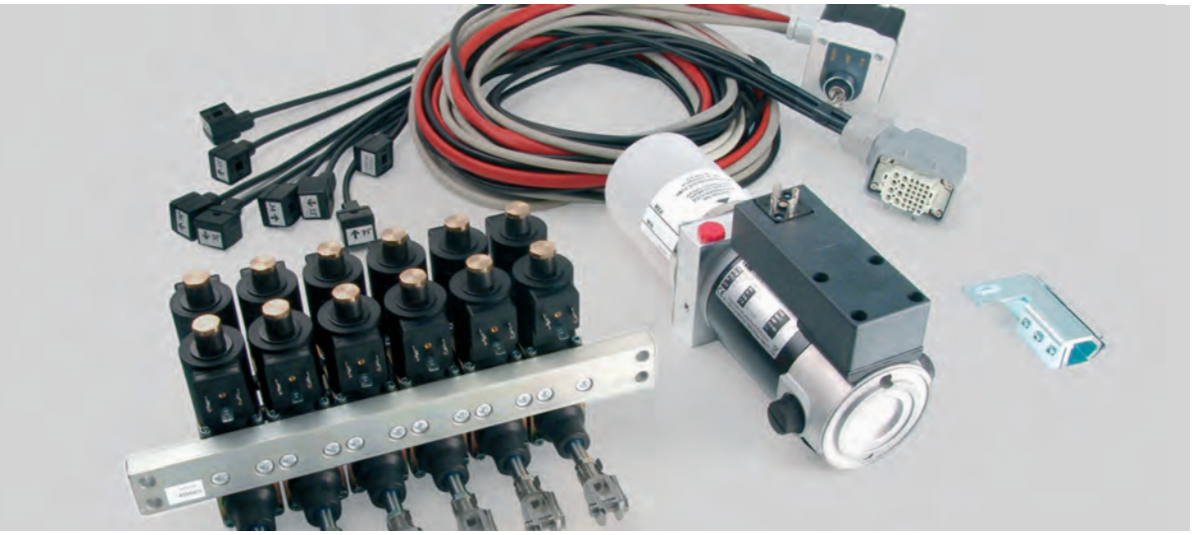
Communication between multiple transmitters and receivers allows classic tandem operations such as catch & release and pitch & catch plus many other configurations. Can be combined with our fixed radio to provide crane to crane or machine to machine communication.



Diagnostic Tool

Allows cable connection from transmitter to receiver overriding radio for situations where radio transmission is not allowed. Data can be viewed and saved on a PC in editable format. Available in 2 versions, cable connection only and wireless connection

PWM Actuator Kit APT400



The PWM Actuator kit APT400 can be combined with any KRON, ZEUS2 or THOR2 radio control system to provide a remote control solution for almost any hydraulic crane on the market today which is currently equipped with manual cross rod controls. The system can be installed easily with no welding to the transmission rods and without effecting the integrity of the original system.
The electro hydraulic system of the APT400 works independently from the crane hydraulics thanks to a dedicated electro hydraulic control unit. This prevents potential failures caused by sharing the oil from the crane circuit which is often contaminated by years of heavy and intensive use.
This dedicated power pack only operates when crane manoeuvres are activated thus ensuring low operating temperatures and avoidance of wear & tear. Calibration of the actuators is carried out by the radio control unit once installation is complete allowing the speed and acceleration factors to be set according to the requirements of the operator.

The complete kit consists of

- Electro Hydraulic power pack
- Actuator kit
- Rod clamps
- Wiring kit
- By pass valve

The components can be purchased as a kit or as separate components (see page 7) and a typical connection drawing is shown on the next page.

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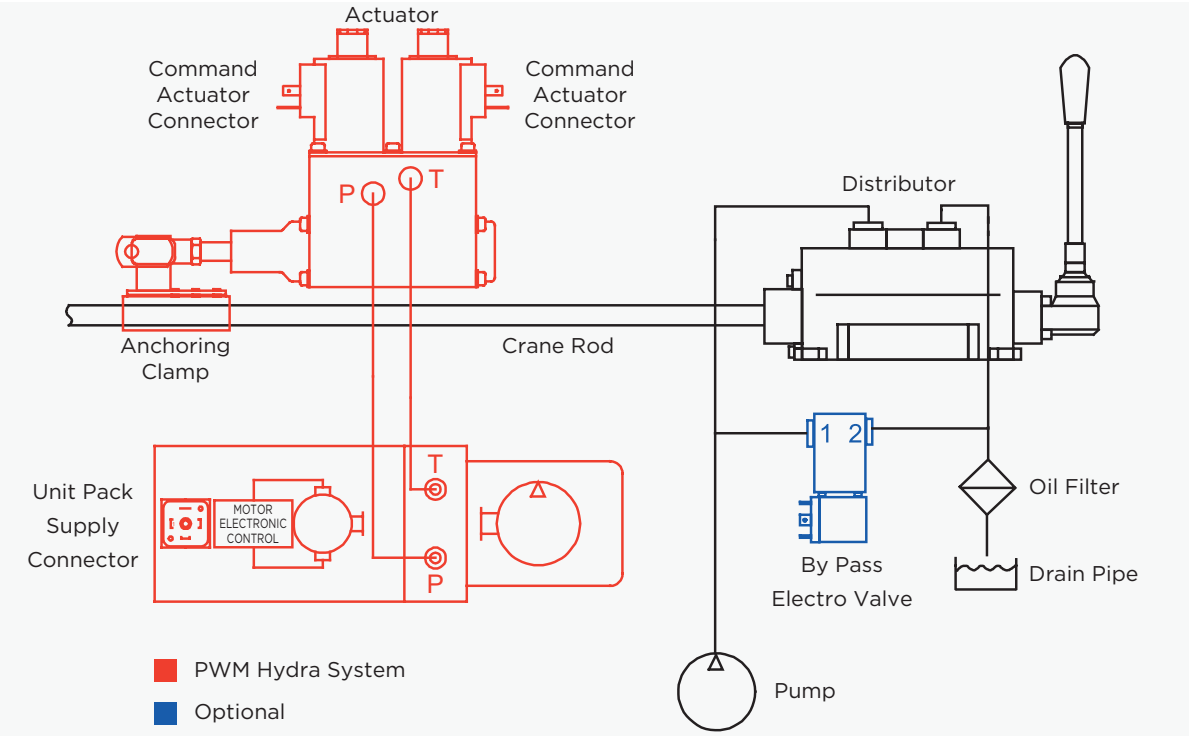
Typical Connection Diagram for 4 Function Monoblock



Rechargeable NiMh Batteries

Driving Signal	PWM at 80Hz
Coil Resistance	5.5 Ohm
Absorption at 27 Vdc	170 ÷ 620 mA
Absorption at 13.5 Vdc	300 ÷ 1250 mA
Operating Temperature	–20° c ÷ +70° c (–4° f ÷ 158° f)
Max Stroke	26mm (±13mm from centre)
Max Stroke (optinoal)	40mm (±20mm from centre)
Thrust Force and Traction at 12 bar	600N
Optimal Operating Pressure	15 ÷ 20 bar
Max Operating Pressure	30 bar
Hydraulic Circuit Connection	1/4" Gas
Dimensions (L.W.H)	210 x 38 x 138mm
Weight (single mode)	1500 g
Standard Distance between Centres	38, 42, 44, 46, 48, 50 mm *
Number of Standard Functions	4 ÷ 8 *

Electro Hydraulic Central Unit

Supply Voltage	12 o 24 Vdc +20% –10%
Operating Pressure	18 bar 27 Vdc – 16 bar 13.5 Vdc
Dimensions (L.W.H)	330 x 130 160 mm
Weight (dry)	5200 g

Counter Pressure Valve with Filter

Operating Temperature	–20° c ÷ +70° c (–4° f ÷ 158° f)
Flow Rate	70l/min
Dimensions (L.W.H)	84 x 50 132 mm
Weight (dry)	110 g

* in case of monoblock: 4F and 40 mm distance between centres

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Components / Options for Actuator Kit APT400

The Complete Electrical Wiring

The electrical wiring of the receiver / actuator / control unit system.

The Clamps for the Transmission Rods

The clamps to be fixed to the transmission rods of the crane avoid welding whatsoever and render the system independent.

Fittings and Hydraulic Piping

Fittings and connecting pipes to the control unit.

Other Accessories for The Actuator APT400 (optional)

Stroke Extension Kit

The standard actuator is +/– 13mm from the centre and fits most part of the hydraulic distributors present in the market. A kit that can extend the piston's stroke up to +/– 20mm is available.

Adapter Kit

It is possible to connect the actuators APT 400 directly to the proportional manual distributors Walvoil SD6–SD8, Galtech and Parker, thanks to the dedicated flanging kit. This configuration involves the removal of the transmission bars.

The By–Pass Valve

This valve is required to make the crane comply with CE regulations. In case you are lacking it, it is available in our catalogue.

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Tilt Sensor

The Tilt Sensor device is a micro switch within the transmitter which is able to recognise emergency situations caused by dropping or seriously tilting the transmitter, the function of the Tilt Sensor can be customised according to customer requirements and the level of safety required. It can be set to perform a number of actions from the activation of a simple buzzer up to total cut out of the radio transmission.

Serial Cable

All of our joystick style transmitters can be equipped with a socket for serial cable connection to the receiver. The direct cable connection from transmitter to receiver overrides the radio transmission thus overcoming any issues of signal noise and allowing use in those areas where radiofrequency transmission is not permitted.

Diagnostic Tool

This tool allows you to connect the transmitter or receiver to a PC to undergo status diagnostics. The data can be viewed by means of an easy and intuitive graphical interface, and can be saved to your PC in editable format.

There are two versions of the tool :

Standard – The transmitter can be connected to the tool only via cable

Plus – In addition to cable connection, the device can be connected in wireless mode allowing diagnostics to be carried out without removing the receiver from the crane

Double Battery

This feature is available only on the THOR2 transmitter and consists of a twin battery compartment. Once the first battery reaches the 'low power' state the transmitter automatically switches to the second battery. This switch over takes place without interruption to the power supply making it the ideal solution for applications where the radio system has to operate continuously for long periods.

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M880 Receiving Units

Weight	Dimensions
1700g	140 x 65 x 230mm

Weight	Dimensions
3500g	205 x 130 x 280mm

The new range of M880 Radio systems includes a total of four new receiver units, the M880 Lac and Ldc are the most popular and cost effective units, housing a maximum of 20 relays or MOSFETS they are suitable for use with the full range of transmitters and flexible enough to cover a large percentage of hydraulic crane applications.
Where the 20 relays of the type L receiver are not sufficient then the Hac & Hdc receivers come in to their own, configurable with a maximum of 73 relays or MOSFETS there are very few crane applications that can not be accommodated by a combination of the H receiver and one of our range of radio transmitters.
All receiving units in the M880 range are encased in solid and robust enclosures with a protection rating of IP66 making them suitable for indoor and outdoor use

Remote Radio Control

M880 HAC / M880 HDC / M880 LAC / M880 LDC Receivers

Technical Data

M880 HAC / M880 HDC Receivers

Dimensions & weight	M880 HAC / HDC 205 x 130 x 280 (3500g)
Power supply (M880 AC type)	45 – 240 Vac (50–60 Hz)
Absorbed power	45 VA max
Power supply (M880 DC/AC type)	11 – 30 Vdc 24 Vac
Absorbed power	44 W max. 68 VA max
Operating temperature range	–25 to +70°C (–13 to 158° F)
Casing protection	IP66
Safety enable (N/O) relay(s)	8 (ISO 13849–1:2006 6.2.6 architecture)
STOP relays (N/C & N/O)	8 (ISO 13849–1:2006 6.2.7 architecture)
Timed relay	1
Horn output	1
Feedback	
Serial LCD data	> 100 Bytes/sec
Digital ON/OFF commands	128 max.
Diagnostics	By means of status LED/display or through interface to PC using specific IMET equipment
Analogue inputs	12 Voltage (0 – 10VDC) Current (4/20mA, 0/20 mA)
Digital inputs	8 0/24 VDC optoisolated
Outputs	
Max number of control relays	
Max number of control relays (N–O/N–C)	ON/OFF – 128 max relay (AC or DC) or MOSFET (DC) ANALOGUE 32 max
Serial communication interfaces	(Proportional PWM/Analogue curent/Analogue voltage)
	RS232 or RS485 (max 115200 Baud)
	CAN_Bus (ID 11–29 Bit) {1 Mbit/s max)
	CANOpen (ID 11–29 Bit) {1 Mbit/s max)
	Other types on request

M880 LAC / M880 LDC Receivers

Dimensions & weight	M880 LAC / LDC 140 x 65 x 230mm (1700g)
Power supply (M880 LAC type)	24–55 Vac / 100–240 Vac (50–60 Hz)
Absorbed power	30 VA max
Power supply (M880 LDC type)	11 – 30 Vdc
Absorbed power	22 W max
Operating temperature range	–25 to +60°C (–13 to 140° F)
Casing protection	IP66
Safety enable (N/O) relay(s)	1 (ISO 13849–1:2006 6.2.6 architecture)
STOP relays (N/C & N/O)	2 (ISO 13849–1:2006 6.2.7 architecture)
Timed relay	1
Horn output	1
Feedback	
Serial LCD data	> 100 Bytes/sec
Digital ON/OFF commands	128 max.
Diagnostics	By means of status LED/display or through interface to PC using specific IMET equipment
Analogue inputs	4 Voltage (0 – 10VDC) Current (4/20mA, 0/20 mA)
Digital inputs	8 0/24 VDC optoisolated
Outputs	
Max number of control relays	20
Max number of control relays (N–O/N–C)	4 (with relay board mods RLC) 14 (with relay board mods RDC)
Max number of service relays	3 (start, klaxon and t–relay)
Max number of DC command drivers	20 (MOSFET)
Number of analogue outputs	8 proportional (PWM) analogue current and/or voltage
Serial communication interfaces	RS232 (max 115200 Baud)
	CAN_Bus (ID 11–29 Bit) {1 Mbit/s max)
	CANOpen (ID11–29 Bit) {1 Mbit/s max)

KRON, ZEUS2, THOR2, AREAS2, G4L & G4S Joystick Transmitters

	KRON	ZEUS2	THOR2	ARES2	G4L	G4S
Dimensions	180x107x160mm	205x150x150mm	295x180x160mm	143x80x143mm	430x225x180mm	265x185x165mm
Dimensions with LCD display		205x205x150mm	295x250x165mm			
Weight (inc. battery)	880g max	1450g max	2300g max	667g max	4000g max	1950g max
Power supply	3.6 VDC					
Battery	Ni – MH 3.6V					
Low battery notification time	15 minutes					
Operating temperature range	–25 to 55°C (–13 to +131° F)					
Casing protection	IP65					
Safety categories ISO 13849–1	STOP circuit PLe Cat4 ISO 13849–1:2006 6.2.7 architecture with 5A fuse					
	Joysticks PLd Cat3 ISO 13849–1:2006 6.2.7 architecture with 5A fuse					
	Push button and toggle switch commands PLc Cat2 ISO 13849–1:2006 6.2.7 architecture					
Status indicator/diagnostic LEDs	Green – power ON Yellow – diagnostic Blue – LINK status					
Commands/outputs	56 maximum					
Number of panel indicators	16 maximum					
Number of ON/OFF commands	56 maximum					
Number of analogue commands	16 (19) maximum					
Max UMFS commands up to PLd Cat3	16 (ISO 13849–1:2006 6.2.6 architecture)					
Display (optional extra(	Graphic backlight LCD 102x64 / 128x64 / 160x64 pixels monochrome QVGA 3.5" colour TFT					
Beeper in transmitter	Internal buzzer					
Backlit panel	Optional					
Serial lines	RS232 or RS485 CAN					
Optional extras	Wired control cable Dead man function IREADY infra red start up					