

Installation, use and maintenance manual

Master/Slave Network Management

Function available on hydronic units (chillers/heat pumps) equipped with DANFOSS controller

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1 INTRODUCTION

This document describes how the Master/Slave Network Management function works.

The Master/Slave Network Management function is an accessory and is identified by the abbreviation MTS.

i Integrate the information contained in this document with existing information in the unit manual.

1.1 Network architecture

The network architecture defines how the hydronic units (chillers and heat pumps) are connected to each other and communicate via the CAN network of Danfoss MCX controllers. Correct configuration of the network architecture ensures stable and secure operation of the Master/Slave Network Management function.

i Request an assessment from Technical Support for architectures which are outside the standard limits described in the Main Scenarios section.

i Connect only one remote control panel within the same network.

The network function allows the exchange of operating data and control information between multiple connected units.

The Master unit uses the network architecture to:

- Manage the single setpoint.
- Activate and coordinate the Slave units.

i The Master/Slave Network Management function does not manage the units' pumps.

1.1.1 Supported hardware configurations

- Standard network:
 - » Up to 4 units
 - » Or 3 units + 1 remote control panel
- CAN bus type: Multi-drop configuration with 120 Ω termination resistors.
- Typical baud rate: 250 kbit/s.
- Cables used: Shielded twisted pair CAN cable, AWG22 section.
- Maximum CAN network length: 100 meters including internal and external wiring.

1.2 Glossary of function

The following functions are supported:

Supported function	Description
Wired logic	Wired logic refers to the set of electrodynamic devices placed within a panel that controls the unit. Examples of electrodynamic devices are relays and timer relays.
Step regulation	The thermal power is expressed as a number of steps/units that are switched on and off depending on the distance from the set point.
Single pump PS	The unit has only one integrated pump.
Double pump PD	The unit has two integrated pumps.
Equal units	Equal units have the same model, type, power, number of compressors and accessories.
Master/Slave or Redundancy	All units contribute to meet system's requirements except for the backup units.
Master Unit	This is the only unit in the network that has thermoregulation control. The master unit calls the slave units.
Slave Unit	This is a unit subordinate to the decisions of the Master unit.
Unit field bus	This is the communication system which interconnects the units.
FC Free Cooling function	The FC function uses water at winter ambient temperature for thermoregulation in cooling mode.

The following functions are not supported:

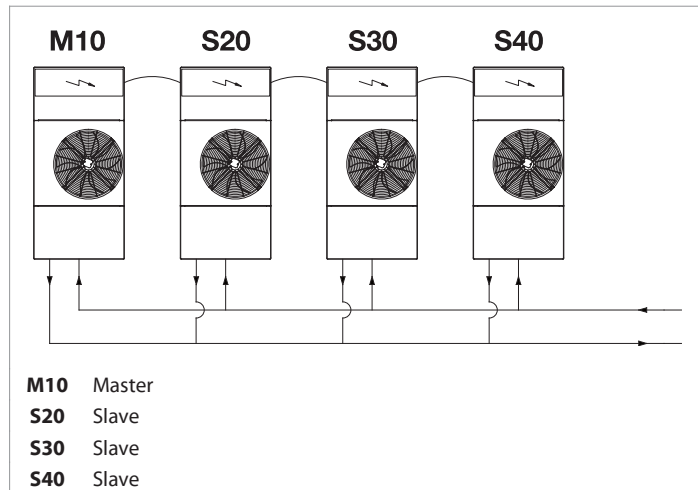
Not supported function	Description
Backup unit	This is a special, optional slave unit that is active under specific conditions.
Customised system management	Functions not validated during the quotation or order phase are not supported.
VPF variable flow	Particular management of the pump under Inverter.
HYM hybrid system management function	The HYM function calls an external heat generator to supplement or replace the heat pump. Normally, a boiler is installed in parallel with the heat pump.
DHW function for domestic hot water management	The DHW function regulates the temperature of hot water for domestic use.
MULTIFUNCTIONAL UNITS	Multifunctional units are machines that simultaneously manage heating and cooling modes.
Different units	Units are considered different when they differ in model, type, power, number of compressors and accessories.
Priority for a unit	Slave units are called by checking the status of the unit and the operating hours. The unit statuses considered by the master unit are: unit on, unit off and unit in alarm.

1.3 Definition of "unit network"

A unit network is a set of a minimum of 2 and a maximum of 4 units connected to the same system.

The installed units must:

- Have the same cooling capacity.
- Be identical to each other (same model).
- Have a common hydronic section.
- Share some electrical connections with wired logic.



2 OPERATING PRINCIPLES

The operating principles describe how the Master manages the units connected to the network to ensure thermal regulation and balanced operation.

2.1 What the function does

- Uses the Master probes as a operating reference for the entire network.
- Decides how many units to activate.
- Sends the required rate to each individual unit.
- Checks for alarms and verifies the correct communication.
- Ensures balanced operating hours.

2.2 Software scenarios

Master/Slave: All units are available, and the Master completes the start-up of an entire unit before moving on to the next one.

- Hour management: The unit with the fewest operating hours is activated first.
- Pump management: Each unit independently manages its own pump as follows:
 - » Unit powered and OFF: Pump OFF.
 - » Unit powered and ON: Pump ON.
 - » Unit powered and in ALARM: The pump status depends on the alarm.
- Alarm management
 - » Single unit alarm and pump off: The unit in alarm with the pump off is excluded, the Master adjusts the sequence involving other available units.
 - » Single unit alarm and pump on: The unit in alarm with the pump on contributes with its partially active resources, and the Master considers it available.
 - » Communication loss: The unit is considered unavailable, and the Master adjusts the sequence by involving other available units.
 - » Master unavailable: The network promotes a new Master.



With MTS accessory, all units in the network must be in ON mode. Do not switch off the units via BMS (remote On/Off or communication protocols).

3 DISPLAY

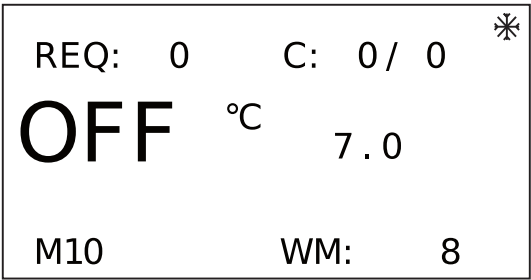
On the display, the units are shown as follows:

- M followed by node ID (e.g. M10), when viewing the main screen directly on the MMI display of the Master unit.
- S followed by node ID (e.g. S20), when viewing the main screen directly on the MMI display of the Slave unit.
- RS followed by node ID (e.g. RS20), when viewing the main screen via navigation from the Master unit's MMI display.

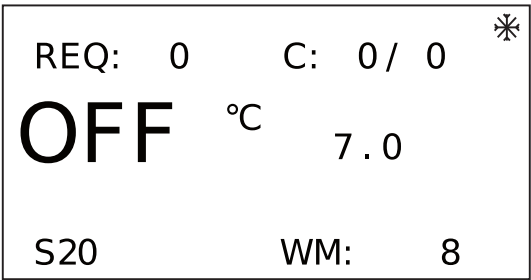
3.1 Overview of OFF screens

This chapter illustrates the screens displayed on single units in OFF status.

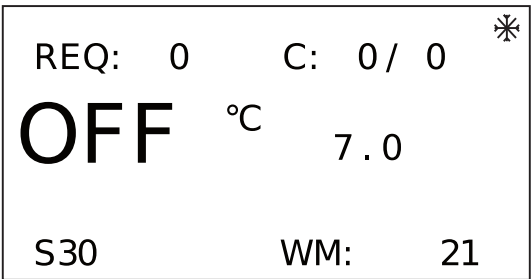
Screen on the M10 Master unit:



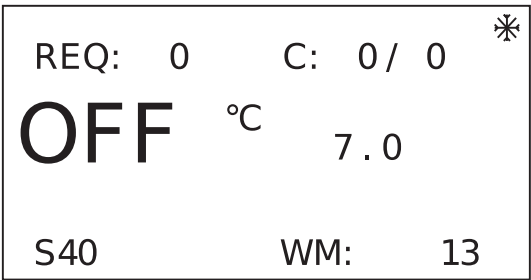
Screen on the S20 Slave unit:



Screen on the S30 Slave unit:



Screen on the S40 Slave unit:

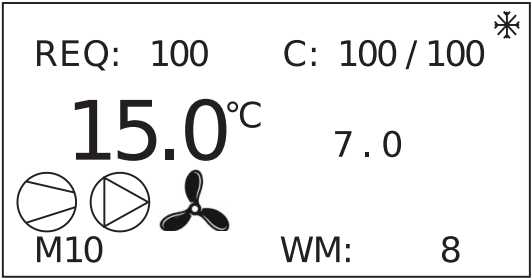


3.2 Overview of ON screens

This chapter illustrates the screens displayed on the single units when switched ON, with the relative graphic and functional information.

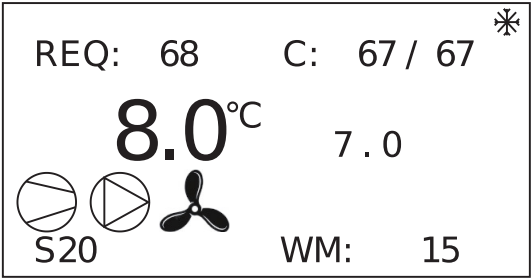
Screen on the M10 Master unit in ON mode:

- REQ = Power required to the unit [%].
- C = Active power of the unit, circuit 1 [%] / circuit 2 [%].
- M10 = Code identifying the Master unit and its own ID10.
- WM = Count of the unit's operating minutes [min].

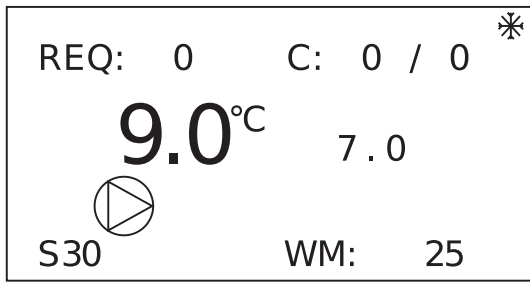


Screen of Slave Unit S20 in ON mode:

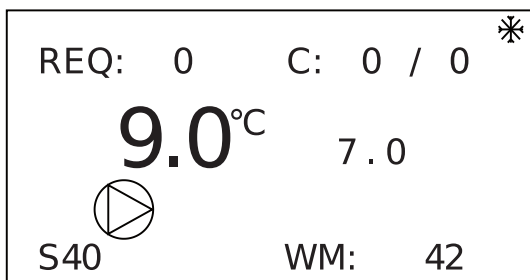
- REQ = Power required to the unit [%].
- C = Active power of the unit, circuit 1 [%] / circuit 2 [%].
- S20 = Code identifying the Slave unit with its own ID20.
- WM = Count of the unit's operating minutes [min].



Screen on Slave unit S30 in ON mode (the information shown on screen S20 apply):



Screen on Slave unit S40 in ON mode (the information shown on screen S20 applies):

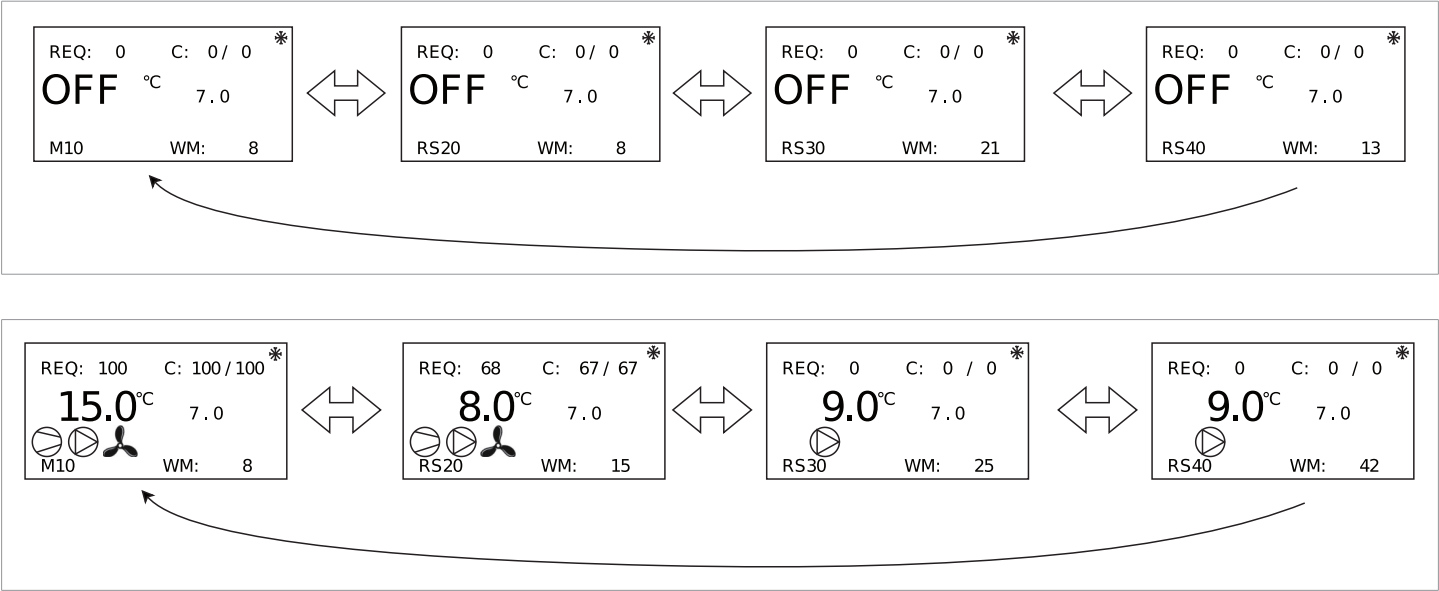


3.3 Browsing the network

Use the right arrow on the display of any unit to browse and scroll through the screens of the other connected units.

i When connecting to a new unit, the display maintains the same browsing characteristics and modes as the local unit.

Below is an example of browsing from the Master unit to the other units.
The units displayed by the Master unit are indicated as RS20, RS30, RS40.



i When browsing from one unit to another, it is necessary to wait a few moments to allow the information to upload.

searching
node . . .

4 COMMISSIONING

During commissioning, the installer performs and verifies the correct wiring of the network, checks the communication between the units and proceeds with the activation of the entire system.

The chapter guides the installer through the preliminary checks, settings and functional tests necessary to verify the network and the engagement logic related to the assignment of IDs.

Procedures during commissioning:

1. Connections and hardware checks.
2. Communication checks.
3. Network initialisation and first start-up.

4.1 Connections and hardware checks

The following section explains how to connect and perform hardware checks before starting up the system.

1. Physically connect all units with shielded CAN cable.
2. Wire the CAN H, CAN L, and GND terminals.
3. Install 120 Ω termination resistors at both ends of the bus.
4. Verify that the shielding is properly grounded.
5. Power up the units.

 Consult the wiring diagram before making any connections.

4.2 Communication checks

The checks described below allow you to identify any communication or network setting problems.

 Network checks must be performed before proceeding with network initialisation.

 Network checks must be performed with the units powered up and in OFF mode.

Using the right arrow on the display of the Master unit, scroll through the screens of the other connected units to:

1. Check that the code M10 is displayed on the Master unit.
2. Check that there are no alarms on the Master unit.
3. Check that the code RS20 is displayed on the first of the Slave units.
4. Check that the code RS30 is displayed on the second of the Slave units.
5. Check that the code RS40 is displayed on the third of the Slave units.

 Check that there are no alarms on all connected Slave units.

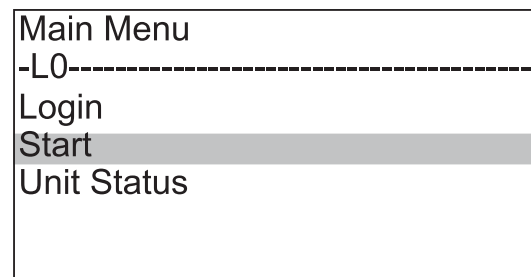
4.3 Network initialisation and first start-up.

After completing the above checks, you can initialise the network and then start up the units.

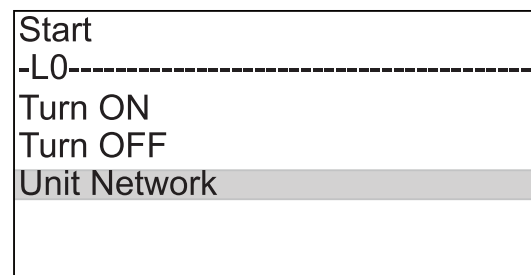
 The network must be initialised only once it has been checked.

 The network must be initialised with the units powered up and in OFF mode.

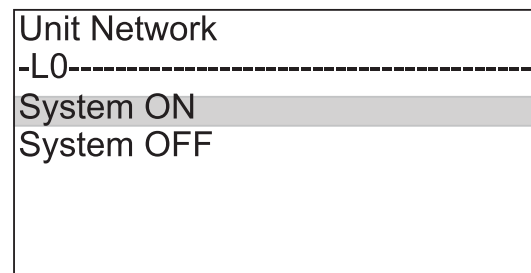
1. Access the Start menu.



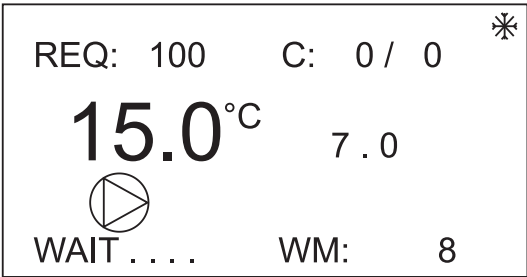
2. Access the Unit Network section.



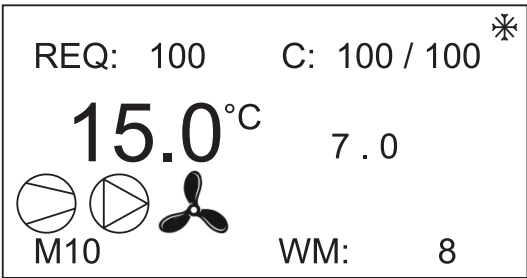
3. Click the System ON control.



4. Wait for the network initialisation to complete.



5. Check the units start-up.



5 PARAMETERS (L0)

The chapter contains a table listing all the parameters available to the user. The selection has been made to ensure simple and immediate access only to those values which can be modified safely without risk for the overall operation of the unit.

PARAMETER	Description	Range	Default
n01	Unit network activation	0/1	1 (enabled)
n02	Number of slave nodes	1...3	1

Series		Master/Slave Network	
Review		Management	
0		ENGLISH	
Catalogue		CL	

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The data indicated in this manual is purely indicative. The manufacturer reserves the right to modify the data whenever it is considered necessary.