DIP

Measuring amplifiers and controllers
Preassembled systems up to 3 parameters
(Cl_2, ClO_2, O_3, pH, ORP)

Contents

Product features

DIP measuring amplifiers and controllers

Triple measuring amplifier and controller for pools

The DIP (**D**osing **I**nstrumentation **P**ool) is specially designed for swimming pool applications. It measures up to three parameters and controls two parameters at the same time, giving you perfect control of the water quality of your pool.

The DIP speaks five languages (English, German, French, Polish and Russian), making it easy for non-experts to carry out all operations.

Other features:

- maintenance-free measuring electrodes
- a sample-water sensor to prevent overdosing
- a choice of control functions.

Monitoring and control parameters

The DIP measures up to these three parameters at the same time:

- chlorine, chlorine dioxide or ozone
- pH
- redox (ORP).

The DIP controls these two parameters at the same time:

- chlorine, chlorine dioxide or ozone
- pH.

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Fig. 1 DIP

In the following chapters, the DIP measuring amplifiers and controllers are simply referred to as “controllers”.

DIP-A preassembled systems

Our preassembled systems take our tried-and-tested electrodes and DIP controllers, combine them to suit specific applications, and mount them on a plate ready for quick installation.

Each combination is available with a choice of measuring cells and cleaning methods.

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Fig. 2 DIP-A-D2

DIP-A preassembled system for chlorine (Cl_2), chlorine dioxide (ClO_2), ozone (O_3), pH and redox (ORP)

Equipped with a DIP controller, the system is particularly suitable for swimming pool water disinfection.

The system incorporates one of these AquaCells:

- D1, pressure-proof, with cleaning motor
- D2, pressure-proof, with hydro-mechanical cleaning
- D3, pressureless, with hydro-mechanical cleaning.

Note: For details on AquaCells, see separate data booklet, "Measurement and Control Accessories".

Features

- Mounted on a base plate and wired ready for connection
- With prepared cable sets
- With Cl_2 electrode
- With a measuring range of 0 to 30 mg/l for Cl_2, ClO_2 or O_3
- With temperature compensation.

Identification

Type key, DIP, controllers

Example: DIP 1-D 2-P 3-R W-G

Example:	DIP	1-D	2-P	3-R	-W	-G
Measuring amplifier and controller						
DIP Dosing Instrumentation Pool						
Input parameter 1						
D Chlorine (Cl_2), chlorine dioxide (ClO_2) or ozone (O_3)						
Input parameter 2						
P pH						
Input parameter 3						
R Redox (ORP)						
Mounting						
W Wall-mounted						
Voltage						
G 1 x 230 V, 50/60 Hz						
H 1 x 120 V, 50/60 Hz						

Identification

Type key, DIP-A, preassembled systems

Example: DIP-A, D1-P-AU-PCB-RRX-QS-T, W-H

Example:	DIP	-A	D1	-P	-AU	-PCB	-RRX	-QS	T	W	-H

Measuring amplifier and controller	
DIP	Dosing Instrumentation Pool
Assembly	
A	Preassembled
Cell type	
D1	Pressure-proof with cleaning motor
D2	Pressure-proof with hydro-mechanical cleaning
D3	Pressureless with hydro-mechanical cleaning
Pressure retention valve	
P	With pressure-retention valve
X	Without pressure-retention valve
Disinfection electrodes	
AU	Gold
PT	Platinum
pH electrodes	
PCB	pH, ceramic diaphragm, with buffer solution
PTB	pH, PTFE diaphragm, with buffer solution
PKB	pH, KCL filling, with buffer solution
PGB	pH, gel filling, with buffer solution
PCX	pH, ceramic diaphragm, without buffer solution
PTX	pH, PTFE diaphragm, without buffer solution
PKX	pH, KCL filling, without buffer solution
PGX	pH, gel filling, without buffer solution
X	No electrode
Redox (ORP) electrodes	
RRB	Redox (ORP), without reference system, with buffer solution
RRX	Redox (ORP), without reference system, without buffer solution
X	No electrode
Flow sensor	
QS	Flow sensor integrated
X	No flow sensor
Temperature sensor	
T	With Pt100
X	No temperature sensor
Mounting	
W	Wall-mounted
P	Panel-mounted
Voltage	
G	1 x 230 V, 50/60 Hz
H	1 x 120 V, 50/60 Hz

Functions

DIP, controllers

Features	DIP
Input parameter 1	
Chlorine (Cl_2)	●
Chlorine dioxide (ClO_2)	●
Ozone (O_3)	●
Input parameter 2	
pH	●
Input parameter 3	
Redox (ORP)	●
Input, miscellaneous	
Flow sensor	●
Controller stop (potentialfree contact)	●
Mounting options	
Wall-mounted	●
Voltage	
1 x 230 V, 50/60 Hz	●
1 x 120 V, 50/60 Hz	●

DIP-A, preassembled systems

Features	DIP-A
Cell type	
Pressure-proof, with cleaning motor	●
Pressure-proof, with hydro-mechanical cleaning	●
Pressureless, with hydro-mechanical cleaning	●
Electrodes	
Gold (disinfection only)	●
Platinum (disinfection only)	●
pH	●
Redox (ORP)	●
Variant	
Flow sensor	●
Remote on/off	●
Temperature sensor	
Pt100	●
Voltage	
1 x 230 V, 50/60 Hz	●
1 x 120 V, 50/60 Hz	●

DIP controllers and preassembled systems

General data

Electronics	16-bit microprocessor system
Max. distance from the DIP to the sensors	3 metres
Display	Two high-resolution plain-text LCD displays
Indication mode	Measured value as a physical variable
Relay outputs (max. relay load 250 V/ 6 A, max. 550 VA)	One alarm relay One stand-by relay
	Each parameter of parameter groups 1 and 2 have these relays: • one alarm relay • two potential-free controller switch relays for Cl_2 or ClO_2 or O_3 or pH. The potential-free controller switch relays can be configured as either of these: • limit switch • 2-position controller (pulse pause, pulse frequency) • 3-position step controller for either - Cl_2 or ClO_2 or O_3 with or without return or - for pH without return.
Signal outputs (max. load: 500 Ohm)	Four analog outputs (0-20 mA or 4-20 mA), galvanically isolated from the inputs, for these measuring parameters: • disinfection parameter Cl_2 / ClO_2 / O_3 • pH • redox (ORP) • temperature.
	two analog outputs (0-20 mA or 4-20 mA) for continuous controller: • disinfection parameter Cl_2 / ClO_2 / O_3 • pH (chlorine and pH).
Interface	CAN bus
Temperature compensation	The temperature can be measured automatically by a Pt100 sensor (–5 to 120°C, measured in °C or °F) or set manually on the controller.
pH compensation	Automatically by pH measurement
Calibration of pH	A plausibility check function checks whether the pH value of the buffer solution is within acceptable limits. Automatic recognition of the buffer solution ensures that the right buffer solution is used for the calibration. If the user calibrates the pH value with a wrong buffer solution, an error message will be displayed.
Permissible temperature	Operation: 0 to 50°C Storage: –20 to +65°C
Permissible relative humidity	Max. 90% (non-condensing)
Power consumption	Approx. 15 VA
Enclosure class	IP 65
Weight	Approx. 2 kg

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Fig. 3 DIP

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Fig. 4 DIP-A-D2

Measuring parameters and ranges

Parameter group	Parameter	Possible measuring range [1]
1	Chlorine (Cl_2) [mg/l]	0.00 - 0.50 0.00 - 1.00 0.00 - 2.00 0.00 - 5.00 0.0 - 10.0 0.0 - 20.0 0.0 - 30.0
	Chlorine dioxide (ClO_2) [mg/l]	0.00 - 0.50 0.00 - 1.00 0.00 - 2.00 0.00 - 5.00 0.0 - 10.0 0.0 - 50.0
	Ozone (O_3) [mg/l]	0.00 - 0.50 0.00 - 1.00 0.00 - 2.00 0.00 - 5.00
2	pH	0.00 - 14.00 2.00 - 12.00 5.00 - 9.00
3	Redox (ORP) [mV]	–1500 to +1500 0 - 1000

[1] As regards preassembled systems, the lower limit of the measuring range can be different, depending on the type of measuring cell.

Control data

Description	Value
Setpoint	Adjustable as physical variable within the measuring range (for example mg/l)
Hysteresis	0 to 50 % of the upper limit of the measuring range
Setpoint selection	0 to 100 % of the measuring range
Proportional band, X_p	0.1 to 3000 %
Reset time, T_N	1 to 3000 s, resolution 1 s
Derivative action time, T_V	1 to 1000 s, resolution 1 s
Constant load	0 to 50 %
Limitation of the maximum dosing capacity	From the adjusted constant load up to 100 %
Control direction	Upward or downward control

Dimensions

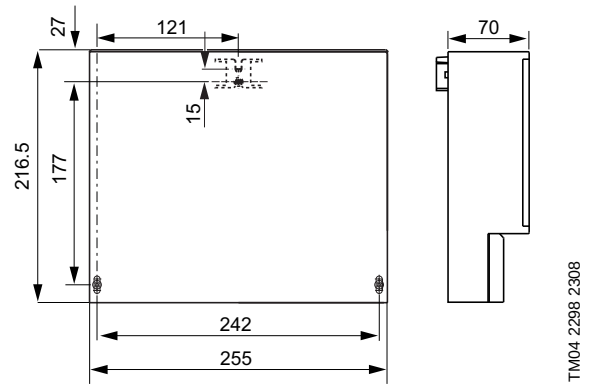

Fig. 5 Dimensions, DIP controller

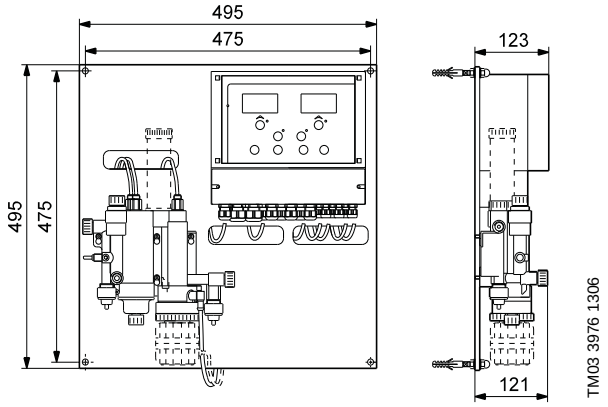

Fig. 6 Dimensions, DIP-A, preassembled system

Product selection

DIP, controllers

Controller	Voltage: 115/120 V	Voltage: 230/240 V	Controller mounting: Wall-mounted	Enclosure material: Polystyrene	Enclosure material: Noryl (enclosure) ABS (sensor interface)	Enclosure class: IP 65	Enclosure class: IP 54 (enclosure) IP 65 (sensor interface)	Input parameter 1: Chlorine (Cl_2), chlorine dioxide (ClO_2) or ozone (O_3)	Input parameter 1: pH	Input parameter 2: pH	Input parameter 3: Redox (ORP)	Type designation	Product number
DIP	●		●	●		●		●		●	●	DIP, 1-D 2-P 3-R, W-H	96622358 (353-2000-10002)
		●	●	●		●		●		●	●	DIP, 1-D 2-P 3-R, W-G	96622357 (353-2000-10001)

DIP-A, preassembled systems

Controller	Voltage		Cell type				Electrode						Sensor		Type designation	Product number
							1		2		3					
	115/120 V	230/240 V	D1, pressure-proof with cleaning motor	D2, pressure-proof with hydro-mechanical cleaning	D3, pressureless with hydro-mechanical cleaning	With pressure-retention valve	Without pressure-retention valve	Gold (Cl_2, ClO_2, O_3) (disinfection)	Platinum (Cl_2, ClO_2, O_3) (disinfection)	pH ceramic diaphragm	Redox (ORP) ceramic diaphragm	Redox (ORP) without reference system	Flow sensor	Temperature sensor		
DIP-A	●		●			●		●		●		●	●	●	DIP-A, D1-P-AU-PCB-RRB-QS-T, W-H	96622514 (314-339-10027)
	●		●			●		●		●		●		●	DIP-A, D1-P-AU-PCB-RRB-X-T, W-H	96622519 (314-339-10031)
	●		●			●			●	●		●	●	●	DIP-A, D1-P-PT-PCB-RRB-QS-T, W-H	96622516 (314-339-10029)
	●		●			●			●	●		●		●	DIP-A, D1-P-PT-PCB-RRB-X-T, W-H	96622522 (314-339-10033)
	●			●		●		●		●		●	●	●	DIP-A, D2-P-AU-PCB-RRB-QS-T, W-H	96622719 (314-939-10019)
	●			●		●			●	●		●	●	●	DIP-A, D2-P-PT-PCB-RRB-QS-T, W-H	96622721 (314-939-10021)
	●				●		●	●		●		●	●	●	DIP-A, D3-X-AU-PCB-RRB-QS-T, W-H	96622657 (314-639-10016)
	●				●		●	●		●		●		●	DIP-A, D3-X-AU-PCB-RRB-X-T, W-H	96622661 (314-639-10020)
	●				●		●		●	●		●	●	●	DIP-A, D3-X-PT-PCB-RRB-QS-T, W-H	96622659 (314-639-10018)
	●				●		●		●	●		●		●	DIP-A, D3-X-PT-PCB-RRB-X-T, W-H	96622663 (314-639-10022)
		●	●			●		●		●		●	●	●	DIP-A, D1-P-AU-PCB-RRB-QS-T, W-G	96622512 (314-339-10038)
		●	●			●		●		●		●		●	DIP-A, D1-P-AU-PCB-RRB-X-T, W-G	96622518 (314-339-10035)
		●	●			●			●	●		●	●	●	DIP-A, D1-P-PT-PCB-RRB-QS-T, W-G	96622515 (314-339-10028)
		●	●			●			●	●		●		●	DIP-A, D1-P-PT-PCB-RRB-X-T, W-G	96622520 (314-339-10018)
		●		●		●		●		●		●	●	●	DIP-A, D2-P-AU-PCB-RRB-QS-T, W-G	96622718 (314-939-10022)
		●		●		●			●	●		●	●	●	DIP-A, D2-P-PT-PCB-RRB-QS-T, W-G	96622720 (314-939-10020)
		●			●		●	●		●		●	●	●	DIP-A, D3-X-AU-PCB-RRB-QS-T, W-G	96622656 (314-639-10015)
		●			●		●	●		●		●		●	DIP-A, D3-X-AU-PCB-RRB-X-T, W-G	96622660 (314-639-10012)
		●			●		●		●	●		●	●	●	DIP-A, D3-X-PT-PCB-RRB-QS-T, W-G	96622658 (314-639-10017)
		●			●		●		●	●		●		●	DIP-A, D3-X-PT-PCB-RRB-X-T, W-G	96622662 (314-639-10021)

Accessories

Cables

Description	DIP	Product number
Special cable, 1 metre, coaxial, single screening, N screw plug for pH, redox (ORP) or reference electrode	●	96609182 (321-252)
Special cable, 3 metres, coaxial, single screening, N screw plug for pH, redox (ORP) or reference electrode	●	96609183 (321-250)
Special cable, 10 metres, coaxial, single screening, N screw plug for pH, redox (ORP) or reference electrode*	●	96701441 (321-250/10)
Special cable, 25 metres, coaxial, single screening, N screw plug for pH, redox (ORP) or reference electrode*	●	95703576 (321-250/25)

* If the length of the cable between controller and electrode exceeds 3 metres, an impedance converter is required.

Buffer solutions

for pH and redox (ORP)

Description	pH	Redox (ORP)	Product number
Buffer solutions for calibrating the pH single-rod probes 1 set per 100 ml for pH 4.01, 7.00 or 9.18	●		96609165 (549-050)
Buffer solutions for checking the redox (ORP) single-rod probes or electrodes, 100 ml (+220 mV)		●	96609166 (549-051)

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Fig. 7 Buffer solutions

Impedance converter

for pH and redox (ORP)

Description	pH	Redox (ORP)	Product number
Impedance converter for pH or redox (ORP) measurement. The impedance converter is necessary if the length of the cable between controller and electrode exceeds 3 metres.	●	●	95704730 (336-312)

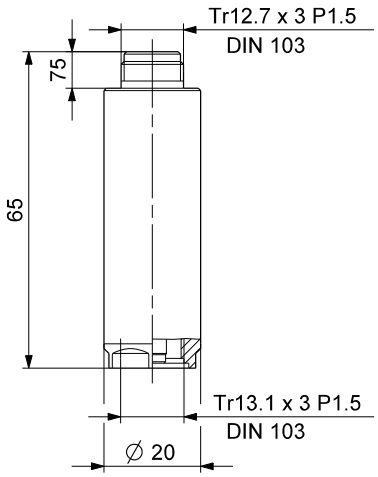

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Fig. 8 Dimensions, impedance converter

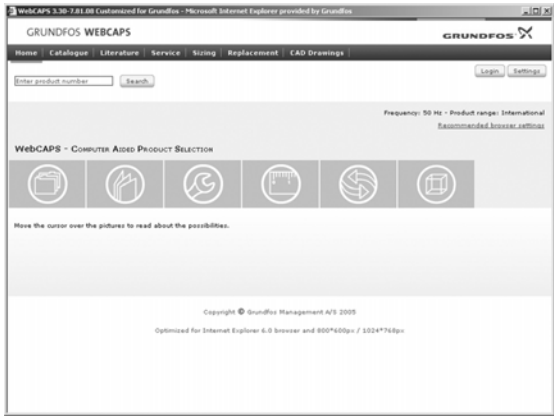
Interface converter

Description	Product number
CAN bus/RS232 converter for bidirectional connection of DIP to a PLC	95702009 (353-0501)

For more accessories, please see the separate Data Booklet “Measurement and control accessories”

Further product documentation

WebCAPS



WebCAPS is a **Web**-based **C**omputer **A**ided **P**roduct **S**election program available on www.grundfos.com.

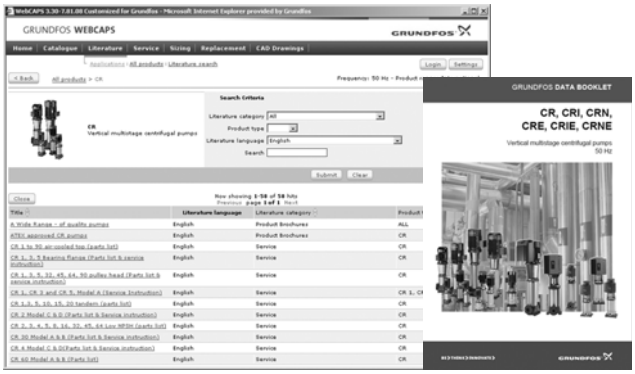
WebCAPS contains detailed information on more than 185,000 Grundfos products in more than 20 languages.

In WebCAPS, all information is divided into 6 sections:

- Catalogue
- Literature
- Service
- Sizing
- Replacement
- CAD drawings.

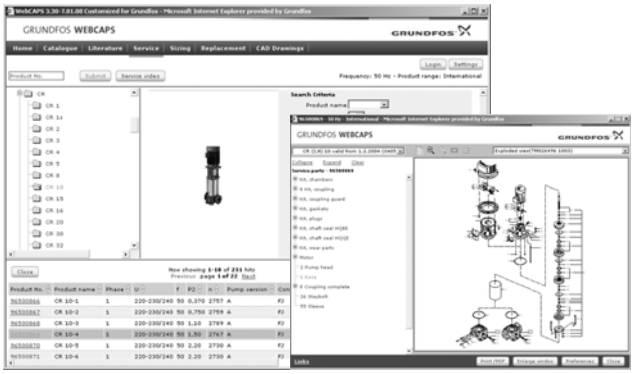
Catalogue

This section is based on fields of application and pump types, and contains
- technical data
- curves (QH, Eta, P1, P2, etc) which can be adapted to the density and viscosity of the pumped liquid and show the number of pumps in operation
- product photos
- dimensional drawings
- wiring diagrams
- quotation texts, etc.



Literature

In this section you can access all the latest documents of a given pump, such as
- data booklets
- installation and operating instructions
- service documentation, such as Service kit catalogue and Service kit instructions
- quick guides
- product brochures, etc.



Service

This section contains an easy-to-use interactive service catalogue. Here you can find and identify service parts of both existing and discontinued Grundfos pumps.
Furthermore, this section contains service videos showing you how to replace service parts.

Further product documentation

Sizing

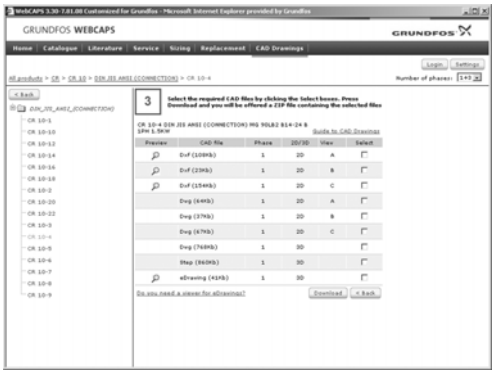
This section is based on different fields of application and installation examples, and gives easy step-by-step instructions in how to

- select the most suitable and efficient pump for your installation
- carry out advanced calculations based on energy consumption, payback periods, load profiles, life cycle costs, etc.
- analyse your selected pump via the built-in life cycle cost tool
- determine the flow velocity in wastewater applications, etc.

Replacement

In this section you find a guide to selecting and comparing replacement data of an installed pump in order to replace the pump with a more efficient Grundfos pump.
The section contains replacement data of a wide range of pumps produced by other manufacturers than Grundfos.

Based on an easy step-by-step guide, you can compare Grundfos pumps with the one you have installed on your site. When you have specified the installed pump, the guide will suggest a number of Grundfos pumps which can improve both comfort and efficiency.



CAD drawings

In this section it is possible to download 2-dimensional (2D) and 3-dimensional (3D) CAD drawings of most Grundfos pumps.

These formats are available in WebCAPS:

2-dimensional drawings:

- .dxf, wireframe drawings
- .dwg, wireframe drawings.

3-dimensional drawings:

- .dwg, wireframe drawings (without surfaces)
- .stp, solid drawings (with surfaces)
- .eprt, E-drawings.

WinCAPS

Fig. 9 WinCAPS CD-ROM

WinCAPS is a **Win**dows-based **C**omputer **A**ided **P**roduct **S**election program containing detailed information on more than 185.000 Grundfos products in more than 20 languages.

The program contains the same features and functions as WebCAPS, but is an ideal solution if no Internet connection is available.

WinCAPS is available on CD-ROM and updated once a year.

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Subject to alterations.

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