# Hydro MPC

**Service instructions**

GRUNDFOS

Original service instructions.

## CONTENTS

> *Warning*
>
> *Prior to service work, read these service instructions carefully. Installation and service work must comply with local regulations and accepted codes of good practice.*
>
> *Observe the safety instructions in the installation and operating instructions for the product.*

## 1. Symbols used in this document

> *Warning*
>
> *If these safety instructions are not observed, it may result in personal injury.*

> Note
>
> *Notes or instructions that make the job easier and ensure safe operation.*
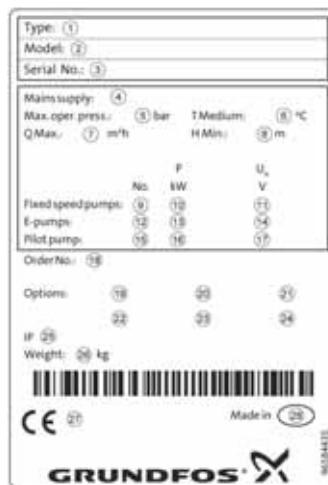
## 2. Identification

This section shows the nameplate, the type key and the codes that can appear in the variant code.

> Note
>
> *As codes can be combined, a code position may contain more than one code (letter).*

### 2.1 Nameplate



**Fig. 1**   Nameplate, booster system

| Pos. | Description |
|---|---|
| 1 | Type designation |
| 2 | Model |
| 3 | Serial number |
| 4 | Supply voltage |
| 5 | Maximum operating pressure [bar] |
| 6 | Liquid temperature [°C] |
| 7 | Maximum flow rate [m³/h] |
| 8 | Minimum head [m] |
| 9 | Number of mains-operated pumps |
| 10 | Motor power [kW] for mains-operated pumps |
| 11 | Rated voltage [V] for mains-operated pumps |
| 12 | Number of pumps with frequency converter |
| 13 | Motor power [kW] for pumps with frequency converter |
| 14 | Rated voltage [V] for pumps with frequency converter |
| 15 | Number of pilot pumps |
| 16 | Motor power [kW] for pilot pump |
| 17 | Rated voltage [V] for pilot pump |
| 18 | Order number |
| 19-24 | Options |
| 25 | Enclosure class |
| 26 | Weight [kg] |
| 27 | CE mark |
| 28 | Country of origin |

**Type key**

| Example | Hydro MPC -E /G /NS 3 CRIE 5-8 * 3 x 380-415 V, 50/60 Hz, N, PE |
|---|---|

**Type range**

**Control variants**
E: Pumps with integrated frequency converter (0.37 - 22 kW)
E: Pumps connected to a Grundfos CUE frequency converter (30 kW and up), one per pump
F: Pumps connected to one Grundfos CUE frequency converter
S: Mains-operated pumps (start/stop)

**Manifold material**
    Stainless steel
/G: Galvanised steel
/OM: Other materials
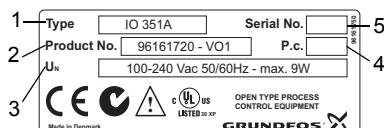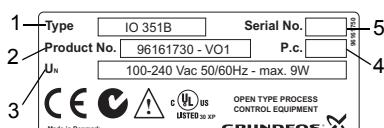
**Suction manifold**
    With suction manifold
/NS: Without suction manifold

**Number of pumps with integrated frequency converter and pump type**

**Number of mains-operated pumps and pump type**

**Supply voltage, frequency**
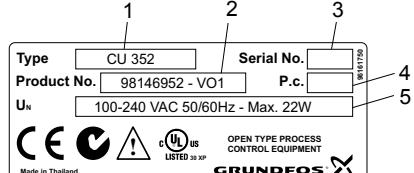
\* Code for custom-built solution.

## 2.2 Nameplate, IO 351



**Fig. 2** Nameplate, IO 351A



**Fig. 3** Nameplate, IO 351B

| Pos. | Description |
|---|---|
| 1 | Type designation |
| 2 | Product and version numbers |
| 3 | Permissible supply voltage, frequency and maximum power consumption |
| 4 | Production code (year, week) |
| 5 | Serial number |

**Type key**

| Code | Meaning | IO | 3 | 5 | 1 | B |
|---|---|---|---|---|---|---|
| IO | Input-output module | | | | | |
| 35 | Controller series | | | | | |
| 1 | Model number | | | | | |
| A | For pumps with fixed speed | | | | | |
| B | For pumps with fixed speed and pumps in F-systems controlled by external frequency converters or the CUE, or as input-output module | | | | | |

## 2.3 Nameplate, CU 352



**Fig. 4** Nameplate, CU 352

| Pos. | Description |
|---|---|
| 1 | Type designation |
| 2 | Product and version numbers |
| 3 | Serial number |
| 4 | Production code (year, week) |
| 5 | Rated voltage, frequency and power |
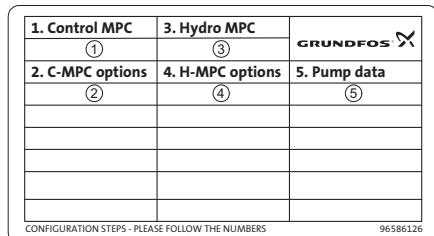
**Type key**

| Code | Meaning | CU | 3 | 5 | 2 | O |
|---|---|---|---|---|---|---|
| CU | Control unit | | | | | |
| 35 | Controller series | | | | | |
| 2 | Model number | | | | | |
| O | For panel mounting | | | | | |

## 2.4 Configuration file label

The configuration file label shows the configuration file numbers programmed in the CU 352.
See section *6. Factory configuration of Hydro MPC*.

| 1. Control MPC | 3. Hydro MPC | GRUNDFOS |
|---|---|---|
| ① | ③ | |
| **2. C-MPC options** | **4. H-MPC options** | **5. Pump data** |
| ② | ④ | ⑤ |
| | | |
| | | |
| | | |
| | | |
| CONFIGURATION STEPS - PLEASE FOLLOW THE NUMBERS | | 96586126 |

TM03 1742 3105

**Fig. 5** Configuration file label

| Pos. | Description |
|---|---|
| 1 | Control MPC - GSC file |
| 2 | Control MPC options - GSC files |
| 3 | Hydro MPC - GSC file |
| 4 | Hydro MPC options - GSC files |
| 5 | Pump data - GSC files |
| 6 | Pilot pump data - GSC files |
| 7 | Service contact information - GSC files |

Note
*A GSC (Grundfos Standard Configuration) file is a configuration data file.*

## 3. Technical data

### 3.1 Pressures

**Inlet pressure**

Hydro MPC booster systems can operate with a positive inlet pressure (precharged pressure system) or with a negative inlet pressure (vacuum at the suction manifold).

We recommend to calculate the inlet pressure in these cases:
- Water is drawn through long pipes.
- Water is drawn from depths.
- Inlet conditions are poor.

Note
*In this manual, the term "inlet pressure" is defined as the pressure/vacuum which can be measured immediately before the booster system.*

To avoid cavitation, make sure that there is a minimum inlet pressure on the suction side of the booster system. The minimum inlet pressure in bar can be calculated as follows:

$$p_s \quad > \quad H_v + \rho \times g \times 10^{-5} \times NPSH + H_s - P_b$$

| | | |
|---|---|---|
| $p_s$ | = | The required minimum inlet pressure in bar read from a pressure gauge on the suction side of the booster system. |
| $H_v$ | = | Vapour pressure of the pumped liquid in bar. |
| $\rho$ | = | Density of the pumped liquid in $kg/m^3$. |
| $g$ | = | Gravitational acceleration in $m/s^2$. |
| NPSH | = | Net Positive Suction Head in metres head. |
| | | NPSH can be read from the NPSH curve at the maximum performance at which the pump will run. See installation and operating instructions for CR, CRI, CRN. |
| $H_s$ | = | Safety margin = minimum 0.1 bar. |
| $p_b$ | = | Barometric pressure in bar. Normal barometric pressure is 1.013 bar. |

**Maximum inlet pressure**

See the CR, CRI, CRN installation and operating instructions (96462123) delivered together with this booster system.

**Operating pressure**

As standard, the maximum operating pressure is 16 bar.
Hydro MPC booster systems with a maximum operating pressure higher than 16 bar are available on request.

### 3.2 Temperatures

Liquid temperature:     0 °C to +60 °C.

Ambient temperature:  0 °C to +40 °C.

### 3.3 Relative air humidity

Maximum relative air humidity: 95 %.

### 3.4 Sound pressure level

For sound pressure level, see the installation and operating instructions for the CR pumps.
The sound pressure level for a number of pumps can be calculated as follows:
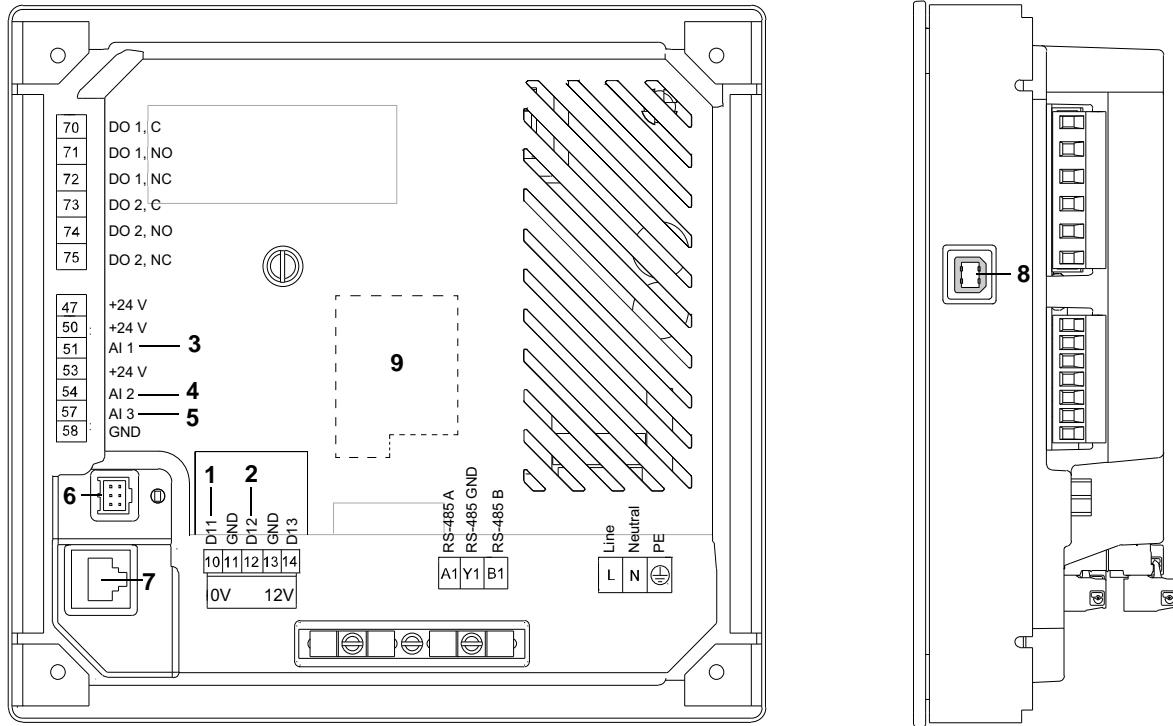
| | | |
|---|---|---|
| $L_{max.}$ | = | $L_{pump} + (n - 1) \times 3$ |
| $L_{max.}$ | = | Maximum sound pressure level |
| $L_{pump}$ | = | Sound pressure level of one pump |
| $n$ | = | Number of pumps |

# 4. CU 352 and IO 351

## 4.1 Functions of terminals, CU 352



**Fig. 6** Functions of terminals, CU 352

**Hydro MPC default settings**

| Pos. | Default settings |
|------|------------------|
| 1 | External start/stop |
| 2 | Water shortage, pressure/level switch |
| 3 | Discharge pressure |
| 4 | Inlet pressure (disabled if no sensor is connected) |
| 5 | Configurable analog input (disabled if no sensor is connected) |
| 6 | PC Tool connection, TTL |
| 7 | Ethernet connection |
| 8 | PC Tool connection, USB |
| 9 | Optional CIM card |

## 4.2 Functions of terminals, IO 351A and IO 351B

### 4.2.1 IO 351A
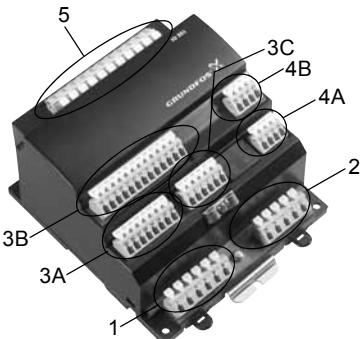


**Fig. 7** Terminal groups

The module can be divided into these groups:

| Group 1: | Connection of power supply |
|---|---|
| Group 2: | Digital outputs 1-3 |
| Groups 3A, 3C: | Digital inputs<br>GENIbus |
| Group 4A: | Inputs for PTC sensor or thermal switch |

### 4.2.2 IO 351B



**Fig. 8** Terminal groups

The module can be divided into these groups:

| Group 1: | Connection of power supply |
|---|---|
| Group 2: | Digital outputs 1-3 |
| Groups 3A, 3B, 3C: | Digital inputs<br>Analog inputs and outputs<br>GENIbus |
| Groups 4A, 4B: | Inputs for PTC sensor or thermal switch |
| Group 5: | Digital outputs 4-7 |

### 4.2.3 Overview of inputs and outputs of modules

| Type | Pump module A | Pump module B | IO module B |
|---|---|---|---|
| Analog input | Not used | Not used | 2 |
| Analog output | - | 3 | Not used |
| Digital input | 3 | 9 | 9 |
| PTC input | 3 | 6 | Not used |
| Digital output | 3 | 7 | 7 |

The table below shows the modules and the GENIbus number of the individual system types.

| System type and number of pumps | | Module required in addition to the CU 352 | GENIbus number |
|---|---|---|---|
| E | | - | - |
| ES | up to four pumps | A | 31 |
| ES | five or six pumps | B | 31 |
| ED | up to five pumps | A | 31 |
| ED | six pumps | B | 31 |
| EDF | up to six pumps | B | 31 |
| EF | up to three pumps | B | 31 |
| EF | four to six pumps | B + B | 31 + 32 |
| F | up to three pumps | B | 31 |
| F | four to six pumps | B + B | 31 + 32 |
| S | up to three pumps | A | 31 |
| S | four to six pumps | B | 31 |
| | | General module | 41 |
| | | Operating light module | 41 |
| | | General module + operating light module | 41 + 42 |

#### 4.2.4 System type and IO module variants

| System type | Maximum number of pumps | Controller/module | GENIbus address | | Pump number | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Module | E-pump | 1 | 2 | 3 | 4 | 5 | 6 |
| E | 6 | CU 352 | | 1-6 | $E^1$ | $E^1$ | $E^1$ | $E^1$ | $E^1$ | $E^1$ |
| ES | 4 | CU 352 | - | 1 | $E^1$ | - | - | - | - | - |
| | | IO 351A | 31 | - | - | $S^2$ | $S^2$ | $S^2$ | - | - |
| | 6 | CU 352 | - | 1 | $E^1$ | - | - | - | - | - |
| | | IO 351B | 31 | - | - | $S^2$ | $S^2$ | $S^2$ | $S^2$ | $S^2$ |
| ED | 5 | CU 352 | - | 1-2 | $E^1$ | $E^1$ | - | - | - | - |
| | | IO 351A | 31 | - | - | - | $S^2$ | $S^2$ | $S^2$ | - |
| | 6 | CU 352 | - | 1-2 | $E^1$ | $E^1$ | - | - | - | - |
| | | IO 351B | 31 | - | - | - | $S^2$ | $S^2$ | $S^2$ | $S^2$ |
| EDF | 6 | CU 352 | - | - | - | - | - | - | - | - |
| | | IO 351B | 31 | - | $EF^3$ | $EF^3$ | $S^2$ | $S^2$ | $S^2$ | $S^2$ |
| EF | 6 | CU 352 | - | - | - | - | - | - | - | - |
| | | IO 351B | 31 | - | $EF^3$ | $EF^3$ | $EF^3$ | - | - | - |
| | | IO 351B | 32 | - | - | - | - | $EF^3$ | $EF^3$ | $EF^3$ |
| F | 6 | CU 352 | - | - | - | - | - | - | - | - |
| | | IO 351B | 31 | - | $F/S^4$ | $F/S^4$ | $F/S^4$ | - | - | - |
| | | IO 351B | 32 | - | - | - | - | $F/S^4$ | $F/S^4$ | $F/S^4$ |
| S | 3 | CU 352 | - | - | - | - | - | - | - | - |
| | | IO 351A | 31 | - | $S^2$ | $S^2$ | $S^2$ | - | - | - |
| | 6 | CU 352 | - | - | - | - | - | - | - | - |
| | | IO 351B | 31 | - | $S^2$ | $S^2$ | $S^2$ | $S^2$ | $S^2$ | $S^2$ |

**Accessory**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **All** | | IO 351B | $41^5$ | - | Data exchange, for instance to a PLC | | | | | |
| | | 2 x IO 351B | 41, $42^6$ | | | | | | | |

[1] E = 0.37 to 22 kW are E-pumps with integrated frequency converter.
  30 to 55 kW are variable-speed pumps controlled by Grundfos CUE frequency converters.

[2] S = Mains-operated pump.

[3] EF = Variable-speed pump controlled by an external frequency converter (not CUE).

[4] F/S = Mains-operated pump or variable-speed pump controlled via a common frequency converter.

[5] Interface module or operating module.

[6] Interface module and operating module.

### 4.2.5 Internal and external connections

This section shows the internal and external connections.
The section is split up according to the various system types.

Abbreviations used:

DI: Digital input

DO: Digital output

AO: Analog output

AI: Analog input
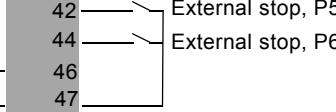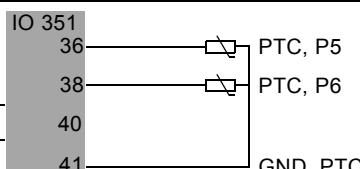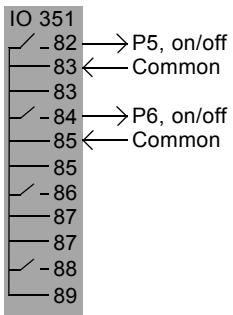
C: Common.

**E systems, CU 352**

| Group | Terminal | Designation | Data | Diagram |
|---|---|---|---|---|
| 1 | L | Connection to phase conductor | 1 x 100-240 VAC ± 10 %, 50/60 Hz | CU 352 L–L N–N ⏚–PE |
| | N | Connection to neutral conductor | | |
| | PE | Connection to protective earth | | |
| 2 | A1 | RS-485 A | GENIbus (Fix the screen with a cable clamp.) | CU 352 — IO 351 A1–A Y1–Y B1–B |
| | Y1 | RS-485 GND | | |
| | B1 | RS-485 B | | |
| | ⏚ | Functional earth | | |
| 3 | | Connection to external fieldbus. See installation and operating instructions for the CIM module. | | |
| 4 | 0 V | Connection to battery | Backup battery | |
| | +12 VDC | | | |
| 5 | 10 | DI1 | Digital input | 10 External stop 11 |
| | 11 | GND | | |
| | 12 | DI2 | | 12 Water shortage 13 |
| | 13 | GND | | 14 |
| | 14 | DI3 | | |
| | | All terminals (except mains terminals) must only be connected to voltages not exceeding 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | |
| 6 | | Ethernet RJ45 | | |
| | | External computing devices connected to the Ethernet connection must comply with the standards IEC 60950 and UL 60950. | | |
| 7 | | GENIbus | Service connection | |
| 8 | 47 | +24 V | Supply to sensor. Short-circuit-protected 30 mA | 47 Pressure sensor |
| | 50 | +24 V | Supply to sensor. Short-circuit-protected 30 mA | 50 |
| | 51 | AI1 | Input for analog signal, 0/4-20 mA or 0-10 V | 51 |
| | 53 | +24 V | Supply to sensor. Short-circuit-protected 30 mA | 53 |
| | 54 | AI2 | Input for analog signal, 0/4-20 mA or 0-10 V | 54 |
| | 57 | AI3 | | 57 |
| | 58 | GND* | | 58 |
| | | All terminals (except mains terminals) must only be connected to voltages not exceeding 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | |
| | | * GND is separated from other earth connections. | | |
| 9 | | USB port | USB 2.0, type B | |
| 10 | 70 | Relay 1 | C | 70 |
| | 71 | | NO | 71 |
| | 72 | | NC | 72 |
| | 73 | Relay 2 | C | 73 |
| | 74 | | NO | 74 |
| | 75 | | NC | 75 |

**ES systems, IO 351, GENIbus number 31**

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 1 | L | Phase conductor | 1 x 100-240 VAC ± 10 %, 50/60 Hz | IO 351 |
| | L | | | L –L |
| | N | Neutral conductor | | N –N |
| | N | | | ⊕ –PE |
| | ⏚ | PE | | |
| | ⏚ | | | |
| 2 | 76 | DO1, 2, 3 C | Relay contact, NO Maximum load: 240 VAC, 2 A Minimum load: 5 VDC, 10 mA | IO 351 76 ← Common 76 ← –77 →P2, on/off –79 →P3, on/off –81 →P4, on/off |
| | 76 | DO1, 2, 3 C | | |
| | 77 | DO1 NO | | |
| | 79 | DO2 NO | | |
| | 81 | DO3 NO | | |
| 3A | 10 | DI1 | Digital input | IO 351 10 External stop, P2 12 External stop, P3 14 External stop, P4 15 Common, GND |
| | 12 | DI2 | | |
| | 14 | DI3 | | |
| | 15 | GND | | |
| | The terminals must only be connected to voltages of maximum 16 V$_{rms}$ and 22.6 V$_{peak}$ or 35 VDC. | | | |
| | Fit jumpers instead of the external stops for which the controller is designed. | | | |
| 3A | 53 | +24 V | Supply to sensor. Max. 50 mA | IO 351 53 55 57 60 Cannot be used. |
| | 55 | GND | | |
| | 57 | AI1 | Input for analog signal, 0/4-20 mA or 0-10 V | |
| | 60 | AI2 | | |
| | The terminals must only be connected to voltages of maximum 16 V$_{rms}$ and 22.6 V$_{peak}$ or 35 VDC. | | | |
| 3C | A | RS-485 A | GENIbus (internal) (Fix the screen with a cable clamp.) | IO 351 CU 352 A A1 Y Y1 B B1 ⏚ ⏚ |
| | A | RS-485 A | | |
| | Y | RS-485 GND* | | |
| | Y | RS-485 GND* | | |
| | B | RS-485 B | | |
| | B | RS-485 B | | |
| | ⏚ | Functional earth | | |
| | * GND is separated from other earth connections. | | | |
| 4A | 30 | PTC1 | Input for PTC sensor or thermal switch | IO 351 30 PTC, P2 32 PTC, P3 34 PTC, P4 35 GND, PTC |
| | 32 | PTC2 | | |
| | 34 | PTC3 | | |
| | 35 | GND, PTC | | |
| | Fit jumpers if no PTC sensor or thermal switch is connected. | | | |
| | The terminals must only be connected to voltages of maximum 16 V$_{rms}$ and 22.6 V$_{peak}$ or 35 VDC. | | | |

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|-------|----------|-------------|------|-----------------------------------|
| 3B | 16 | DI4 | Digital input | |
| | 17 | GND | | |
| | 18 | AO4 | Analog output, 0-10 V | |
| | 20 | DI5 | Digital input | |
| | 21 | GND | | Cannot be used. |
| | 22 | AO5 | Analog output, 0-10 V | |
| | 24 | DI6 | Digital input | |
| | 25 | GND | | |
| | 26 | AO6 | Analog output | |
| | 42 | DI7 | | |
| | 44 | DI8 | Digital input | |
| | 46 | DI9 | | |
| | 47 | GND | | |
| | Fit jumpers instead of the external stops for which the controller is designed. | | | |

Diagram:
42 — External stop, P5
44 — External stop, P6
46
47

| 4B | 36 | PTC4 | | IO 351 |
|----|----|------|------|--------|
| | 38 | PTC5 | Input for PTC sensor or thermal switch | 36 — PTC, P5 |
| | 40 | PTC6 | | 38 — PTC, P6 |
| | 41 | GND, PTC | | 40 |
| | Fit jumpers if no PTC sensor or thermal switch is connected. | | | 41 — GND, PTC |

The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC.

| 5 | 82 | DO4 NO | | IO 351 |
|---|----|--------|------|--------|
| | 83 | DO4 C | | 82 → P5, on/off |
| | 83 | DO4 C | | 83 ← Common |
| | 84 | DO5 NO | | 83 |
| | 85 | DO5 C | Relay contact, NO | 84 → P6, on/off |
| | 85 | DO5 C | Maximum load: 240 VAC, 2 A | 85 ← Common |
| | 86 | DO6 NO | Minimum load: 5 VDC, 10 mA | 85 |
| | 87 | DO6 C | | 86 |
| | 87 | DO6 C | | 87 |
| | 88 | DO7 NO | | 87 |
| | 89 | DO7 C | | 88 |
| | | | | 89 |

**ED systems, IO 351, GENIbus number 31**

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 1 | L | Phase conductor | 1 x 100-240 VAC ± 10 %, 50/60 Hz | IO 351<br>L — L<br>N — N<br>⊕ — PE |
| | L | | | |
| | N | Neutral conductor | | |
| | N | | | |
| | ⏚ | PE | | |
| | ⏚ | | | |
| 2 | 76 | DO1, 2, 3 C | Relay contact, NO<br>Maximum load: 240 VAC, 2 A<br>Minimum load: 5 VDC, 10 mA | IO 351<br>76 — Common<br>76<br>77 → P3, on/off<br>79 → P4, on/off<br>81 → P5, on/off |
| | 76 | DO1, 2, 3 C | | |
| | 77 | DO1 NO | | |
| | 79 | DO2 NO | | |
| | 81 | DO3 NO | | |
| 3A | 10 | DI1 | Digital input | IO 351<br>10 — External stop, P3<br>12 — External stop, P4<br>14 — External stop, P5<br>15 — Common GND |
| | 12 | DI2 | | |
| | 14 | DI3 | | |
| | 15 | GND | | |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | |
| | Fit jumpers instead of the external stops for which the controller is designed. | | | |
| 3A | 53 | +24 V | Supply to sensor. Max. 50 mA | IO 351<br>53<br>55<br>57<br>60<br>Cannot be used. |
| | 55 | GND | | |
| | 57 | AI1 | Input for analog signal, 0/4-20 mA or 0-10 V | |
| | 60 | AI2 | | |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | |
| 3C | A | RS-485 A | GENIbus (internal)<br>(Fix the screen with a cable clamp.) | IO 351   CU 352<br>A — A1<br>Y — Y1<br>B — B1<br>⏚   ⏚ |
| | A | RS-485 A | | |
| | Y | RS-485 GND* | | |
| | Y | RS-485 GND* | | |
| | B | RS-485 B | | |
| | B | RS-485 B | | |
| | ⏚ | Functional earth | | |
| | * GND is separated from other earth connections. | | | |
| 4A | 30 | PTC1 | Input for PTC sensor or thermal switch | IO 351<br>30 — PTC, P3<br>32 — PTC, P4<br>34 — PTC, P5<br>35 — GND, PTC |
| | 32 | PTC2 | | |
| | 34 | PTC3 | | |
| | 35 | GND, PTC | | |
| | Fit jumpers if no PTC sensor or thermal switch is connected. | | | |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | |

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|-------|----------|-------------|------|-----------------------------------|
| 3B | 16 | DI4 | Digital input | |
| | 17 | GND | | |
| | 18 | AO4 | Analog output, 0-10 V | |
| | 20 | DI5 | Digital input | |
| | 21 | GND | | Cannot be used. |
| | 22 | AO5 | Analog output, 0-10 V | |
| | 24 | DI6 | Digital input | |
| | 25 | GND | | |
| | 26 | AO6 | Analog output | |
| | 42 | DI7 | | |
| | 44 | DI8 | Digital input | |
| | 46 | DI9 | | |
| | 47 | GND | | |

Fit jumpers instead of the external stops for which the controller is designed.



External stop, P6 (terminals 42, 44, 46, 47)

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|-------|----------|-------------|------|-----------------------------------|
| 4B | 36 | PTC4 | | |
| | 38 | PTC5 | Input for PTC sensor or thermal switch | |
| | 40 | PTC6 | | |
| | 41 | GND, PTC | | |

Fit jumpers if no PTC sensor or thermal switch is connected.



IO 351 — 36, 38, 40, 41 — PTC, P6 — GND, PTC

The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC.

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|-------|----------|-------------|------|-----------------------------------|
| 5 | 82 | DO4 NO | | |
| | 83 | DO4 C | | |
| | 83 | DO4 C | | |
| | 84 | DO5 NO | | |
| | 85 | DO5 C | Relay contact, NO | |
| | 85 | DO5 C | Maximum load: 240 VAC, 2 A | |
| | 86 | DO6 NO | Minimum load: 5 VDC, 10 mA | |
| | 87 | DO6 C | | |
| | 87 | DO6 C | | |
| | 88 | DO7 NO | | |
| | 89 | DO7 C | | |



IO 351 — 82 (P6, on/off), 83 (Common), 83, 84, 85, 85, 86, 87, 87, 88, 89

**EDF systems, IO 351, GENIbus number 31**

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 1 | L | Phase conductor | 1 x 100-240 VAC ± 10 %, 50/60 Hz | IO 351<br>L−L<br>N−N<br>⊕−PE |
| | L | | | |
| | N | Neutral conductor | | |
| | N | | | |
| | ⏚ | PE | | |
| | ⏚ | | | |
| 2 | 76 | DO1, 2, 3 C | Relay contact, NO<br>Maximum load: 240 VAC, 2 A<br>Minimum load: 5 VDC, 10 mA | IO 351<br>76 ← Common<br>76 ←<br>77 → P4, on/off, mains<br>79 → P5, on/off, mains<br>81 → P6, on/off, mains |
| | 76 | DO1, 2, 3 C | | |
| | 77 | DO1 NO | | |
| | 79 | DO2 NO | | |
| | 81 | DO3 NO | | |
| 3A | 10 | DI1 | Digital input | IO 351<br>10 External stop, P1<br>12 External stop, P2<br>14 External stop, P3<br>15 Common, GND |
| | 12 | DI2 | | |
| | 14 | DI3 | | |
| | 15 | GND | | |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | |
| | Fit jumpers instead of the external stops for which the controller is designed. | | | |
| 3A | 53 | +24 V | Supply to sensor. Max. 50 mA | IO 351<br>53<br>55<br>57<br>60<br>Cannot be used. |
| | 55 | GND | | |
| | 57 | AI1 | Input for analog signal, 0/4-20 mA or 0-10 V | |
| | 60 | AI2 | | |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | |
| 3C | A | RS-485 A | GENIbus (internal)<br>(Fix the screen with a cable clamp.) | IO 351  CU 352<br>A  A1<br>Y  Y1<br>B  B1<br>⏚  ⏚ |
| | A | RS-485 A | | |
| | Y | RS-485 GND* | | |
| | Y | RS-485 GND* | | |
| | B | RS-485 B | | |
| | B | RS-485 B | | |
| | ⏚ | Functional earth | | |
| | * GND is separated from other earth connections. | | | |
| 4A | 30 | PTC1 | Input for PTC sensor or thermal switch | IO 351<br>30 PTC, P1<br>32 PTC, P2<br>34 PTC, P3<br>35 GND, PTC |
| | 32 | PTC2 | | |
| | 34 | PTC3 | | |
| | 35 | GND, PTC | | |
| | Fit jumpers if no PTC sensor or thermal switch is connected. | | | |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | |

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 3B | 16 | DI4 | Digital input | IO 351 |
| | 17 | GND | | 16 — VFD1, ready |
| | 18 | AO4 | Analog output, 0-10 V | 17 — VFD1, GND |
| | 20 | DI5 | Digital input | 18 — VFD1, speed |
| | 21 | GND | | 20 — VFD2, ready |
| | 22 | AO5 | Analog output, 0-10 V | 21 — VFD2, GND |
| | 24 | DI6 | Digital input | 22 — VFD2, speed |
| | 25 | GND | | 23 |
| | 26 | AO6 | Analog output | 24 |
| | | | | 25 |
| | | | | 26 |
| | 42 | DI7 | | |
| | 44 | DI8 | Digital input | 42 — External stop, P4 |
| | 46 | DI9 | | 44 — External stop, P5 |
| | 47 | GND | | 46 — External stop, P6 |
| | | | | 47 — Common, GND |

Fit jumpers instead of the external stops for which the controller is designed.

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 4B | 36 | PTC4 | | IO 351 |
| | 38 | PTC5 | Input for PTC sensor or thermal switch | 36 — PTC, P4 |
| | 40 | PTC6 | | 38 — PTC, P5 |
| | 41 | GND, PTC | | 40 — PTC, P6 |
| | | | | 41 — GND, PTC |

Fit jumpers if no PTC sensor or thermal switch is connected.

The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC.

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 5 | 82 | DO4 NO | | IO 351 |
| | 83 | DO4 C | | 82 → VFD1, start |
| | 83 | DO4 C | | 83 ← Common |
| | 84 | DO5 NO | | 83 |
| | 85 | DO5 C | Relay contact, NO | 84 → VFD2, start |
| | 85 | DO5 C | Maximum load: 240 VAC, 2 A | 85 ← Common |
| | 86 | DO6 NO | Minimum load: 5 VDC, 10 mA | 85 |
| | 87 | DO6 C | | 86 → P3, on/off, mains |
| | 87 | DO6 C | | 87 ← Common |
| | 88 | DO7 NO | | 87 |
| | 89 | DO7 C | | 88 |
| | | | | 89 |

**EF systems, module B1, IO 351, GENIbus number 31**

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 1 | L | Phase conductor | 1 x 100-240 VAC ± 10 %, 50/60 Hz | |
| | L | | | IO 351 |
| | N | Neutral conductor | | L–L |
| | N | | | N–N |
| | ⏚ | PE | | ⊕–PE |
| | ⏚ | | | |
| 2 | 76 | DO1, 2, 3 C | | IO 351 |
| | 76 | DO1, 2, 3 C | | 76 |
| | 77 | DO1 NO | Relay contact, NO | 76 |
| | 79 | DO2 NO | Maximum load: 240 VAC, 2 A | 77 Cannot be used. |
| | | | Minimum load: 5 VDC, 10 mA | 79 |
| | 81 | DO3 NO | | 81 |
| 3A | 10 | DI1 | | IO 351 |
| | 12 | DI2 | Digital input | 10 External stop, P1 |
| | 14 | DI3 | | 12 External stop, P2 |
| | 15 | GND | | 14 External stop, P3 |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | 15 Common, GND |
| | Fit jumpers instead of the external stops for which the controller is designed. | | | |
| 3A | 53 | +24 V | Supply to sensor. Max. 50 mA | IO 351 |
| | 55 | GND | | 53 |
| | 57 | AI1 | | 55 |
| | 60 | AI2 | Input for analog signal, 0/4-20 mA or 0-10 V | 57 Cannot be used. |
| | | | | 60 |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | |
| 3C | A | RS-485 A | | IO 351   CU 352 |
| | A | RS-485 A | | A   A1 |
| | Y | RS-485 GND* | GENIbus (internal) | Y   Y1 |
| | Y | RS-485 GND* | (Fix the screen with a cable clamp.) | B   B1 |
| | B | RS-485 B | | ⏚   ⏚ |
| | B | RS-485 B | | |
| | ⏚ | Functional earth | | |
| | * GND is separated from other earth connections. | | | |
| 4A | 30 | PTC1 | | IO 351 |
| | 32 | PTC2 | Input for PTC sensor or thermal switch | 30 PTC, P1 |
| | 34 | PTC3 | | 32 PTC, P2 |
| | 35 | GND, PTC | | 34 PTC, P3 |
| | Fit jumpers if no PTC sensor or thermal switch is connected. | | | 35 GND, PTC |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | |

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 3B | 16 | DI4 | Digital input | IO 351 |
| | 17 | GND | | 16 — VFD1, ready |
| | 18 | AO4 | Analog output, 0-10 V | 17 — VFD1, GND |
| | 20 | DI5 | Digital input | 18 — VFD1, speed |
| | 21 | GND | | 20 — VFD2, ready |
| | 22 | AO5 | Analog output, 0-10 V | 21 — VFD2, GND |
| | 24 | DI6 | Digital input | 22 — VFD2, speed |
| | 25 | GND | | 23 — VFD3, ready |
| | 26 | AO6 | Analog output | 24 — VFD3, GND |
| | | | | 25 — VFD3, speed |
| | | | | 26 |
| | 42 | DI7 | | 42 |
| | 44 | DI8 | Digital input | 44 |
| | 46 | DI9 | | 46 |
| | 47 | GND | | 47 |
| 4B | 36 | PTC4 | | IO 351 |
| | 38 | PTC5 | Input for PTC sensor or thermal switch | 36 |
| | 40 | PTC6 | | 38 |
| | 41 | GND, PTC | | 40 |
| | Fit jumpers if no PTC sensor or thermal switch is connected. | | | 41 |

The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC.

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 5 | 82 | DO4 NO | | IO 351 |
| | 83 | DO4 C | | 82 → VFD1, start |
| | 83 | DO4 C | | 83 ← Common |
| | 84 | DO5 NO | | 83 |
| | 85 | DO5 C | Relay contact, NO | 84 → VFD2, start |
| | 85 | DO5 C | Maximum load: 240 VAC, 2 A | 85 ← Common |
| | 86 | DO6 NO | Minimum load: 5 VDC, 10 mA | 85 |
| | 87 | DO6 C | | 86 → VFD3, start |
| | 87 | DO6 C | | 87 ← Common |
| | 88 | DO7 NO | | 87 |
| | 89 | DO7 C | | 88 |
| | | | | 89 |

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**EF systems, module B2, IO 351, GENIbus number 32**

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 1 | L<br>L | Phase conductor | 1 x 100-240 VAC ± 10 %, 50/60 Hz | IO 351<br>L—L<br>N—N<br>⏚—PE |
| | N<br>N | Neutral conductor | | |
| | ⏚<br>⏚ | PE | | |
| 2 | 76 | DO1, 2, 3 C | | IO 351 |
| | 76 | DO1, 2, 3 C | Relay contact, NO<br>Maximum load: 240 VAC, 2 A<br>Minimum load: 5 VDC, 10 mA | 76<br>76<br>77<br>79<br>81  Cannot be used. |
| | 77 | DO1 NO | | |
| | 79 | DO2 NO | | |
| | 81 | DO3 NO | | |
| 3A | 10 | DI1 | Digital input | IO 351<br>10 — External stop, P4<br>12 — External stop, P5<br>14 — External stop, P6<br>15 — Common, GND |
| | 12 | DI2 | | |
| | 14 | DI3 | | |
| | 15 | GND | | |
| | The terminals must only be connected to voltages of maximum 16 V$_{rms}$ and 22.6 V$_{peak}$ or 35 VDC. | | | |
| | Fit jumpers instead of the external stops for which the controller is designed. | | | |
| 3A | 53 | +24 V | Supply to sensor. Max. 50 mA | IO 351<br>53<br>55<br>57<br>6  Cannot be used. |
| | 55 | GND | | |
| | 57 | AI1 | Input for analog signal, 0/4-20 mA or 0-10 V | |
| | 60 | AI2 | | |
| | The terminals must only be connected to voltages of maximum 16 V$_{rms}$ and 22.6 V$_{peak}$ or 35 VDC. | | | |
| 3C | A | RS-485 A | GENIbus (internal)<br>(Fix the screen with a cable clamp.) | IO 351   CU 352<br>A — A1<br>Y — Y1<br>B — B1<br>⏚   ⏚ |
| | A | RS-485 A | | |
| | Y | RS-485 GND* | | |
| | Y | RS-485 GND* | | |
| | B | RS-485 B | | |
| | B | RS-485 B | | |
| | ⏚ | Functional earth | | |
| | * GND is separated from other earth connections. | | | |
| 4A | 30 | PTC1 | Input for PTC sensor or thermal switch | IO 351<br>30 — PTC, P4<br>32 — PTC, P5<br>34 — PTC, P6<br>35 — GND, PTC |
| | 32 | PTC2 | | |
| | 34 | PTC3 | | |
| | 35 | GND, PTC | | |
| | Fit jumpers if no PTC sensor or thermal switch is connected. | | | |
| | The terminals must only be connected to voltages of maximum 16 V$_{rms}$ and 22.6 V$_{peak}$ or 35 VDC. | | | |

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 3B | 16 | DI4 | Digital input | IO 351 |
| | 17 | GND | | 16 — VFD4, ready |
| | 18 | AO4 | Analog output, 0-10 V | 17 — VFD4, GND |
| | 20 | DI5 | Digital input | 18 — VFD4, speed |
| | 21 | GND | | 20 — VFD5, ready |
| | 22 | AO5 | Analog output, 0-10 V | 21 — VFD5, GND |
| | 24 | DI6 | Digital input | 22 — VFD5, speed |
| | 25 | GND | | 23 — VFD6, ready |
| | 26 | AO6 | Analog output | 24 — VFD6, GND |
| | | | | 25 — VFD6, speed |
| | | | | 26 |
| | 42 | DI7 | | 42 |
| | 44 | DI8 | Digital input | 44 |
| | 46 | DI9 | | 46 |
| | 47 | GND | | 47 |
| 4B | 36 | PTC4 | Input for PTC sensor or thermal switch | IO 351 |
| | 38 | PTC5 | | 36 |
| | 40 | PTC6 | | 38 |
| | 41 | GND, PTC | | 40 |
| | Fit jumpers if no PTC sensor or thermal switch is connected. | | | 41 |

The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC.

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 5 | 82 | DO4 NO | Relay contact, NO<br>Maximum load: 240 VAC, 2 A<br>Minimum load: 5 VDC, 10 mA | IO 351 |
| | 83 | DO4 C | | 82 → VFD4, start |
| | 83 | DO4 C | | 83 ← Common |
| | 84 | DO5 NO | | 83 |
| | 85 | DO5 C | | 84 → VFD5, start |
| | 85 | DO5 C | | 85 ← Common |
| | 86 | DO6 NO | | 85 |
| | 87 | DO6 C | | 86 → VFD6, start |
| | 87 | DO6 C | | 87 ← Common |
| | 88 | DO7 NO | | 87 |
| | 89 | DO7 C | | 88 |
| | | | | 89 |

**F systems, module B1, IO 351, GENIbus number 31**

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 1 | L | Phase conductor | 1 x 100-240 VAC ± 10 %, 50/60 Hz | |
| | L | | | IO 351 |
| | N | Neutral conductor | | L–L |
| | N | | | N–N |
| | ⏚ | PE | | ⊕–PE |
| | ⏚ | | | |
| 2 | 76 | DO1, 2, 3 C | | IO 351 |
| | 76 | DO1, 2, 3 C | Relay contact, NO | 76 ← ┐ Common |
| | 77 | DO1 NO | Maximum load: 240 VAC, 2 A | 76 ← ┘ |
| | 79 | DO2 NO | Minimum load: 5 VDC, 10 mA | 77 → P1, on/off, mains |
| | 81 | DO3 NO | | 79 → P2, on/off, mains |
| | | | | 81 → P3, on/off, mains |
| 3A | 10 | DI1 | | IO 351 |
| | 12 | DI2 | Digital input | 10 — External stop, P1 |
| | 14 | DI3 | | 12 — External stop, P2 |
| | 15 | GND | | 14 — External stop, P3 |
| | The terminals must only be connected to voltages of maximum 16 V$_{rms}$ and 22.6 V$_{peak}$ or 35 VDC. | | | 15 — Common, GND |
| | Fit jumpers instead of the external stops for which the controller is designed. | | | |
| 3A | 53 | +24 V | Supply to sensor. Max. 50 mA | IO 351 |
| | 55 | GND | | 53 ⎫ |
| | 57 | AI1 | | 55 ⎪ |
| | 60 | AI2 | Input for analog signal, 0/4-20 mA or 0-10 V | 57 ⎬ Cannot be used. |
| | | | | 60 ⎭ |
| | The terminals must only be connected to voltages of maximum 16 V$_{rms}$ and 22.6 V$_{peak}$ or 35 VDC. | | | |
| 3C | A | RS-485 A | | |
| | A | RS-485 A | | IO 351    CU 352 |
| | Y | RS-485 GND* | GENIbus (internal) | A — A1 |
| | Y | RS-485 GND* | (Fix the screen with a cable clamp.) | Y — Y1 |
| | B | RS-485 B | | B — B1 |
| | B | RS-485 B | | ⏚        ⏚ |
| | ⏚ | Functional earth | | |
| | * GND is separated from other earth connections. | | | |
| 4A | 30 | PTC1 | | IO 351 |
| | 32 | PTC2 | Input for PTC sensor or thermal switch | 30 — PTC, P1 |
| | 34 | PTC3 | | 32 — PTC, P2 |
| | 35 | GND, PTC | | 34 — PTC, P3 |
| | Fit jumpers if no PTC sensor or thermal switch is connected. | | | 35 — GND, PTC |
| | The terminals must only be connected to voltages of maximum 16 V$_{rms}$ and 22.6 V$_{peak}$ or 35 VDC. | | | |

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|-------|----------|-------------|------|-------------------------------------|
| 3B | 16 | DI4 | Digital input | IO 351 |
| | 17 | GND | | 16 |
| | 18 | AO4 | Analog output, 0-10 V | 17 |
| | 20 | DI5 | Digital input | 18 → VFD1, GND / VFD1, speed |
| | 21 | GND | | 20 |
| | 22 | AO5 | Analog output, 0-10 V | 21 |
| | 24 | DI6 | Digital input | 22 |
| | 25 | GND | | 23 |
| | 26 | AO6 | Analog output | 24 |
| | | | | 25 |
| | | | | 26 |
| | 42 | DI7 | | |
| | 44 | DI8 | Digital input | 42 → VFD, ready |
| | 46 | DI9 | | 44 |
| | 47 | GND | | 46 |
| | | | | 47 → VFD, GND |
| | Fit jumpers instead of the external stops for which the controller is designed. | | | |
| 4B | 36 | PTC4 | | IO 351 |
| | 38 | PTC5 | Input for PTC sensor or thermal switch | 36 |
| | 40 | PTC6 | | 38 |
| | 41 | GND, PTC | | 40 |
| | Fit jumpers if no PTC sensor or thermal switch is connected. | | | 4 |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | |
| 5 | 82 | DO4 NO | | IO 351 |
| | 83 | DO4 C | | 82 → P1, on/off, VFD |
| | 83 | DO4 C | | 83 ← Common |
| | 84 | DO5 NO | | 83 |
| | 85 | DO5 C | Relay contact, NO | 84 → P2, on/off, VFD |
| | 85 | DO5 C | Maximum load: 240 VAC, 2 A | 85 ← Common |
| | 86 | DO6 NO | Minimum load: 5 VDC, 10 mA | 85 |
| | 87 | DO6 C | | 86 → P3, on/off, VFD |
| | 87 | DO6 C | | 87 ← Common |
| | 88 | DO7 NO | | 87 |
| | 89 | DO7 C | | 88 → VFD, start |
| | | | | 89 ← Common |

**F systems, module B2, IO 351, GENIbus number 32**

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 1 | L | Phase conductor | 1 x 100-240 VAC ± 10 %, 50/60 Hz | IO 351 |
| | L | | | L−L |
| | N | Neutral conductor | | N−N |
| | N | | | ⊕−PE |
| | ⏚ | PE | | |
| | ⏚ | | | |
| 2 | 76 | DO1, 2, 3 C | | IO 351 |
| | 76 | DO1, 2, 3 C | | 76 ← ⎤ Common |
| | 77 | DO1 NO | Relay contact, NO | 76 ← ⎦ |
| | 79 | DO2 NO | Maximum load: 240 VAC, 2 A | 77 → P4, on/off, mains |
| | 81 | DO3 NO | Minimum load: 5 VDC, 10 mA | 79 → P5, on/off, mains |
| | | | | 81 → P6, on/off, mains |
| 3A | 10 | DI1 | | IO 351 |
| | 12 | DI2 | Digital input | 10 — External stop, P4 |
| | 14 | DI3 | | 12 — External stop, P5 |
| | 15 | GND | | 14 — External stop, P6 |
| | The terminals must only be connected to voltages of maximum 16 V$_{rms}$ and 22.6 V$_{peak}$ or 35 VDC. | | | 15 — Common, GND |
| | Fit jumpers instead of the external stops for which the controller is designed. | | | |
| 3A | 53 | +24 V | Supply to sensor. Max. 50 mA | IO 351 |
| | 55 | GND | | 53 |
| | 57 | AI1 | | 55 |
| | 60 | AI2 | Input for analog signal, 0/4-20 mA or 0-10 V | 57 } Cannot be used. |
| | | | | 60 |
| | The terminals must only be connected to voltages of maximum 16 V$_{rms}$ and 22.6 V$_{peak}$ or 35 VDC. | | | |
| 3C | A | RS-485 A | | IO 351    CU 352 |
| | A | RS-485 A | | A    A1 |
| | Y | RS-485 GND* | GENIbus (internal) | Y    Y1 |
| | Y | RS-485 GND* | (Fix the screen with a cable clamp.) | B    B1 |
| | B | RS-485 B | | ⏚    ⏚ |
| | B | RS-485 B | | |
| | ⏚ | Functional earth | | |
| | * GND is separated from other earth connections. | | | |
| 4A | 30 | PTC1 | | IO 351 |
| | 32 | PTC2 | Input for PTC sensor or thermal switch | 30 — PTC, P4 |
| | 34 | PTC3 | | 32 — PTC, P5 |
| | 35 | GND, PTC | | 34 — PTC, P6 |
| | Fit jumpers if no PTC sensor or thermal switch is connected. | | | 35 — GND, PTC |
| | The terminals must only be connected to voltages of maximum 16 V$_{rms}$ and 22.6 V$_{peak}$ or 35 VDC. | | | |

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 3B | 16 | DI4 | Digital input | IO 351 |
|  | 17 | GND |  | 16 |
|  | 18 | AO4 | Analog output, 0-10 V | 17 |
|  | 20 | DI5 | Digital input | 18 |
|  | 21 | GND |  | 20 |
|  | 22 | AO5 | Analog output, 0-10 V | 21 |
|  | 24 | DI6 | Digital input | 22 |
|  | 25 | GND |  | 23 |
|  | 26 | AO6 | Analog output | 24 |
|  |  |  |  | 25 |
|  |  |  |  | 26 |
|  | 42 | DI7 |  | 42 |
|  | 44 | DI8 | Digital input | 44 |
|  | 46 | DI9 |  | 46 |
|  | 47 | GND |  | 47 |
| 4B | 36 | PTC4 |  | IO 351 |
|  | 38 | PTC5 | Input for PTC sensor or thermal switch | 36 |
|  | 40 | PTC6 |  | 38 |
|  | 41 | GND, PTC |  | 40 |
|  | Fit jumpers if no PTC sensor or thermal switch is connected. |  |  | 41 |

The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC.

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 5 | 82 | DO4 NO |  | IO 351 |
|  | 83 | DO4 C |  | 82 → P4, on/off, VFD |
|  | 83 | DO4 C |  | 83 ← Common |
|  | 84 | DO5 NO |  | 83 |
|  | 85 | DO5 C | Relay contact, NO | 84 → P5, on/off, VFD |
|  | 85 | DO5 C | Maximum load: 240 VAC, 2 A | 85 ← Common |
|  | 86 | DO6 NO | Minimum load: 5 VDC, 10 mA | 85 |
|  | 87 | DO6 C |  | 86 → P6, on/off, VFD |
|  | 87 | DO6 C |  | 87 ← Common |
|  | 88 | DO7 NO |  | 87 |
|  | 89 | DO7 C |  | 88 |
|  |  |  |  | 89 |

**S systems, IO 351, GENIbus number 31**

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|---|---|---|---|---|
| 1 | L<br>L<br>N<br>N | Phase conductor<br><br>Neutral conductor | 1 x 100-240 VAC ± 10 %, 50/60 Hz | IO 351<br>L –L<br>N –N |
| | ⏚<br>⏚ | PE | | ⊕ –PE |
| 2 | 76<br>76<br>77<br>79<br><br>81 | DO1, 2, 3 C<br>DO1, 2, 3 C<br>DO1 NO<br>DO2 NO<br><br>DO3 NO | Relay contact, NO<br>Maximum load: 240 VAC, 2 A<br>Minimum load: 5 VDC, 10 mA | IO 351<br>76 ← Common<br>76 ←<br>– 77 → P1, on/off, mains<br>– 79 → P2, on/off, mains<br>– 81 → P3, on/off, mains |
| 3A | 10<br>12<br>14<br>15 | DI1<br>DI2<br>DI3<br>GND | Digital input | IO 351<br>10 External stop, P1<br>12 External stop, P2<br>14 External stop, P3<br>15 Common, GND |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | |
| | Fit jumpers instead of the external stops for which the controller is designed. | | | |
| 3A | 53<br>55<br>57<br><br>60 | +24 V<br>GND<br>AI1<br><br>AI2 | Supply to sensor. Max. 50 mA<br><br>Input for analog signal, 0/4-20 mA or 0-10 V | IO 351<br>53<br>55<br>57<br>60<br>Cannot be used. |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | |
| 3C | A<br>A<br>Y<br>Y<br>B<br>B | RS-485 A<br>RS-485 A<br>RS-485 GND*<br>RS-485 GND*<br>RS-485 B<br>RS-485 B | GENIbus (internal)<br>(Fix the screen with a cable clamp.) | IO 351   CU 352<br>A    A1<br>Y    Y1<br>B    B1<br>⏚    ⏚ |
| | ⏚ | Functional earth | | |
| | * GND is separated from other earth connections. | | | |
| 4A | 30<br>32<br>34<br>35 | PTC1<br>PTC2<br>PTC3<br>GND, PTC | Input for PTC sensor or thermal switch | IO 351<br>30 PTC, P1<br>32 PTC, P2<br>34 PTC, P3<br>35 GND, PTC |
| | Fit jumpers if no PTC sensor or thermal switch is connected. | | | |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | |

| Group | Terminal | Designation | Data | Diagram for standard configuration |
|-------|----------|-------------|------|-----------------------------------|
| 3B | 16 | DI4 | Digital input | IO 351 |
| | 17 | GND | | 16 |
| | 18 | AO4 | Analog output, 0-10 V | 17 |
| | | | | 18 |
| | 20 | DI5 | Digital input | 20 |
| | 21 | GND | | 21 |
| | 22 | AO5 | Analog output, 0-10 V | 22 |
| | | | | 23 |
| | 24 | DI6 | Digital input | 24 |
| | 25 | GND | | 25 |
| | 26 | AO6 | Analog output | 26 |
| | 42 | DI7 | | 42 — External stop, P4 |
| | 44 | DI8 | Digital input | 44 — External stop, P5 |
| | 46 | DI9 | | 46 — External stop, P6 |
| | 47 | GND | | 47 — Common, GND |
| | Fit jumpers instead of the external stops for which the controller is designed. | | | |
| 4B | 36 | PTC4 | | IO 351 |
| | 38 | PTC5 | Input for PTC sensor or thermal switch | 36 — PTC, P4 |
| | 40 | PTC6 | | 38 — PTC, P5 |
| | 41 | GND, PTC | | 40 — PTC, P6 |
| | Fit jumpers if no PTC sensor or thermal switch is connected. | | | 41 — GND, PTC |
| | The terminals must only be connected to voltages of maximum 16 $V_{rms}$ and 22.6 $V_{peak}$ or 35 VDC. | | | |
| 5 | 82 | DO4 NO | | IO 351 |
| | 83 | DO4 C | | 82 → P4, on/off |
| | 83 | DO4 C | | 83 ← Common |
| | 84 | DO5 NO | | 83 |
| | 85 | DO5 C | Relay contact, NO | 84 → P5, on/off |
| | 85 | DO5 C | Maximum load: 240 VAC, 2 A | 85 ← Common |
| | 86 | DO6 NO | Minimum load: 5 VDC, 10 mA | 85 |
| | 87 | DO6 C | | 86 → P6, on/off |
| | 87 | DO6 C | | 87 ← Common |
| | 88 | DO7 NO | | 87 |
| | 89 | DO7 C | | 88 |
| | | | | 89 |

### 4.2.6 CU 352 and IO 351 installation and operating instructions

See WinCAPS or WebCAPS > Service > Hydro MPC > CU 352 or IO 351 > Installation and operating instructions.

# 5. Fault correction tools

## 5.1 MPC/CU 352 indicator lights and alarm relay

See WinCAPS or WebCAPS > Service > Hydro MPC > CU 352 or IO 351 > Installation and operating instructions.

## 5.2 MPC display

### 5.2.1 Status

The display shown below is the status display. This display is shown when the Hydro MPC is switched on, and it appears if the buttons of the control panel remain untouched for 15 minutes.
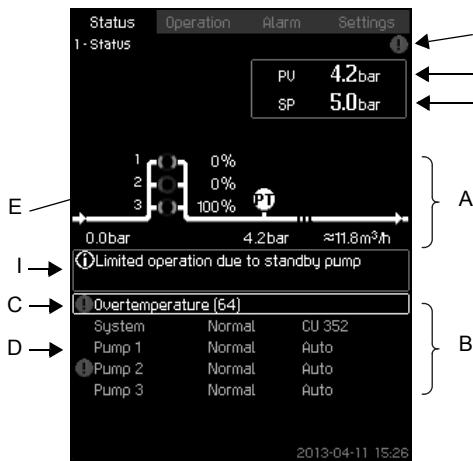
**Fig. 9** Status menu

### Description

No settings can be made in this menu.

The actual value (process value, PV) of the control parameter, usually the discharge pressure, is shown in the upper right corner (G) together with the selected setpoint (SP) (H).

The upper half of the display (A) shows a graphic illustration of the pump system. The selected measuring parameters are shown with sensor symbol and actual value.

The lower display half (B) shows the following:

- the most recent active alarm, if any, and the fault cause with the fault code in brackets
- system status with actual operating mode and control source
- pump status with actual operating mode.

> **Note**
>
> *If a fault has occurred, the warning symbol ⨪ or alarm symbol ⊗ will be shown in the line (C) together with the cause and fault code, for instance "Overtemperature (64)".*

If the fault is related to one of the pumps, the symbol ⨪ or ⊗ will also be shown in front of the status line (D) of the pump in question. At the same time, the pump status indicator (E) will change colour to either yellow or red as described in the table below. The symbol ⨪ or ⊗ will be shown to the right in the top line of the display (F). As long as a fault is present, this symbol will be shown in the top line of all displays.

### Description of pump status

| Pump status indicator | Description |
|---|---|
| Rotating, green | Pump running. |
| Permanently green | Pump ready (not running). |
| Rotating, yellow | Warning. Pump running. |
| Permanently yellow | Warning. Pump ready (not running). |
| Permanently red | Alarm. Pump stopped. |

For further details on an alarm, go to the "Alarm" menu in the top bar. The "3. Alarm" display gives access to the following status displays.

- Actual alarms
- Alarm log
- Service contact information.

### Alarm log

The alarm log can store up to 24 warnings and alarms.
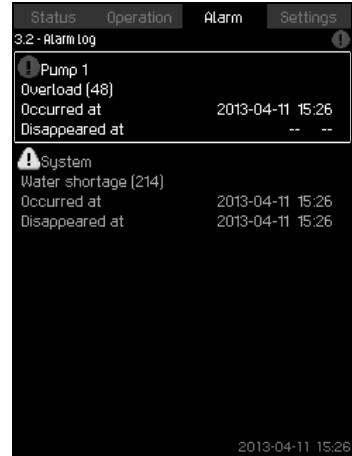
**Fig. 10** Alarm log

### Description

Here warnings and alarms are shown.

For every warning or alarm, the following will be shown:

- Whether it is a warning ⚠ or an alarm ⊗.
- Where the fault occurred. System, Pump 1, Pump 2, etc.
- In case of input-related faults, the input will be shown.
- The cause of the fault and the alarm code in brackets, for instance "Water shortage (214)".
- When the fault occurred: Date and time.
- When the fault disappeared: Date and time. If the fault still exists, date and time will be shown as --...--.
- The most recent warning/alarm is shown at the top of the display.

### 5.2.2 Passwords

Passwords can be set to prevent unauthorised change of settings in the menus "Operation" and "Settings".

See the Hydro MPC installation and operating instructions.

Both passwords are disabled. If a password is enabled, the factory setting is "1234".

### Service passwords

If a customer password is set and not available for a Grundfos service engineer, the booster system can be unlocked by using the Grundfos service code "6814". Please protect this code and avoid unauthorised use of the code.

### 5.2.3 Alarm list

Check all active alarm codes before starting the fault correction.

| MPC alarm indication Protocol description | Alarm code | Associated device and device number | Description/cause | Remedy | Reset type[1] | Alarm/warning Action type[2] |
|---|---|---|---|---|---|---|
| Phase failure, pump | 2 | Pump 1-6 | - | Check that all three mains phases are within a 15 V band. | Auto | Warning |
| Too many restarts | 7 | Pump 1-6 | HSD = hardware shut-down. There has been a fault, and the permissible number of restarts for the fault type has been exceeded. • Fault in mains supply. • Terminal box defective. | Restore mains supply. Replace terminal box. | Auto | Warning |
| Undervoltage, pump | 40 | Pump 1-6 | Mains voltage is too low at start. | Bring voltage back to prescribed level. | Auto | Warning |
| Undervoltage, pump | 42 | Pump 1-6 | Faulty mains supply at the time of cutting in the terminal box. | Restore correct mains supply. | Auto | Warning |
| Undervoltage, pump | 73 | Pump 1-6 | • Fall in mains supply. • Mains supply failure while motor is running. | Restore correct mains supply. | Auto | Warning |
| Overvoltage, pump | 32 | Pump 1-6 | Mains voltage is too high at start. | Bring voltage back to prescribed level. | Auto | Warning |
| Overload, associated device | 48 | Pump 1-6 | Heavy overload has caused software shut-down (SSD). | Check and possibly reduce the load. | Auto | Warning |
| Overload, associated device | 50 | Pump 1-6 | MPF = motor protection function. The built-in motor protection has detected a sustained overload (MPF 60 sec. limit). | Check and possibly reduce load or improve cooling. | Auto | Warning |
| Overload, associated device | 51 | Pump 1-6 | Heavy overload ($I_{max.}$ very high). Pump blocked at start. | Deblock the pump. | Auto | Warning |
| Overload, associated device | 54 | Pump 1-6 | The built-in motor protection has detected a transitory overload (MPF 3 sec. limit). | Check and possibly reduce load or improve cooling. | Auto | Warning |
| Too high motor temperature | 65, 70 | Pump 1-6 | PTC sensor in the motor has signalled overtemperature. | Check and possibly reduce load or improve cooling. | Auto | Warning |
| Too high motor temperature | 67 | Pump 1-6 | The terminal box has indicated overtemperature. | Check and possibly reduce load or improve cooling. Temperature during operation can be read via PC Tool E-products. | Auto | Warning |
| Other fault, associated device | 76 | Pump 1-6 | Internal communication fault has occurred in the pump. | Try to reset the fault: 1. Switch off the power supply. 2. Wait until all diodes are out. 3. Switch on the power supply. If this does not remedy the fault, replace the terminal box. | Auto | Warning |
| Limit 1 exceeded | 190 | Measured parameter | The measured parameter has exceeded the limit set. | Remove the cause of the fault. | Man/auto | Alarm/warning Stop/unchanged |
| Limit 2 exceeded | 191 | Measured parameter | The measured parameter has exceeded the limit set. | Remove the cause of the fault. | Man/auto | Alarm/warning Stop/unchanged |

| MPC alarm indication Protocol description | Alarm code | Associated device and device number | Description/cause | Remedy | Reset type[1] | Alarm/warning Action type[2] |
|---|---|---|---|---|---|---|
| Pressure relief | 219 | System | The monitored pressure could not be reduced sufficiently. | Reduce the pressure to below the limit. | Auto | Warning |
| | | | | | | Unchanged |
| Pressure build-up fault | 215 | System | The pressure set cannot be reached within the configured time. | Check limit and pipes. | Man/ auto | Alarm/warning |
| | | | | | | Stop/unchanged |
| Pumps outside duty range | 208 | System | The pump is running outside the defined range. | Check the system. | Man/ auto | Warning |
| | | | | | | Unchanged |
| Pilot pump fault | 216 | Pilot pump | Pilot pump fault. | Check wires. Check the pump. | Auto | Warning |
| Water shortage Water shortage* | 206 | Booster system | The precharge pressure (or the level in the feed tank) is below its programmable warning limit. | Check the actual pressure and the corresponding settings. Check the sensor/switch, wiring and input according to the wiring diagram. Check the sensor/switch. | Man/ auto | Warning |
| | | | | | | Unchanged |
| Water shortage Water shortage* | 214 | | The precharge pressure (or the level in the feed tank) is below its programmable alarm limit. | | Man/ auto | Alarm |
| | | | | | | Stop |
| | | | The pressure switch detects water shortage. | | | Warning |
| | | | | | | Unchanged |
| Pressure high Pressure above maximum pressure* | 210 | | The operating pressure is above the programmable high-pressure alarm limit. | | Man/ auto | Alarm |
| | | | | | | Fast stop (overrules min. seq. time) |
| Pressure low Pressure below min. pressure* | 211 | | The operating pressure is below the programmable low-pressure alarm limit. | | Man/ auto | Alarm/warning |
| | | | | | | Stop/unchanged |
| Alarm, all pumps Alarm, all pumps* | 203 | | All pumps set to Auto have stopped due to a pump alarm. | Fault-find according to the alarm message/code: 1. System. 2. Pumps installed. Use fault-finding for the pump. | Auto | Alarm |
| | | | Pumps are not indicating alarm. | Check the GENIbus wires, for instance connection and polarity. | | Stop |
| External fault External fault* | 003 | | The digital input set to "External fault" has been or is still closed. | The fault reading can be reset with the R100 when the digital input is no longer closed. Reset by pressing [+] or [-]. | Man/ auto | Alarm/warning |
| | | | | | | Stop/unchanged |
| Dissimilar sensor signals Dissimilar sensor signals* | 204 | Primary sensor and/or redundant sensor | Primary feedback sensor value (pressure) is inconsistent with redundant feedback sensor value. | Check the wiring and input according to the wiring diagram. Check the sensor output according to the value measured. | Auto | Warning |
| | | | | | | Unchanged |
| Fault, primary sensor Closed-loop feedback sensor signal fault* | 089 | Primary sensor | A fault in the sensor assigned to the feedback control has been detected. | Check the wiring and input according to the wiring diagram. Check the sensor output according to the value measured. | Auto | Alarm |
| | | | Fault in the settings of the sensor assigned to the controller. | Check the settings of the primary sensor. | | Stop |
| Fault, sensor General (measurement) sensor signal fault* | 088 | CU 352 IO 351B as IO module | The signal, for instance 4 to 20 mA, from one of the analog sensors is outside the selected signal range. | Check the wiring and input according to the wiring diagram. Check the sensor output according to the value measured. | Auto | Warning |
| | | | | | | Unchanged |

| MPC alarm indication Protocol description | Alarm code | Associated device and device number | Description/cause | Remedy | Reset type[1] | Alarm/warning Action type[2] |
|---|---|---|---|---|---|---|
| Internal fault, CU 352 Real-time clock out of order* | 157 | CU 352 | The real-time clock in the CU 352 is out of order. | Replace the CU 352. | Auto | Warning |
| Fault, Ethernet Ethernet: No address from DHCP server* | 231 | | No address from DHCP server. | Communication fault. Contact the system integrator. | | |
| Fault, Ethernet Ethernet: Auto-disabled due to misuse* | 232 | | Auto-disabled due to misuse. | | | Unchanged |
| FLASH parameter verification error FLASH parameter verification error* | 083 | | Verification error in the CU 352 FLASH memory. | Replace the CU 352. | | |
| Other fault, associated device | 83 | | Setting data not correct. | Other fault, associated device. | | Warning |
| IO 351 internal fault Hardware fault, type 2* | 080 | IO 351 | Hardware fault in the IO 351A. | See "Actual alarms", and identify the faulty IO 351 module from the alarm message. Replace the module. | Auto | Warning |
| | | | Hardware fault in the IO 351B. | | | Unchanged |
| VFD not ready VFD not ready* | 213 | Pump 1-6 CU 352 | The VFD signal relay does not release the VFD for operation. | Check for VFD alarm. Check the wiring and input according to the wiring diagram. | Auto | Warning |
| | | | | | | Unchanged |
| Communication fault Pump communication fault* | 010 | Pump 1-6 IO 351 | No GENIbus communication with a device connected to the CU 352. | See "Actual alarms", and identify the faulty device from the alarm message. 1. Check the power supply. 2. Check the GENIbus cable connection. 3. Check that the GENIbus number of the device is correct, using the R100. | Auto | Warning |
| | | | | | | Unchanged |
| Device alarms | From device | Pump 1-6 | The device is in alarm condition. | See "Actual alarms" and identify the faulty device from the alarm message. Fault-find according to the service instructions for the device. | Auto | Warning |
| | | | | | | Unchanged |

[1]  Reset either of these types:   •   "Auto acknowledgement" (automatic).
   •   "Auto acknowledgement" or "Manual acknowledgement" (automatic/manual).
[2]  System goes to operating mode "Stop" (no delay (< 0.5 s) between pump disconnections).
*   Protocol description.

### 5.3 R100 and Grundfos GO Remote

The R100 or the Grundfos Go Remote can be used for setting the addresses of the IO 351 modules and for reading out settings. The general-purpose IO module inputs and outputs are set up via the CU 352 or with a PC Tool connected via the CU 352.

#### 5.3.1 PC Tool E-products

The Grundfos PC Tool E-products, version 11.00.01 or later, supports the Hydro MPC and the components included.
A detailed PC Tool Help assistant is available in the tool program, and a user manual in PDF format can be printed from the tool. The tool can be connected to the CU 352 of the Hydro MPC booster system and communicate with IO modules and E-pumps. The "Network list" of the tool shows the units which are capable of communicating with the application in question.
The tool supports these functions:

#### 5.3.2 Network list

This is a list of all GENIbus products connected to the network. Clicking [Network list] in the toolbar allows you to toggle between the network list expanded and collapsed.

#### 5.3.3 Monitor

This function gives an overview and details of the operating status of the product.

**Output**

If the expected output function does not take place according to the graphical presentation, it may be due to the following faults:

- Defective component connected to the output. Check the component according to the wiring diagram.
- The output from the IO module does not function according to the graphical presentation. Check the physical output.

**Input**

If the expected input function does not take place according to the graphical presentation, it may be due to the following faults:

- The input signal is not as shown in the graphical presentation. Check that the signal is OK on the input terminal.
- The input of the IO module is defective. Replace the IO module.
- The CU 352 is defective.

#### 5.3.4 Standard configuration

The standard configuration function allows you to select the appropriate standard configuration file for the product and send the file to the product.
It is possible to import a Grundfos Standard Configuration (GSC) file library via Tools > Update configuration files.
From factory, the Hydro MPC booster system is configured/programmed for the application.
If an IO module is replaced, the new module will automatically be configured from the CU 352 when the booster system is restarted. Remember to give the new module the correct GENIbus address by means of the R100.
If replaced, a CU 352 must be configured to the application in question. Follow the instructions in the "HELP assistant".
Standard configuration files are included in the tool when it is installed for the first time.
Subsequently, it is the user's responsibility to download the current version of the "Standard configuration file library". See section *5.3.7 Updating configuration files.*

#### 5.3.5 Custom configuration

The custom configuration function enables you to change selected standard configuration settings to a custom configuration.
Custom configuration should be considered as an expert tool to be used for changing/adjusting standard data.

#### 5.3.6 Data logging

Data logging of all data takes place continuously. In the net list, you can select the data to be visible. When the PC Tool is shut down, you will be asked whether you want to save your data log.

#### 5.3.7 Updating configuration files

You can import an updated library of the standard configuration files from Tools > Update configuration files. If the selected library is the same as or older than the one already installed, a warning allows you to either skip the update or proceed to overwrite the existing library. "Update GSC Files" opens a dialogue, allowing you to browse for the zipped GSC files library.

| Note | *If your computer is connected to a Grundfos network, the dialogue offers an automatic update. When you select the automatic update, the PC Tool will find the updated GSC library on the Grundfos network. Accordingly, you need not browse for the library.* |
|------|------|

## 6. Factory configuration of Hydro MPC

### 6.1 Necessary equipment

The following equipment is required:

1. R100 or Grundfos GO Remote, SW version 14, Nov. 01, 2005 or later.
2. PC Tool E-Products, version 11.00.01 or later.

### 6.2 Factory configuration of Hydro MPC

The configuration consists of these steps:

*6.2.1 Setting the GENIbus number in IO 351 modules, if any*

*6.2.2 Configuration of the CU 352*

*6.2.3 Configuration of external frequency converters, if any*

*6.2.4 Step-by-step configuration of E-pump(s), if any.*

#### 6.2.1 Setting the GENIbus number in IO 351 modules, if any

Depending on the Control MPC system type and Control MPC options, the control panel is equipped with none or up to four IO 351A/B modules.
The modules present will have the designation numbers A1, A2, A01 or A03.
The units must have a GENIbus number according to the table below.
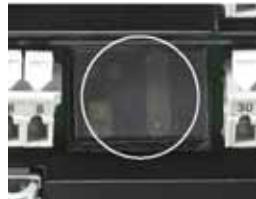
| Module with designation | Address of module | Control MPC option GSC file to download |
|---|---|---|
| IO 351B interface | 41 | 98272072 |
| IO interface | 42 | 98272073 |
| Operating lights | 41 | 98272076 |
| Interface and operating lights | 41 + 42 | 98272077 |
| Pressure relief | 41 | 98272079 |
| Interface and pressure relief | 41 + 42 | 98272081 |

To assign GENIbus numbers to the IO 351 module(s), if any, proceed as follows:

1. Switch on the power supply to the Control MPC.
2. Switch on the R100 or Grundfos GO Remote and point it at the IR window of the first IO 351 to make contact with this module.

| Note | *If there is more than one IO 351, move close to the IR window to make sure that only one module is communicating with the R100 or Grundfos GO Remote at a time.* |
|---|---|
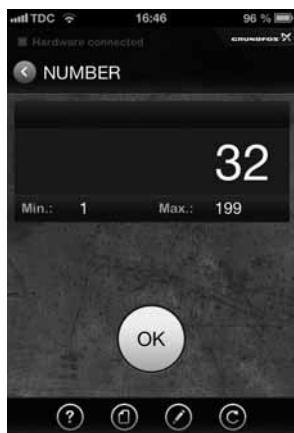


**Fig. 11** IR window of the IO 351

3. For R100 remote control, go to the first display in the installation menu "Number, IO 351". Set the address of the module according to the table in section *6.2.1 Setting the GENIbus number in IO 351 modules, if any*.



**Fig. 12** Installation menu, "Number, IO 351"

4. For Grundfos GO Remote, go to the "NUMBER" display under Settings. Set the address of the module according to the table in section *6.2.1 Setting the GENIbus number in IO 351 modules, if any*.



**Fig. 13** Grundfos GO Remote

5. Send the number to the unit by pressing [OK] on the R100 or Grundfos GO Remote.
6. Switch off the R100 or Grundfos GO Remote.
7. Repeat steps 2 to 5 for each IO 351 module.

### 6.2.2 Configuration of the CU 352

To make the system work properly, the CU 352 in the Control MPC must be configured with a number of GSC files (Grundfos Standard Configuration files).

- Control MPC requires a "Control MPC GSC file" which includes information about the system type in question (E, ES, ED, etc.) and the number of main pumps in the system.
- Control MPC based on one or two IO 351B modules with the designation numbers A01 and A03 requires a "Control MPC options - GSC file".
- Hydro MPC requires a Hydro MPC GSC file describing the discharge pressure, sensor range and dry-running protection type.
- Hydro MPC fitted with a redundant primary sensor requires a "Hydro MPC options - GSC file".
- Hydro MPC requires a "Pump data GSC file" describing the performance curve of the pump in question.
  If a pilot pump is connected, a file describing the performance curve of the pilot pump in question must be loaded.

Note the right order of configuration:

1. Control MPC
2. Control MPC options
3. Hydro MPC
4. Hydro MPC options
5. Pump data
6. Pilot pump data, if any
7. Service contact information, if any.

**Configuration of Control MPC**

**Example:** Hydro MPC-ES with three pumps CRIE 5-8.

Control MPC has two options, "Interface I/O module" and "Operating lights module".

Hydro MPC has one option, "Redundant sensor, 16 bar".

The printed label of GSC files will look like this:

| 1. Control MPC | 3. Hydro MPC | GRUNDFOS |
|---|---|---|
| 96307032 | 96307209 | |
| **2. C-MPC options** | **4. H-MPC options** | **5. Pump data** |
| 96592488 | 96592497 | 96307221 |
| | | |
| | | |
| | | |
| | | |
| | | |
| CONFIGURATION STEPS - PLEASE FOLLOW THE NUMBERS | | 96586126 |
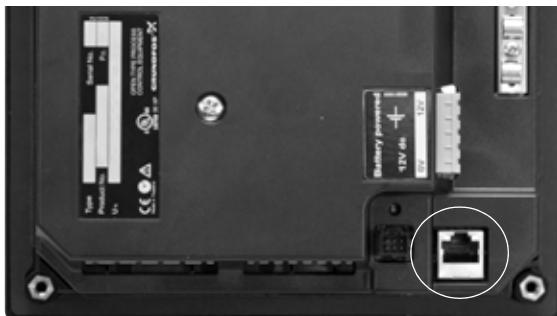
**Fig. 14** Example of a printed label of GSC files

| Note | *After each GSC file download (if no further configurations are to be made), restart the CU 352 by clicking [Restart] in the right bottom of the PC Tool.*<br><br>*When you click [Restart], the CU 352 will initialise. This procedure takes about 25 seconds.* |
|---|---|

Step-by-step configuration of Control MPC

1. Set all automatic circuit breakers covering the pumps to off.
2. Connect the PC Tool to the service connection (TTL port) or USB connection on the CU 352.

TM05 4754 2512

**Fig. 15** Service connection (TTL)

TM05 4753 2512

**Fig. 16** USB connection

3. Switch on the power supply to the Control MPC.
4. Start the PC Tool E-products.
5. When communication has been established, the PC Tool "Network list" will display the icons for the CU 352 and the IO 351 module(s), if any.
6. Select the CU 352 in the "Network list".
7. Select the PC Tool function "Standard configuration". [F6].
8. Select "Application" in "Search by".

TM05 4440 2312

9. Click the required application.

TM05 4441 2312

10. From the drop-down menus, select the configuration of the current application.
11. When the selection has been made, click [Search Now] and the configuration file will appear.

TM05 4442 2312

12. A configuration file is now available as a result of the previous selections. In the "Configuration files" field, details on the configuration files can be found. Make sure that these details are correct and apply to the system.
13. Select the file from the "Configuration files" field and click [Send].

TM05 4466 2312

14. Select "Number" in "Search by".
15. Check that the selected configuration file number is now shown in the label under "1. Control MPC". This indicates that the CU 352 has received and stored the GSC file.

Follow the procedure described above to find and send the configuration files for the remaining applications:

• Control MPC options
• Hydro MPC
• Hydro MPC options
• Pump data
• Pilot pump data, if available
• Service contact information, if available.

If no further configurations are to be made, restart the CU 352 by clicking [Restart] in the right bottom of the PC Tool.

### 6.2.3 Configuration of external frequency converters, if any

The manufacturer's factory settings of the external frequency converter(s) used in Hydro MPC F, EF and EDF must be changed to the Grundfos settings before the MPC is ready for test.

To configure the external frequency converter:

1. Switch on the power supply to the frequency converter(s) by means of the automatic circuit breaker.
2. For each frequency converter, make the settings as described in the table below.

**VLT 2800**

Press [QUICK MENU] + [+] to access all parameters.

| Parameter | Factory setting | | | Grundfos setting | | |
|---|---|---|---|---|---|---|
| | Function | Value or number in display of VLT | | Function | Value or number in display of VLT | |
| | | Value | Number of function | | Value | Number of function |
| 001 | Language | English | [0] | Language | [2] | - |
| 101 | Torque characteristic | Constant torque | [1] | Torque characteristic | Variable torque low | [2] |
| | | | | | Variable torque medium | [3] |
| 102 | Motor power | - | - | Motor power | [3] | - |
| 103 | Motor voltage | 230/400 V | - | Motor voltage | [3] | - |
| 104 | Motor frequency | 50 Hz | | Motor frequency | [3] | - |
| 105 | Motor current | | - | Motor current | [3] | - |
| 106 | Rated motor speed | | - | Rated motor speed | [3] | - |
| 128 | Thermal motor protection | No protection[1] | [0] | Thermal motor protection | Thermistor trip, LC filter connected[1] | [2] |
| | | | | | No thermal protection, LC filter not connected[1] | [0] |
| 136 | Slip compensation | 100 % | - | Slip compensation | 0 % | - |
| 202 | Output frequency high limit | 132 Hz | - | Output frequency high limit | [4] | - |
| 205 | Maximum reference | 50 Hz | - | Maximum reference | [4] | - |
| 207 | Ramp-up time 1 | 3 sec. | - | Ramp-up time 1 | 1 sec. | - |
| 208 | Ramp-down time 1 | 3 sec. | - | Ramp-down time 1 | 1 sec. | - |
| 303 | Digital input 19 | Reversing | [9] | Digital input 19 | Thermistor, LC filter connected[1] | [25] |
| | | | | | No function, LC filter not connected[1] | [0] |
| 405 | Reset function | Manual reset | [0] | Reset function | Auto reset x 10 | [10] |
| 412 | Variable switching frequency | Without LC filter | [2] | Variable switching frequency | LC filter connected | [3] |
| | | | | | Without LC filter | [2] |

[1] Thermistor function used for thermal protection of LC filter.

[2] For information about languages available, see relevant documentation.

[3] Use data from the Hydro MPC booster system.

[4] 51 Hz for a 50 Hz supply and 61 Hz for a 60 Hz supply.

**Factory settings of VLT 2800**

To recall the factory settings of all parameters, follow the procedure below:

1. Disconnect the power supply.
2. Press and hold [QUICK MENU] + [+] + [CHANGE DATA] and reconnect the power supply.
3. All parameters are now reset to the factory setting, except the fault log.

**VLT 6000**

Press [EXTEND MENU] to access all parameters.

| Parameter | Factory setting | | | Grundfos setting | | |
|---|---|---|---|---|---|---|
| | Function | Value or number in display of VLT | | Function | Value or number in display of VLT | |
| | | Value | Number of function | | Value | Number of function |
| 001 | Language | - | - | Language | -[2] | - |
| 102 | Motor power | - | - | Motor power | -[3] | - |
| 103 | Motor voltage | - | - | Motor voltage | -[3] | - |
| 104 | Frequency | 50 Hz | | Frequency | -[3] | - |
| 105 | Motor current | - | - | Motor current | -[3] | - |
| 106 | Rated motor speed | - | - | Rated motor speed | -[3] | - |
| 117 | ETR trip1 | - | 4 | Thermistor trip, LC filter connected[1] | - | 2 |
| | | | | No thermal protection, LC filter not connected[1] | - | 0 |
| 202 | Maximum frequency | 50 Hz | - | Maximum frequency | -[4] | - |
| 205 | Maximum reference frequency | 50 Hz | - | Maximum reference frequency | -[4] | - |
| 206 | Ramp-up time | - | - | Ramp-up time | 1 sec. | - |
| 207 | Ramp-down time | - | - | Ramp-down time | 1 sec. | - |
| 303 | Reverse | - | 1 | No function | - | 0 |
| 323 | Alarm | - | 8 | Ready | - | 1 |
| 400 | Manual reset | - | 0 | Auto reset x 10 | - | 6 |
| 408 | ASFM, adjustable switching frequency modulation | - | 0 | LC filter connected | - | 2 |
| | | | | LC filter not connected | - | 0 |

[1]  Thermistor function used for thermal protection of LC/RFI filter.

[2]  For information about languages available, see relevant documentation.

[3]  Use data from the Hydro MPC booster system.

[4]  51 Hz for a 50 Hz supply and 61 Hz for a 60 Hz supply.

**Factory settings of VLT 6000**

To recall the factory settings of all parameters, follow one of the procedures below:

**Procedure 1**

1. Set parameter 620 to (3).
2. Disconnect the power supply.
3. Reconnect the power supply.
4. All parameters are now reset to the factory setting, except the fault log.

**Procedure 2**

1. Disconnect the power supply.
2. Press and hold [DISPLAY MODE] + [CHANGE DATA] + [OK] and reconnect the power supply.
3. All parameters are now reset to the factory setting, except the fault log.

**VLT FC 100**

Press [EXTEND MENU] to access all parameters.

| Parameter | Factory setting | | | Grundfos setting | | |
|---|---|---|---|---|---|---|
| | Function | Value or number in display of VLT | | Function | Value or number in display of VLT | |
| | | Value | Number of function | | Value | Number of function |
| 001 | Language | English | [0] | Language | _[2] | - |
| 002 | Motor speed unit | RPM | [0] | Motor speed unit | Hz | [1] |
| 120 | Motor power | - | - | Motor power | _[3] | - |
| 122 | Motor voltage | - | - | Motor voltage | _[3] | - |
| 123 | Motor frequency | 50 Hz | - | Motor frequency | _[3] | - |
| 124 | Motor current | - | - | Motor current | _[3] | - |
| 125 | Rated motor speed | 1460 RPM | - | Rated motor speed | _[3] | - |
| 190 | Motor thermal protection | ETR trip 1 | [4] | Thermistor trip, LC filter connected[1] | Thermistor trip | [2] |
| | | | | No thermal protection, LC filter not connected[1] | No protection | [0] |
| 419 | Maximum output frequency | 100 Hz | | Maximum output frequency | 51 Hz | - |
| 303 | Maximum reference | 50 Hz | | Maximum reference | _[4] | - |
| 341 | Ramp 1 ramp-up time | - | - | Ramp 1 ramp-up time | 1 sec. | - |
| 342 | Ramp 1 ramp-down time | - | - | Ramp 1 ramp-down time | 1 sec. | - |
| 511 | Digital input 19 | Reversing | [10] | No operation | - | [0] |
| 540 | Relay 1 | Alarm | [9] | Relay 1 | Drive ready | [2] |
| | Relay 2 | Running | [5] | Relay 2 | Control ready | [1] |
| 1420 | Reset mode | Manual reset | [0] | Auto reset x 10 | - | [10] |
| 1401 | Switching frequency | 4.0 Hz | [6] | Switching frequency | 5.0 Hz | [7] |
| | | | | | - | |

[1] Thermistor function used for thermal protection of LC/RFI filter.

[2] For information about languages available, see relevant documentation.

[3] Use data from the Hydro MPC booster system.

[4] 51 Hz for a 50 Hz supply and 61 Hz for a 60 Hz supply.

**Factory setting of VLT FC 100**

To recall the factory settings of all parameters, follow one of the procedures below:

**Procedure 1**

1. Set parameter 14-22.
2. Press [OK].
3. Select "Initialisation" (for NLCP select "2").
4. Press [OK].
5. Disconnect the power supply.
6. Reconnect the power supply.
7. All parameters are now reset to the factory setting, expect RFI 1, protocol, address, baud rate, minimum response delay, maximum response delay, maximum inter.char delay, operating data, historic log and fault log.

**Procedure 2**

1. Disconnect the power supply.
2. Press and hold [STATUS] + [MAIN MENU] + [OK] and reconnect the power supply.
3. All parameters are now reset to the factory setting, expect the number of operating hours, power-ons and overtemperature and overvoltage faults.

### 6.2.4 Step-by-step configuration of E-pump(s), if any

Before the Hydro MPC system is ready for test, the E-pumps have to be set.

• Switch on the power supply to the E-pumps by means of the automatic circuit breaker.

• Set the GENIbus number to the same number as that of the pump using the R100 or Grundfos GO Remote.

(Number = 1 for pump No 1, etc. Pilot pumps are set to GENIbus number 10.)

| Note | **Number the pumps from left to right, always starting with the E-pumps.** |
| --- | --- |
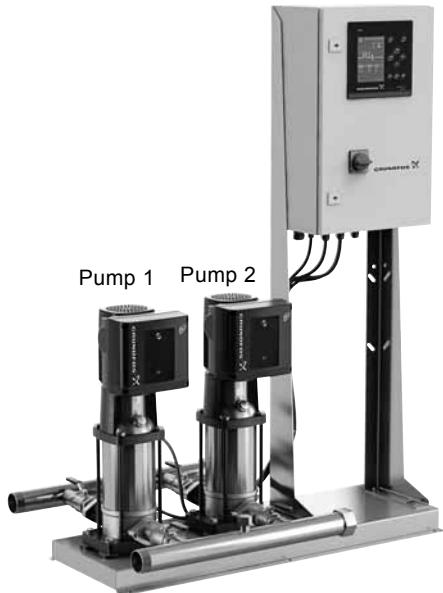


**Fig. 17** Pumps numbered from left to right

If a PC with PC Tool E-products is already connected via the service connection on the back of the CU 352, start at step 4. If not, start from step 1.

1. Connect your PC with PC Tool to the service connection on the back of the CU 352.

2. Start the PC Tool E-products.

3. When communication has been established, the PC Tool "Network list" will display the icons for the pumps installed.

4. Select the pump you want to configure from the "Network list".

5. Select the PC Tool function "Standard configuration".

6. Go to section "Search by" and select "Number".

7. Find the relevant GSC file number from the table below.

8. Enter the GSC file number in the "Configuration No" field and click [Search Now].

9. Select the file from the field "Configuration files" and click [Send].

10. Repeat steps 4 to 9 for each E-pump.

**GSC file number**

| Application | GSC file number |
| --- | --- |
| MGE 1Ph HM2MKII (model C) | 95139670 |
| MGE 3Ph HM3MKII (model D) | 95139671 |
| MGE 3Ph HMLarge (model F) | 95139672 |
| MGE 3Ph HM3MK11 (model G) | 97913788 |
| MGE 1Ph/3Ph Saver (model H/I)* | 98428069 |
| MGE 1Ph/3Ph Saver (model H/I)** | 98428068 |

\*  For MPC-E 50/60 Hz and MPC-ED / MPC-ES 60 Hz.

\*\*  For MPC-ED / MPC-ES 50 Hz.

### Configuration of the CUE(s), if any

The manufacturer's factory settings of the CUE used in Control MPC must be changed to the Control MPC settings before it is ready to test.

To configure the CUE:

1. Switch off the power supply to the CUE(s) by means of the automatic circuit breaker.

2. Connect the PC Tool to the GENIbus terminals of the CUE which you want to configure.

3. Switch on the power supply to the CUE.

4. Start the PC Tool E-products.

5. When communication has been established, the PC Tool "Network list" will display the icon for the CUE.

6. Select the CUE in the "Network list".

7. Select the PC Tool function "Custom configuration".

8. Go to section "GENIbus", and set the unit number to the same number as that of the CUE.
   (Number = 1 for CUE No 1, etc. Pilot pumps are set to 10.)
   **Note:** Steps 7 and 8 are not necessary for the CUE in Hydro MPC-F.

9. Go to section "General", select "Pump Family" and enter motor data. See fig. 7.
   **Note:** Motor data are to be read from the motor nameplate.
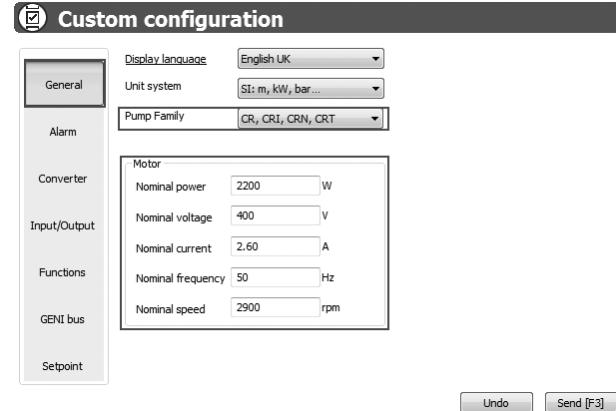


**Fig. 18**  "Custom configuration" (general)

10. Select the PC Tool function "Standard configuration".

11. Go to section "Search by" and select "Number".

12. Enter the GCS file number "96890456" in the "Configuration No" field and click [Search Now].

13. Select the file from the "Configuration files" field and click [Send].

14. Switch on the power supply to the next CUE with the main switch, and repeat steps 6 to 13 for each CUE.

## 7. Danfoss frequency converters

For further documentation on Danfoss frequency converters, see the manual supplied with the frequency converter, or download it from http://www.danfoss.com.

## 8. CUE

Service instructions, see WebCAPS.

Service instructions, extended, see GTI.

## 9. MGE

Service instructions, see WebCAPS.

Service instructions, extended, see GTI.

## 10. Disposal

This product or parts of it must be disposed of in an environmentally sound way:

1.  Use the public or private waste collection service.
2.  If this is not possible, contact the nearest Grundfos company or service workshop.

Subject to alterations.

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