Flamco



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Flamco

# Flamcomat / Flexcon M-K
# SPC Extension module

**ENG** Installation and operating instructions
Translation of the original operating instructions (DEU)

# Table of Contents



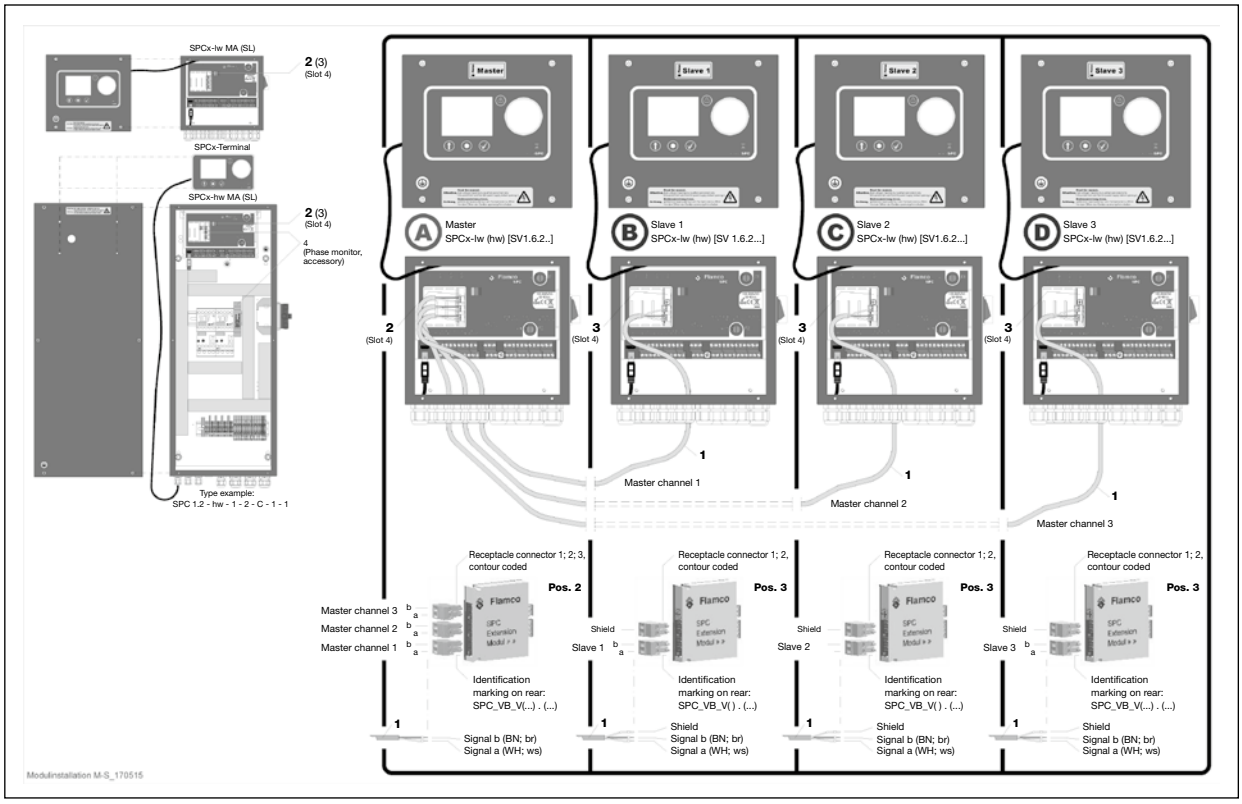
The present documentation is a supplement to the mounting and operating instructions: Flamcomat, Doc. No.: MC01821/20171003.; Flexcon® M-K, Doc. No.: MV00019/20161014, and to be used exclusively with these basic documents! In particular, the general safety information provided therein, as well as the information on equipment, application and function, shall apply. If additional devices are installed, the mounting and operating instructions for the relevant equipment are required (e.g. overflow spill, temperature sensor...) The respective most recent versions and information provided by the relevant branches are valid.

## 1. Intended area of application

Electrical add-on module of the SPC control system, for the provision of a load-dependent connected mode (VBIa) of 2 to 4 automatic pressurisation devices from the standard series: Flamcomat® or Flexcon® M-K. Due to the function and interface definitions of participating control systems additional active or passive actuators can be included in the partial or complete output requirement or to increase availability. The interface management of the sensors and actuators is effected by a master control system. The declarations of conformity for the basic documents of the standard deliveries apply.

## 2. Module installation, equipment

The installation, initialisation of the CAN Bus interfaces define this connected mode, the Master, Slave 1 and, if necessary, Slaves 2 and 3 (Master: transmitting, dictating; Slave: receiving, executing). The selection of the control system for the positioning of the SPC extension type M (Master) determines the pressure reference point ('Druck-Referenzpunkt' (DRP)) of the interconnected equipment.




### 2.1 Technical specifications

| Position | Designation | Type | Information notes |
|---|---|---|---|
| 1 | CAN Bus signal line | Li2YCY (TP) 1 x 2 x min. 0.25²<br>Installation length: Max. 500 m<br>Data transmission rate: 125 kBit/s | Configured, length 10 m, outer sheath, special mixture on PVC basis, colour pebble grey (RAL 7032). Other lengths and quality grades according to requirements at the place of installation, to be provided on site. |
| 2 | CAN Bus interface connector | SPC extension type M (DRP)<br>LxWxH [mm]: 58x12x46 | Installation location, master:<br>Standard slot No. Slot 4, not No.: 1 |
| 3 | CAN Bus interface connector | SPC extension type S<br>LxWxH [mm]: 58x12x46 | Installation location, slave:<br>Standard slot No. Slot 4, not No.: 1 |

## 3. General requirements and functions

The applications of relevant unit combinations in heating or cooling circuits must be determined in accordance with the design as required. The technical safety, electrical and hydraulic requirements from a relevant project apply. Annex E contains descriptions of frequent applications.

### 3.1 Master

The connection configuration is only possible at the Master and is effected by Flamco Service as commissioned. The following are implemented: pressure setting, actual pressure and actual level detection, evaluation and indication as well as the release of an interface activation for pressurisation (atmospheric degassing, Flamcomat), top-up and overflow spill as well as for the maintenance run of all units configured in the connection, dependent on the functions of the operating modes VBla-la, -ws, -sr for each of the existing accessory installations and errors.

**Control settings and functions:**

- **Display indication following commissioning start:** This is the operating display for standard equipment with SPC (operating menu [10]) including the identification add-on for indicating this interconnected participant (MA). Following a switchover at the SPC key slider, there is an additional operating display 2. It contains details for the actual situations of interconnectedly configured units for the participants (MA; SL 1; SL 2; SL 3), the individual levels, the operating modes also changing from relevant errors (la, ws, sr), the available actuators and the available total filling quantity of currently active units (Annex B).

- **Menu:** Settings in the menus [8-1-1] (operating pressure) and [8-5-1…6] (degassing Flamcomat®) determine the pressurisation process of the entire equipment in accordance with the connection configuration. These menus are available at the Master only. Changes in the menus [4-1…20] (language), [8-2-1] (top up), [8-2-2] (overflow spill), [8-4-1…17] (collective error message) apply to the equipment of the Master. Settings in the menu [3] (date, time) are sent to the slaves 1…3 (Annex A).

- **Top up ('Nachspeisung' (NS)) of active (passive)* units:** In order to avoid overfilling the evaluation of equal switch-on conditions per participant is effected. The existing configurations and parameter settings per unit apply (Annex B).

- **Overflow spill ('Abspeisung' (AS)) of active (passive)* units:** Analogously as top up for parameters overflow spill, independently active actuators to increase or decrease pressure. The existing configurations and parameter settings per unit apply (Annex B).

- **Switch-on sequence and operating time distribution for active (passive)* units:** The sequence of switching in actuators for pressurisation is effected from the evaluation of the existing volume of the installed basic tanks and the actuator operating time per existing actuator. If the levels are equal, the evaluation of operating time applies. If only active (passive)* individual units exist or are effective, the switch-on sequence for two existing motors per unit is effected from the evaluation of the individual operating times; the sequence for two existing valves in accordance with the switch-on sequence of the motors. This is also done for the maintenance run of all participants in the connection.

- **Maintenance run:** This is the forced switching of actuators with mechanical parts moving against one another in order to avoid non-permissible friction due to deposits following an excessive standstill period. It is effected on the basis of parameters for the temporal switch-on limit for motor and valve, for each existing unit following expiry of 14 days, if there was no switching of the motor(s) per unit within this time period.

)* Passive units may become active (see: 4. Operating modes).

### 3.2 Slave

A pressure setting is not possible, not required. Existing values from existing sensors and actuators are managed by the Master in dependence of the functions of the operating modes VBla-la, -ws, -sr for each existing accessory installation as well as for errors.

**Control settings and functions:**

- **Display indication following commissioning start at the Master:** There is the operating display of standard equipment with SPC (operating menu [10]), without specification of the actual value for the pressure. This indication and a selectable operating display 2 is only contained in the Master control system. The identification of the relevant participant in the connection (SL 1…3) is supplemented (Annex B).

- **Menu:** Changes in the menus [4-1…20] (language), [8-2-1] (top up), [8-2-2] (overflow spill), [8-4-1…17] (collective error message) apply to the Slave where the settings were made. The indications in menu [3] (date, time) are transmitted by the Master or, in the event of any changes, reset to the existing Master data (Annex A).

### 3.3 Master and Slave

Installations (parametrisations) on existing interfaces of the SPC are effected in accordance with the design for operational use. They are effective for each participant in the connection (control system) and allocated operating mode (see Annex D).

**Control settings and functions:**

- **Errors:** Relevant messages of one's own unit and the connection messages in accordance with the connection configuration can be effectively indicated on the terminal. Necessary collective error messages can be activated in the menus [8-4-1…17] (configuration of unit), [12-5-1…4] (connection Master) and in [13-2-1…2] (connection Slave 1…3) (see Annexes A and C).

## 4. Operating modes

In the connection configuration on the master they are allocated to each unit. Changes can only be made by Flamco Service. An allocation of operating modes to the participants Master (MA), Slave 1 (SL 1), Slave 2 (SL 2) or Slave 3 (SL 3) is possible as needed.

-la

**VBla-la:** Unit actively participating in pressurisation in load-dependent operation. Existing actuators (motors, valves) for pressurisation participate with load dependence in the output requirement individually or up to the possible sum of all actuators of the existing units. In this way, the design or the number of the active units determines the minimum and maximum output capacity for pressurisation. In the case of a relevant error, the available equalising volume flow may be limited or non-existent. It is therefore recommended to dimension the number of units or their design with a possible reserve (this increases reliability from availability by load and operating time distribution or in the case of individual errors by actuators for pressurisation).

-ws

**VBla-ws:** Unit participating passively in pressurisation in backup operation. In the case of a relevant error, or for the operating time alignment of other participants, it can become the active unit, if own errors do not prevent operations from being taken over.

-sr

**VBla-sr:** Unit passively participating in pressurisation in duty/emerg. standby mode. In the case of a relevant error of other participants, it can become the active unit if own errors do not prevent operations from being taken over.

**VBla-ws and VBla-sr:** The number of passive units determines reliability. In the case of combinations, the backup unit takes over first, then the duty/emerg. standby unit. If passive units are identical, the sequence consists of a takeover from the module installation per unit (control system): 1.: MA; 2.: SL 1; 3.: SL 2; 4.: SL 3.

- **Takeover of active units:** Following the takeover of the functions of an active unit, in the operating display 2 of the Master the operation mode changes with la to ws and ws to la. This change corresponds to a temporary functionality. The start configuration is contained in: Menu [12-1-2] (Master, composite mode). Whilst the maintenance run is active, and during passive takeover, the display will not change.

- **Reset of active passive-units:** This is effected after remedying and making acknowledgeable the error on the faulty and leading active unit. An existing pressurisation request, independent of existing reset options, will first be terminated. The operating modes in the operating display 2 of the Master change with first available specifications.

- **Passive takeover:** In the case of pressurisation requests from active units, each level outside a nominal level (50±10%) can also lead to the participation of passive units. This effects a level reduction or increase from connecting in existing actuators. This also applies, if a reset has been effected outside the nominal level, the level is 0% or if there are two passive units respectively exceeding or underrunning the nominal level (see also 3.1; NS; AS).

### 4.1 Combinations

Selection is made in accordance with the design for operational use. The minimum and maximum equalisation volume flows to be provided in a heating circuit or a cooling circuit and the necessary redundancy are the determining factor here.

**Combination notes**

- The location of the pressure reference point ('Druck-Referenzpunkt' (DRP)) is determined by the positioning of the master control system on the required automatic device.
- Units including motor 1 or motors 1 and 2 can be combined. The application of identical unit versions is recommended.
- Passive units must correspond to the output capacity in respect of active units.
- It is possible to locate units within operating premises on different floors of the building (static heights).
- The installation of different nominal sizes of basic tanks may limit the availability for pressurisation.
- An availability of passive units may be increased by the selection of a larger nominal size of the basic tank or the additional installation of add-on tanks.
- Add-on tanks are to be used exclusively in the nominal size of the allocated basic tank. Flexcon® M-K: Gas compartment coupling ('Gasraumkopplung' (GRK)) is to be effected.
- Gas compartment coupling (GRK) of the participants Flexcon® M-K (MA, SL 1…3) at a joint static height is recommended.

### 4.2 Combination variants

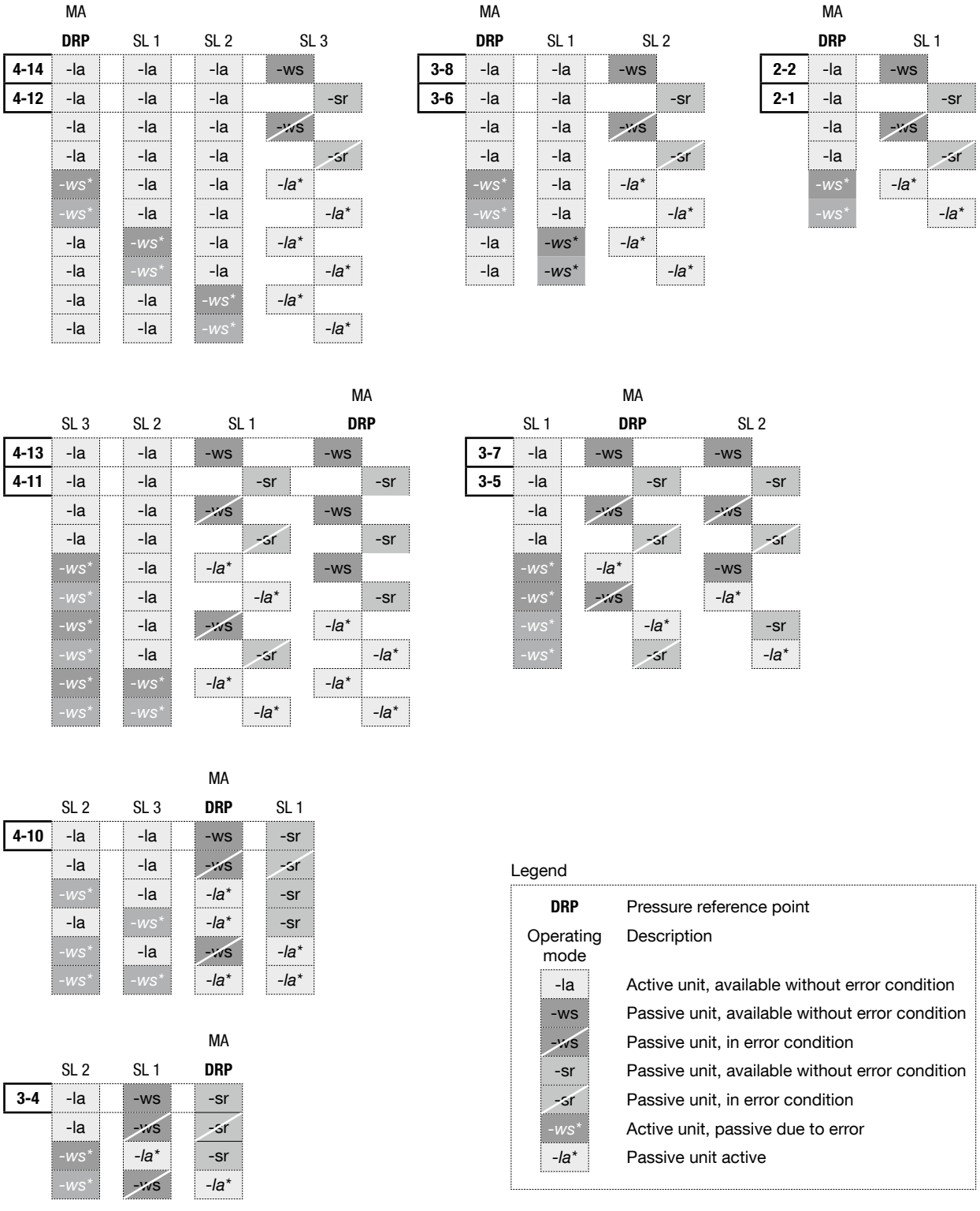
| Units VBla- | | | | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flamcomat® | Flexcon® M-K | Master Slave 1; 2; 3 | 4 | -la | -la | -la | -la | -la | -la | | | | | | | | | |
| | | Master Slave 1; 2 | 3 | -la | -la | -la | -la | -la | -la | -la | -la | -la | -la | -la | -la | | | |
| | | Master Slave 1 | 2 | -la | -la | -ws | -la | -sr | -ws | -la | -la | -ws | -la | -sr | -ws | -la | -la | -la |
| | | | | -la | -ws | -ws | -sr | -sr | -sr | -la | -ws | -ws | -sr | -sr | -sr | -la | -ws | -sr |

### 4.3 Combination limitations

It is not possible to combine different pressurisation methods within a single VBla device. Depending on the equipment combination only the applications for the units Flamcomat® or Flexcon® M-K can be configured.

### 4.4 Combinations with passive units in the event of an error

The following schematically represented takeover variants contain examples where a takeover is possible and the output stand-by remains intact as designed. There are further options, also in dependence on installed accessories that do not permit any takeover or may restrict or even completely prevent output stand-by (Annex C and D). How the participants MA; SL 1…3 are allocated to operating modes is only shown in the form of examples. This allocation is possible as needed.



**Example for combination variant 4-13 with full loss of stand-by**

- Unit configurations SL1…3; MA: Flamcomat® DP 60-1-50. Top up and overflow spill, respectively self-tested, overflow spill with impulse water counter.

| Participants display | | Existing error messages | | | Availability [%] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Group | No. | Designation | 5 | 4 | 3 | 2 | 1 |
| SL 1 | -ws | APVS / MH)* | 29 | Overflow spill not permissible | | 0 | | | |
| SL 2 | -Ia | | 13 | Motor protection, motor 2 on | | | | 50 | |
| | | | 15 | Run time, motor 1 exceeded | 50 | | | | |
| SL 3 | -Ia | | 13 | Motor protection, motor 2 on | | | | | 50 |
| | | | 15 | Run time, motor 1 exceeded | | | | | 50 |
| MA | -ws | | 10 | Minimum level underrun | | | 100 | | |
| | | | 19 | Original level underrun | | | 100 | | |
| | | | 27 | Top up time exceeded | | | 0 | | |
| MA | -ws | AMVB )** | 141 | Slave 3 pressure decrease 0% | | | | | 0 |
| | | | 135 | Slave 3 pressure increase 0% | | | | | |
| | | | 137 | Slave 2 pressure decrease 50% | | | | 50 | |
| | | | 131 | Slave 2 pressure increase 50% | | | | | |
| | | | 139 | Slave 1 pressure decrease 0% | | 0 | | | |
| | | | 133 | Slave 1 pressure increase 0% | | | | | |
| | | | 134 | Slave 2 pressure increase 0% | 0 | | | | |
| | | | 140 | Slave 2 pressure decrease 0% | | | | | |

)* (Annex C) Alarms, process and procedural errors / messages, information notes.

)** (Annex C) Alarms, messages connected mode.

## 5. Special operating situations.

**Errors**
Messages that are not VB errors are issued as described in the basic document (Individual units MA, SL1..3). See also error messages, Annex C.

**Control system 'OFF', loss of supply voltage**
- Slave: Relevant Slave without function, also temporary individual decommissioning.
- Master: The entire VBla configuration is without function, also temporary total decommissioning of the connection pressurisation
- Master and Slave: In the case of activities in response to maintenance requests, electrical disconnection must be consciously carried out and secured against restoration.

**Ball valves, unit closed**
- Slave: Control is effected by the Master irrespective of any changed installation preconditions.
  - Flamcomat®
    Pump: No pressure increase in the system and subsequent errors (system pressure underrun). Continuous operation without any flowing heat transfer medium causes a high temperature load, and also results in steam formation. This may cause damage to seals and cause the winding temperature or motor protection switch to be triggered. The pump may become unusable.
    Valve: No pressure decrease in the system and subsequent errors (system pressure is exceeded).
  - Flexcon® M-K
    Compressor: No pressure increase in the system, and subsequent errors. The pressure in the tank can be increased up to the opening pressure of the existing safety valve. Continuous operation causes a high temperature load. This may cause the winding temperature or motor protection switch to be triggered. The compressor may become unusable. A subsequently opened ball valve may cause a level reduction and subsequent errors (system pressure is exceeded).
    Valve: No pressure decrease in the system and subsequent errors. The pressure in the tank is reduced. A subsequently opened ball valve may cause a level increase and subsequent errors (system pressure is underrun).
- Master: Pressurisation not possible (Pressure changes cannot be evaluated).
- Master and Slave: If there are any requests for the closure of ball valves, the participants in the connection must first be electrically disconnected.

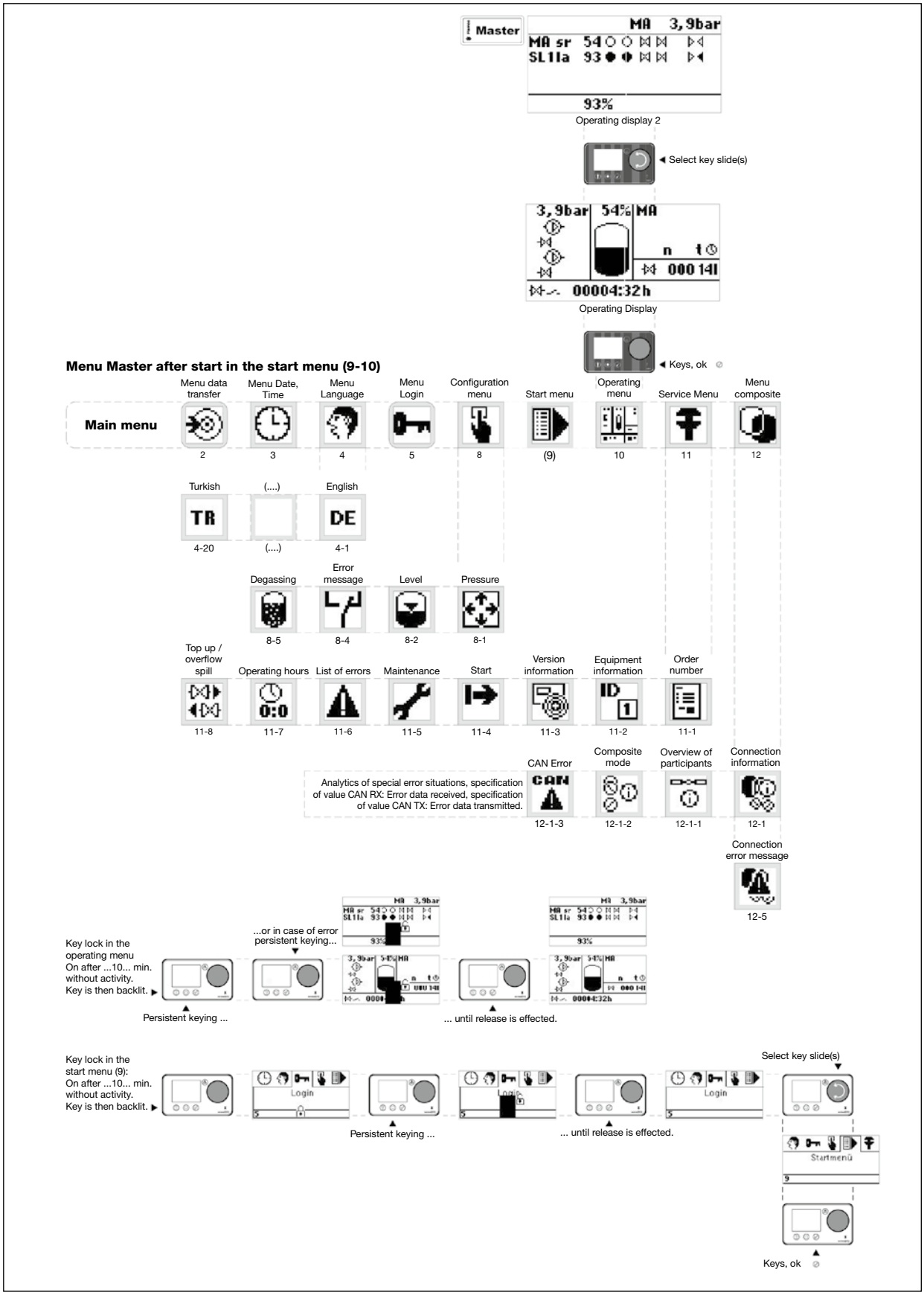
**Pressure sensor defective. No signal after start**
- Slave: Functionally, there is no pressure value detection. Therefore, this is not relevant and non-critical (with SPC extension analogue only output value content).
- Master: This is the pressure reference point ('Druck-Referenzpunkt' (DRP)) in this connected mode. The entire VB configuration is without function (no actual pressure value detection, no pressurisation).

**Maintenance**
Depending on the maintenance content of Maintenance 1-4 (Error message Nos.: 56-59), see basic document. For electrical decommissioning see: Control 'OFF'.

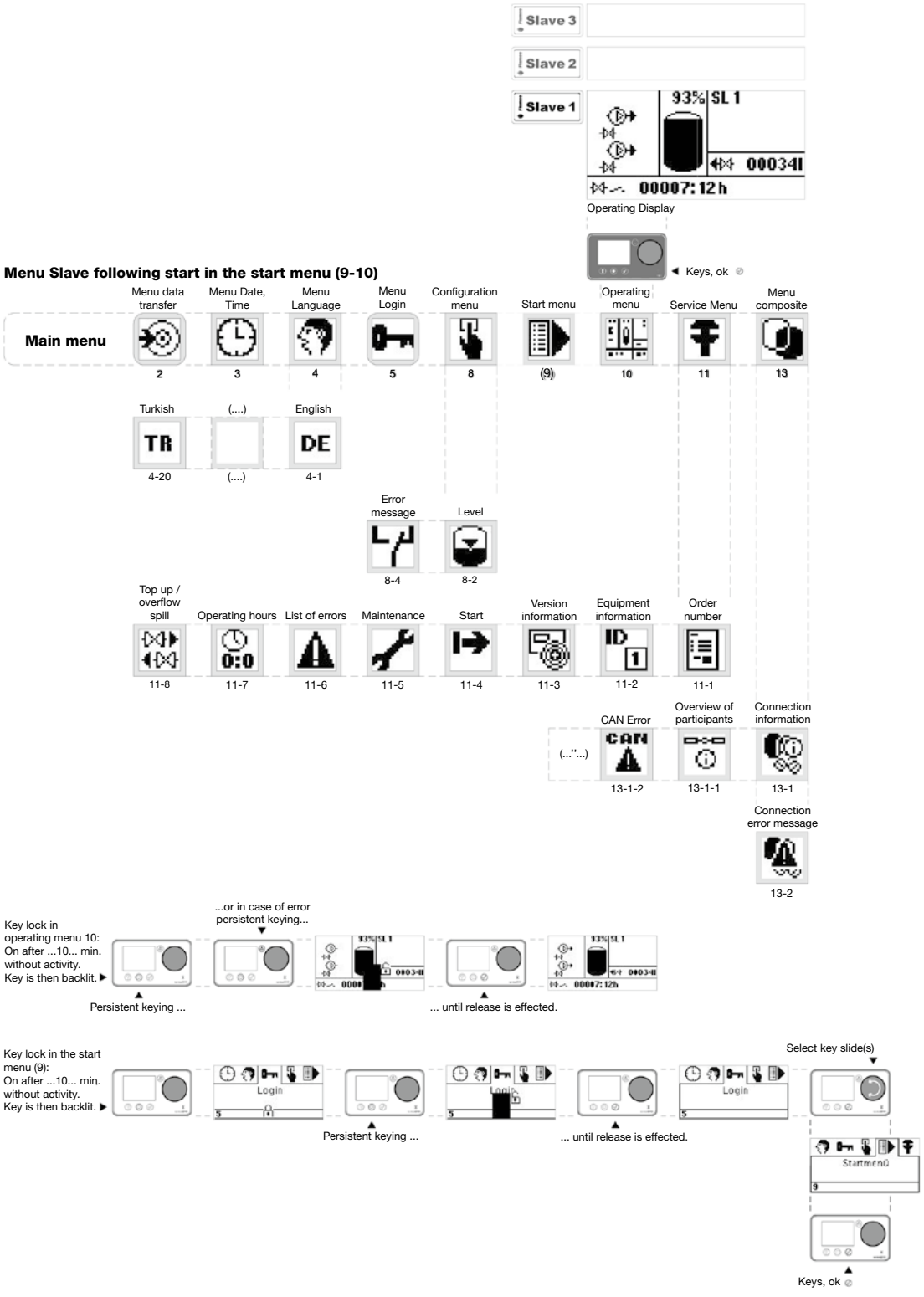
**Upgrade, adding accessories, replacement or modifications of tanks and VB automatic devices**
- These services shall be provided by Flamco Service.

## Attachment A. Menu

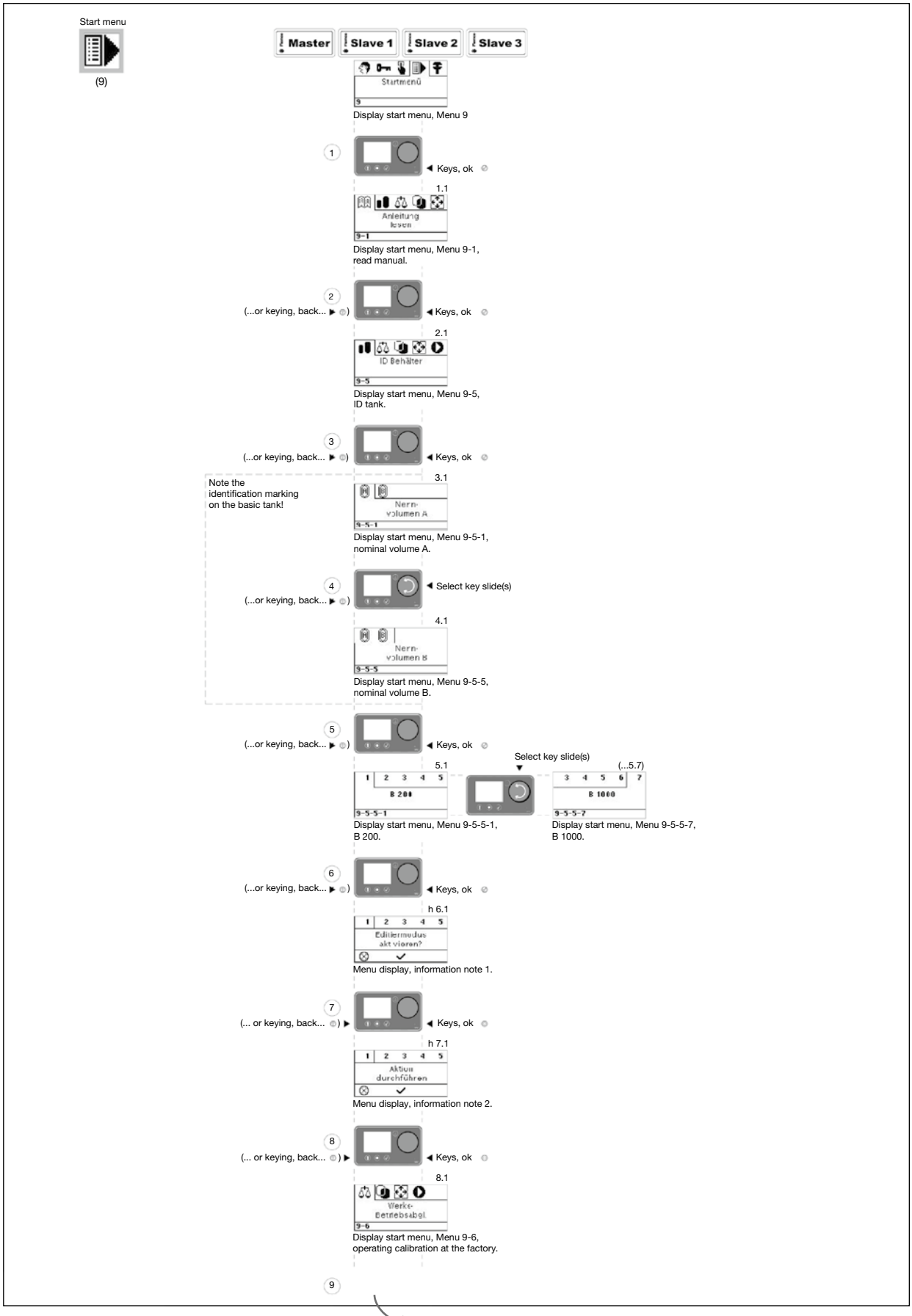
**Main menu Master Flamcomat®**



## Main menu Slave Flamcomat®



## Start menu Flamcomat



P12

Start menu

(9)

Master | Slave 1 | Slave 2 | Slave 3

9 (... or keying, back... ) ▶  ◀ Keys, ok

h 9.1


Menu display, information note 1.

10 (... or keying, back... ) ▶  ◀ Keys, ok

h 10.1


Menu display, information note 2.

11 (... or keying, back... ) ▶  ◀ Keys, ok

h 11.1

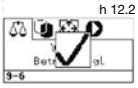

Menu display, information note 3.

12 (... or keying, back... ) ▶  ◀ Keys, ok

h 12.1

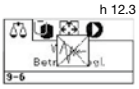

Display start menu, Menu 9-6, calibration is carried out, information note: Please wait.

h 12.2



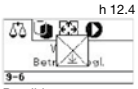

Display start menu, Menu 9-6, information note: Successful calibration is confirmed.

h 12.3



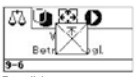

Possible information note: No measured value smoothing. Exclude disturbance forces, repeat calibration.

h 12.4



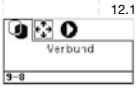

Possible information note: Min. measured value underrun. Align tank, exclude disturbance forces, repeat calibration

h 12.5




Possible information note: Max. measured value overrun. Align tank, exclude disturbance forces, repeat calibration

12.1



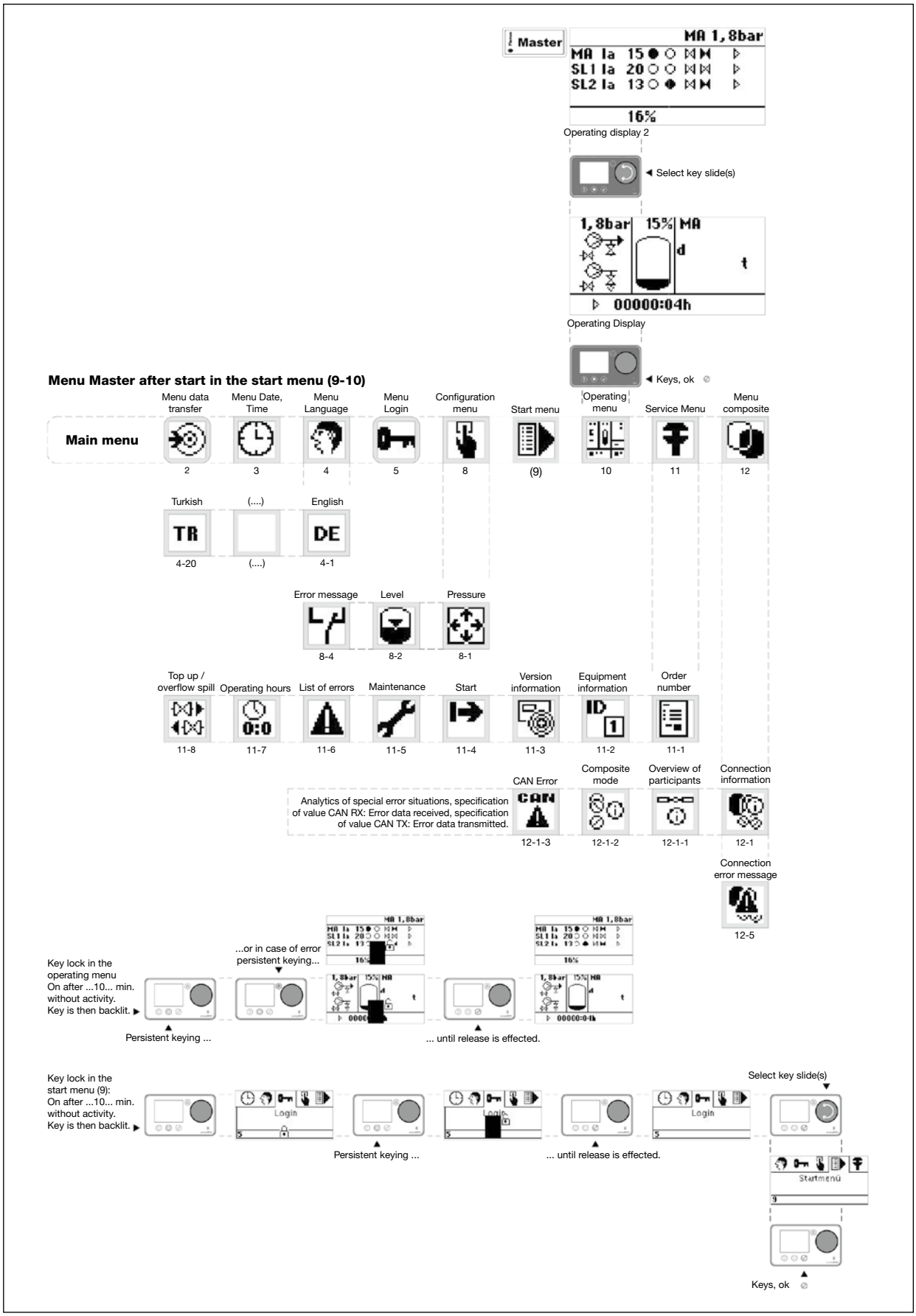

Display start menu, Menu 9-8, Composite.

13 (...or keying, back... ▶ )  ◀ Keys, ok

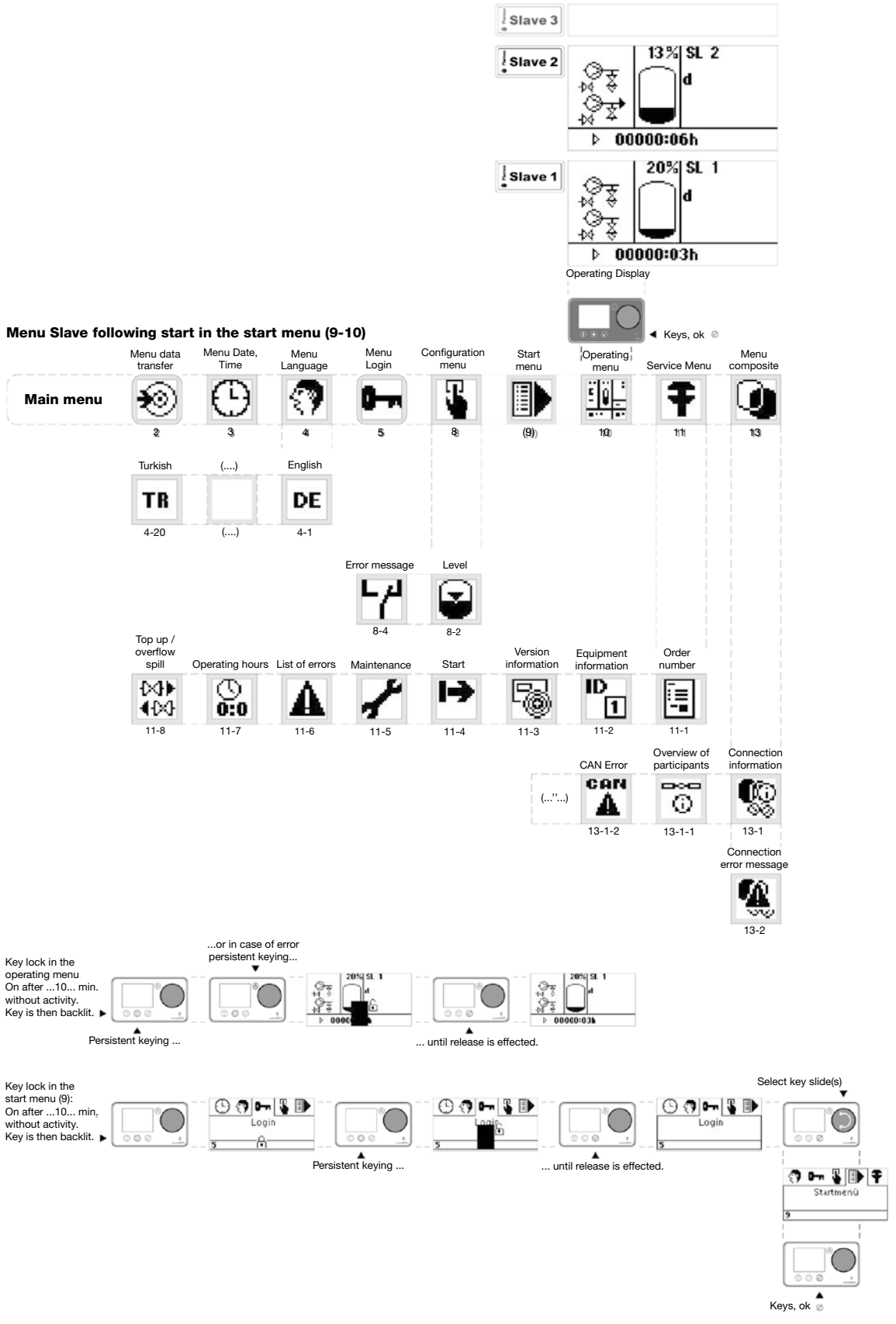
h 13.1


Display start menu, Menu 9-8, information note: The configuration of the connection must be effected by Service.

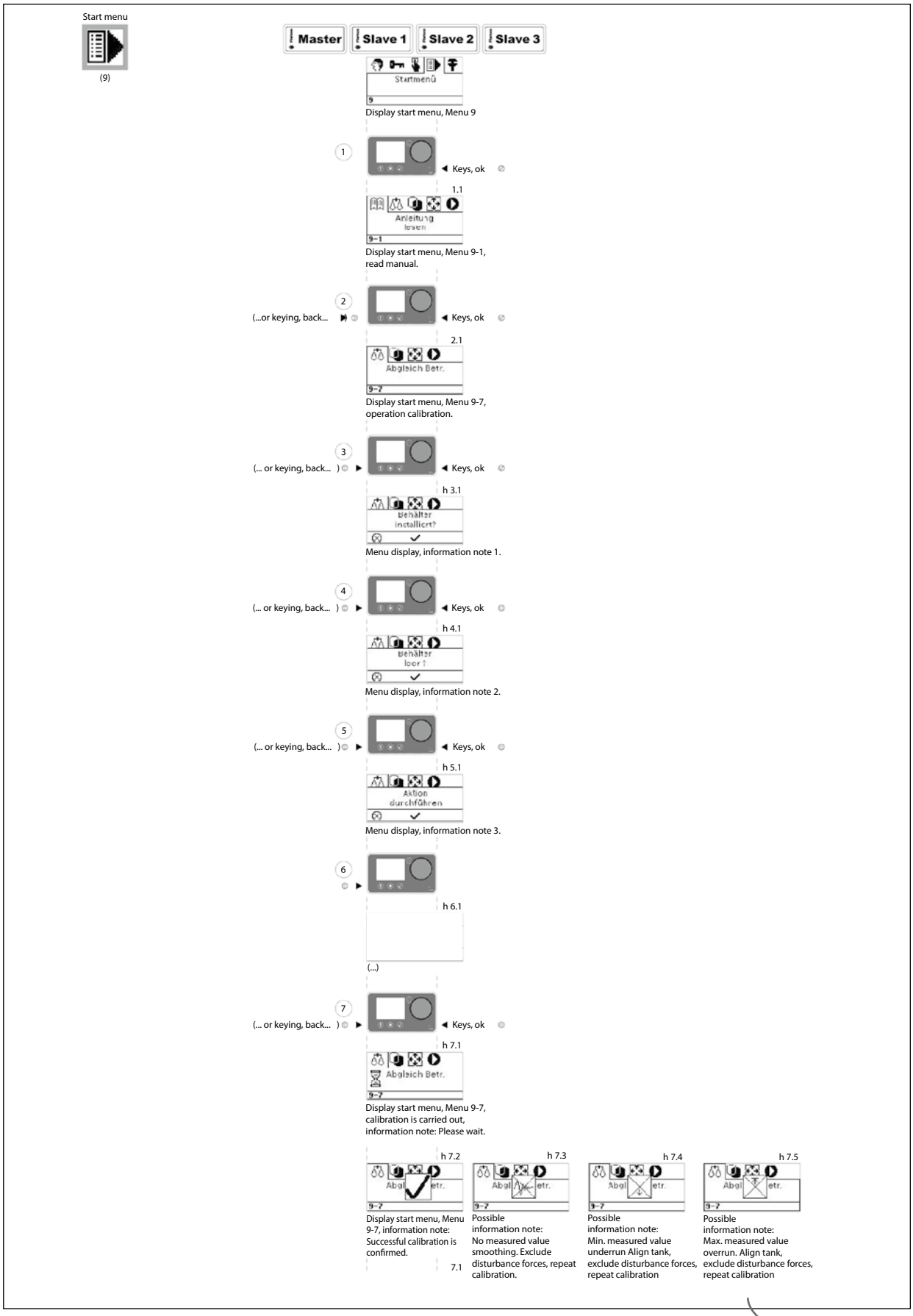
## Main menu Master Flexcon® M-K



## Main menu Slave Flexcon® M-K

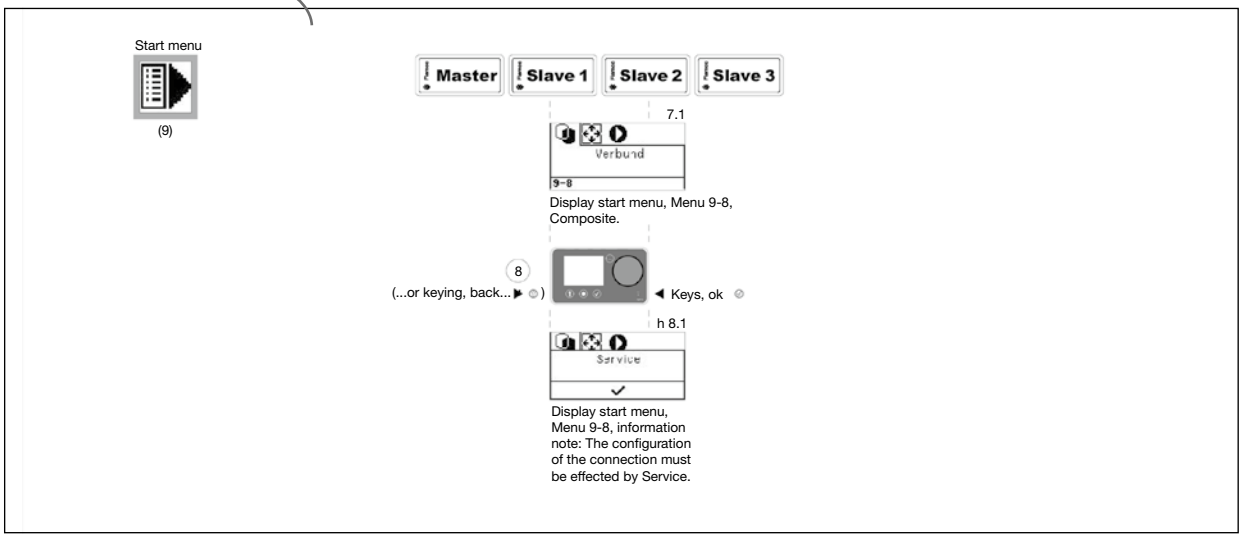


## Start menu Flexcon® M-K

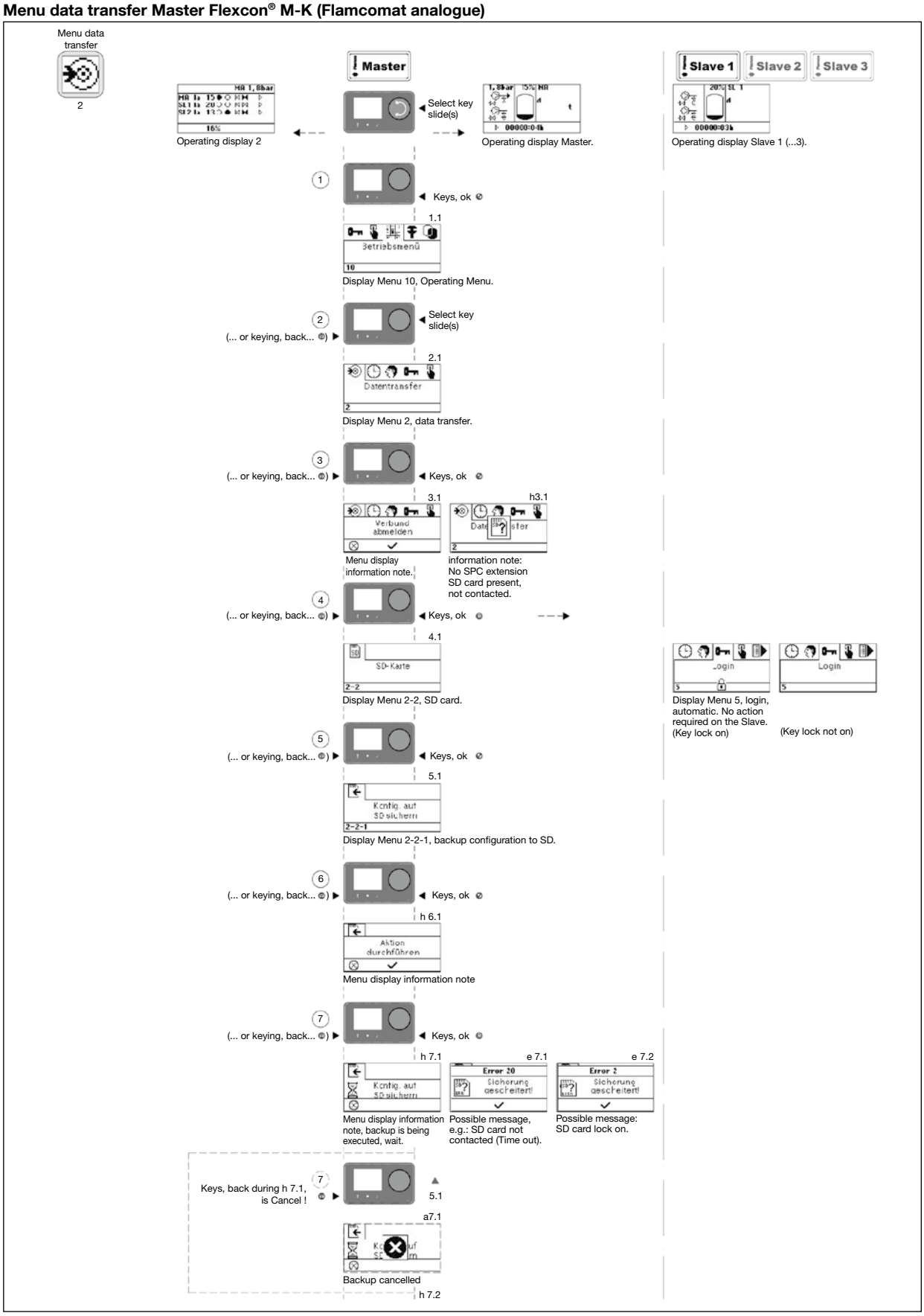



P17

P16

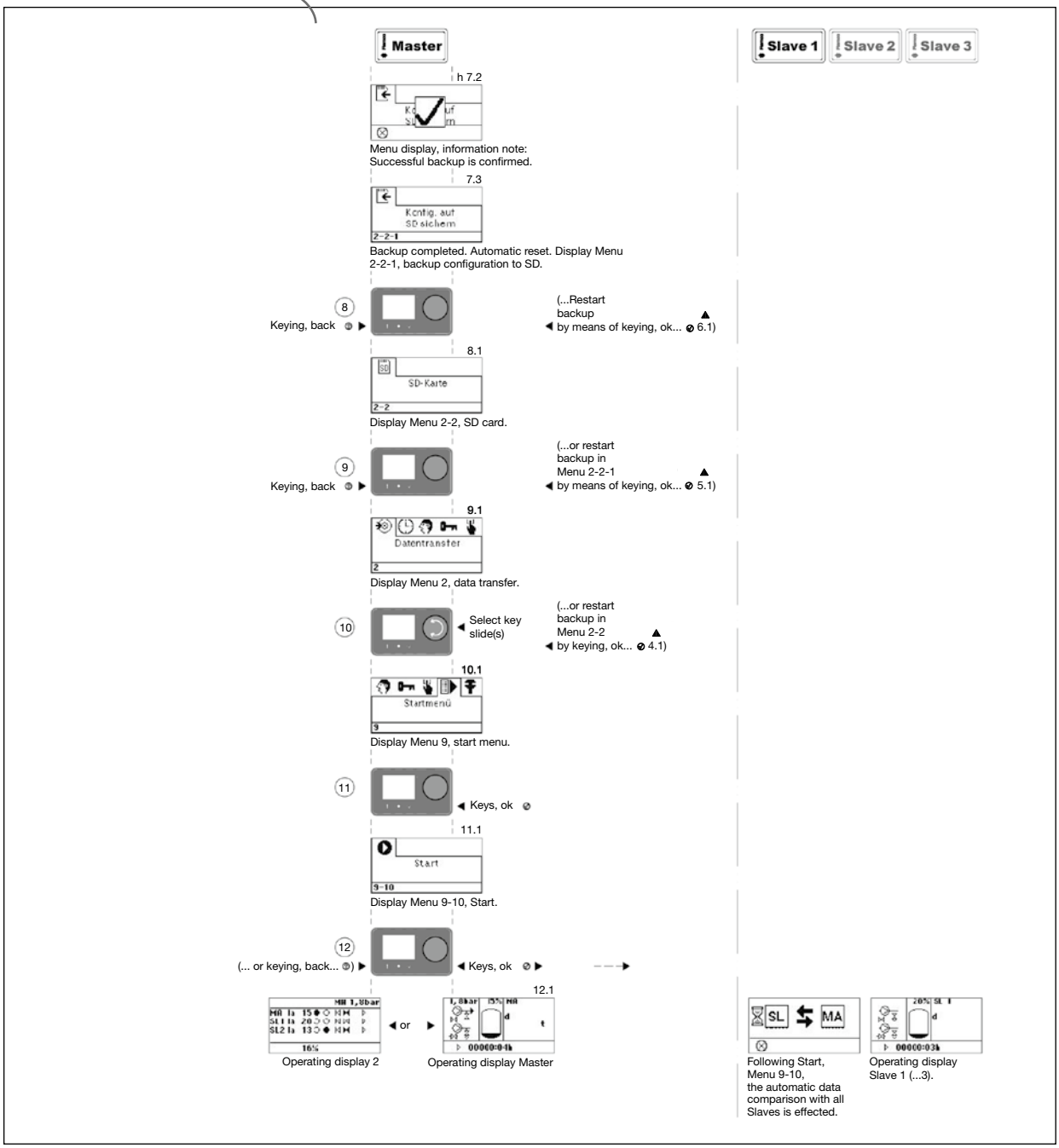

Start menu
(9)
Master
Slave 1
Slave 2
Slave 3
7.1
Verbund
9-8
Display start menu, Menu 9-8, Composite.
8
(...or keying, back... )
Keys, ok
h 8.1
Service
Display start menu, Menu 9-8, information note: The configuration of the connection must be effected by Service.

## Menu data transfer Master Flexcon® M-K (Flamcomat analogue)

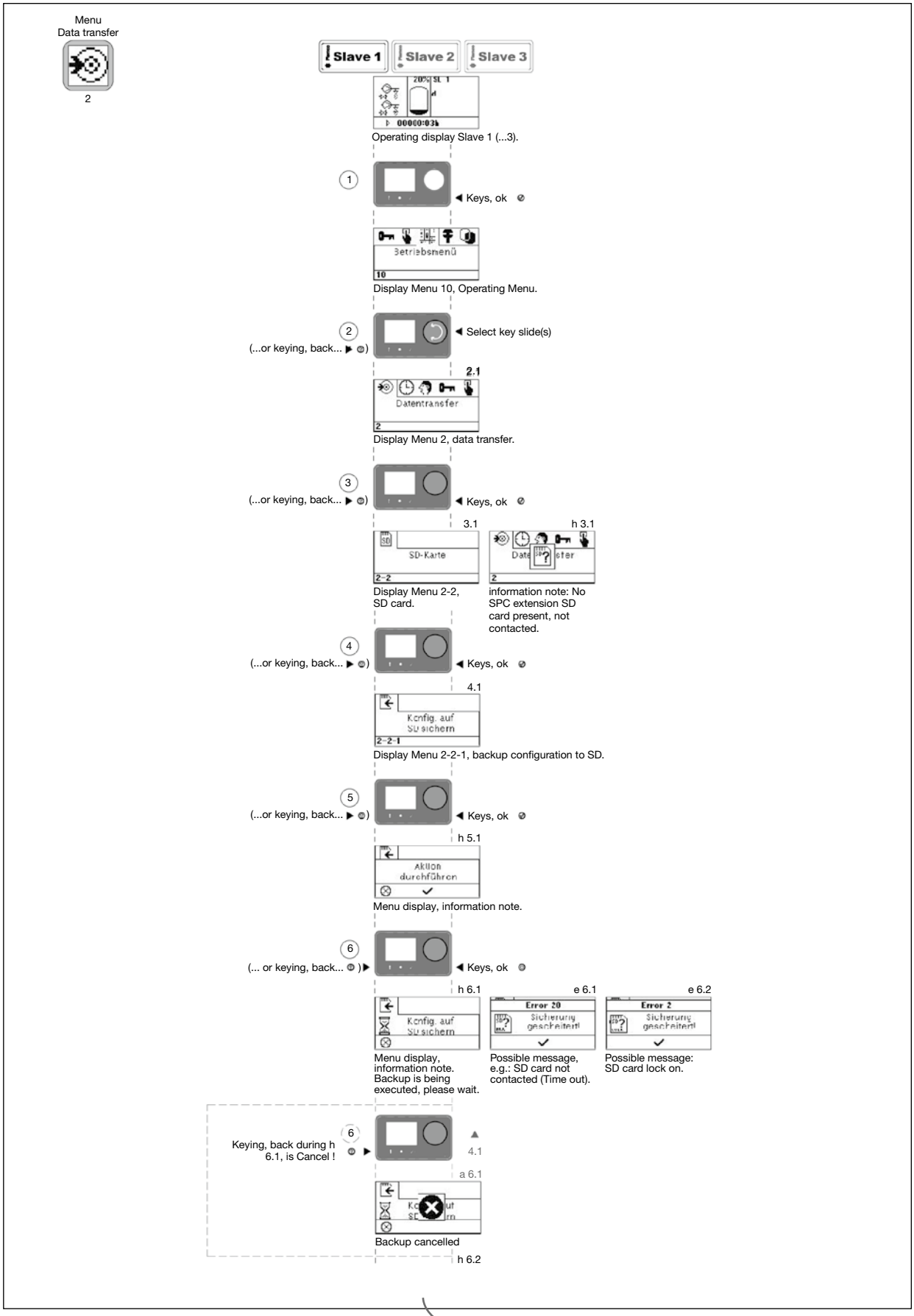



P19

P18

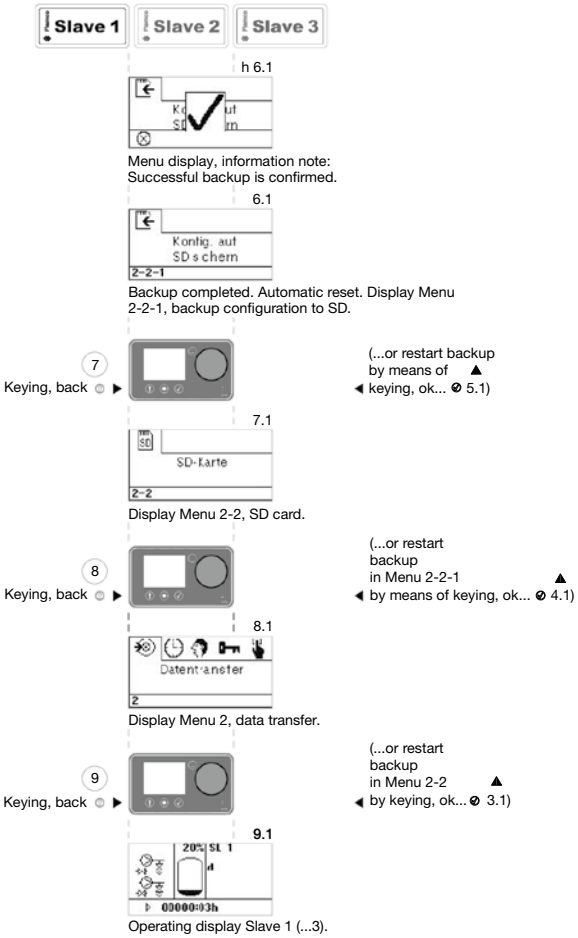

Master
Slave 1
Slave 2
Slave 3
h 7.2
Menu display, information note:
Successful backup is confirmed.
7.3
Konfig. auf SD sichern
2-2-1
Backup completed. Automatic reset. Display Menu 2-2-1, backup configuration to SD.
8
Keying, back
(...Restart backup by means of keying, ok... 6.1)
8.1
SD-Karte
2-2
Display Menu 2-2, SD card.
9
Keying, back
(...or restart backup in Menu 2-2-1 by means of keying, ok... 5.1)
9.1
Datentransfer
2
Display Menu 2, data transfer.
10
Select key slide(s)
(...or restart backup in Menu 2-2 by keying, ok... 4.1)
10.1
Startmenü
9
Display Menu 9, start menu.
11
Keys, ok
11.1
Start
9-10
Display Menu 9-10, Start.
12
(... or keying, back...)
Keys, ok
12.1
or
Operating display 2
Operating display Master
SL
MA
Following Start, Menu 9-10, the automatic data comparison with all Slaves is effected.
Operating display Slave 1 (...3).

## Menu data transfer Slave Flexcon® M-K (Flamcomat analogue)



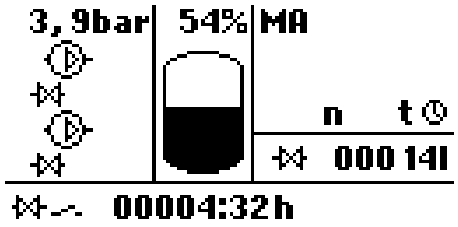
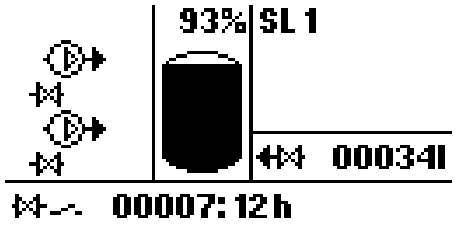

P21

P20

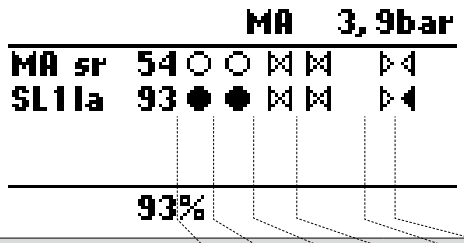

Slave 1
Slave 2
Slave 3
h 6.1
Menu display, information note:
Successful backup is confirmed.
6.1
Kontig. aut
SD schern
2-2-1
Backup completed. Automatic reset. Display Menu
2-2-1, backup configuration to SD.
7
Keying, back
(...or restart backup
by means of ▲
◀ keying, ok... ⊘ 5.1)
7.1
SD-Karte
2-2
Display Menu 2-2, SD card.
8
Keying, back
(...or restart
backup
in Menu 2-2-1 ▲
◀ by means of keying, ok... ⊘ 4.1)
8.1
Datentransfer
2
Display Menu 2, data transfer.
9
Keying, back
(...or restart
backup
in Menu 2-2 ▲
◀ by keying, ok... ⊘ 3.1)
9.1
20% SL 1
00000:03h
Operating display Slave 1 (...3).

## Attachement B. Operating displays

**Flamcomat®, combination 2-1: MA VBIa-sr; SL 1 VBIa-la**

| Operating display 1 Master | Operating display Slave 1 |
|---|---|
|  |  |
| **Example description:** | **Example description:** |
| - Connection participant: Master.<br>**Pressure reference point in the project.**<br>- Actual pressure: 3.9 bar (e.g.: $P_A$ = 4.1 bar; $P_A$- = 0.2 bar).<br>- Unit ID: DP….<br>- Tank level 54%<br>- Top up self-tested; valve; volt-free; not on; total switch-on time: 4 h, 32 min.<br>- Overflow spill self-tested; valve 230 V not on; impulse water counter; total overflow spill volume: 14 litres.<br>- Temperature monitor (installed, configured) is on.<br>*In the terminal there is an indication: 't', and the relevant error message.*<br>*Information note: If degassing is activated, the use of pump pressurisation stops the degassing process in order to prevent the temperature increasing to a value >70 °C. The standard installation is effected in expansion line 1, in flow-off direction downstream of existing VB. Installations per unit and control system are possible or required.*<br>- Exclusion period degassing is on (» No degassing), degassing selected: Normal (n). | - Connection participants: Slave 1.<br>- Unit ID: DP….<br>- Pump 1; 2 on.<br>- Tank level 93%.<br>- Top up self-tested; valve; volt-free; not on; total switch-on time: 7 h, 12 min.<br>- Overflow spill self-tested; valve 230 V on; impulse water counter; total overflow spill volume: 34 litres.<br>- Temperature monitor (installed, configured) is on.<br>*In the terminal, an indication with: 't', is not effected, the relevant error message is effected on the Master only.*<br>*Note: Example gives an existing multiple Installation on (MA; SL1)*<br>- Exclusion period degassing is on (» No degassing), degassing selected: Normal (n). (Displays, Master only). |

**Operating display 2 Master**

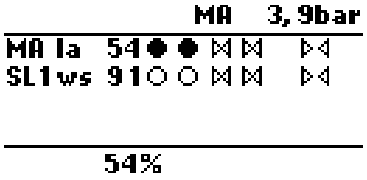



**Example description:**

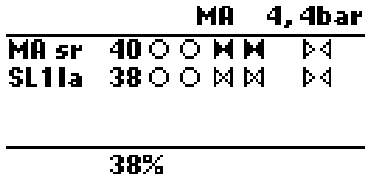
| | Motor 1 | Motor 2 | Valve 1, pressure decrease | Valve 2, pressure decrease | Top up | Overflow spill |
|---|---|---|---|---|---|---|

*Black iluminated symbols are active.*
Only the existing content of the installed tank nominal size of the basic tank on the respective existing load-dependent unit is evaluated and indicated (93%).

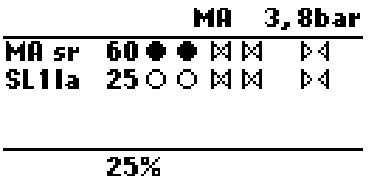
• **Takeover of active unit:**

| Operating display 2 Master | Example - Error |
|---|---|
|  | Display on Slave 1: No.: 29 Spill incorrect<br>Display on Master: No.: 133 SL 1 P+0% Power<br>No.: 139 SL 1 P-0% Power<br>**Example description:**<br>The previously active, now defective unit SL 1 changes from -la to -ws and becomes passive. The previously passive, not defective unit MA changes from -sr to -la and becomes active. The level value necessary for subsequent switchings changes from the value of the defective to the value of the non-defective unit. A reset is effected if the error on the SL 1 has been remedied and the message acknowledged. |

• **Passive operating takeover when tolerance is underrun:**

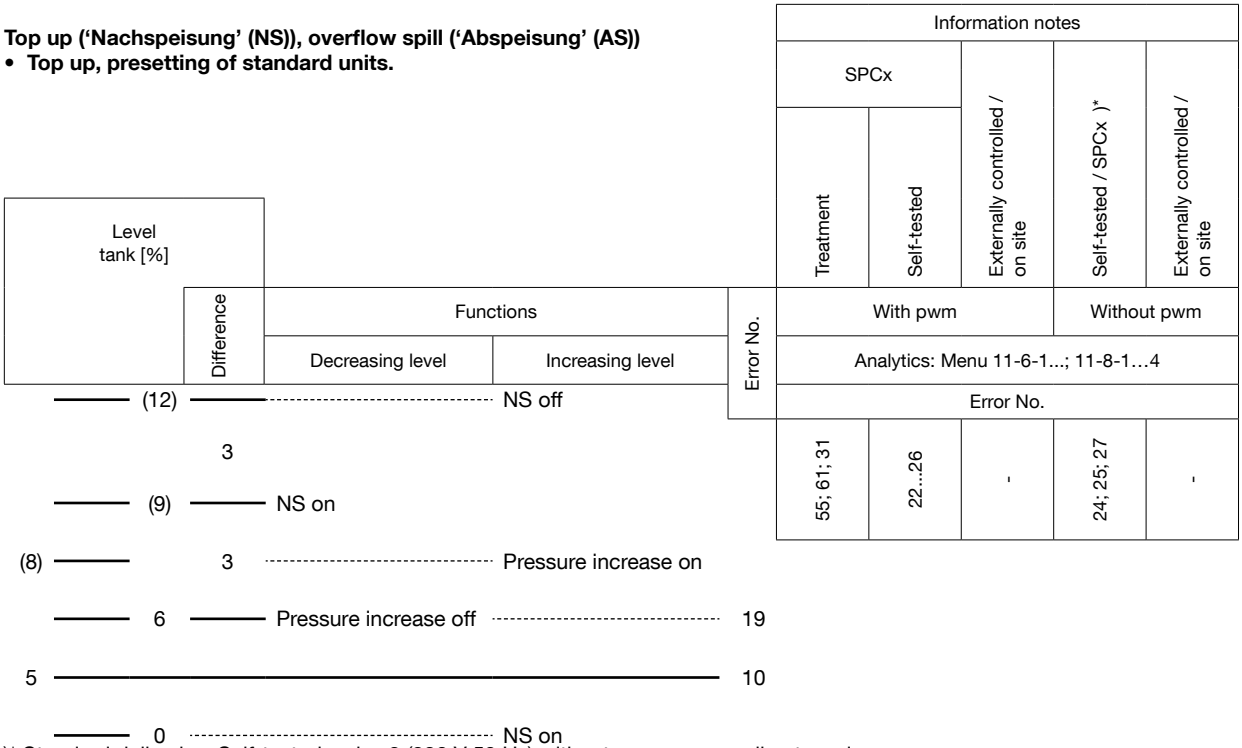
| Operating display 2 Master | Example description: |
|---|---|
|  | The level of the passive unit is 40% from previously existing switchings or error situations and is not within the tolerance of the presetting (50 ±10%). The request to decrease the pressure of an active unit (SL 1 la) is effected to achieve this presetting by a passive unit (MA sr). There will be no switch-over passive / active. If, on completion of this pressure decrease, there is a value within this presetting, passive takeover has been completed. |

• **Passive operating takeover when tolerance is exceeded:**

| Operating display 2 Master | Example description: |
|---|---|
|  | The level of the passive unit is 60% from previously existing switchings or error situations and is not within the tolerance of the presetting (50 ±10%). The request to increase the pressure of an active unit (SL 1 la) is effected to achieve this presetting by a passive unit (MA sr). There will be no switch-over passive / active. If, on completion of this pressure increase, there is a value within this presetting, passive takeover has been completed. |

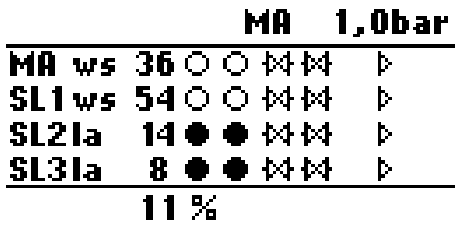
**Flamcomat®, combination 4-13: MA VBla-ws; SL 1 VBla-ws; SL 2 VBla-la; SL 3 VBla-la**

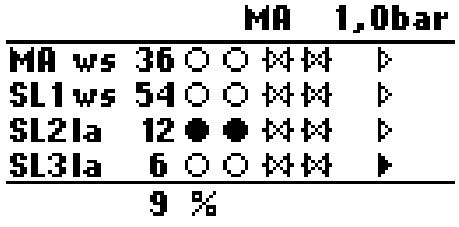
**Top up ('Nachspeisung' (NS)), overflow spill ('Abspeisung' (AS))**
• **Top up, presetting of standard units.**

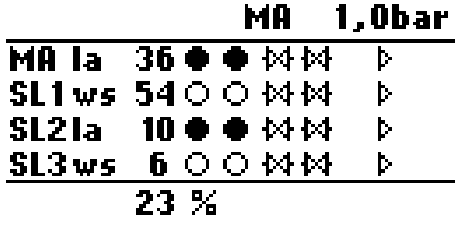


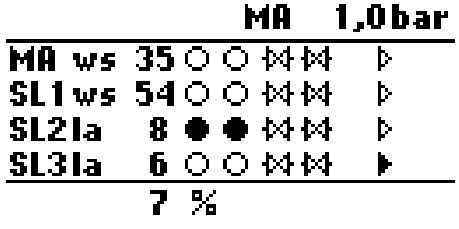

)* Standard deliveries: Self-tested, valve 3 (230 V 50 Hz) without pwm or according to order.

- **Top up and pressure increase:** Example descriptions in the sequence A...D

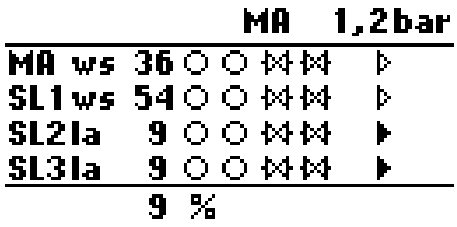
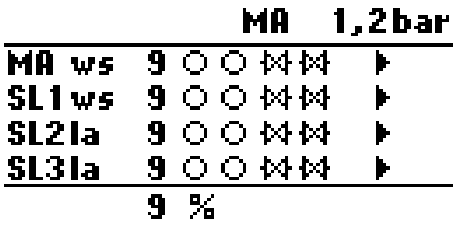
| Operating display 2 Master | | |
|---|---|---|
|  | A | With the actual pressure 1.0 bar (e.g.: $P_A$ = 1.2 bar; $P_{A-}$ = 0.2 bar), the actuators for pressure increase become active in dependence on the load.<br>(A passive takeover from the required level decrease is not effected, presetting: 50 ±10%). |

| Operating display 2 Master | | |
|---|---|---|
|  | B | With the level value reached of the minimum water level the installed/configured NS actuator (standard delivery) becomes active. This value causes the actuators for pressure increase to be switched off. Existing error messages:<br>Display on Slave 3: No.: 19 Minimum water level<br>Display on Master: Without |

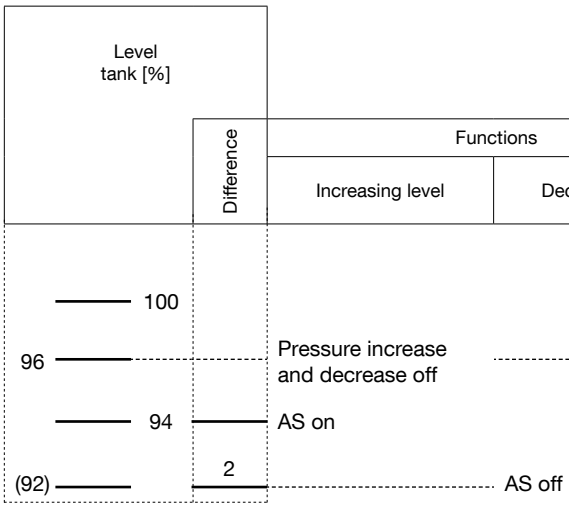
| Operating display 2 Master | | |
|---|---|---|
|  | C | An existing error message including the availability of 0% leads to a unit change, from SL3 to MA (takeover of active unit). Existing error messages:<br>Display on Slave 3: No.: 19 Minimum water feed<br>No.: 27 Time NS cycle exceeded<br>Display on Master: No.: 135 SL 3 P+0% Power<br>No.: 141 SL 3 P-0% Power<br>A reset is effected if the pressurisation request following C is ended (1.2 instead of 1.0 bar) and the error message No.: 27 has been acknowledged. |

| Operating display 2 Master | | |
|---|---|---|
|  | D | If the reset is effected and if there is again a pressurisation request, the situation according to B, possibly with changed levels, exists. |

- **Top up without requesting a pressure increase, occurrence of a defect.**
  - Decreasing levels on active units: NS only on, if the levels of active units meet the existing switch-on conditions (see presettings).
  - Decreasing levels on passive units: NS only on, if the levels of active and passive units meet the existing switch-on conditions (see presettings).

| Operating display 2 Master | Operating display 2 Master |
|---|---|
|  |  |

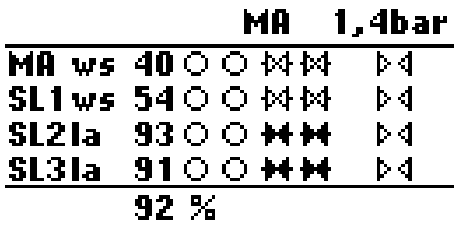
• **Overflow spill (AS), presetting of standard units.**

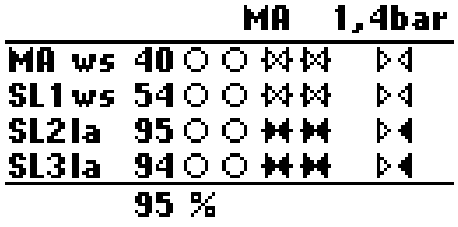


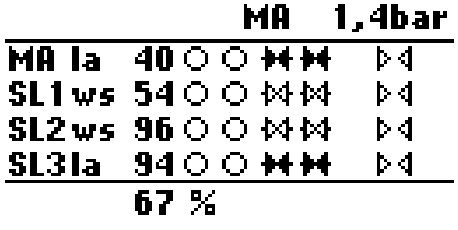

| Difference | Functions: Increasing level | Functions: Decreasing level | Error No. | Information notes: Self-tested / SPCx )* | Information notes: Externally controlled / on site | Information notes: Externally controlled / on site | Information notes: Register (SPCx) |
|---|---|---|---|---|---|---|---|
| | | | | With pwm | | Without pwm | |
| | | | | Analytics: Menu 11-6-1...; 11-8-3; -5; -6 | | | |
| | | | | Error No. | | | |
| | | | 11 | 28; 29 | ' | ' | ' |

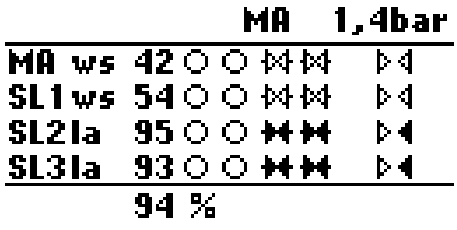
)* Standard deliveries: Following order, self-tested, valve 3.1 (230 V 50 Hz) with pwm.

• **Overflow spill and pressure decrease:** Example descriptions in the sequence A...D

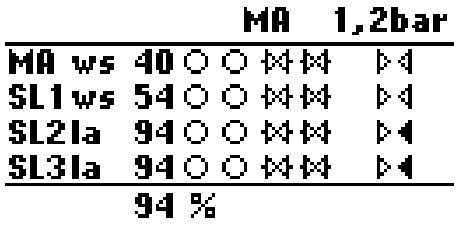
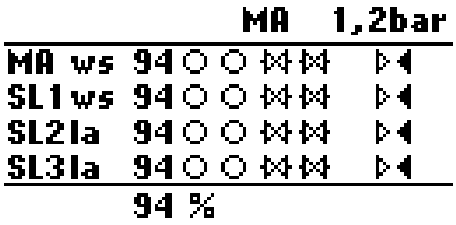
| **Operating display 2 Master** | | |
|---|---|---|
|  | A | With the actual pressure 1.4 bar (e.g.: $P_A$ = 1.2 bar; $P_A$+ = 0.2 bar), the actuators for pressure decrease become active in dependence on the load. (A passive takeover from the required level increase is not effected, presetting: 50 ±10%). |

| **Operating display 2 Master** | | |
|---|---|---|
|  | B | With the level values reached for the overflow spill (94%) of active participants, the installed/configured overflow spill actuators (standard delivery) become active. |

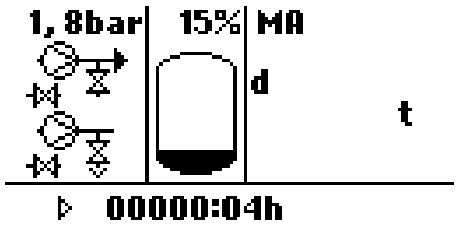
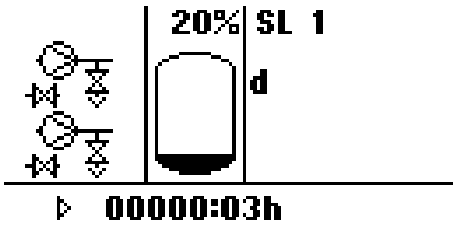
| **Operating display 2 Master** | | |
|---|---|---|
|  | C | An existing error message including the availability of 0% leads to a unit change, from SL2 to MA (takeover of active unit).<br>Existing error messages:<br>Display on Slave 2: No.: 11 Alarm limit max.<br>Display on Master: No.: 134 SL 2 P+0% Power<br>No.: 140 SL 2 P-0% Power<br>A reset is effected if the pressurisation request following C is ended (1.2 instead of 1.4 bar) and the error message No.: 11 has been acknowledged. |

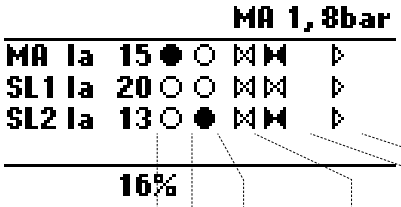
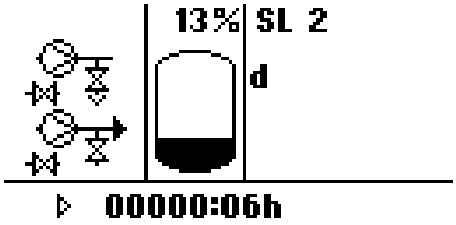
| Operating display 2 Master | | |
|---|---|---|
|  | D | If the reset is effected and if there is again a pressurisation request, the situation according to B, possibly with changed levels, exists. |

- **Overflow spill in the case of an error occurring.**
  - Increasing levels on active units: AS only on, if the levels of active units meet the existing switch-on conditions (see presettings).
  - Increasing levels on passive units: AS only on, if the levels of active and passive units meet the existing switch-on conditions (see presettings).

| Operating display 2 Master | Operating display 2 Master |
|---|---|
|  |  |

**Flexcon® M-K, combination 3-9: MA VBIa-Ia; SL1 VBIa-Ia; SL2 VBIa-Ia**

| Operating display Master | Operating display Slave 1 |
|---|---|
|  |  |
| **Example description:** | **Example description:** |
| - Connection participant: Master.<br>**Pressure reference point in the project.**<br>- Actual pressure: 1.8 bar (e.g.: $P_A$ = 2.0 bar; $P_A$- = 0.2 bar).<br>- Unit ID: DK….<br>- Compressor 1 of 2 on.<br>- Tank level 15%.<br>- Top up ext. controlled (e.g.: FILL-PE); volt-free; not on; total switch-on time: 4 min.<br>- Temperature monitor (installed, configured) is on. *In the terminal there is an indication with: 't', and the relevant error message.*<br>*Information note: The application of compressor pressurisation only effects a display indication, no action. The standard installation is effected in flow-off direction downstream of existing VB. Installations per control system are possible or required.*<br>- Density of heat transfer medium changed to unequal 1,000 kg/m³ (identical values of all connection participants required). | - Connection participant: Slave 1.<br>- Unit ID: DK….<br>- Tank level 20%.<br>- Top up ext. controlled (e.g.: FILL-PE); volt-free; not on; total switch-on time: 3 min.<br>- Temperature monitor (installed, configured) is on.<br>*In the terminal, an indication with: 't', is not effected, the relevant error message is effected on the Master only.*<br>*Note: Example gives an existing multiple Installation on (MA; SL1)*<br>- Density of heat transfer medium changed to unequal 1,000 kg/m³ (identical values of all connection participants required). |

| Operating display 2 Master | Operating display Slave 2 |
|---|---|
|  |  |
| Example description: | Example description: |
| Motor 1 / Motor 2 / Valves 1 and 1.1; pressure decrease a) / Valve 2 / 2.1; relief b) / Top up / Overflow spill (not present) | - Connection participant: Slave 2.<br>- Unit ID: DK….<br>- Compressor 2 of 2 on.<br>- Tank level 13%.<br>- Top up ext. controlled (e.g.: FILL-PE); volt-free; not on; total switch-on time: 6 min.<br>- Temperature monitor not installed, configured. In the terminal, an indication with: ‘t’, is not effected, the relevant error message is effected.<br>- Density of heat transfer medium changed to unequal 1,000 kg/m³ (identical values of all connection participants). |

*Black iluminated symbols are active.*

Identical tank nominal sizes (NG) of the basic tanks (GB) are installed on the VBIa-Ia units, then:

| | VBIa- | Installed GB / NG | Actual volume | | Actual level values | | | | Display |
|---|---|---|---|---|---|---|---|---|---|
| | | *[Litres]* | *[Litres]* | *[∑ Litres]* | *Display* | *[Litres]* | *[∑ Litres]* | *[%]* | *[∑ %]* |
| MA | -Ia | 1200 | 1185 | | 15% | 178 | | | |
| SL1 | -Ia | 1200 | 1185 | 3555 | 20% | 237 | 569 | 16.01 | 16 |
| SL2 | -Ia | 1200 | 1185 | | 13% | 154 | | | |

Unequal tank nominal sizes (NG) of the basic tanks (GB) are installed on the VBIa-Ia units, then:

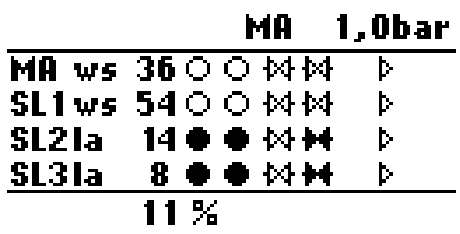
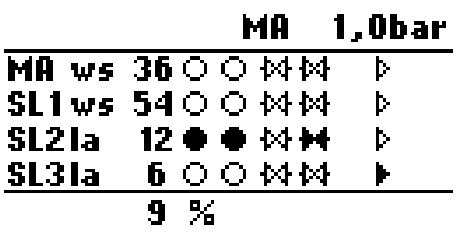
| | VBIa- | Installed GB / NG | Actual volume | | Actual level values | | | | Display |
|---|---|---|---|---|---|---|---|---|---|
| | | *[Litres]* | *[Litres]* | *[∑ Litres]* | *Display* | *[Litres]* | *[∑ Litres]* | *[%]* | *[∑ %]* |
| MA | -Ia | 1000 | 950 | | 15% | 143 | | | |
| SL1 | -Ia | 1600 | 1566 | 3701 | 20% | 313 | 610 | 16.48 | 16 |
| SL2 | -Ia | 1200 | 1185 | | 13% | 154 | | | |

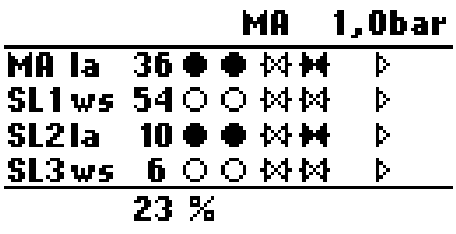
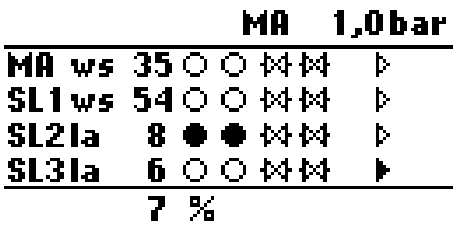
a) Only individual representation, also in the case of 2 installed valves (GB and BB).
b) Only individual representation, also in the case of 2 installed compressors (GB 2 or GB 1 and BB 1).

**Flexcon® M-K, combination 4-13: MA VBIa-ws; SL 1 VBIa-ws; SL 2 VBIa-Ia; SL 3 VBIa-Ia.**

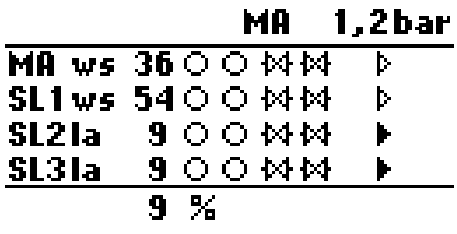
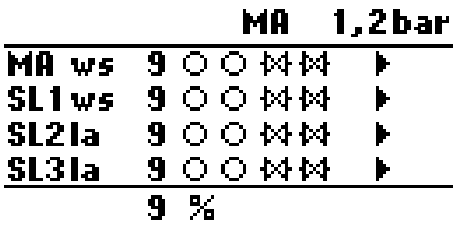
**Top up (‘Nachspeisung’ (NS))**

- **Top up, presetting of standard units.**
  The relevant representation does not correspond to the section:
  ‘• Flamcomat®, combination 4-13: MA VBIa-ws; SL 1 VBIa-ws; SL 2 VBIa-Ia; SL 3 VBIa-Ia’ (Page: 21).
- **Top up and pressure increase**
  The relevant texts for the image sequences A…D correspond to the section:
  ‘• Flamcomat®, combination 4-13: MA VBIa-ws; SL 1 VBIa-ws; SL 2 VBIa-Ia; SL 3 VBIa-Ia’ (Page: 22).

| Operating display 2 Master | A | Operating display 2 Master | B |
|---|---|---|---|
|  | |  | |

| Operating display 2 Master | C | Operating display 2 Master | D |
|---|---|---|---|
|  | |  | |

- **Top up without requesting a pressure increase, occurrence of a defect.**
  The relevant texts for the image sequences correspond to the section:
  '• Flamcomat®, combination 4-13: MA VBla-ws; SL 1 VBla-ws; SL 2 VBla-la; SL 3 VBla-la' (Page: 22).

| Operating display 2 Master | Operating display 2 Master |
|---|---|
|  |  |

## Attachement C. Error messages

| Error No. | Terminal text | Summary description Causes/Measures | Delay in message detection. | Delay time *) | Message activation only, if error still present after delay. | Acknowledgement duty (latching) | Exceptions | Current list of errors / history | Collective error message | Menu collective error message **) | System availability and the availability reported by the Slave to the Master. ***) | Information notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | [%] | |
| **Alarms, process and procedural errors.** | | | | | | | | | | | | |
| **APVS** | | | | | | | | | | | | |
| 1 | Surge. Sens. | Short circuit, sensor voltage pressure or weight sensor | No | Without | | No | | X/X | Yes | | 100 | |
| | Operating voltage of the sensors not present due to short circuit. Test of E installation. Poss. replacement of signal lines. | | | | | | | | | | | |
| 2 | PS 20mA ↑ | Short circuit, current loop, pressure sensor | No | Without | | No | | X/X | Yes | | 0 | |
| | Sensor range exceeded due to overload, incorrect value output during normal operation, or short circuit on the signal line or E installation. Checking the E installation and the allocation of the sensor type to the unit version. Poss. replacement of the sensor, signal line. | | | | | | | | | | | |
| 3 | PS 4mA ↓ | Interruption, current loop, pressure sensor | No | Without | | No | | X/X | Yes | | 0 | |
| | Sensor range is underrun due to incorrect value output during normal operation or signal line not contacted or defective. Test of E installation. Poss. replacement of the sensor, signal line. | | | | | | | | | | | |
| 4 | LS 20mA ↑ | Short circuit, current loop, weight sensor (content) | No | Without | | No | | X/X | Yes | | 0 | |
| | Sensor range exceeded due to overload, incorrect value output during normal operation, or short circuit on the signal line or E installation. Ground / ext. influencing to be excluded. Checking the E installation and the allocation of the sensor type to the NG and tank version (identification marking on the tank, type A, B). Poss. replacement of the sensor, signal line. | | | | | | | | | | | |
| 5 | LS 4mA ↓ | Interruption, current loop, weight sensor (content) | No | Without | | No | | X/X | Yes | | 0 | |
| | Sensor range is underrun due to relief, incorrect value output during normal operation or signal line not contacted or defective. Ground / ext. influencing to be excluded. Test of E installation. Poss. replacement of the sensor, signal line. | | | | | | | | | | | |
| 6 | - | | | | | | | | | | | |
| 7 | - | | | | | | | | | | | |
| 8 | Pressure ↓ | Lower alarm limit, pressure | Yes | General delay | Yes | No | | X/X | Yes/ No | 8-4-1 | 100 | Changing the values $P_A$; $P_e$; PSV see menu: 8-1-1. Safety relevant data changes are effected by Flamco Service. |
| | Safety value from presetting was reached or underrun. Value: $P_A$ - $P_A$- - 0.3 bar. Poss. subsequent fault from Nos.: 10-17; 19; 20; 24-27. Loss of heat transfer medium, top up not available or with malfunction. System insufficiently filled, vented. Insufficient delivery output for increasing pressure. Flamcomat®: Valves 1; 2 (DH) do not close; Flexcon® M-K: Valves 1; 1.1 (DH) do not close; incorrect valve installations. | | | | | | | | | | | |
| 9 | Pressure ↑ | Upper alarm limit, pressure | Yes | General delay | Yes | No | | X/X | Yes/ No | 8-4-1 | 100 | |
| | Safety value from presetting was reached or exceeded. Value: $P_A$ + $P_A$+ + 0.3 bar. Poss. subsequent fault from Nos.: 11; 20. Flamcomat®: Valves 1; 2 (DH) do not open, particle filter not cleaned, incorrect installation of the valves, incorrect design, incorrect inputs. Flexcon® M-K: Valves 1; 1.1 (DH) do not open, free outflow is obstructed or incorrect installation, incorrect design, incorrect inputs. | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | Level ↓ | Lower alarm limit, content | Yes | General delay | Yes | No | | X/X | Yes/ No | 8-4-2 | 100 | |
| | Safety value from presetting was reached or underrun. Motors off (Top up already on). Value: 5% of actual volume. Loss of heat transfer medium, top up not available, with malfunction, or flow pressure too low. System insufficiently filled, vented. Add necessary heat transfer medium. | | | | | | | | | | | |
| 11 | Level ↑ | Upper alarm limit, content | No | Without | | Yes | | X/X | Yes/ No | 8-4-2 | 0 | |
| | Safety value from presetting was reached or exceeded. Motors, valves off. Value: 96% of actual volume. Flamcomat®: Valves 1; 2 (DH); 3 (NS) do not close, valve 3.1 (AS) does not open, incorrect design of tank. Reduce filling volume. Flexcon® M-K: Valves 1; 1.1 (DH) do not close, existing NS with malfunction, incorrect design of tank. Reduce filling volume. | | | | | | | | | | | |
| 12 | TP/MP M1 on | TP/current sensor M1 Signal on | No | Without | | Yes | | X/X | Yes/ No | 8-4-8 | 0/50 | |
| | Motor off. SPCx-lw: Minimum current value from presetting was underrun, safety temperature switch of the motor has triggered (winding defect, overload, overtemperature, motor cooling insufficient), voltage supply of motor interrupted. Establishing the initial conditions. SPCx-hw: Motor protection switch has triggered (winding defect, overload, overtemperature, motor cooling insufficient, incorrect setting). Check setting (motor type plate), establishing the initial conditions. | | | | | | | | | | | |
| 13 | TP/MP M2 on | TP/curr. sensor M2, signal on | No | Without | | Yes | | X/X | Yes/ No | 8-4-8 | 0/50 | |
| | See No.: 12 | | | | | | | | | | | |
| 14 | TP/MP M3 on | TP/curr. sensor M3, signal on | No | Without | | Yes | NS M3! | X/X | Yes/ No | 8-4-8 | 0 | NS Fill P |
| | See No.: 12; SPCx-lw | | | | | | | | | | | |
| 15 | Run time M1 ↑ | Max. uninterrupted run time Motor 1 overrun | No | Without | | Yes | | X/X | Yes/ No | 8-4-7 | 0/50 | |
| | Safety value from presetting was exceeded. Value: 30 min. motor off. Incorrect design, ball valves not completely opened, leaking system, insufficient delivery output. Check installation, establish initial conditions. | | | | | | | | | | | |
| 16 | Run time M2 ↑ | Max. uninterrupted run time motor 2 exceeded | No | Without | | Yes | | X/X | Yes/ No | 8-4-7 | 0/50 | |
| | See No.: 15 | | | | | | | | | | | |
| 17 | MDB on | Signal minimum pressure limiter | No | Without | | Yes | mpl! | X/X | Yes/ No | 8-4-5 | 0 | |
| | Project setting was underrun. All existing actuators off, no DH, NS, AS. Comply with the project safety requirements. | | | | | | | | | | | |
| 18 | Top-up-V. ↓ | Min. Pressure, level | No | Without | | No | NS M3! | X/X | Yes/ No | 8-4-4 | 0 | NS Fill P |
| | Min. pressure from min. level underrun. Motor NS off. Installation, check infeed. | | | | | | | | | | | |
| 19 | Critical level ↓ | Min. Level, water feed | No | Without | | No | | X/X | Yes/ No | 8-4-2 | 100 | |
| | Safety value from presetting was underrun. Motors off (Top up already on). Value: 6% of actual volume | | | | | | | | | | | |
| 20 | DRS on | Signal diaph. rupture sensor | No | Without | | Yes | drs! | X/X | Yes/ No | 8-4-3 | 0 | |
| | Conductive sensor including guide value detection. Diaph. rupture suspected. DH, NS off. Open condensate drain, check drain and, if necessary, sensor. Flexcon® M-K: Pressureless tank required. (Combine diaphragm change with maintain. 2) | | | | | | | | | | | |
| 21 | TM on | Signal of temperature monitor | No | Without | | No | tc! | X/X | Yes/ No | 8-4-6 | 100 | |
| | Signal Xs1 (70 °C +-5K) is on. Flamcomat®: Degassing off; Flexcon® M-K: Message only, no action. [Reset Xsd (70 °C +-5K - 1.5K)] | | | | | | | | | | | |
| 22 | Fill quant. ↓ | No signal IWZ following NS on | No | Without | | Yes | pwm! | X/X | Yes/ No | 8-4-9 | 0 | |
| | No signal within 1 min. following valve 3 on. Flow-through quantity too low or missing signal line. Establish initial conditions. | | | | | | | | | | | |
| 23 | Fill incorrect | Signal IWZ without NS on | No | Without | | Yes | pwm! )2 | X/X | Yes/ No | 8-4-9 | 0 | |
| | Valve 3 (NS) or return valve is not closed. Check NS installation, cleaning, restore function. | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | Fill distance ↓ | Cycle interval NS underrun | No | Without | | Yes | | X/X | Yes/ No | 8-4-9 | 0 | Modifications of safety relevant data shall be effected by Flamco Service. |
| | Safety value from presetting was underrun. | | | | | | | | | | | |
| 25 | Fill number ↑ | Max. number of cycles NS exceeded | No | Without | | Yes | | X/X | Yes/ No | 8-4-9 | 0 | |
| | Safety value from presetting was exceeded. | | | | | | | | | | | |
| 26 | Fill quant. ↑ | Max. quantity of an NS cycle exceeded | No | Without | | Yes | pwm! | X/X | Yes/ No | 8-4-9 | 0 | |
| | Safety value from presetting was exceeded. | | | | | | | | | | | |
| 27 | Fill time ↑ | Max. time of an NS cycle exceeded | No | Without | | Yes | without pwm | X/X | Yes/ No | 8-4-9 | 0 | |
| | Safety value from presetting was exceeded. | | | | | | | | | | | |
| 28 | Spill quant. ↓ | No signal pwm following AS on | No | Without | | Yes | pwm! | X/X | Yes/ No | 8-4-10 | 0 | |
| | No signal within 1 min. following valve 3.1 (AS) on. Flow-through quantity too low or missing signal line. Establish initial conditions. | | | | | | | | | | | |
| 29 | Spill incorrect | Signal pwm without AS on | No | Without | | Yes | pwm! )2 | X/X | Yes/ No | 8-4-10 | 0 | |
| | Valve 3.1 (AS) is not closed. Cleaning, restore function. | | | | | | | | | | | |
| 30 | PM on | Phase monitoring on | No | Without | | No | SPC exten-sion ana-logue | X/X | Yes/ No | 8-4-17 | 0 | SPCx-hw-1-...-1 |
| | No pressurisation, motor, valve (DH) OFF. Phase missing or phase sequence incorrect. Check installation, phases, phase sequence L1/U; L2/V; L3/W to be provided. | | | | | | | | | | | |
| 31 | Treatment 3 ↑ | Max. Treatment quantity NS | No | Without | | Yes | pwm! | X/X | Yes/ No | 8-4-11 | 0 | |
| | The residual treatment capacity of the softening cartridge is 0%. Top up is stopped, not activated. | | | | | | | | | | | |

**Messages, information notes**

**MH**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | Reset | Control restart | No | Without | | No | | -/X | No | | 100 |
| | Temporary loss of mains voltage or internal reset. In the case of a repeat reset within a short period of time, inform Flamco Service. | | | | | | | | | | |
| 51 | Power on | Normal start | No | Without | | No | | -/X | No | | 100 |
| | Restart of control system due to mains voltage being connected in after prior minimum shutdown time greater than 2...s (normal start). | | | | | | | | | | |
| 52 | Battery volt. ↓ | Insufficient battery voltage | No | Without | | No | | -/X | No | | 100 |
| | Inform Flamco Service. | | | | | | | | | | |
| 53 | Date/time? | Control system time invalid | No | Without | | No | | X/X | Yes/ No | 8-4-16 | 100 |
| | Input of current values required. | | | | | | | | | | |
| 54 | Modif. param. | Parameter modified | No | Without | | No | | -/X | No | | 100 |
| | Setting was changed manually. | | | | | | | | | | |
| 55 | Treatment 1 ↑ | Treatment quantity NS (70%) warning threshold 1 | No | Without | | Yes | pwm! | X/X | Yes/ No | 8-4-11 | 100 |
| | Residual treatment capacity of the softening cartridge is 30%. Preparations for replacement required | | | | | | | | | | |
| 56 | Maintain. 1 ! | Maintain. 1 required | No | Without | | Yes | | X/X | Yes/ No | 8-4-12 | 100 | General maintenance, automatic device |
| | Execute ! Issue proof of maintenance, subsequently confirm in menu 11-5-2 (Warranty). Value: 365d (1a) | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 | Maintain. 2 ! | Maintain. 2 required | No | Without | | Yes | | X/X | Yes/ No | 8-4-13 | 100 | Internal test pressure device |
| | Execute ! Issue proof of maintenance, subsequently confirm in menu 11-5-3 (Warranty). Value: 1825d (5a) | | | | | | | | | | | |
| 58 | Maintain. 3 ! | Maintain. 3 required | No | Without | | Yes | | X/X | Yes/ No | 8-4-14 | 100 | Strength test pressure device |
| | Execute ! Issue proof of maintenance, subsequently confirm in menu 11-5-4 (Warranty). Value: 3650d (10a) | | | | | | | | | | | |
| 59 | Maintain. 4 ! | Maintain. 4 required | No | Without | | Yes | | X/X | Yes/ No | 8-4-15 | 100 | Electrical test |
| | Execute ! Issue proof of maintenance, subsequently confirm in menu 11-5-5 (Warranty). Value: 548d (1,5a) | | | | | | | | | | | |
| 60 | Extension | Last external module action with error | No | Without | | Yes | | X/- | No | | 100 | Module LED flashes red |
| | SD card not present or lock SD card on. Switch off lock, contact SD card. | | | | | | | | | | | |
| 61 | Treatment 2 ↑ | Treatment quantity NS (90%) warning threshold 2 | No | Without | | Yes | pwm! | X/X | Yes/ No | 8-4-11 | 100 | |
| | Residual treatment capacity of the softening cartridge is 10%. Making available for replacement required. | | | | | | | | | | | |

**Alarms, messages, connected mode.**

**AMVB**

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 120 | IO module ? | MA/SL module is missing, removed or initialisation error | No | Without | | Yes | MA/ SL | R) X/X | Yes/ No | 12-5-1 13-2-1 | | AMVB | Connection module **1** |
| | Switch off control system, plug in module required (ensure connection of the data lines), switch on control system. | | | | | | | | | | | | |
| 121 | Incorrect module K1 | On the MA channel 1 incorrect SL No. or unconfirmed | No | Without | | No | MA/ SL | R) X/X | Yes/ No | 12-5-1 13-2-1 | | | |
| | Restore initial situation (module slot, configuration of receptacle connectors according to start protocol). | | | | | | | | | | | | |
| 122 | Incorrect module K2 | On the MA channel 2 incorrect SL No. or unconfirmed | No | Without | | No | MA | R) X/X | Yes/ No | 12-5-1 | | | |
| | See No. 121. | | | | | | | | | | | | |
| 123 | Incorrect module K3 | On the MA channel 3 incorrect SL No. or unconfirmed | No | Without | | No | MA | R) X/X | Yes/ No | 12-5-1 | | | |
| | See No. 121. | | | | | | | | | | | | |
| 124 | Data exchange K1 | On the MA channel 1 data exchange VB defective or data exchange error on the SL | No | Without | | Yes | MA/ SL | R) X/X | Yes/ No | 12-5-2 13-2-2 | | | Data exchange **2** |
| | Restore initial situation (...data line, connections, module slot to be checked) | | | | | | | | | | | | |
| 125 | Data exchange K2 | Data exchange VB Channel 2 defective | No | Without | | Yes | MA | R) X/X | Yes/ No | 12-5-2 | | | |
| | See No. 124. | | | | | | | | | | | | |
| 126 | Data exchange K3 | Data exchange VB Channel 3 defective | No | Without | | Yes | MA | R) X/X | Yes/ No | 12-5-2 | | | |
| | See No. 124. | | | | | | | | | | | | |
| 127 | Data ? Ka 1 | MA has not received all data from SL on channel 1 | No | Without | | Yes | MA | R) X/X | Yes/ No | 12-5-2 | | | |
| | Restore initial situation (...data line, connections, module slot to be checked) | | | | | | | | | | | | |

Message group

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 128 | Data ? Ka 2 | MA has not received all data from SL on channel 2 | No | Without | | Yes | MA | R) X/X | Yes/ No | 12-5-2 | | AMVB | Data exchange **2** |
| | See No. 127. | | | | | | | | | | | | |
| 129 | Data ? Ka 3 | MA has not received all data from SL on channel 3 | No | Without | | Yes | MA | R) X/X | Yes/ No | 12-5-2 | | | |
| | See No. 127. | | | | | | | | | | | | |
| 130 | Pressure ↑ 50% SL 1 | SL channel 1 including 50% pressure increase | No | Without | | No | MA | X/X | Yes/ No | 12-5-3 | | | Pressurisation **3** |
| | In line with the equipment of existing connection participants, see Nos. 12; 13; 15; 16. Message in pairs with No. 136 | | | | | | | | | | | | |
| 131 | Pressure ↑ 50% SL 2 | SL channel 2 including 50% pressure increase | No | Without | | No | MA | X/X | Yes/ No | 12-5-3 | | | |
| | In line with the equipment of existing connection participants, see Nos. 12; 13; 15; 16. Message in pairs with No. 137. | | | | | | | | | | | | |
| 132 | Pressure ↑ 50% SL 3 | SL channel 3 including 50% pressure increase | No | Without | | No | MA | X/X | Yes/ No | 12-5-3 | | | |
| | In line with the equipment of existing connection participants, see Nos. 12; 13; 15; 16. Message in pairs with No. 138. | | | | | | | | | | | | |
| 133 | Pressure ↑ 0% SL 1 | SL channel 1 including 0% pressure increase | No | Without | | No | MA | R) X/X | Yes/ No | 12-5-3 | | | |
| | In line with the equipment of existing connection participants, see Nos. 2-5; 11-18; 20; 22-31. Message in pairs with No. 139. | | | | | | | | | | | | |
| 134 | Pressure ↑ 0% SL 2 | SL channel 2 including 0% pressure increase | No | Without | | No | MA | R) X/X | Yes/ No | 12-5-3 | | | |
| | In line with the equipment of existing connection participants, see Nos. 2-5; 11-18; 20; 22-31. Message in pairs with No. 140. | | | | | | | | | | | | |
| 135 | Pressure ↑ 0% SL 3 | SL channel 3 including 0% pressure increase | No | Without | | No | MA | R) X/X | Yes/ No | 12-5-3 | | | |
| | In line with the equipment of existing connection participants, see Nos. 2-5; 11-18; 20; 22-31. Message in pairs with No. 141. | | | | | | | | | | | | |
| 136 | Pressure ↑ 50% SL 1 | SL channel 1 including 50% pressure decrease | No | Without | | No | MA | X/X | Yes/ No | 12-5-3 | | | |
| | Message in pairs with No. 130. (Display factual only. Valve function is not monitored by sensors) | | | | | | | | | | | | |
| 137 | Pressure ↑ 50% SL 2 | SL channel 2 including 50% pressure decrease | No | Without | | No | MA | X/X | Yes/ No | 12-5-3 | | | |
| | Message in pairs with No. 131. (Display factual only. Valve function is not monitored by sensors) | | | | | | | | | | | | |
| 138 | Pressure ↑ 50% SL 3 | SL channel 3 including 50% pressure decrease | No | Without | | No | MA | X/X | Yes/ No | 12-5-3 | | | |
| | Message in pairs with No. 132. (Display factual only. Valve function is not monitored by sensors) | | | | | | | | | | | | |
| 139 | Pressure ↑ 0% SL 1 | SL channel 1 including 0% pressure decrease | No | Without | | No | MA | R) X/X | Yes/ No | 12-5-3 | | | |
| | Message in pairs with No. 133. (Display factual only. Valve function is not monitored by sensors) | | | | | | | | | | | | |
| 140 | Pressure ↑ 0% SL 2 | SL channel 2 including 0% pressure decrease | No | Without | | No | MA | R) X/X | Yes/ No | 12-5-3 | | | |
| | Message in pairs with No. 134. (Display factual only. Valve function is not monitored by sensors) | | | | | | | | | | | | |
| 141 | Pressure ↑ 0% SL 3 | SL channel 3 including 0% pressure decrease | No | Without | | No | MA | R) X/X | Yes/ No | 12-5-3 | | | |
| | Message in pairs with No. 135. (Display factual only. Valve function is not monitored by sensors) | | | | | | | | | | | | |
| 142 | Miscellaneous SL 1 | SL channel 1 including miscellaneous error | No | Without | | No | MA | X/X | Yes/ No | 12-5-4 | | | Miscellaneous **4** |
| | Messages of the connection participant Slave 1, not allocated to message groups 1-3. See Slave 1 messages. | | | | | | | | | | | | |
| 143 | Miscellaneous SL 2 | SL channel 2 including miscellaneous error | No | Without | | No | MA | X/X | Yes/ No | 12-5-4 | | | |
| | Messages of the connection participant Slave 2, not allocated to message groups 1-3. See Slave 2 messages. | | | | | | | | | | | | |
| 144 | Miscellaneous SL 3 | SL channel 3 including miscellaneous error | No | Without | | No | MA | X/X | Yes/ No | 12-5-4 | | AMVB | Miscellaneous **4** |
| | Messages of the connection participant Slave 3, not allocated to message groups 1-3. See Slave 3 messages. | | | | | | | | | | | | |

APVS

APVS

| | | |
|---|---|---|
| 145 | - | |
| 146 | - | |
| 147 | - | |
| 148 | - | |

| | | | |
|---|---|---|---|
| *) | Standard delay time 60 s. | MA/SL | display Master and Slave |
| **) | Menu 8-4 Error message unit, Menu 12-5 Connection error message Master; Menu 13-2 Connection error message Slave. | MA | Display Master |
| ***) | 50%: 1 of 2 existing motors is available (ID: DP, DK). | DH | pressurisation |
| R) | Message: 'Connection blocked', in RS485 data record (Easycontact, no redundancy). | NS | top up |
| 2) | Detection 15 s after switch-off of NS-/AS- valve. | AS | Overflow spill |

## Attachement D. Unit accessories, SPC additions

**Identical installations and configurations (Menu 8) for each participant (Master, Slave 1…3), independent of the operating mode, are recommended.**

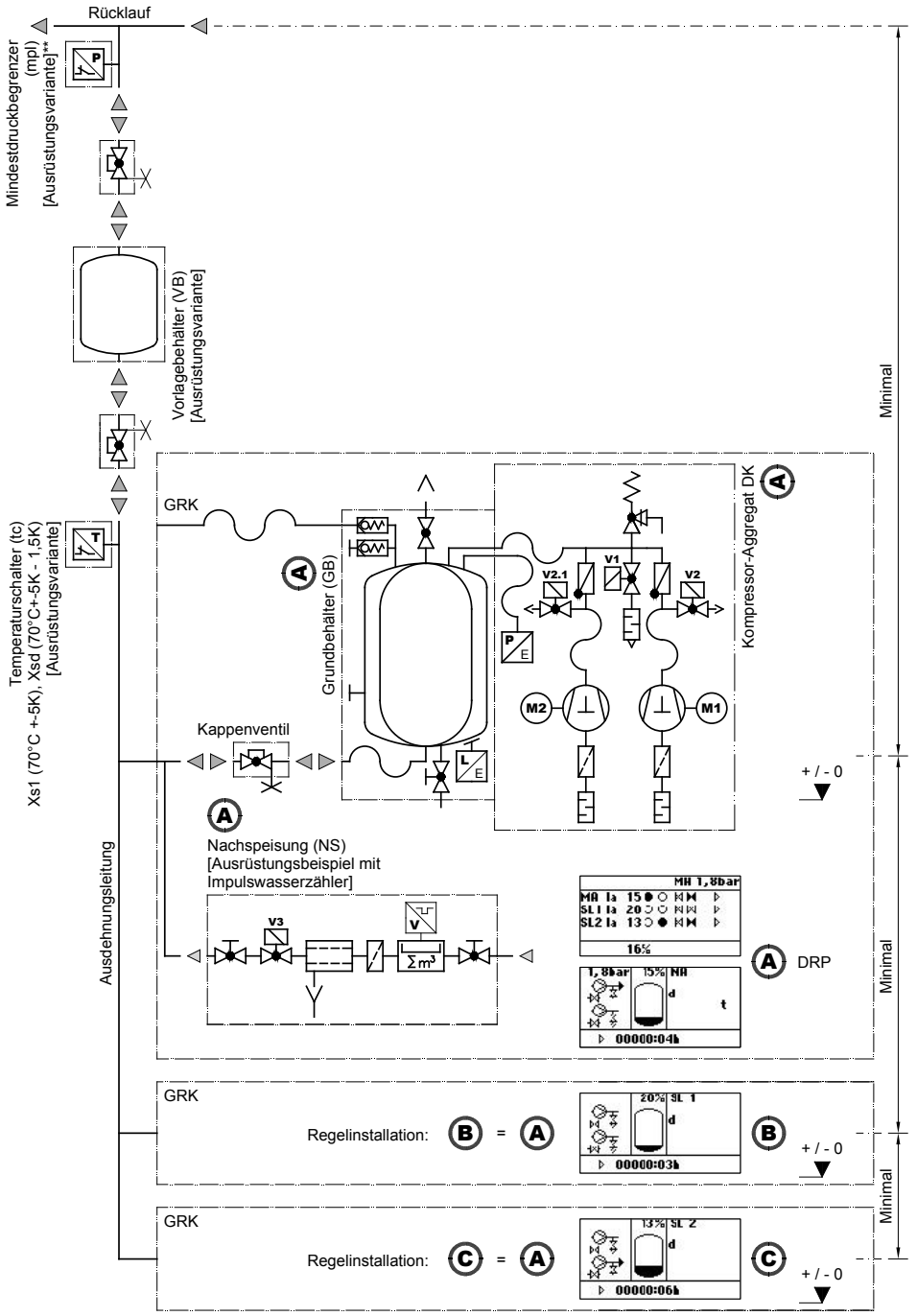
| | | | | Application | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Master | | | Slave 1...3 | | | | |
| No. | Component/Function | Interface/ Designation/No. | | Flamcomat® | Flexcon® M-K | SPC | GB | GB | SPC | GB | GB | Information notes | Installation |
| 1 | SPC extension type M | Slot 4 | | X | X | X | | | | | | Init. data CAN-Bus Master | By the factory, service |
| 2 | SPC extension type S | Slot 4 | | X | X | | | | X | | | Init. data CAN-Bus Slave | |
| 3 | SPC extension analogue | Slot 3 | | X | X | X | | | X | | | Init. data content, pressure analogue (No.: 18) | To be provided on site |
| 4 | SPC extension SD | Slot 2 | | X | X | X | | | X | | | Init. Save data configuration on SD card | |
| 5 | Easycontact | A<br>B | RS485 | X | X | X | | | X | | | **1)** | |
| 6 | Signal doubler, content | 1<br>5<br>34 | Signal +<br>Signal -<br>2 GND | X | | X | | | X | | | Unit 1 | By the factory, service |
| | | 1<br>5<br>34 | Signal +<br>Signal -<br>2 GND | X | | X | | | X | | | Unit 2 **7)** | |
| 7 | Impulse water counter pwm | 8<br>9 | 1<br>2 GND | X | X | X | | | X | | | Top up or overflow spill | By the factory, service |
| 8 | Minimum pressure limiter mpl | 10<br>11 | 1<br>2 GND | X | X | X | | | X | | | **2)** | To be provided on site |
| 9 | Collective error message fault | 12<br>13<br>14 | no<br>com<br>nc | X | X | X | | | X | | | Volt-free (nc: error) **1)** | |
| 10 | Top up (NS) refill | 15<br>16<br>17 | PE<br>1<br>2 | X | X | X | | | X | | | Volt-free / Optionally or / Flamco Fill P **3)** | By the factory, service |
| | Overflow spill (AS) drain | | | X | | X | | | X | | | | |
| 11 | Top up (NS) refill | 18<br>19<br>20 | PE<br>N<br>L | X | X | X | | | X | | | 230 V 50 Hz / Optionally or / Flamco Fill P **3)** | |
| | Overflow spill (AS) drain | | | X | | X | | | X | | | | |
| 14 | Temperature switch tc | 27<br>28 | 1<br>2 GND | X | X | X | | | X | | | **2)** | To be provided on site |
| 15 | Diaphragm rupture sensor drs | 31<br>32 | 1<br>2 GND | X | X | X | X | X | X | X | X | **4)** | By the factory, service |
| 16 | Diaphragm rupture detector (drs/ mbm4) | 31<br>32 | 1<br>2 GND | X | | X | X | X | X | X | X | **5)** | To be provided on site |
| 17 | Pressure switch, level ps | 33<br>34 | 1<br>2 GND | | X | X | | | X | | | Flamco Fill P | By the factory, service |
| 18 | Analogue 0-10 V | 35<br>36<br>37 | 1 pressure<br>com<br>2 content | X<br>X | X<br>X | X<br>X | | | X | | | SPCx-lw: SPC extension analogue required, including SPCx-hw-1-A-B-C-D-1 available. **6)** | To be provided on site |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | Motor protection | F1/2<br>MS1/2 | 38<br>39<br>40 | 1<br>com<br>2 | X | X | X | | | X | | | SPCx-hw | By the factory |

**1)** Slave: No error messages pressure min./max. (Master is pressure reference point).
**2)** The respective first signal on MA or SL1, SL2, SL3 becomes active for defined subsequent switching (…existing value at the place of installation…).
**3)** NS, AS is identical required in respect of each active and passive unit. If the interfaces 15; 16; 17 and 18; 19; 20 are to be applied, only that signal will be available for AS that is not used for NS. AS only possible, if NS installed.
**4)** The installation of more than two sensors in one control system is not permitted.
**5)** Signal display on the relevant tank and signal input at the control system.
**6)** Slave: No output of pressure value (Master is pressure reference point).
**7)** Only applicable in the case of identical operating modes (-la, -ws; -sr) of 2 units. The availability from existing nominal sizes of the basic and add-on tanks is to be ensured.

## Attachement E. Unit installations, examples

**Flexcon® M-K, combination 3-9**




DRP Druck-Referenzpunkt
GRK Gasraumkopplung (Empfehlung)
◁ Strömungsrichtung; Wärmeträger.
◁△ Strömungsrichtung; Wärmeträger, Ablauf.
◁△ Strömungsrichtung; Wärmeträger- Ergänzung.
]** Keine Forderung nach DIN EN 12828 bei Druckhalteeinrichtungen mit automatischer Nachfülleinrichtung.

(A) Ausrüstung Master

(B) Ausrüstung Slave 1

(C) Ausrüstung Slave 2

**Flamcomat®, combination 2-1**