# Supplementary instructions

## Peristaltic metering pump DULCO flex Control - DFYa

## with PROFIBUS®

These operating instructions are only valid when read in conjunction with the “Operating instructions for the peristaltic metering pump DULCO flex Control - DFYa”!

The operator is liable for any damage caused by installation and operating errors!

**Please carefully read these operating instructions before use. · Do not discard.**
**The operator shall be liable for any damage caused by installation or operating errors.**
**The latest version of the operating instructions are available on our homepage.**

Part no. 999768

BA DX 032 04/21 EN

# Table of contents

# 1 Requirements

The pump can be enhanced with PROFIBUS® functionality by means of a plug-in module. To do this, insert the plug-in module into the front of the pump (similar to a relay module). The operating menu then displays the menu item *'Fieldbus'* and the status bar shows the PROFIBUS® symbol.

*The pump must have the software version V04.03.02.00 or higher for the PROFIBUS® module to work. If it is not working, the LED on the PROFIBUS® module slowly flashes red and green.*

# 2 Setting up the pump

## 2.1 General

The pump with the plugged-in PROFIBUS® module is set up in the same way as the standard pump, with the addition of the bus functionality.

*The pump interrupts the set-up process in the event of pauses longer than 60 s.*

## 2.2 Setting up the slave address

The address is pre-set to “125”. There is no need to manually set up the slave address if a master in the PROFIBUS® segment assigns the slave addresses.

1. Press the *[Menu]* key.
2. Turn the *[Clickwheel]* to *‘Fieldbus’* and press the *[Clickwheel]*.
3. Turn the *[Clickwheel]* to *‘BUS Address’* and press the *[Clickwheel]*.

Always enter the PROFIBUS® address as 3 digits (addresses between “002” and “125”):

1. Set the 1st digit using the *[Clickwheel]* and press the *[Priming]* key.

   ⇨ The 2nd digit of the address is highlighted.

2. Set the 2nd digit using the *[Clickwheel]* and press the *[Priming]* key.

   ⇨ The 3rd digit of the address is highlighted.

3. Set the 3rd digit using the *[Clickwheel]* and press the *[Clickwheel]*.

## 2.3 Switching PROFIBUS® to active / inactive

*‘Fieldbus’* must be set to *‘Active’* in the operating menu for the pump to be controlled using the PROFIBUS®:

1. Press the *[Menu]* key.
2. Turn the *[Clickwheel]* to *‘Bus active’* and press the *[Clickwheel]*.
3. Turn the *[Clickwheel]* to *‘Active’* or *‘Inactive’* and press the *[Clickwheel]*. You’re done!

All external inputs, such as level monitoring and external control (pause, contact input, analogue input), will continue to function while the PROFIBUS® is *‘active’*. They result in the reactions that would be expected with the pump without the PROFIBUS® module being plugged in - refer to “Operating instructions for the peristaltic pump DULCO flex Control - DFYa”. The pump transmits relevant information via the PROFIBUS® to the master (PLC, PC etc.).

If the PROFIBUS® is set to *‘inactive’*, the settings for the operating mode previously selected are reloaded.

If the pump is switched to another operating mode, it stops and can only be restarted using the *[Stop/Start]* key.

# 3 Special features in active PROFIBUS® mode

## 3.1 General

*The pump cannot be manually set or programmed in PROFIBUS® mode! To do this, set the PROFIBUS® to 'Inactive'.*

- The *[Clickwheel]* can be used to switch between the continuous displays at any time, as in the other operating modes. This does not affect the operation of the pump.
- The settings from other operating modes are carried over when switching over to PROFIBUS® operation. **However, settings made using the PROFIBUS® are not saved!** They only apply as long as the pump is connected to the PROFIBUS®. Only the total number of revolutions and the total number of litres continue to be counted and saved.
- If the pump is switched to PROFIBUS® mode, it stops and can only be restarted using the PROFIBUS®.

## 3.2 Displays

**Operating display**

There are additional identifiers in the operating display when PROFIBUS® mode is running.

*The commonly used identifiers can be found in the "Controls" chapter in the "Operating instructions for the peristaltic metering pump DULCO flex Control - DFYa".*

**Status display**

Profibus Stop PROFIBUS®: the pump has been stopped using PROFIBUS®. The master has sent the pump a corresponding telegram.

**Main display**

⇌ Connection error: If the pump loses its connection to the PROFIBUS® (for instance as soon as the PROFIBUS® is stopped), an error message with the ⇌ symbol appears on the main display.

## 3.3 LEDs on the PROFIBUS® module

| LEDs | Cause |
|---|---|
| Flashing red and green at a slow rhythm | Connection between the PROFIBUS® module and pump has been disrupted;<br>the hardware or software version of the pump may not be suitable for PROFIBUS® |
| Lit red | No connection to the PROFIBUS® |
| Lit green | Pump in cyclic operation |

# 4 Installation

## Bus installation

All devices that are members of the bus system must be connected in a line. There are up to 32 possible positions (master, slaves, repeaters).

At both the beginning and end of the cable, the bus must be terminated with a terminating resistance.

## Plugs and cables

For the PROFIBUS® cable, use a screened, twisted-pair cable in conformity with EN 50170 (cable type A).

*Use of shielding which is earthed at one end prevents low-frequency ground loops. Shielding earthed at one end has no effect in combating HF magnetic pick-up. Shielding earthed at both ends as well as twisted conductors work to counter magnetic HF pick-up, but have no effect against electrical HF pick-up.*

For PROFIBUS®, it is recommended to establish a bilateral, low-inductance (i.e., large area and low-impedance) connection with the protective earth.

The overall length of the bus cabling without repeaters varies according to the desired data transmission rate:

*Tab. 1: Data transmission rate and length of the bus cabling*

| Data transmission rate | Maximum length of bus cabling |
|---|---|
| kBit/s | m |
| 1500 | 200 |
| 500 | 400 |
| 187.5 | 1000 |
| 93.75 | 1200 |
| 19.2 | 1200 |
| 9.6 | 1200 |

The PROFIBUS® module has a M12 industry socket for connection to the PROFIBUS® cable. The pin configuration complies with the PROFIBUS® standard - see below - which means that commercially available bus plugs may be used. Please note that cable connections made with these plugs generally only meet the requirements for protection against contact and moisture according to IP 20!

## Note for achieving IP 65 degree of protection

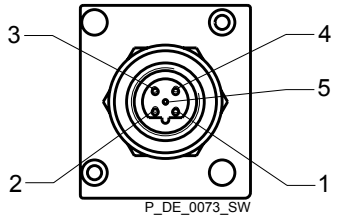
An installation compliant with the protection against contact and moisture according to IP 65 is possible, since the M12 industry socket of the PROFIBUS® module allows this. However, in this case the PROFIBUS® cable must also be fitted with M12 industry plugs in conformity with IP 65.

In order to achieve the IP 65 degree of protection for the PROFIBUS® cable installation, special Y-adapters or terminating adapters must be installed (e.g. - see below).

**CAUTION!**

- Degree of protection IP 65 applies only to a plug/ socket combination that has been screwed together!
- In ambient conditions requiring protection against contact and moisture according to IP 65, cables with moulded M12 industry plugs must be used (e.g., see below).
- Degree of protection IP 65 applies only to an unwired pump (with PROFIBUS® module) if an IP 65-capable cover is placed over the M12 industry socket! The cover included in the delivery does not guarantee chemical resistance.

**Socket on the PROFIBUS® module (M12 )**




1 5 V
2 A conductor (green)
3 GND
4 B conductor (red)
5 Shielding

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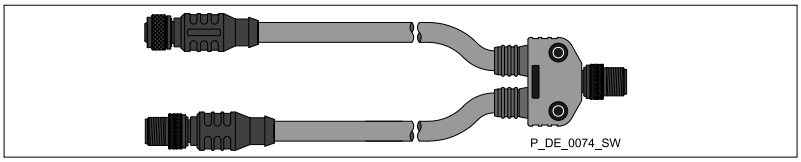
**Y-adapter (order no. 1040956)**

The Y-adapter connects to the pump using a moulded M12 plug. The ends are provided with an M12 plug and an M12 socket. The Y-adapter complies with the requirements for protection against contact and moisture according to IP 65.

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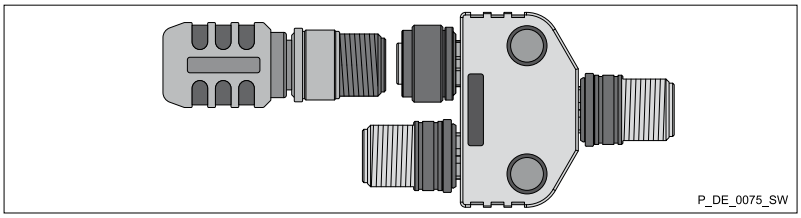
**PROFIBUS® termination, complete (order no. 1040955)**

If the pump is the last bus device connected to the PROFIBUS® cable, it must be connected completely as a termination using the PROFIBUS® termination - see EN 50170. The PROFIBUS® termination, complete, complies with the requirements for protection against contact and moisture according to IP 65. (It consists of a Y-plug and terminating resistance.)



# 5 Operation

## 5.1 General

The plugged-in PROFIBUS® module make the PROFIBUS® pump a unit with slave functionality in compliance with DP-V1. This means that the usage data is transmitted both cyclically and acyclically.

## 5.2 GSD file

Use the GSD file to configure the master. It describes all features of the pump in PROFIBUS® mode (keywords, diagnostics, modules, slots). The GSD file can be downloaded from the PROFIBUS® website and from the ProMinent website. The file name is unique: `DFYA1180.GSD`

## 5.3 Description of the data objects

**Description of the data objects**

*The initial parameters must be transmitted from the master so that the pump can engage in cyclic data transmission. Only standard parametrisation is needed for this – there are no application-specific parameters.*

*Please note: Data is stored according to the "Big-Endian" principle! This means that the byte with the highest-value bits is stored first at the memory location with the lowest storage address. Refer to the section below for an example based on "Status":*

The pump status is stored as UINT32 type at the offset addresses +0 to +3. Bytes are stored in this sequence:

| Name | Type | Offset | Byte | Bits |
|---|---|---|---|---|
| Status | UINT32 | +0 | 0 | 24 ... 31 |
| | | +1 | 1 | 16 ... 23 |
| | | +2 | 2 | 8 … 15 |
| | | +3 | 3 | 0 … 7 |

All the data objects that can be cyclically transmitted are described below.

*Tab. 2: All data objects*

| Name | No. | Type | Description | | | |
|---|---|---|---|---|---|---|
| Unit identifier | 0 | UINT32 | Byte 0+1 | = 0x1180 | Identification number | |
| | | | Byte 2 | = 0x50 | ProMinent identifier for pump product group | |
| | | | Byte 3 | = 8 | "DULCO flex Control" pump family | |
| Status | 1 | UINT32 | **bit** | **Name** | **Function** | |
| | | | 0 | Motor | 0 – Motor idle | 1 – Motor running |

| Name | No. | Type | Description | | | |
|---|---|---|---|---|---|---|
| | | | 1 | | - | - |
| | | | 2 | Mode | 00 – halt | 03 – contact |
| | | | 3 | | 01 – manual | 04 - analog |
| | | | 4 | | 02 – batch | |
| | | | 5 | Error | There are errors - see “Errors” | |
| | | | 6 | Warnings | There are warnings - see “Warnings” | |
| | | | 7 | Manual stop | Pump has been stopped manually | |
| | | | 8 | Stop | Pump has stopped | |
| | | | 9 | Priming | Pump is in priming mode (higher-level function) | |
| | | | 10 | Auxiliary | Pump is in auxiliary mode (higher-level function) | |
| | | | 11 | Pause | Pump has been switched to pause (higher-level function) | |
| | | | 12 | Module | Fieldbus mode active | |
| | | | 13 | Hose change | Hose is being changed | |
| | | | 14 | Batch Mem. | Batch memory is activated | |
| | | | 15 | Calibrated | Pump is calibrated | |
| | | | 16 | Relay 1 | Relay 1 physically exists | |
| | | | 17 | Relay 2 | Relay 2 physically exists | |
| | | | 18 | AnalogOut | Module physically exists | |
| | | | 19 | Hose rupture | Hose rupture sensor is installed | |
| | | | 20 | Actual direction of rotation | 0 = clockwise<br>1 = counter-clockwise<br>The user should stop the pump and wait for release to change the direction of rotation(Bit #21 in the status). Only than can the direction of rotation be reversed. | |
| | | | 21 | Direction of rotation | Release for change of direction of rotation | |
| | | | 22 | - | - | |
| | | | 24 | - | - | |
| | | | 27 | - | - | |
| Start-Stop | 2 | BYTE | Corresponds to Start-Stop switch; if Start-Stop = 0, then the pump is stopped. | | | |
| Reset | 3 | BYTE | If the “Reset” value is switched from 1 to 0, the internal pump memory is deleted (e.g. with batch metering) and - as far as possible - existing errors are cleared. | | | |
| Mode | 4, 5 | BYTE | **Value** | **Name** | **Description** | |
| | | | 0 | Halt | Pump is ready but not metering. | |
| | | | 1 | Manual | Pump is metering continuously at the set frequency. | |

| Name | No. | Type | Description | | |
|---|---|---|---|---|---|
| | | | 2 | Batch | When triggered, the pump meters the number of revolutions set in batch pre-selection. |
| | | | 3 | Contact | Pump meters the number of revolutions calculated from the product of “Number of triggers * External factor”. |
| | | | 4 | Analog | Pump meters according to the analogue signal and the *‘Analog’* mode set on the pump. |
| Dos. capacity | 6, 7 | UINT16 | Capacity set in litres / hour (“Minimum” .. “Maximum capacity”). | | |
| Actual capacity | 8 | UINT16 | Actual capacity in litres / hour (0.. “Maximum capacity”). | | |
| Maximum capacity | 9 | UINT16 | Maximum dosing rate in litres / hour | | |
| Batch pre-selection | 10, 11 | UINT32 | Number of half revolutions in batch mode per trigger. (12 … Maximum = 999.999 litres / trigger). | | |
| Batch start | 12 | BYTE | If the value changes from 1 to 0, batch metering is activated in batch mode. Batches can also be activated via the contact input. | | |
| Batch memory | 13 | BYTE | If the batch memory is activated and a new batch is triggered during batch metering already in progress, then the remaining revolutions are increased by the number of the new batch.<br>If the memory is not activated, the remaining revolutions of the batch not yet processed are cleared and the new batch is processed. | | |
| Remaining revolutions | 14 | UINT32 | The remaining revolutions still to be processed with batch metering | | |
| External factor | 15, 16 | UINT16 | Factor by which the incoming pulses are multiplied. The factor is given as a hundredth. Value range is 2…19998 - the factor is then 0.01…99.99 revolutions. | | |
| External memory | 17 | BYTE | As with batch metering, again here totalling is undertaken with high factors or the remaining revolutions are cleared. | | |
| Direction of rotation | 19 | UINT16 | Target direction of rotation 0 = clockwise and 1 = counter-clockwise | | |
| Hose service life | 20 | UINT32 | Hose service life - revolutions since the last hose change | | |
| Error | 21 | UINT16 | **bit** | **Name** | **Function** |
| | | | 0 | Minimum | Metering liquid level too low |
| | | | 1 | Batch | Too many revolutions > 100000 |
| | | | 2 | Analog < 4 mA | Analogue current is less than 4 mA |
| | | | 3 | Analog > 23 mA | Analogue current is greater than 23 mA |
| | | | 4 | Temperature fault | Temperature too high |
| | | | 5 | Hose rupture | Metering hose damaged |
| | | | 6 | - | - |
| | | | 7 | - | - |
| | | | 8 | - | - |
| | | | 9 | - | - |
| | | | 11 | - | - |

| Name | No. | Type | Description | | |
|---|---|---|---|---|---|
| | | | 13 | Bus error | Bus error reported by the module |
| | | | 14 | System error | System components faulty - see LCD screen |
| | | | 15 | Module error | Error in module handling |
| Warnings | 22 | UINT16 | **bit** | **Name** | **Function** |
| | | | 0 | Minimum | Metering liquid level too low |
| | | | 1 | Calibration | - |
| | | | 2 | - | - |
| | | | 3 | - | - |
| | | | 4 | - | - |
| | | | 5 | - | - |
| | | | 6 | - | - |
| | | | 7 | - | - |
| | | | 8 | - | - |
| Revolutions counter | 23 | UINT32 | Counts the number of revolutions since the last reset | | |
| Reset revolutions counter | 24 | UINT8 | If the value changes from 1 to 0, the revolutions counter is reset | | |
| Volume counter | 25 | FLOAT32 | Volume counter | | |
| Litres per revolution | 26 | FLOAT32 | Litres per revolution | | |
| Clear volume counter | 27 | UINT8 | If the value changes from 1 to 0, the volume counter is cleared | | |
| Identity code | 28 | STRING32 | Pump identity code (pump specification) | | |
| Serial number | 29 | STRING16 | Pump serial number | | |
| Name | 30 | STRING32 | Pump name, freely selectable (max. 32 characters) | | |
| Installation site | 31 | STRING32 | Installation site, freely selectable. (max. 32 characters) | | |

## 5.4 Cyclic data transmission

DP-V0 describes the cyclic data transmission in the PROFIBUS®.

### 5.4.1 Overview of the data objects

The data objects are summarised into modules and their configuration identifier - see following table. The configuration identifier enables modules to be excluded from cyclic data transmission during configuration to avoid unnecessarily burdening the cyclic data transmission.

*Tab. 3: Modular construction*

| Module no. | Output | Length | Input | Length | Module name | Configuration identifier (hex) |
|---|---|---|---|---|---|---|
| 1 | - | - | Status | 4 bytes | Status | 40.83 |
| 2 | Start-Stop<br>Reset | 1 bytes<br>1 bytes | - | - | Control | 80.81 |
| 3 | Mode | 1 bytes | Mode | 1 bytes | Operating mode | C0,80,80 |
| 4 | Dos. capacity | 2 bytes | Dos. capacity<br>Actual capacity | 2 bytes<br>2 bytes | Capacity | C0,81,83 |
| 5 | - | - | Maximum capacity | 2 bytes | Maximum capacity | 40.81 |
| 6 | Batch pre-selection<br>Batch start<br>Batch memory | 4 bytes<br>1 bytes<br>1 bytes | Batch pre-selection | 4 bytes | Batching | C0,85,83 |
| 7 | - | - | Remaining revolutions | 4 bytes | Remaining revolutions | 40.83 |
| 8 | External factor<br>External memory | 2 bytes<br>1 bytes | External factor | 2 bytes | Transmission multiplier | C0,82,81 |
| 9 | - | - | - | - | - | 40.80 |
| 10 | Direction of rotation* | 2 bytes | - | - | Direction of rotation | 80.80 |
| 11 | Hose service life | - | Hose service life | 4 bytes | Tube lifespan | 40.83 |
| 12 | - | - | Error<br>Warnings | 2 bytes<br>2 bytes | Error warning | 40.83 |
| 13 | Clear revolutions counter | 1 bytes | Revolutions counter | 4 bytes | Revolution number | C0,80,83 |
| 14 | Clear volume counter | 1 bytes | Volume counter<br>Litres per revolution | 4 bytes<br>4 bytes | Quantity | C0,80,87 |

* only change once the pump has stopped!

*Tab. 4: Pump data (output data)*

| Offset | Value | Type | Name | Range | Module name | Module no. |
|---|---|---|---|---|---|---|
| +0 | - | BYTE | Start-Stop | 0.1 | Control | 2 |
| +1 | - | BYTE | Reset | 0.1↓ | - | |
| +2 | - | BYTE | Mode | see *Tab. 3 'Modular construction' on page 12* | Operating mode | 3 |
| +3<br>+4 | high<br>low | UINT16 | Dos. capacity | 0..max. Freq. | capacity | 4 |

| Offset | Value | Type | Name | Range | Module name | Module no. |
|---|---|---|---|---|---|---|
| +5<br>+6<br>+7<br>+8 | high<br>↓<br>low | UINT32 | Batch pre-selection | 1..99999 | Batching | 6 |
| +9 | - | BYTE | Batch start | 0.1↓ | - | |
| +10 | - | BYTE | Batch memory | 0.1 | - | |
| +11<br>+12 | high<br>low | UINT16 | External factor | 0..9999 | Transmission multiplier | 8 |
| +13 | - | BYTE | External memory | 0.1 | - | |
| +14 | - | BYTE | - | 0.1 | - | 10 |
| +15 | - | BYTE | Clear revolutions counter | 0.1↓ | Revolution number | 13 |
| +16 | - | BYTE | Clear volume counter | 0.1↓ | Quantity | 14 |

*Tab. 5: Pump data (input data)*

| Offset | Value | Type | Name | Range | Module name | Module no. |
|---|---|---|---|---|---|---|
| +0<br>+1<br>+2<br>+3 | high<br>↓<br>low | UINT32 | Status | see<br>↳ *Tab. 4 'Pump data (output data)'*<br>*on page 12* | Status | 1 |
| +4 | - | BYTE | Mode | see<br>↳ *Tab. 3 'Modular construction'*<br>*on page 12*@<br>@ | Operating mode | 3 |
| +5<br>+6 | high<br>low | UINT16 | Dos. capacity | 0..max. Freq. | capacity | 4 |
| +7<br>+8 | high<br>low | UINT16 | Actual capacity | 0..max. Freq. | | |
| +9<br>+10 | high<br>low | UINT16 | Maximum capacity | e.g. 410 l/h↓ | Maximum capacity | 5 |
| +11<br>+12<br>+13<br>+14 | high<br>↓<br>low | UINT32 | Batch pre-selection | 12..maximum half revolutions for a maximum metering volume of 999.999 litres / trigger | Batching | 6 |
| +15<br>+16<br>+17<br>+18 | high<br>↓<br>low | UINT32 | Remaining revolutions | 1..99999 | Remaining revolutions | 7 |
| +19<br>+20 | high<br>low | UINT16 | External factor | 2..19998 | Transmission multiplier | 8 |

| Offset | Value | Type | Name | Range | Module name | Module no. |
|---|---|---|---|---|---|---|
| +21 | - | BYTE | - | -↓ | - | 9 |
| +26<br>+27 | high<br>low | UINT16 | Error | see ↳ *Further information on page 8* | Error warning | 12 |
| +28<br>+29 | high<br>low | UINT16 | Warnings | see ↳ *Further information on page 8* | | |
| +30<br>+31<br>+32<br>+33 | high<br>↓<br>low | UINT32 | Revolutions counter | $0..(2^{32})-1$ | Revolution number | 13 |
| +34<br>+35<br>+36<br>+37 | high<br>↓<br>low | FLOAT | Volume counter | ... (litres) | Quantity | 14 |
| +38<br>+39<br>+40<br>+41 | high<br>↓<br>low | FLOAT | ml per revolution | ... (litres) | | |

### 5.4.2 Configuration

It is possible to select on the master which modules are to be involved in cyclic data transmission. Modules and slots always relate to each other. Empty spaces (empty modules) therefore have to be configured for modules to be excluded.

The target configuration is defined in the form of identifiers. The identifier is stated in the last column in for every defined module.

The identifiers of the modules have to be listed successively in ascending order. If the data of a module is not to be involved in cyclic data transmission, then an empty module must be configured at this point.

**Suggested configurations**

*Tab. 6: Configuration for the transmission of all cyclic modules (42 byte input, 17 byte output)*

| Module 1 | Module 2 | Module 3 | Module 4 | Module 5 | Module 6 | Module 7 | Module 8 |
|---|---|---|---|---|---|---|---|
| 40, 83 | 80, 81 | C0, 80, 80 | C0, 81, 83 | 80, 81 | C0, 85, 83 | 40, 83 | C0, 82, 81 |

| Module 9 | Module 10 | Module 11 | Module 12 | Module 13 | Module 14 | | |
|---|---|---|---|---|---|---|---|
| 40, 83 | 80, 80 | 80, 80 | 40, 83 | C0, 80, 83 | C0, 80, 87 | | |

The following table shows an example of a target configuration in which modules 8, 10, 11 and 14 are excluded from the cyclic data transmission.

**INFORMATION**

**The data objects can still be reached acyclically.**

*Tab. 7: Target configuration*

| Module 1 | Module 2 | Module 3 | Module 4 | Module 5 | Module 6 | Module 7 | Module 8 |
|---|---|---|---|---|---|---|---|
| 40 83 | 80 81 | C0 80 80 | C0 81 83 | 80 81 | C0 85 83 | 40 83 | 0 |

| Module 9 | Module 10 | Module 11 | Module 12 | Module 13 | Module 14 | | |
|---|---|---|---|---|---|---|---|
| 40 80 | 0 | 0 | 40 83 | C0 80 83 | 0 | | |

The pump checks whether the target configuration corresponds to the actual configuration. If this is not the case, the pump reacts and emits a configuration error in the standard diagnostics.

The options for creating the identifier formats must be limited and the followings rules observed for the target configuration to function.

- Always use the special identifier format for coding.
- Always use the byte structure as the format.
- Do not state any manufacturer-specific data (e.g. data types).
- Modules must always be replaced with empty modules to remove them from cyclic data transmission.

The offset addresses of the transmitted data objects will shift by excluding individual modules from the cyclic data transmission - see and :

*Tab. 8: Pump data (reduced output data)*

| Offset | Value | Type | Name | Range | Module name | Module no. |
|---|---|---|---|---|---|---|
| +0 | - | BYTE | Start-Stop | 0.1 | Control | 2 |
| +1 | - | BYTE | Reset | 0.1↓ | | |
| +2 | - | BYTE | Mode | see | Operating mode | 3 |
| +3<br>+4 | high<br>low | UINT16 | Dos. capacity | 0..max. Freq. | capacity | 4 |
| +5<br>+6<br>+7<br>+8 | high<br>↓<br>low | UINT32 | Batch pre-selection | 12..maximum half revolutions for a maximum metering volume of 999.999 litres / trigger | Batching | 6 |
| +9 | - | BYTE | Batch start | 0.1↓ | | |

| Offset | Value | Type | Name | Range | Module name | Module no. |
|---|---|---|---|---|---|---|
| +10 | - | BYTE | Batch memory | 0.1 | | |
| +11 | - | BYTE | Clear revolutions counter | 0.1↓ | Revolution number | 13 |

*Tab. 9: Pump data (reduced input data)*

| Offset | Value | Type | Name | Range | Module name | Module no. |
|---|---|---|---|---|---|---|
| +0<br>+1<br>+2<br>+3 | high<br>↓<br>low | UINT32 | Status | see | Status | 1 |
| +4 | - | BYTE | Mode | see | Operating mode | 3 |
| +5<br>+6 | high<br>low | UINT16 | Dos. capacity | 0..max. Freq. | capacity | 4 |
| +7<br>+8 | high<br>low | UINT16 | Actual capacity | 0..max. Freq. | | |
| +9<br>+10 | high<br>low | UINT16 | Maximum capacity | e.g. 410 l/h↓↓ | Maximum capacity | 5 |
| +11<br>+12<br>+13<br>+14 | high<br>↓<br>low | UINT32 | Batch preselection | 12..maximum half revolutions for a maximum metering volume of 999.999 litres / trigger | Batching | 6 |
| +15<br>+16<br>+17<br>+18 | high<br>↓<br>low | UINT32 | Remaining revolutions | 1..99999 | Remaining revolutions | 7 |
| +19 | - | BYTE | - | -↓ | - | 9 |
| +20<br>+21 | high<br>low | UINT16 | Error | see | Error warning | 12 |
| +22<br>+23 | high<br>low | UINT16 | Warnings | see | | |
| +24<br>+25<br>+26<br>+27 | high<br>↓<br>low | UINT32 | Revolutions counter | 0..($2^{32}$)-1 | Revolution number | 13 |

## 5.5 Acyclic data transmission

(from DP-V1)

The acyclically transmitted data is addressed via slot and index. All data summarised under one slot can then be addressed individually via the index and be transmitted acyclically.

*Slots are identical to the modules of the cyclical transmission.*

*Tab. 10: Slots of the acyclic data objects*

| No. | Slot | Index | Data object | Type | Length | Channel | Channel | read / write |
|---|---|---|---|---|---|---|---|---|
| 0 | Slot 0 | 1 | Unit identifier | UINT32 | 4 bytes | MS1 | MS2 | read |
| 1 | Slot 1 | 1 | Status | UINT32 | 4 bytes | MS1 | MS2 | read |
| 2 | Slot 2 | 1 | Start-Stop | BYTE | 1 bytes | MS1 | MS2 | write |
| 3 | | 2 | Reset | BYTE | 1 bytes | MS1 | MS2 | write |
| 4 | Slot 3 | 1 | Mode | BYTE | 1 bytes | MS1 | MS2 | write |
| 5 | | 2 | Mode | BYTE | 1 bytes | MS1 | MS2 | read |
| 6 | Slot 4 | 1 | Dos. capacity | UINT16 | 2 bytes | MS1 | MS2 | write |
| 7 | | 2 | Dos. capacity | UINT16 | 2 bytes | MS1 | MS2 | read |
| 8 | | 3 | Actual capacity | UINT16 | 2 bytes | MS1 | MS2 | read |
| 9 | Slot 5 | 1 | Maximum capacity | WORD | 2 bytes | MS1 | MS2 | read |
| 10 | Slot 6 | 1 | Batch pre-selection | UINT32 | 4 bytes | MS1 | MS2 | write |
| 11 | | 2 | Batch pre-selection | UINT32 | 4 bytes | MS1 | MS2 | read |
| 12 | | 3 | Batch start | BYTE | 1 bytes | MS1 | MS2 | write |
| 13 | | 4 | Batch memory | BYTE | 1 bytes | MS1 | MS2 | write |
| 14 | Slot 7 | 1 | Remaining revolutions | UINT32 | 4 bytes | MS1 | MS2 | read |
| 15 | Slot 8 | 1 | External factor | UINT16 | 2 bytes | MS1 | MS2 | write |
| 16 | | 2 | External factor | UINT16 | 2 bytes | MS1 | MS2 | read |
| 17 | | 4 | External factor | BYTE | 1 bytes | MS1 | MS2 | write |
| 18 | Slot 9 | 1 | - | BYTE | 1 bytes | MS1 | MS2 | read |
| 19 | Slot 10 | 1 | - | BYTE | 1 bytes | MS1 | MS2 | write |
| 21 | Slot 12 | 1 | Error | UINT16 | 2 bytes | MS1 | MS2 | read |
| 22 | | 2 | Warnings | UINT16 | 2 bytes | MS1 | MS2 | read |
| 23 | Slot 13 | 1 | Revolutions counter | UINT32 | 4 bytes | MS1 | MS2 | read |
| 24 | | 3 | Clear revolutions counter | BYTE | 1 bytes | MS1 | MS2 | write |
| 25 | Slot 14 | 1 | Volume counter | FLOAT | 4 bytes | MS1 | MS2 | read |
| 26 | | 2 | Litres per revolution | FLOAT | 4 bytes | MS1 | MS2 | read |
| 27 | | 3 | Clear volume counter | BYTE | 1 bytes | MS1 | MS2 | write |
| 28 | Slot 15 | 1 | Identity code | STRING | 32 bytes | MS1 | MS2 | read |
| 29 | | 2 | Serial number | STRING | 16 bytes | MS1 | MS2 | read |
| 30 | | 3 | Device names | STRING | 32 bytes | MS1 | MS2 | read / write |
| 31 | | 4 | Installation place | STRING | 16 bytes | MS1 | MS2 | read / write |

## 5.6 Extended diagnostics

(from the 7th byte)

The pump uses the mechanism of the extended PROFIBUS® diagnostics to report error statuses to the master. The extended diagnostics can be found in the diagnostics telegram. The extended diagnostics include the device-related “Alarm_Type (48)” and the “Diagnostic_User_Data”.

*Tab. 11: Construction of the extended PROFIBUS® diagnostics telegram*

| Header_Byte | Alarm_Type | Slot_Number | Alarm_Specifier | Diag-nostic_User_Data |
|---|---|---|---|---|
| Bit 1-6: Length of the status message, including Header_Byte | 48 | 1 | 1 | see Table ↳ *Tab. 12 ‘Diag-nostic_User_Data’ on page 18* |
| Bit 7-8: 0 | | | | |

Diagnostic_User_Data consists of a minimum of one group of 3 bytes with error information. Diagnostic_User_Data consists of a maximum of 19 groups. The error information of a group is coded as follows:

*Tab. 12: Diagnostic_User_Data*

| Service no.<br>(1st byte)<br>(2nd byte) | Error type<br>Type of data access<br>(3rd byte) |
|---|---|
| No. – see Table ↳ *Chapter 5 ‘Operation’ on page 8* | |
| 0x30 | OK |
| 0x31 | Date outside of limits |
| 0x32 | Date protected |
| 0x34 | Option not installed |
| 0x35 | Service not defined |
| 0x36 | Value cannot be changed |
| 0x37 | Update completed |
| 0x55 | Communication error |
| 0xD3 | Write access |
| 0xE5 | Read access |

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