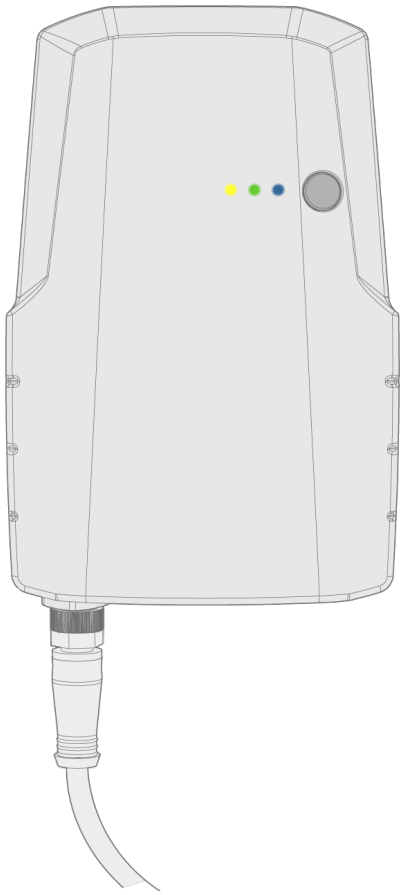
DIGITAL CONNECTIVITY MODULE (DCM) 2.0



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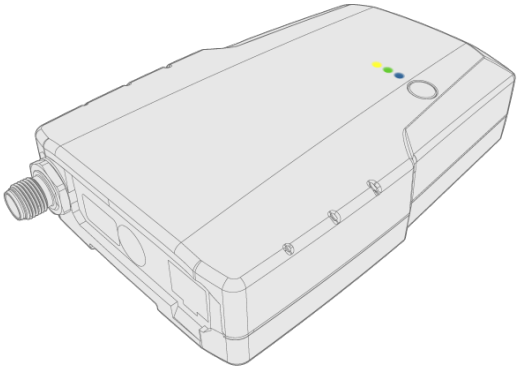
1. GENERAL



Kemppi's Digital Connectivity Module 2.0 (DCM 2.0) is a small single-board computer connected directly to the welding power source or wire feeder. It forms a connection between the welding equipment and robot / cobot (collaborative robot) via the Modbus TCP fieldbus or EtherNet/IP (in the setups, DCM 2.0 is a slave device).

DCM 2.0 uses WLAN or LAN for communicating with the PC, tablet or mobile device.

DCM 2.0 is compatible with the following Kemppi welding equipment:

- X5 FastMig (Auto, AP and APC equipment)
  >> Firmware version: 1.58 SP4 or later

DCM 2.0 does not support a double wire feeder configuration.

- Master M 358
  >> Firmware version: 1.24 SP3 or later
- Master M 353, 355
  >> Firmware version: 1.24 SP3 or later

Important notes

Read the instructions through carefully. For your own safety, and that of your working environment, pay particular attention to the safety instructions delivered with the equipment.

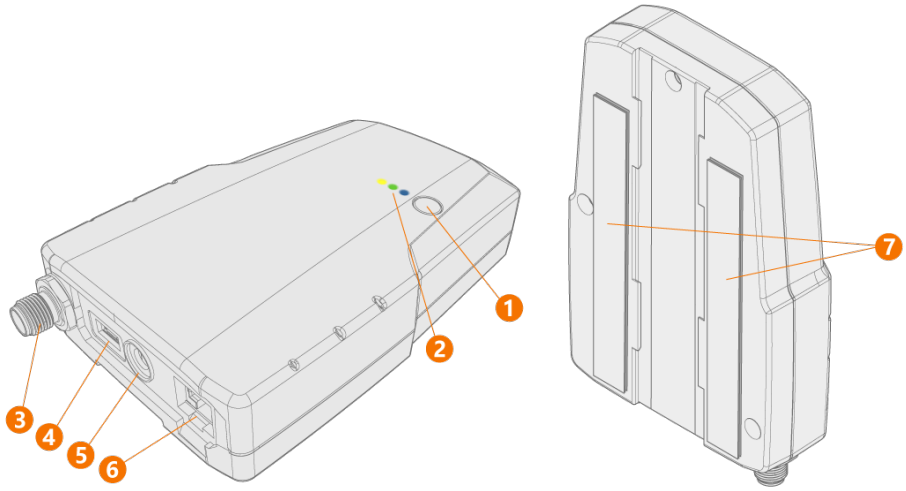
Items in the manual that require particular attention in order to minimize damage and harm are indicated with the below symbols. Read these sections carefully and follow their instructions.

Note: Gives the user a useful piece of information.

Caution: Describes a situation that may result in damage to the equipment or system.

Warning: Describes a potentially dangerous situation. If not avoided, it will result in personal damage or fatal injury.

1.1 EQUIPMENT DESCRIPTION



1. Function button
2. 3 LED indicators
3. CAN connection (5-pin, M12 bus connector)
4. USB connector *
5. Power connector *
6. Ethernet connector
7. Mounting tape.

** Not needed for normal operation. DCM 2.0 is powered through the CAN connection.*

LEDs explained

- LED A (green / yellow / red)
  >> Green: Lit or blinks to indicate USB activity
  >> Yellow: Indicates a warning
  >> Red: Indicates an error
- LED B (green)
  >> Blinks when the device is starting up and is lit continuously when the power is on and the operating system is up and running
- LED C (blue)
  >> Blinks when a client is not connected (access point mode) or when the device is searching for a connection (client mode)
  >> Lit continuously when a client is connected to DCM 2.0 or when DCM 2.0 is connected to an access point.

EQUIPMENT IDENTIFICATION

Serial number

Serial number of the device is marked on the rating plate or in another distinctive location on the device.

Quick Response (QR) code

The serial number and other device-related identification information may also be saved in the form of a QR code (or a barcode) on the device. Such code can be read by a smartphone camera or with a dedicated code reader device providing fast access to the device-specific information.

2. INSTALLATION

⚠ *Do not power on the equipment before the installation is complete.*

Before installation

Check the contents of the packages and make sure the parts are not damaged.

"Mounting on equipment" on the next page

"Connecting cables" on page 9

"Quick guide for setting up DCM 2.0" on page 10

"Connecting to DCM 2.0 user interface" on page 15

2.1 MOUNTING ON EQUIPMENT

The DCM 2.0 device can be fixed on the side of a power source or a wire feeder either with the factory-fitted mounting tape or with an optional DIN rail.

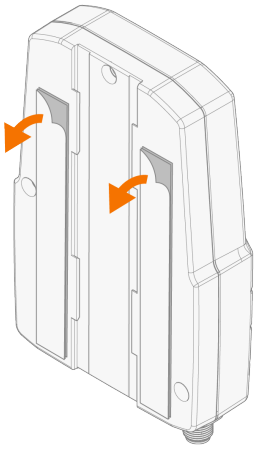
The mounting tape can be used on any clean and suitable surface. The mounting tape counterparts are attached together on delivery.

Do not detach the mounting tape counterpart from the DCM 2.0 device before fixing. This way the mounting tape counterparts are positioned correctly on the installation surface.

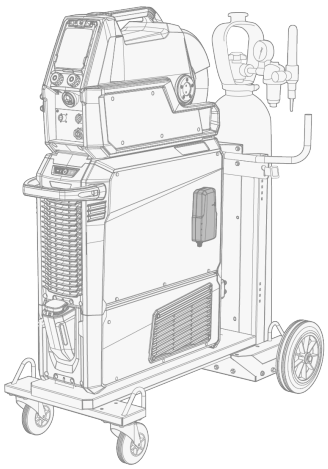
Install the DCM 2.0 device the connectors facing down. This also prevents e.g. dust and impurities from getting into the connectors.

Fixing with mounting tape

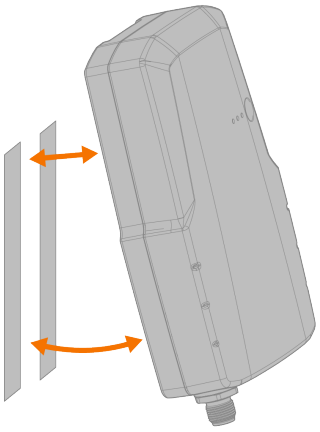
1. Clean the installation surface (where the DCM 2.0 device is to be fixed).
2. Remove the cover wrappings from the mounting tape counterpart to reveal the adhesive surface. Leave the mounting tape counterparts still attached.



3. Press the DCM 2.0 device firmly against the installation surface so that the glue sticks.



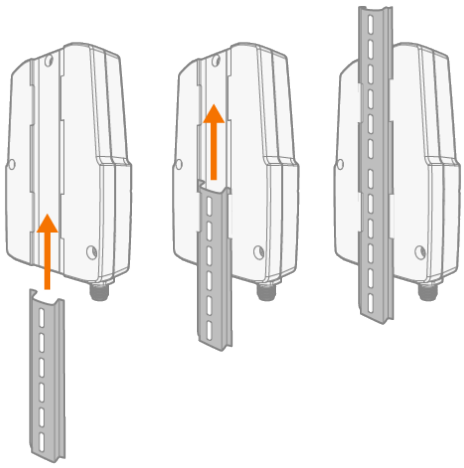
4. Let the mounting tape's adhesive cure for 30 minutes.
5. Due to the velcro-type mounting tapes, it is now possible to detach and attach the DCM 2.0 device if needed.



Mounting on DIN rail (optional)

Note that the rail installation typically requires drilling fixing holes on the fixing surface for the rail itself. This is not covered by this instruction.

The rear of the DCM 2.0 box has a groove for the standard DIN rail fixing:

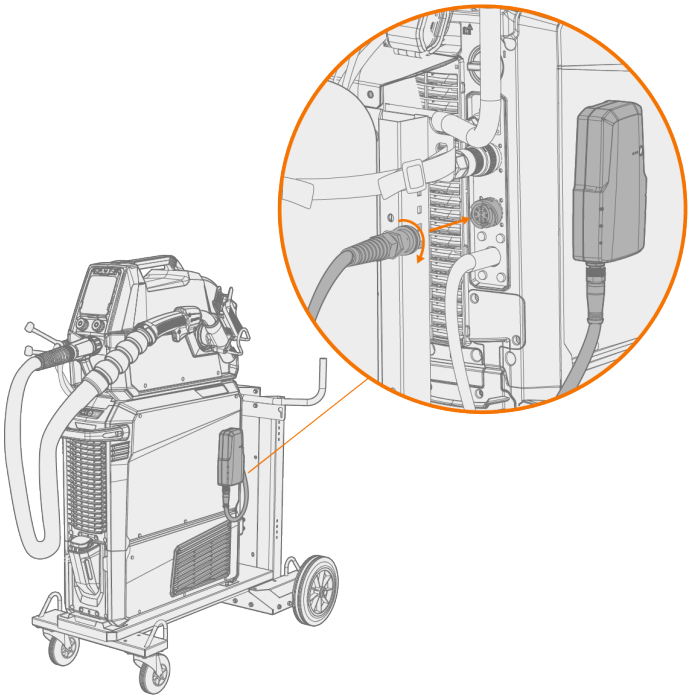


2.2 CONNECTING CABLES

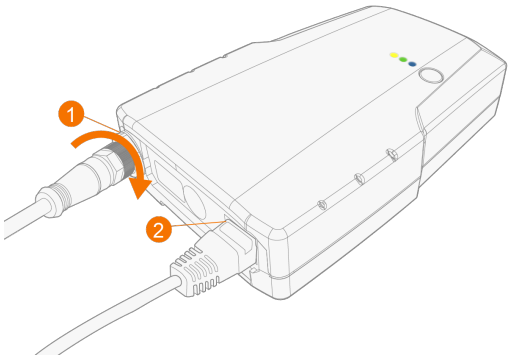
DCM 2.0 requires a CAN and an Ethernet cable to be connected.

It is recommended to use a shielded Ethernet cable (minimum F/UTP – foil shielded / unshielded twisted pair).

1. Connect the CAN cable to the power source (or wire feeder).



2. Connect the other end of the CAN cable to the DCM 2.0 (1). Secure the cable by turning the cable coupling firmly on the connector threads.
3. Connect the Ethernet cable to the DCM 2.0 (2). Connect the other end of the Ethernet cable to e.g. the cobot controller.



2.3 QUICK GUIDE FOR SETTING UP DCM 2.0

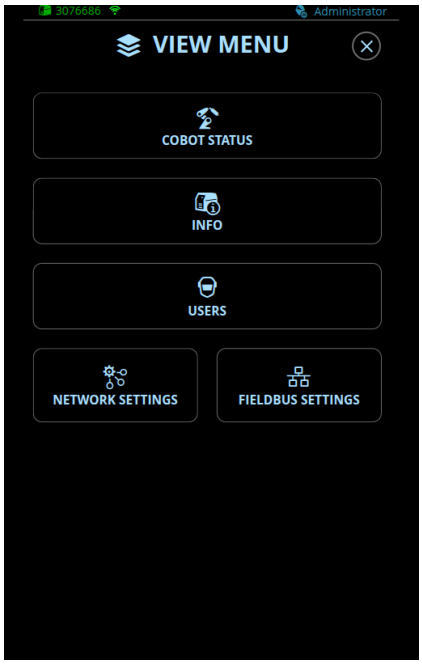
This section is a quick guide for a typical setup of DCM 2.0. The links lead to the corresponding instructions with more information.

Connect to network and DCM 2.0 user interface ("WLAN access point mode" on page 15)

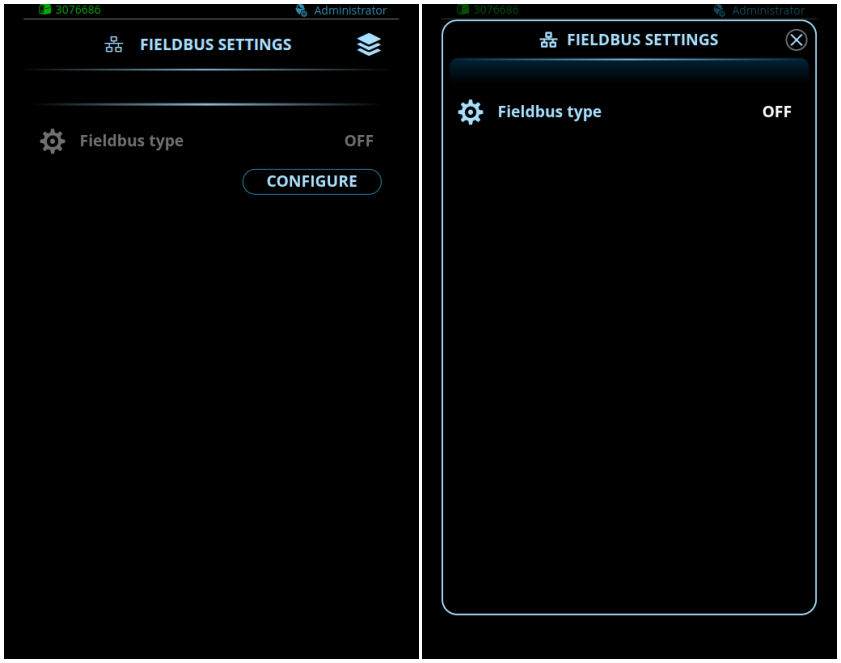
1. Connect your device (PC, laptop, mobile device) to the WLAN network offered by DCM 2.0.
   >> The WLAN default name (SSID) is DCM<*DCM serial number*>, e.g., DCM1234567.
   >> The default password is KemppiDCM<*DCM security code*>, e.g., KemppiDCM1234.
2. Open an internet browser and enter the default network address DCM<*DCM serial number*>.local or the IP address 192.168.3.1.

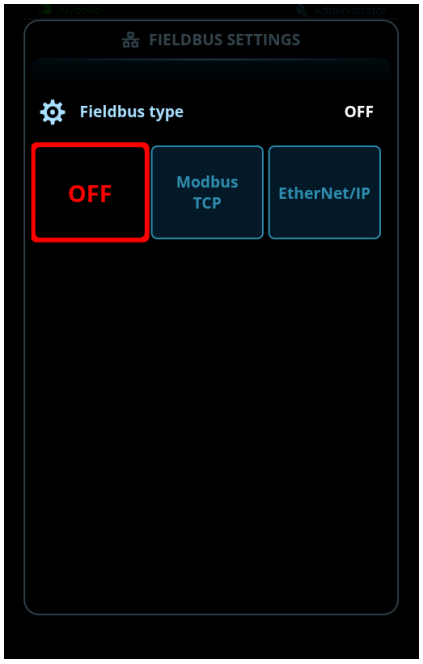
Select the fieldbus type and configure the fieldbus settings ("Fieldbus settings" on page 26)

1. In the **View menu**, select **Fieldbus settings**.

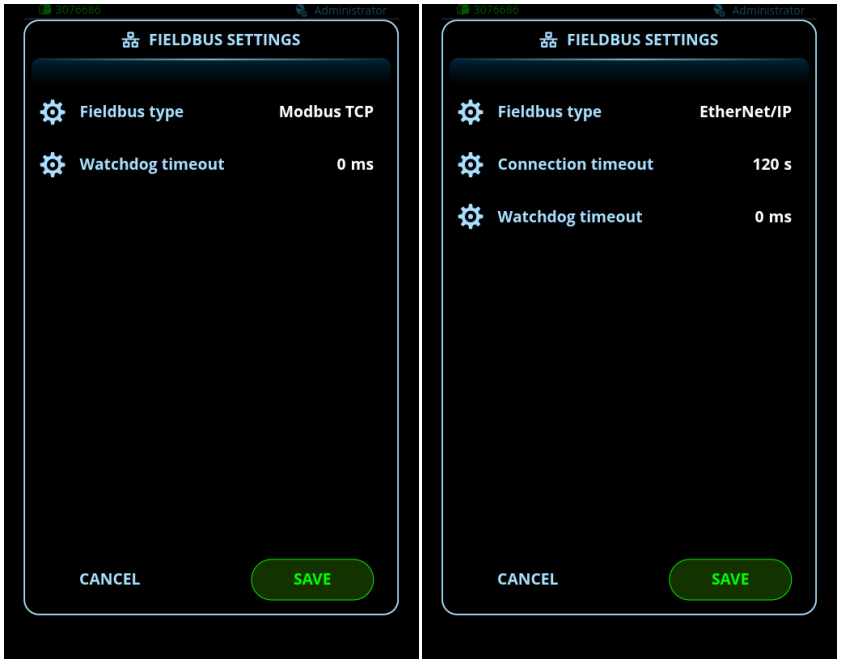


2. In the **Fieldbus settings** view, select **Configure**, then select the fieldbus type.



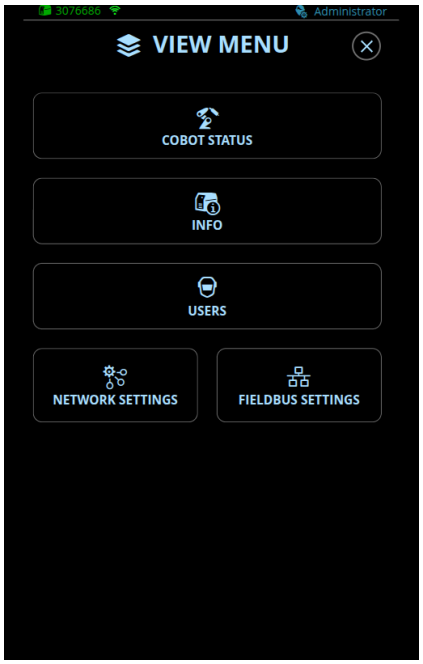


3. Confirm the selection and close the view by selecting **Save**.

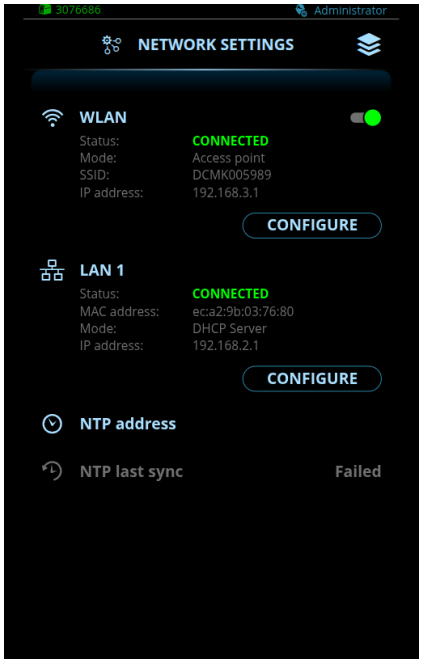


Configure the network settings ("Network settings" on page 24)

1. In the **View menu**, select **Network settings**.

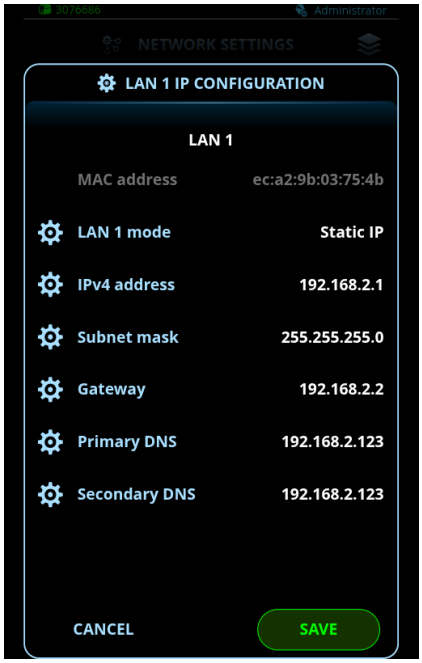


2. In the **Network settings** view, select **Configure** for LAN 1.



3. The **LAN 1 IP Configuration** view opens with the default settings. If you want to change the default mode of the LAN 1 interface (DHCP Server), select **LAN 1 mode**.

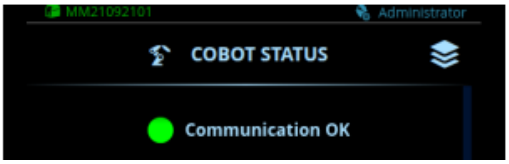
4. Select the settings values for adjustment.



5. Confirm the values and close the view by selecting **Save**.

Connect to the cobot

1. Connect the cobot to the Ethernet port on the rear of DCM 2.0.
2. Confirm the connection between the cobot and DCM 2.0 in the **Cobot status view**.



2.4 CONNECTING TO DCM 2.0 USER INTERFACE

"WLAN access point mode" below

"WLAN client mode" below

"Ethernet port (LAN 1)" on the next page

2.4.1 WLAN ACCESS POINT MODE

Access point mode is the default WLAN operating mode. In this mode DCM 2.0 acts as an access point to which other devices (PC, mobile device) can connect. For information on network settings, refer to "Network settings" on page 24.

The DCM 2.0 security code (1) and serial number (2) can be found in the rating plate on the DCM 2.0 device.

1. Connect your device to the WLAN network.
   >> The WLAN default name (SSID) is DCM<*DCM serial number*>, e.g., DCM1234567.
   >> The default password is KemppiDCM<*DCM security code*>, e.g., KemppiDCM1234.
2. Once connected (connecting may take a few seconds), open an internet browser and enter the default network address.
   >> The network address for DCM 2.0 is DCM<*DCM serial number*>.local, e.g., DCM1234567.local.
   >> You are now connected to the DCM 2.0 user interface.

If the default network address does not work, use the numeric IP address (192.168.3.1).

2.4.2 WLAN CLIENT MODE

In the WLAN client mode, DCM 2.0 connects to an existing WLAN network. When your device (PC, mobile device) is connected to the same WLAN network as DCM 2.0, you can access the DCM 2.0 user interface either with the default network address or the IP address that DCM 2.0 obtains from the WLAN network. For information on network settings, refer to "Network settings" on page 24.

Connect DCM 2.0 only to a secured WLAN network to prevent device intrusions!

If you change the network settings of the connection you are currently using to access the DCM 2.0 user interface, the connection will be lost when the new settings take effect. To reconnect, set your device's (e.g. PC) network settings to match those of the DCM 2.0 user interface.

To configure WLAN client mode:

1. Access the DCM 2.0 user interface preferably by connecting your PC to the Ethernet connector on the DCM 2.0 device.
2. Open an internet browser and enter the default network address DCM<*DCM serial number*>.local.

The DCM 2.0 serial number (*) can be found in the rating plate on the DCM 2.0 device.

>> You are now connected to the DCM 2.0 user interface.

3. Go to the Network settings view and select **Configure**.
4. Configure the settings as explained in the table 'WLAN IP configuration - client mode' in the **Network settings** view and save the settings.

>> DCM 2.0 connects to the network automatically (connecting may take approximately 1 minute), after which the IP address obtained from the network appears in the Network settings view.

To connect to DCM 2.0 user interface in WLAN client mode:

1. Connect your device to the same WLAN network as DCM 2.0.
2. Open an internet browser and enter the default network address DCM<*DCM serial number*>.local. You can also use the IP address that was shown in the Network settings view (step 4 above).

If the default network address does not work, use the IP address that was shown in the Network settings view.

2.4.3 ETHERNET PORT (LAN 1)

If your PC is connected directly to the DCM 2.0, the cobot cannot establish a connection to it. To allow both the PC and the cobot to connect, use a dedicated network switch.

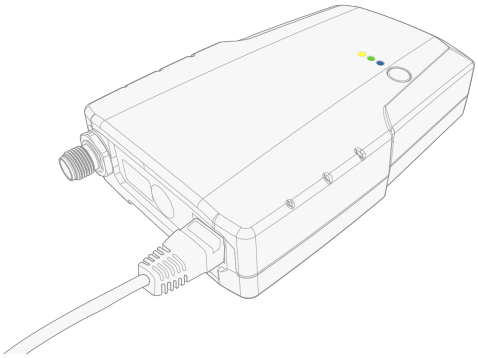
If you change the network settings of the connection you are currently using to access the DCM 2.0 user interface, the connection will be lost when the new settings take effect. To reconnect, set your device's (e.g. PC) network settings to match those of the DCM 2.0 user interface.

The Ethernet port is intended for connecting to the fieldbus and robot/cobot. The Ethernet port can be configured by the user to adapt to different network configurations and allows access to the DCM 2.0 user interface from the connected network.

The default mode is DHCP server mode. For the operating modes supported by the Ethernet port, refer to "Network settings" on page 24.

The DCM 2.0 serial number (*) can be found in the rating plate on the DCM 2.0 device.

1. Connect your PC to the Ethernet port on the rear of DCM 2.0.



2. Open an internet browser and enter the default network address DCM<*DCM serial number*>.local.
   >> You are now connected to DCM 2.0.

If the default network address does not work, use the numeric IP address (192.168.2.1).

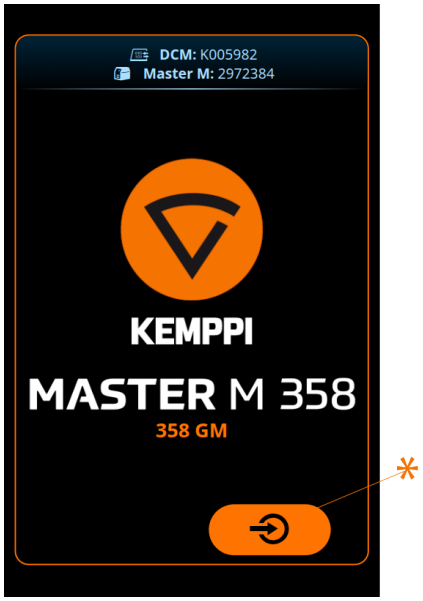
3. OPERATION

3.1 DCM 2.0 USER INTERFACE

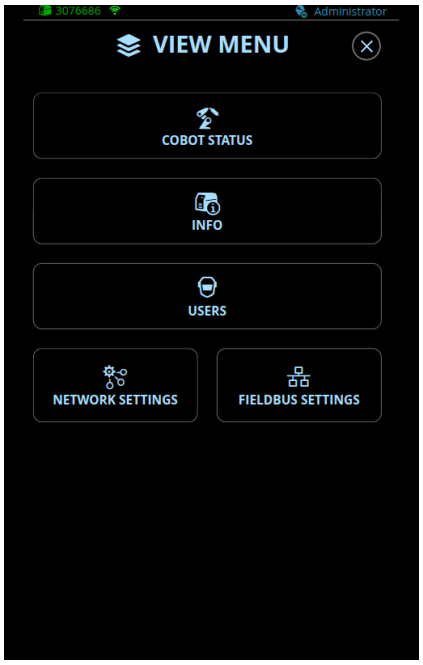
The DCM 2.0 can be controlled by a web-based user interface on a PC, tablet or mobile device.

3.1.1 LOGGING IN TO DCM 2.0 USER INTERFACE

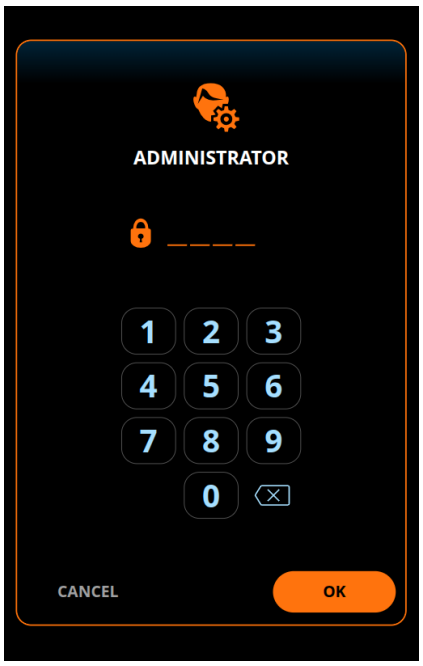
1. Access the DCM 2.0 user interface in your internet browser (for information, refer to "Connecting to DCM 2.0 user interface" on page 15).
2. Select the start button (*).



The **View menu** opens.

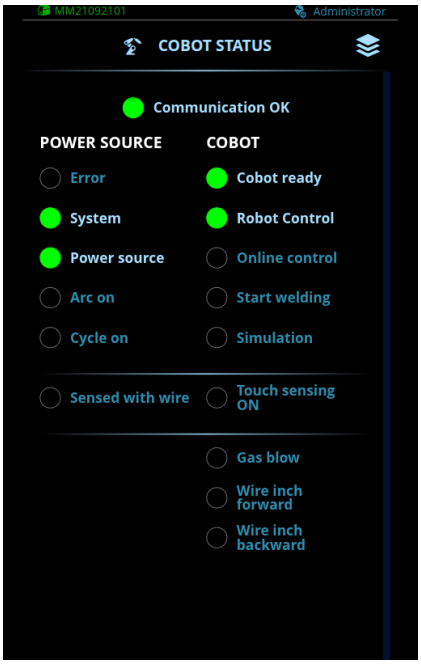


If the PIN query is ON, enter the PIN (only the administrator user role is available) and select **OK**.



3.1.2 COBOT STATUS

The **Cobot status** view displays the communication between the power source and the cobot.

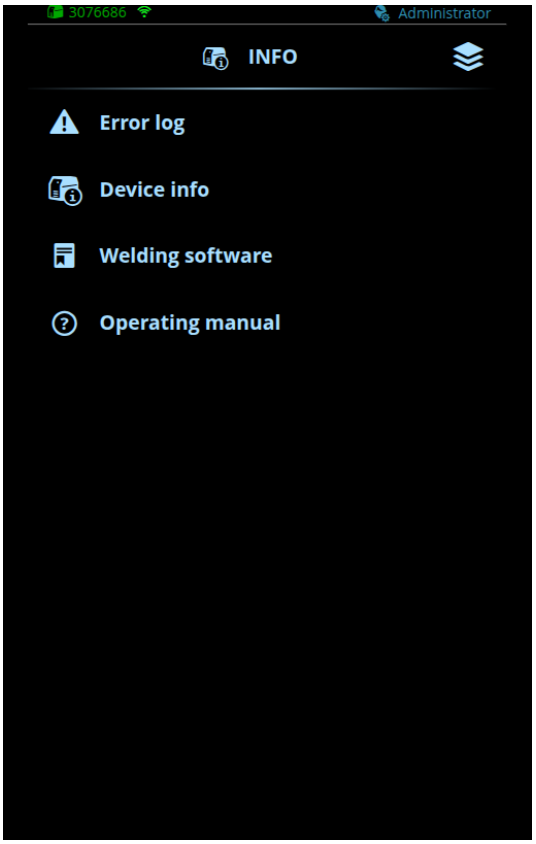


Parameter	Description
General	
Communication OK	Green light: The communication between the welding system and the cobot works. No light: The communication between the welding system and the cobot does not work.
Power source	
Error	No light: No errors are active. Red light: There is an error in the welding system that prevents welding. Select the error symbol for more information.
System	Green light: The welding system is ready for welding. All system devices are correct and working. No light: The welding system is not ready for welding.
Power source	Green light: The power source is ready to start a new weld. No light: The power source is not ready to start a new weld.
Arc on	Green light: The welding arc is established. No light: The welding arc is not established.
Cycle on	Green light: The welding cycle is in progress (the pre gas and post gas phases are included in the welding cycle). No light: The welding cycle is complete.
Sensed with wire	Green light: A contact between the touch sensor and the workpiece has been detected with the filler wire. No light: No contact between the touch sensor and the workpiece has been detected.
Cobot	
Cobot ready	Green light: The cobot is ready to start a new weld. No light: The cobot is not ready to start a new weld.
Robot control	Green light: The cobot can control the welding equipment, the welding torch trigger is disabled. No light: The cobot cannot control the welding equipment, the welding torch trigger is enabled.

Online control	Green light: Online control mode is enabled. In online control mode, the cobot controls the values of certain parameters directly. No light: Online control mode is not enabled. The values of the parameters come from the active memory channel. For more information, refer to "Online control" on page 41.
Start welding	Green light: The cobot has requested welding or simulation if the simulation mode is on. No light: The cobot has not requested welding or simulation.
Simulation	Green light: The simulation mode is on. The StartWelding control bit controls the simulation cycle. In simulation mode the arc is not lit and wire is not fed. No light: The simulation mode is off. The StartWelding control bit controls the welding cycle.
Touch sensing ON	Green light: Touch sensing is ON. No light: Touch sensing is OFF.
Gas blow	Green light: The shielding gas valve is open for gas blow. No light: The shielding gas valve is closed.
Wire inch forward	Green light: The wire inch forward function is ON. No light: The wire inch forward function is OFF.
Wire inch backward	Green light: The wire inch backward function is ON. No light: The wire inch backward function is OFF.

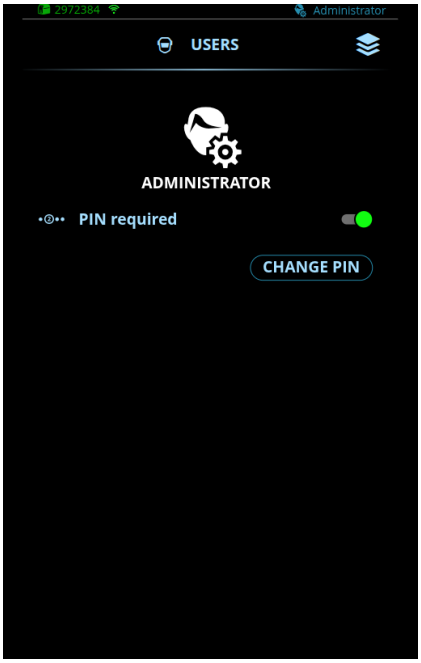
3.1.3 INFO

The **Info** view shows information on the device usage. Through this view it is also possible to access the error logs, list of installed welding programs, additional operating information and device info, such as activated licenses, the software version and equipment serial numbers.

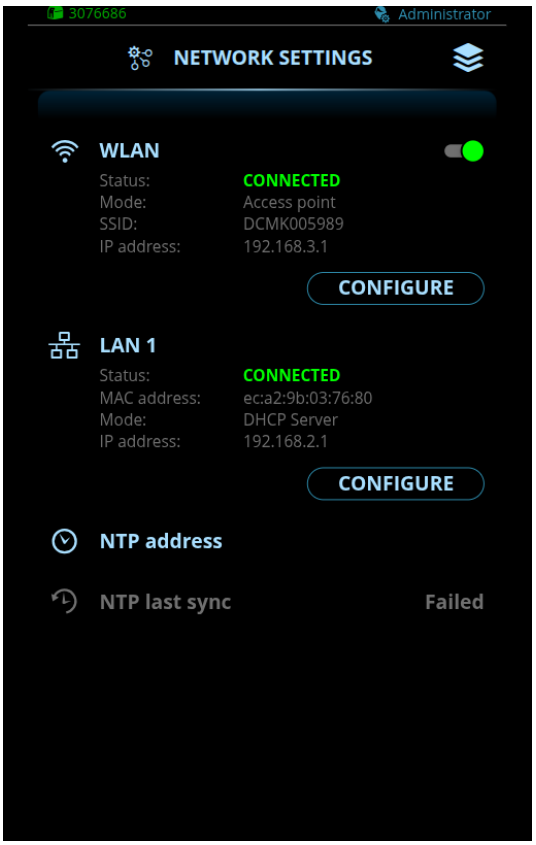


3.1.4 USERS

In the **Users** view the administrator can enable and change the administrator PIN.



3.1.5 NETWORK SETTINGS



Changing settings

1. To access your network's IP settings, select **Configure**.
2. Select the settings parameter for adjustment.
3. Select the settings value.
   >> Depending on the settings parameter to be adjusted, refer also to the Network settings table below for more details.
4. Confirm the new value / selection and close the adjustment view by selecting **Save**.

WLAN IP configuration - access point mode

Parameter	Value	Description
WLAN	ON/OFF	WLAN ON/OFF selection.
Status	Connected / Not connected	Indicates whether a device (PC, tablet, mobile device) is connected to DCM 2.0.
Mode	Access point	DCM 2.0 acts as an access point to which other devices (PC, tablet, mobile device) can connect.
SSID	Default = DCM<DCM serial number>	The SSID (Service Set Identifier), i.e. the name of the WLAN network offered by DCM 2.0.
IP address	Default = 192.168.3.1	WLAN IP address of DCM 2.0.
Security protocol	WPA2	Security protocol for the WLAN.
Password		WLAN password.

WLAN IP configuration - client mode

Parameter	Value	Description
WLAN	ON/OFF	WLAN ON/OFF selection.
Status	Connected / Not connected	Indicates whether the DCM 2.0 is connected to the WLAN network.
Mode	Client	DCM 2.0 connects to the existing WLAN network.
SSID		Local wireless network's SSID (Service Set Identifier), i.e. the name of your WLAN network.
IP address	E.g. 172.31.0.113	WLAN IP address for DCM 2.0.
Subnet mask	E.g. 255.255.252.0	DCM 2.0 subnet mask.
Gateway	E.g. 172.31.0.1	IP address of the WLAN router.
Primary DNS	E.g. 8.8.8.8	IPv4 address of Primary DNS server.
Secondary DNS	E.g. 8.8.4.4	IPv4 address of Secondary DNS server.
Security protocol	OFF/WEP/WPA2	Security protocol for wireless networks.
Password		WLAN password.

LAN 1 IP configuration

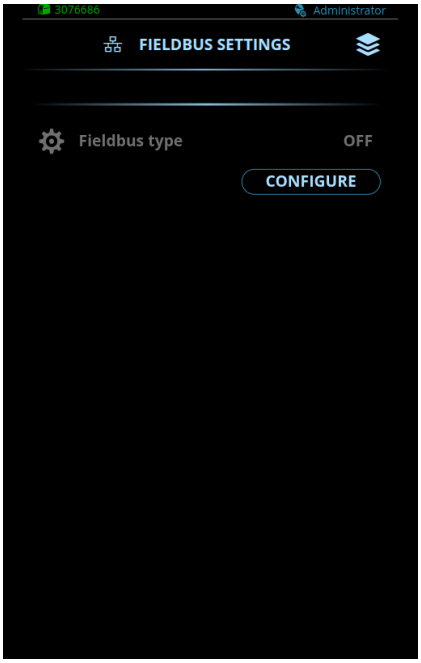
Parameter	Value	Description
Status	Connected / Not connected	Indicates whether the DCM 2.0 is connected to the LAN network.
MAC address	ec:a2:9b: *<03:76:51>*	The unique address of DCM 2.0 allocated by Kemppi.
Mode	Static IP / Client / DHCP server Default = DHCP server	Static IP: DCM 2.0 is allocated a fixed IP address. Client: DCM 2.0 requests an IP address from the DHCP server. DHCP server: DCM 2.0 allocates IP addresses to external devices that are connected to the same network interface and operate in the DHCP client mode.
IP address	Default = 192.168.2.1	IP address for DCM 2.0.
Subnet mask	Default = 255.255.255.0	DCM 2.0 subnet mask.
Gateway	E.g. 10.0.0.125 / Empty	IPv4 address of the gateway (if used).
Primary DNS	E.g. 10.0.0.125 / Empty	IPv4 address of Primary DNS server.
Secondary DNS	E.g. 10.0.0.125 / Empty	IPv4 address of Secondary DNS server.

NTP (Network Time Protocol) configuration

Parameter	Value	Description
NTP address	Default = 1.kemppi.-pool.ntp.org	This is the address of the NTP server. NTP is used to synchronize the system time of DCM 2.0.
NTP last sync		The date and time of the last successful time synchronization.

3.1.6 FIELDBUS SETTINGS

You can adjust fieldbus settings in the Fieldbus settings view.



Changing settings

1. Select **Configure**.
2. Select the settings parameter for adjustment.
3. Select the settings value.
   >> Depending on the settings parameter to be adjusted, refer also to the Fieldbus settings tables below for more details.
4. Confirm the new value / selection and close the adjustment view by selecting **Save**.

Modbus TCP fieldbus settings

Parameter	Value	Description
Identification information		
Vendor name	Kemppi	Vendor identifier assigned to Kemppi.
Vendor URL	www.kemppi.com	Vendor's URL address.
Product name	DCM	Name of the product.
Model name	DCM 2.0	Name of the product model.
User application name	Welding automation	Application description.
Connection status	Connected / Not connected	Indicates whether the connection between DCM 2.0 and the robot / cobot is working.
Adjustable parameters		
Fieldbus type	Modbus TCP	Fieldbus type selection.
Watchdog timeout	0...50000 ms 0 = Disabled Default = 0	Timeout for toggling the watchdog bit.

EtherNet/IP fieldbus settings

Parameter	Value	Description
Identification information		
ODVA Vendor ID	1403	Vendor identifier assigned to Kemppi by ODVA.
ODVA Device type	100	Indication of the general type of the connected device.
Product code	4	Code from which the robot identifies the connected device.
Product name	DCM 2.0	Name of the product.
Connection status	Connected / Not connected	Indicates whether the connection between DCM 2.0 and the robot / cobot is working.
Adjustable parameters		
Fieldbus type	EtherNet/IP	Fieldbus type selection.
Connection timeout	1...3600 s 0 = Disabled Default = 120	The amount of time in seconds that a connection can be open without activity (read or write) before closing the connection.
Watchdog timeout	1...50000 ms 0 = Disabled Default = 0	Timeout for toggling the watchdog bit.

For information on the parameters essential for configuring the EtherNet/IP fieldbus at the cobot end, refer to "EtherNet/IP fieldbus parameters" on the next page.

3.2 ETHERNET/IP FIELDBUS PARAMETERS

This section describes the essential parameters for configuring the EtherNet/IP fieldbus at the cobot end.

Parameter	Value	Unit	Description
Vendor ID	1403	-	Vendor identifier assigned to Kemppi by ODVA.
Device type	100	-	Indication of the general type of the connected device.
Product code	4	-	Code from which the robot identifies the connected device.
Major revision	1	-	Firmware major version number of DCM 2.0.
Minor revision	1	-	Firmware minor version number of DCM 2.0.
Safe device	No	-	Indicates whether DCM 2.0 is an ODVA-certified safety device.
Output assembly	150	-	Output assembly object used for I/O messaging from the cobot to DCM 2.0.
Output size	32	Bytes	Size of the output assembly object in bytes.
Input assembly	100	-	Input assembly object used for I/O messaging from DCM 2.0 to the cobot.
Input size	32	Bytes	Size of the input assembly object in bytes.
Configuration assembly	151	-	Configuration object used for I/O messaging from the cobot to DCM 2.0.
Configuration size	0	Bytes	Size of the configuration assembly object in bytes.
Input connection type	Point-to-point	-	A direct, one-to-one connection between DCM 2.0 and another device on the network, such as the cobot controller.
Output RPI	10 ... 1000 Recommended: 20	ms	Output RPI (Requested Packet Interval) determines the frequency at which the cobot sends output data to DCM 2.0.
Input RPI	10 ... 1000 Recommended: 20	ms	Input RPI determines the frequency at which DCM 2.0 sends input data to the cobot.

3.3 FIELDBUS CONTROL TABLE

This section describes the fieldbus control table for Modbus TCP and EtherNet/IP connections.

For information on setting the control bit states for starting welding, refer to "Setting control bit states to start welding" on page 36.

Control parameters (from cobot to DCM 2.0)

Modbus register address	Byte	Bit / Modbus coil in brackets	Control parameter
0	0	0 (0)	StartWelding
		1 (1)	RobotReadyToWeld
		2 (2)	OnlineControl
		3 (3)	GasBlow
		4 (4)	WireInchForward
		5 (5)	WireInchBackward
		6 (6)	SimulationOn
		7 (7)	RobotControlMode
	1	0 (8)	Watchdog
		1 (9)	HotStartOn
		2 (10)	CraterFillOn
		3 (11)	TouchSensorOn
		4 (12)	(Not in use)
		5 (13)	(Not in use)
		6 (14)	(Not in use)
		7 (15)	(Not in use)
1	2	UINT16	MemoryChannel
	3		
2	4	UINT16	WireFeedSpeed/Current/PlateThickness
	5		
3	6	UINT16	Voltage/FineTuning
	7		
4	8	UINT16	(Not in use)
	9		
5	10	UINT16	Dynamics
	11		
6	12	UINT16	PostCurrent
	13		
7	14	UINT16	(Not in use)
	15		

8	16	UINT16	(Not in use)
	17		
9	18	UINT16	(Not in use)
	19		
10	20	UINT16	(Not in use)
	21		
11	22	UINT16	(Not in use)
	23		
12	24	UINT16	(Not in use)
	25		
13	26	UINT16	(Not in use)
	27		
14	28	UINT16	(Not in use)
	29		
15	30	UINT16	(Not in use)
	31		

Status parameters (from DCM 2.0 to cobot)

Modbus register address	Byte	Bit / Modbus coil in brackets	Status parameter
0	0	0 (0)	WeldingSystemReady
		1 (1)	PowerSourceReady
		2 (2)	ArcOn
		3 (3)	CycleOn
		4 (4)	WeldingVoltageAdjustOn
		5 (5)	Error
		6 (6)	WorkMemoryChannel
		7 (7)	WatchdogTriggered
	1	0 (8)	WeldingSystemAccess
		1 (9)	OnlineControlValuesValid
		2 (10)	TouchSensed
		3 (11)	(Not in use)
		4 (12)	(Not in use)
		5 (13)	(Not in use)
		6 (14)	(Not in use)
		7 (15)	(Not in use)
1	2	UINT16	TAST
	3		

2	4	UINT16	WeldingWireFeedSpeed
	5		
3	6	UINT16	WeldingVoltage
	7		
4	8	UINT16	WeldingCurrent
	9		
5	10	UINT16	ErrorNumber
	11		
6	12	UINT16	UserNumber
	13		
7	14	UINT16	ActiveMemoryChannel
	15		
8	16	UINT16	WeldingArcVoltage
	17		
9	18	UINT16	WatchdogTimeoutValue
	19		
10	20	UINT16	WeldingProcess
	21		
11	22	UINT16	TravelSpeed
	23		
12	24	UINT16	(Not in use)
	25		
13	26	UINT16	(Not in use)
	27		
14	28	UINT16	(Not in use)
	29		
15	30	UINT16	(Not in use)
	31		

Control information

Control information from the cobot to the welding system is transmitted as parameters and individual bits (signals) in the fieldbus control table.

Control parameters:

Parameter name	Parameter value	Raw (bus) value	Description

WireFeedSpeed	0.5 ... 25.0 m/min	5 ... 250	In online control mode: - WireFeedSpeed controls the wire feed speed in applicable processes. - Current controls the current in 1-MIG + WisePenetration, and Pulse + WisePenetration combinations. - PlateThickness controls the plate thickness in MAX Position process.
Current	0 ... 1024 A	0 ... 1024	
PlateThickness	0.0 ... 50.0 mm, step 0.1	0 ... 500	
Voltage/FineTuning	Voltage: 8.0 ... 46.0 V FineTuning: -10...+10	Voltage: 80 ... 460 FineTuning: 0...200	Controls the welding voltage for the MIG process in online control mode. For other welding processes FineTuning function is used instead.
MemoryChannel	0 ... 99	0 ... 99	Controls the active memory channel.
Dynamics	-10 ... +10	0 ... 20	Controls the dynamics for the synergic welding processes in online control mode. Dynamics controls the short circuit behavior of the arc. The lower the value the softer the arc, the higher the value the rougher the arc. (Not available with pulse, double pulse, WiseRoot+, MAX Cool or MAX Speed processes.)
PostCurrent	-30 ... + 30	0 ... 60	Controls the post current in online control mode. Post current setting affects the wire length at the weld end, for example to prevent the wire from stopping too close to the weld pool. This also enables the optimum wire length for the start of the next weld.

Control bits:

Control bit name	Bit state 0	Bit state 1	Requirements	Description
StartWelding	Welding / simulation OFF	Welding / simulation ON	RobotControlMode = 1 and RobotReadyToWeld = 1	Starts the welding sequence. If the simulation mode is ON (SimulationOn = 1), this controls the simulation sequence instead.
RobotReadyToWeld	Cobot is not ready to weld (StartWelding disabled)	Cobot is ready to weld (StartWelding enabled)	RobotControlMode = 1	Safeguards the StartWelding bit so that welding cannot be started if the cobot is not ready.
OnlineControl	Channel control (values from memory channel are used)	Online control (cobot controls certain welding parameters)	RobotControlMode = 1	Enables cobot-controlled values for certain parameters. In online control mode, the parameter values in the active memory channel are overridden. In channel control mode, the values from the active memory channel are used. For more information, refer to "Online control" on page 41.

GasBlow	Gas blow OFF	Gas blow ON	RobotControlMode = 1	Opens the shielding gas valve for testing / purging purposes. During welding the gas valve is controlled automatically, so during welding this bit has no effect.
WireInchForward	Wire inch forward OFF	Wire inch forward ON	RobotControlMode = 1	Feeds the welding wire forward. The wire is fed at the speed of 1.0 m/min for 3 seconds and then 5.0 m/min.
WireInchBackward	Wire inch backward OFF	Wire inch backward ON	RobotControlMode = 1	Feeds the welding wire backwards. The wire is fed at the speed of 1.0 m/min for 3 seconds and then stepped to 5.0 m/min.
SimulationOn	No simulation mode: Normal welding sequence	Simulation mode: Simulated welding sequence (arc is not lit)	RobotControlMode = 1	Turns the welding simulation mode ON and OFF. During simulated welding the arc is not established.
RobotControlMode	Cobot control mode disabled. Cobot cannot control the welding equipment, welding gun trigger is enabled.	Cobot control mode enabled. Cobot can control the welding equipment, the welding gun trigger is disabled.		Defines whether the cobot has control of the welding equipment. When the cobot controls the welding equipment, the welding torch trigger is disabled.
Watchdog	-	-	RobotControlMode = 1	If you set a value for the watchdog timeout parameter, the cobot must toggle the watchdog control bit between states 1 and 0 continuously when the cobot control mode is enabled. If the cobot stops toggling, a watchdog timeout occurs (WatchdogTriggered bit state = 1), and the welding system stops and gives a watchdog error.

HotStartOn	Hot start OFF	Hot start ON		Sets the hot start function ON or OFF in online control mode. Hot start is a welding function that uses higher or lower wire feed speed and welding current at the start of the weld. After the hot start period the current changes to normal welding current level. This facilitates the start of the weld especially with aluminum materials.
CraterFillOn	Crater fill OFF	Crater fill ON		Sets the crater fill function ON or OFF in online control mode. When welding with high power, a crater is usually formed at the end of the weld. The Crater fill function decreases the welding power / wire feed speed at the end of the welding job so that the crater can be filled using a lower power level.
TouchSensorOn	Touch sensor OFF	Touch sensor ON	RobotControlMode = 1	Sets the touch sensor ON/OFF.

Status information

Status information from the welding system to the robot is transmitted as parameters and individual bits (signals) in the fieldbus control table.

Status parameters:

Parameter name	Parameter value	Raw (bus) value	Description
WeldingWireFeedSpeed	0 ... 25.5 m/min	0 ... 255	Measured welding wire feed speed.
WeldingVoltage	0 ... 6553.5 V	0 ... 65535	Measured welding (terminal) voltage.
WeldingCurrent	0 ... 65535 A	0 ... 65535	Measured welding current.
TAST	0 ... 8191	0 ... 8191	TAST (Through Arc Seam Tracking) value. TAST is used for providing precise welds depending on specific weld characteristics or in setups where the position of the work piece varies during repetitive tasks.
ErrorNumber	0 ... 65535	-	System error / warning number.
UserNumber	1 ... 10	1 ... 10	Current user number.
ActiveMemoryChannel	0 ... 99	0 ... 99	Current memory channel number.

WeldingArcVoltage	0 ...6553.5 V	0 ... 65535	Measured welding arc voltage.
WatchdogTimeoutValue	0 ... 65535 ms	0 ... 65535	Watchdog timeout defined by the user.
WeldingProcess	0 ... 18 0 = Unknown 1 = MIG 2 = 1-MIG 3 = Pulse MIG 4 = DPulse MIG 9 = WiseRoot 10 = WiseThin 11 = WiseRoot+ 14 = WiseTh-in+ 16 = MAX Speed 17 = MAX Cool 18 = MAX Position	0 ... 18	Current welding process.
TravelSpeed	0 ... 65535 mm/min	0 ... 65535	The travel speed recommended by Weld Assist (the value is 0 when not applicable).

Status bits:

Status bit name	Bit state 0	Bit state 1	Description
WeldingSystem Ready	Welding system is not ready	Welding system is ready	Indicates whether the welding system is ready to be used for welding. The system is ready when all necessary devices are present and no error is active.
PowerSourceReady	Power source is busy	Power source is ready for a new weld	Indicates whether the power source is ready to start a new weld. The power source is ready when the robot has not requested welding and crater fill is not ongoing.
ArcOn	No welding arc	Welding arc established	Indicates whether welding arc is established.
CycleOn	Welding cycle not active	Welding cycle active	Indicates whether welding cycle is ongoing. The welding cycle includes also pre gas, creep start, crater fill and post gas phases.
WeldingVoltageAdjustOn	Voltage/FineTuning parameter controls the fine tuning value	Voltage/FineTuning parameter controls the welding voltage value	Describes whether the Voltage/FineTuning parameter controls the welding voltage or the fine tuning value.

Error	No error or only a warning	Error in welding system	Indicates whether there is an error in the system that prevents welding.
WorkMemoryChannel	Normal memory channel	Working memory channel	Indicates whether the current channel is a working channel.
WatchdogTriggered	OK	Watchdog timeout has occurred	Bit state 1 indicates that the watchdog timeout has been exceeded and the welding system has stopped.
WeldingSystemAccess	No access (the welding parameters are read-only)	Full access to welding system parameters	Indicates whether the Modbus TCP server has access to control the welding system's parameters.
OnlineControlValuesValid	-	-	Indicates when online control values are valid.
TouchSensed	Touch is not detected	Touch is detected	Indicates if a touch is detected between the wire and the work piece. The touch sensor must be set active with the TouchSensorOn control bit.

3.3.1 SETTING CONTROL BIT STATES TO START WELDING

This section describes the control bits and their states required to start welding with the cobot.

1. Set the control bit RobotControlMode to state 1.
   >> Sets the welding machine to the cobot control mode.
2. Set the control bit RobotReadyToWeld to state 1.
   >> The cobot allows welding and gives the welding machine permission to ignite the arc.
3. To ignite the arc, set the control bit StartWelding to state 1. If you want to simulate the welding sequence without igniting the arc, set the control bit SimulationOn to state 1.

3.4 TIMING DIAGRAMS

"Welding start and stop timing" below

"Memory channel change timing" on the next page

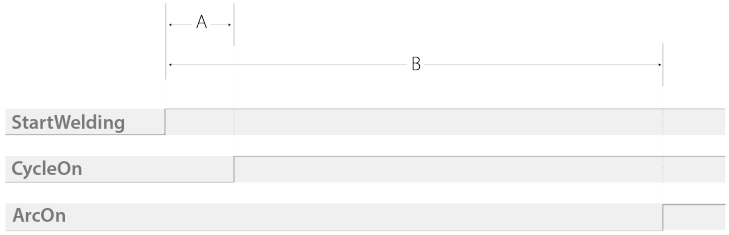
"Wire inch timing" on the next page

"Online control timing" on the next page

"Touch sensor timing" on page 39

3.4.1 WELDING START AND STOP TIMING

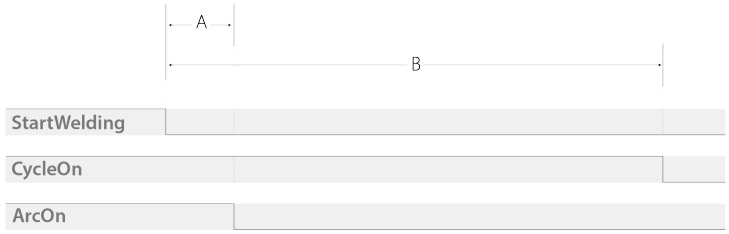
Welding start timing



Item	Description	Min	Typical	Max	Units
A	Cycle on	5	30	50	ms
B	Arc establishment	100	Pre gas time + distance of the wire from the work piece + 150	*	ms

*The maximum time is limited by the wire feeding timeout.

Welding stop timing



Symbol	Description	Min	Typical	Max	Units
A	Arc OFF time	60	70	-	ms
B	Cycle OFF time	100*	Post gas time + 20	-	ms

* If the post gas time is less than 100 ms, the minimum cycle OFF time is determined by the power source shutdown time.

3.4.2 MEMORY CHANNEL CHANGE TIMING

Description	Min	Typical	Max	Units
Total time	0.5	1	2.5	s

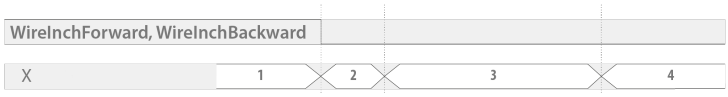
3.4.3 WIRE INCH TIMING

This section describes the timing for the wire inch forward and wire inch backward functions when controlled by the robot.

Wire inch startup timing

Item	Description	Min	Typical	Max	Units
1	Wire feeding OFF	-	-	-	-
2	Startup	20	40	100	ms
3	Wire feeding, slow phase	3	3	3	s
4	Wire feeding, fast phase	-	-	-	-
X	Welding equipment	-	-	-	-

Wire inch stop timing



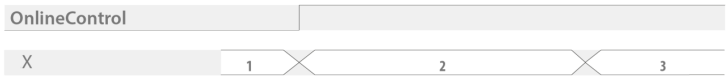
Item	Description	Min	Typical	Max	Units
1	Wire feeding ON	-	-	-	-
2	Stop	-	40	-	ms
3	Wire feeding deceleration	-	30	-	ms
4	Wire feeding OFF	-	-	-	-
X	Welding equipment	-	-	-	-

3.4.4 ONLINE CONTROL TIMING

In online control mode, the cobot controls the values of certain parameters directly.

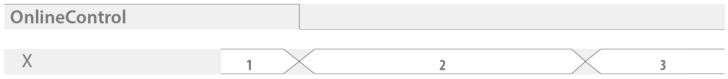
In channel control mode the values of the parameters come from the memory channel.

Switching to online control mode



Item	Description	Min	Typical	Max	Units
1	Channel control mode	-	-	-	-
2	Data setup time	-	2	-	s
3	Online control mode	-	-	-	-
X	Welding equipment	-	-	-	-

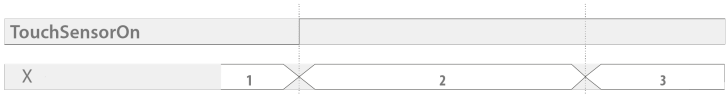
Switching to channel control mode



Item	Description	Min	Typical	Max	Units
1	Online control mode	-	-	-	-
2	Data setup time	-	2	-	s
3	Channel control mode	-	-	-	-
X	Welding equipment	-	-	-	-

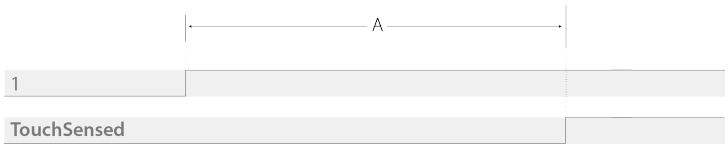
3.4.5 TOUCH SENSOR TIMING

Touch sensor start timing



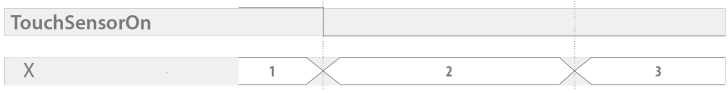
Item	Description	Min	Typical	Max	Units
1	Touch sensor OFF	-	-	-	-
2	Start response time	35	40	80	ms
3	Touch sensor ON	-	-	-	-
X	Welding equipment	-	-	-	-

Touch response timing



Item	Description	Min	Typical	Max	Units
A	Touch signal function reaction time	10	15	20	ms
1	Short circuit (touch)	-	-	-	-

Touch sensor off timing



Item	Description	Min	Typical	Max	Units
1	Touch sensor ON	-	-	-	-
2	Control response time	20	35	60	ms
3	Touch sensor OFF	-	-	-	-
X	Welding equipment	-	-	-	-

3.5 ONLINE CONTROL

The online control function is supported by the X5 FastMig AP/APC equipment with firmware version 1.58 SP3 or later, and Master M 358 with firmware version 1.24 SP2 or later.

The online control function allows the cobot to adjust certain welding parameters directly. This allows the cobot to change welding parameters during welding, for example when changing the welding position or welding around a corner.

The cobot can adjust the following parameters in online control mode:

Parameter	Default value
WireFeedSpeed	0.5 m/min
Current	0 A
PlateThickness	0.0 mm
Voltage	8.0 V
FineTuning	0
Dynamics	0
PostCurrent	0
HotStartOn	OFF (0)
CraterFillOn	OFF (0)

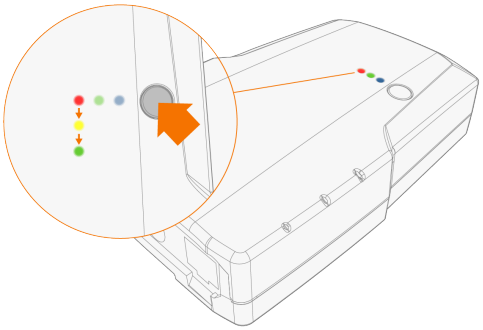
The online control function is used in the following way:

1. Before welding starts, the cobot sets the 'OnlineControl' control bit to state 1.
2. The cobot selects the correct memory channel for welding.
3. The cobot adjusts the values of all online control parameters available in the fieldbus control table.
4. The cobot starts welding in online control mode by setting the 'StartWelding' control bit to state 1.
5. The cobot adjusts online control parameters during welding if necessary.
6. The cobot stops welding by setting the 'StartWelding' control bit to state 0.

3.6 RESETTING

The DCM 2.0 can be reset to factory settings with a long-press of the function button on the module.

1. Ensure that the DCM 2.0 is ready and available: Green LED (B) is lit.
2. Press the function button on the DCM 2.0 device for 20 seconds:
   >> After the first 10 seconds, the leftmost LED (A) turns red.
   >> After 15 seconds, the leftmost LED (A) turns yellow.
   >> After 20 seconds, the leftmost LED (A) turns green.



3. When the leftmost LED (A) is lit in green, release the button.

The factory reset is now in progress. This can take up to 1 minute. When the device reboots, the factory settings have been restored.

3.7 UPDATING DCM 2.0

To update the DCM 2.0 firmware, follow these instructions.

Download update

1. Sign in to Kemppi software hub on your computer.
2. Connect a USB memory stick to the computer.
3. Download the firmware package from the Kemppi software hub's **Software**> **Firmware** > **DCM 2.0** > page.
4. Save the firmware package file to the root folder of the USB memory stick.
5. Remove the USB memory stick from the computer.

Install update

For the LED indicator positions (A, B, C), refer to "Equipment description" on page 4.

1. Start the welding machine attached to the DCM 2.0 and wait approx. 20 seconds until the DCM 2.0 is on standby (the middle LED (B) turns green).
2. Insert the USB memory stick to the DCM 2.0's USB connector.
3. The update process starts automatically (the leftmost LED (A) blinks green)
4. Once the update is finished (the leftmost LED (A) is lit green continuously), remove the USB memory stick from the DCM 2.0's USB connector.
5. Keep the DCM 2.0 turned on for at least 1 minute. This allows the DCM 2.0 to set the installed firmware as default.

   >> The update is now complete.

4. TECHNICAL DATA

Feature	Value
Operating voltage	12...48 V DC
Operating temperature range	-20...40 °C
Degree of protection	IP24
External dimensions *L x W x H*	30 x 104 x 171 mm
Weight without accessories	0.235 kg
Wireless communication type	2.4 GHz, dual mode
Wired communication type	CAN, USB, Ethernet
Standards	IEC 60974-1:2012 IEC 60974-10:2014 + A1

5. ORDERING CODES

For ordering codes, refer to Kemppi.com.