

# E-SOLUTIONS WITH GRUNDFOS CUE

The versatile, wall-mounted frequency converter  
with E-pump functionality



CUE

Select Pump Family

CR, CRI, CRN, CRT



# THE WALL-MOUNTED E-SOLUTION

Easy. Flexible. Ultimate control.

## Taking E-solutions even further

Grundfos CUE is the latest addition to our E-solution programme of speed-controlled pump systems for industry, building services, municipal water supply, municipal wastewater, and irrigation applications. This new comprehensive series of wall-mounted frequency converters with E-pump functionality and user interface is a complementary product to Grundfos E-pumps with integrated frequency converter. With a CUE solution you can control the speed of virtually any Grundfos pump irrespective of size, power range, and application area. That's what we call ground-breaking news!

## Think green, we do

Sustainable development is a key concept at Grundfos. We aim to be one step ahead and use our influence to encourage customers and suppliers to think of environment-friendly solutions too. Because around 70% of the total costs incurred over a variable-speed pump's life are attributed to power consumption, controlling pump speed according to the current demand is a significant contributor to energy savings, and thus reduced CO<sub>2</sub> emissions. With a speed-controlled pump you can reduce your energy consumption and costs with up to 50% - every year that is.

## Everyone goes for speed control

Speed control by means of frequency converters has been part of our product portfolio for almost 25 years. Since the early 1990s, integrated solutions such as the UPE pumps, and later the actual E-pumps (CRE, CHIE, TPE, NBE/NKE), have been in high focus at Grundfos, and in equally high demand with our customers.

A speed-controlled solution is now the first choice for many pump professionals and end users, and the reasons

are fairly obvious. Speed control in variable-demand applications saves an enormous amount of energy and money, and increases everyday comfort and convenience for both installers and end users. With a CUE solution everything is under automatic control. This means that you are in total control of your pump application at all times.

## Versatile and flexible range

Grundfos CUE is suitable for all centrifugal pump types, all application areas, and all power ranges outside the E-pump range. It can be used in connection with both new and existing Grundfos pumps, in installations where the integrated solution will not fit, or is undesirable, or prohibited.

## Typical application areas:

- All ranges outside E-pumps
- Submersible installations
- Wastewater applications
- Water supply and irrigation applications
- ATEX areas
- Sanitary installations

### FACTS ABOUT E-SOLUTIONS

E-solution versus fixed-speed solution in a typical pump application with variable pumping demand \*

Annual energy savings	Up to 50% (typically 25-35%)
Annual reduction in CO <sub>2</sub> emissions	Typically 1 ton CO <sub>2</sub> per 3 kW
Reduction in life cycle costs	Typically 25%
Payback time for the extra investment in an E-solution	2-3 years

\* Figures are based on a pump with a 3 kW motor in an application running 12 hours per day, 220 days per year. Average CO<sub>2</sub> per kWh is set to 0.37 kg. Life cycle cost calculation is based on a 10-year period.



## THE POWER OF BEING IN CONTROL

Simple. Easy. Great control.

Performance, reliability, and convenience are unmatched in the CUE series. It offers plug-and-pump installation and operation coupled with extensive control and monitoring possibilities. All the well-known E-pump functionality, including the unique user interface, has been transferred to these new wall-mounted frequency converters to provide the same exceptional ease of operation as our E-pumps. Along with the very efficient frequency converter with automatic energy optimisation, CUE also includes an advanced controller and a number of monitoring functions.

### **New ways to go**

CUE opens up a whole new range of opportunities. The advantages of speed control can now be extended to pump areas and markets which are not presently covered by our E-pump programme. With the CUE solution, we can offer speed-controlled pump solutions with E-pump functionality and user interface for pumps above 22 kW, and for power supplies outside the E-pump programme. Likewise, you can implement E-solutions in sanitary applications, in ATEX / IECEx areas, and in many other application areas where electronics is unwanted or not allowed.

### **Plug-and-pump convenience**

When installing and commissioning CUE, all you need to do is specify a few application-specific settings and vari-

ables. You get the familiar Grundfos R100 user interface, so it is a simple and easy task which can be done in just a few minutes. CUE also offers extensive possibilities of monitoring of pump, motor, frequency converter, and surroundings, as well as remote control and supervision by means of bus interface and input/outputs.

### **Array of superior features**

A CUE solution hosts a whole array of fantastic features that provide increased comfort and convenience for the user. For instance, there will be no water hammering thanks to a soft start and stop, and the built-in PI controller is your guarantee for e.g. constant pressure independent of the required flow.

### **One solution, one supplier**

With CUE you can rest assured knowing that the entire pump solution; i.e. pump, frequency converter, controller, and sensor is perfectly matched and configured to your specific pump application, and that all systems interfaces and settings are optimised. Apart from increased system security, dealing with just one supplier also means that initial design, configuration, installation, and commissioning are greatly facilitated. And whenever you need expert assistance and service during the life of your CUE solution, you know exactly where to go.



*CUE in reverse osmosis application*

## GREAT VALUE FOR MONEY

Everybody in the value chain has something to gain from a CUE E-solution. If you are:

### **The wholesaler/dealer**

Your business can derive extensive benefits from systems sales. Rather than selling individual parts, you can now offer a complete speed-controlled pump solution from one supplier.

### **The installer**

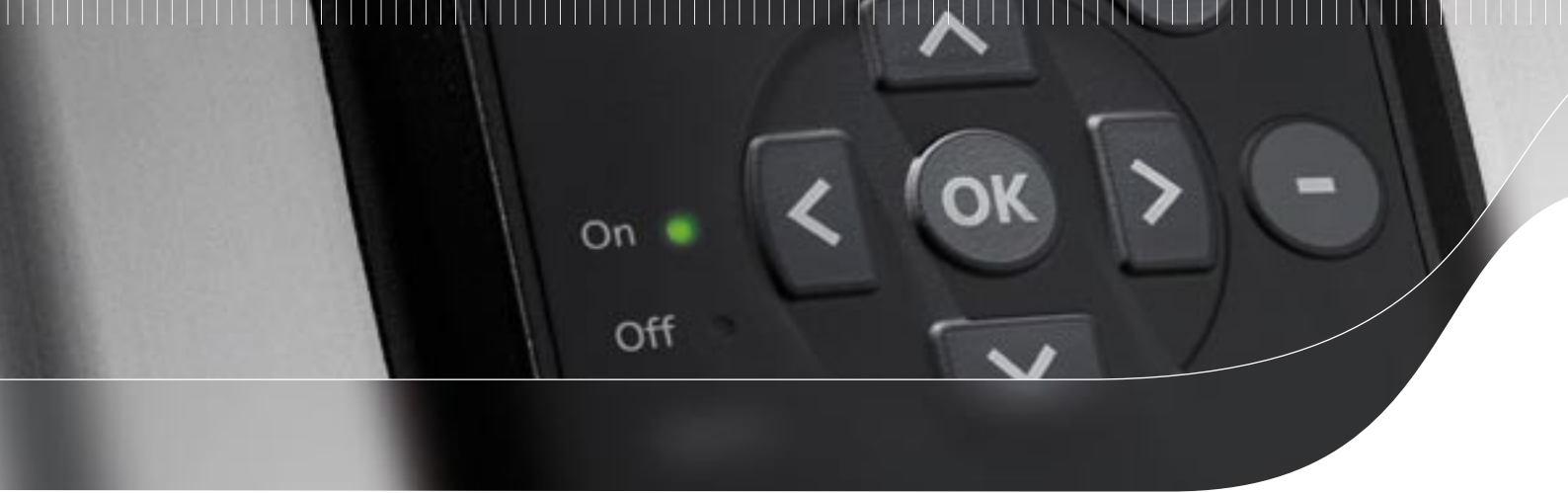
You will experience the comfort and convenience of a plug-and-pump concept compared to a standard frequency converter. Also, ordering everything you need from the same supplier makes selection, order handling, and installation significantly easier.

### **The end user**

You get an easy-to-operate, high-performance pump solution with low life cycle costs. And if you need service, you know whom to contact. It is your guarantee for years of cost-efficient and trouble-free pump operation.



*CUE in industrial applications*



## GRUNDFOS CUE

Comprehensive range. Superior features.

With over 100 different configuration possibilities, covering a power range from 0.55 kW to 250 kW, CUE represents one of the most comprehensive and versatile ranges of frequency converters for pump applications currently on the market. The CUE range is available with 5 different power supplies, 2 enclosure classes IP20/21 (Nema 1) / IP55 (Nema 12), and no less than 24 different output powers. So whatever you need, there is a suitable CUE solution for the job at hand.

What's more, CUE is packed with splendid features that provide maximum convenience and enhanced operational ease. Just take a look at the added value you get with CUE.

### Intuitive start-up guide

The CUE start-up guide enables easy installation and commissioning, and plug-and-pump convenience. Only a few settings need to be specified by the installer on-site, the rest of the set-up is either done automatically or factory preset. (Read more on page 8).

### Smart user interface

The unique and user-friendly operating panel consists of a graphical display with backlight and buttons for pump start/stop, navigation, and menu settings. You get the same "look and feel" with CUE as with our other E-solutions in that user interface and menu structure are identical to the familiar R100 operating panel used in connection with E-pumps. So in fact, operating a CUE solution is just like operating an E-pump.

### Automatic direction of rotation

A CUE solution offers automatic detection and setting of correct direction of rotation. During the start-up, CUE will automatically check the direction of rotation and ensure that the pump is running in the right direction. If the direction of rotation is wrong, CUE will change the direction electronically, thus making manual interchange of motor wires unnecessary.



Automatic detection and setting of correct direction of rotation

## Constant – whatever you want

When we say constant, we mean constant! CUE has a built-in PI controller that provides closed-loop control of whatever value you want to control:

### Constant pressure with or without stop function

With stop function: The head is kept constant at high flow. On/off operation at low flow.

Without stop function: The pressure is kept constant irrespective of the flow.

### Constant differential pressure

The differential pressure is kept constant irrespective of the flow.

### Proportional pressure

The head is reduced at low flow and increased at high flow.

### Constant level with or without stop function

With stop function: The fluid level is kept constant at high flow. On/off operation at low flow.

Without stop function: The fluid level is kept constant irrespective of the flow.

### Constant temperature

The fluid temperature is kept constant irrespective of the flow.

### Proportional pressure

The proportional pressure function ensures that the differential pressure in a circulating application, e.g. a heating or an air-conditioning system, is sufficient at low-flow as

well as at high-flow demands. The differential pressure is automatically raised with increased flow.

## Stop function

In most water supply applications the required flow can be very low, sometimes even equal to zero. In those situations on/off operation of the pump according to demand is more economical. CUE offers a stop function for constant pressure or constant level applications. The stop function furthermore prevents the pump from running against closed valve with the risk of heating up the water in the pump, and thus growth of unhealthy bacteria or damage of the shaft seal.

## Dry-running protection

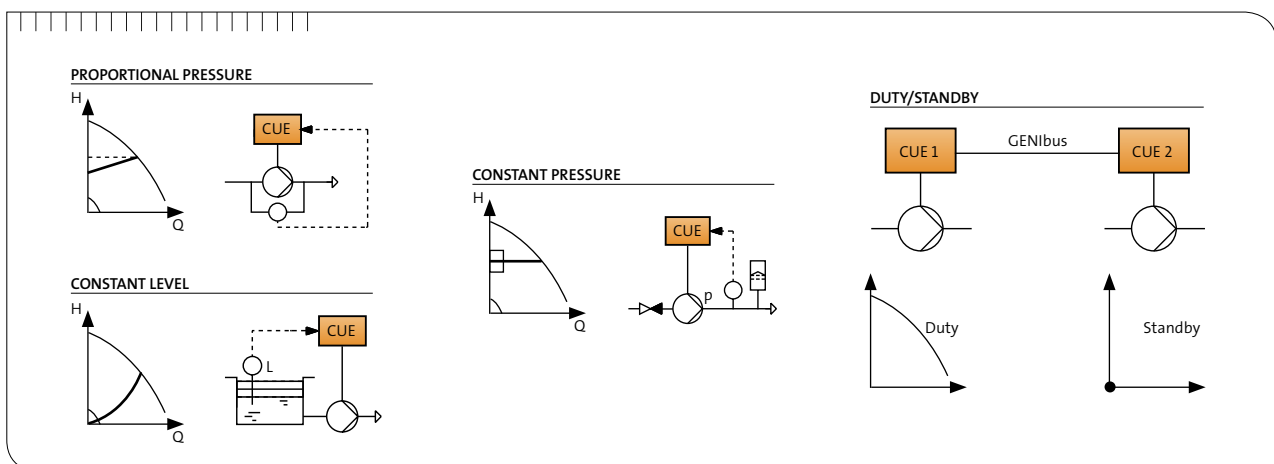
CUE offers protection against dry running, as one of the inputs can be dedicated to a dry-running detector.

## Duty/standby

By interconnecting two CUE converters via the standard built-in GENIbus interface, a duty/standby function of the two pumps can be obtained.

## Motor bearings supervision

CUE has a motor bearings monitoring function that displays an automatic warning when it is time for relubrication or replacement of bearings. This function can be further optimised by the addition of bearings temperature measurement (requires an IO module), which provides a warning or discontinues pump operations automatically in case of overheating.





## SMART USER INTERFACE

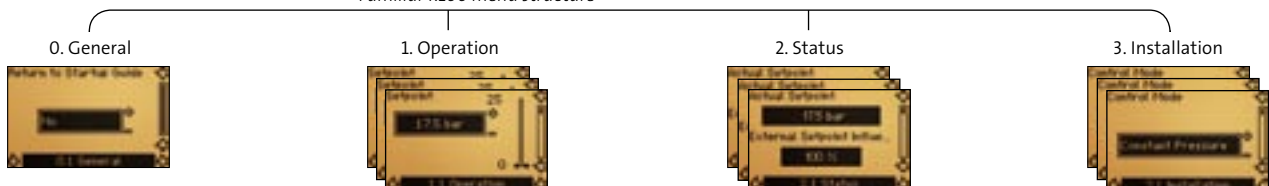


Easy-to-use start-up guide

CUE offers quick and easy set-up and commissioning compared to a standard frequency converter, because it only requires very few settings at start-up. Simply key in application-specific variables such as motor data, pump family, control function (e.g. constant pressure), sensor type, and setpoint, and CUE will automatically set all necessary parameters; i.e. ramp times, min. speed, controller constants, available functions, and so on.

After completing the start-up guide, CUE's menu structure is equivalent to the R100 menu structure used in connection with Grundfos E-pumps.

Familiar R100 menu structure







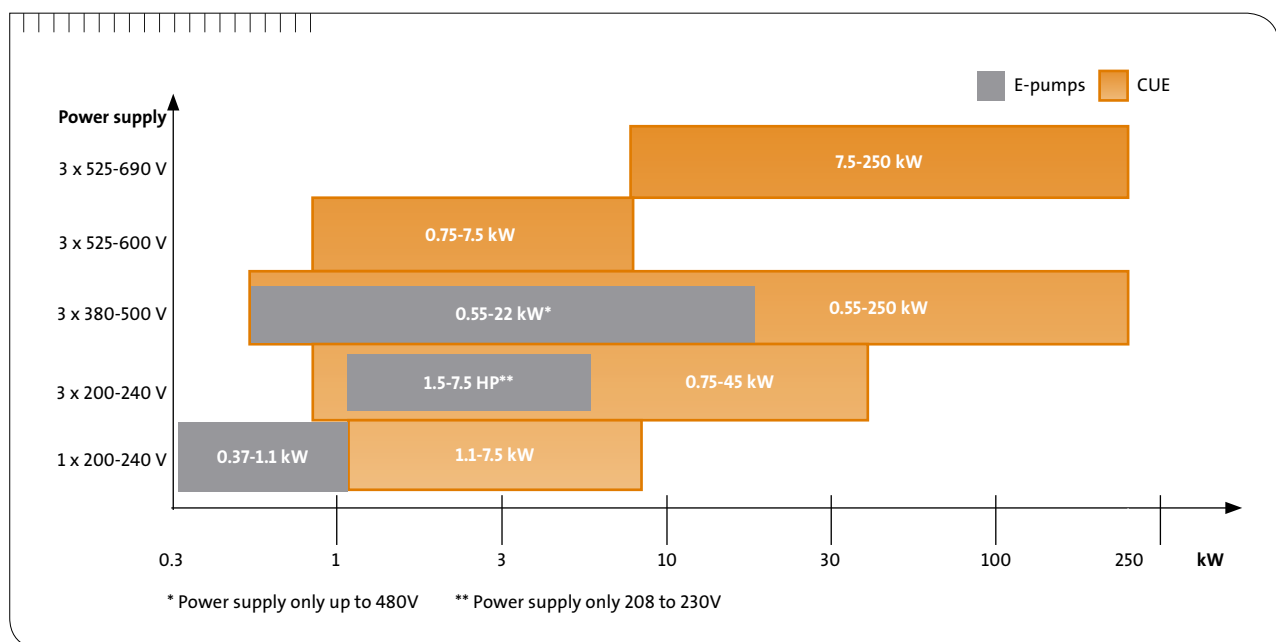
## THE COMPREHENSIVE CUE RANGE

When opting for a CUE solution you get the choice of the following versions of CUE; all available in two enclosure classes IP20/21 (Nema1) or IP55 (Nema12):

- 1-phase, 1x200-240 V, 50/60 Hz (1.1-7.5 kW), C1
- 3-phase, 3x200-240 V, 50/60 Hz (0.75 - 45 kW), C1
- 3-phase, 3x380-500 V, 50/60 Hz (0.55 - 250 kW), C1 up to 90 kW, C2 above 90 kW
- 3-phase, 3x525-600 V, 50/60 Hz (0.75– 7.5 kW), C3
- 3-phase, 3x525-690 V, 50/60 Hz (11 - 250 kW), C3

C1: units with built-in EMC filter for normal household applications. C2: units with built-in EMC filters for industrial applications. C3: units without EMC filter (only applicable in industrial applications).

### CUE OVERVIEW





## INPUT/OUTPUT POSSIBILITIES

### Four digital inputs

One dedicated input for external start/stop.

Remaining inputs can be set to:

- Min. (min. curve)
- Max. (max. curve)
- Ext. fault (external fault)
- Flow switch
- Alarm reset
- Dry running (from external sensor)
- Not active

### Three analogue inputs

One 0-10 V input for external setpoint. One 0/4-20 mA input for sensor feedback. One additional 0/4-20 mA input for sensor (requires an additional IO module).

### Two Pt100/1000 inputs

To be used in connection with motor bearings temperature measurement, or alternative temperature measurement such as the media temperature (requires an additional IO module).

### One analogue output

Can be set to indicate different parameters such as speed, actual value, etc.

### Two digital relay outputs

Can be set to report different operation modes such as running, warning, alarm, etc.

### RS485 GENibus interface

CUE is equipped with a standard RS485 interface that can communicate with Grundfos control systems, and via a Grundfos gateway be connected to other bus systems such as LONWorks, Profibus, Modbus, etc.



*All-in-one solutions with integrated frequency converter are covered by the E-pump programme (cf. Grundfos E-pump brochure).*

### E-SOLUTIONS WITH GRUNDFOS E-PUMPS

If you want an all-in-one solution with integrated pump and electronics, select a Grundfos E-pump instead of a Grundfos CUE solution. The E-pump programme is available in a 1x200-240 V version up to 1.1 kW, a 3x208-230V version up to 7.5 HP, and a 3x380-480 V version up to 22 kW. E-pumps are suitable for virtually all industry and building applications.

# ACCESSORIES

## Add-on card

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Analogue IO module offering:

Two inputs for Pt100/1000 temperature sensors (the card will automatically detect if the sensor is a Pt100 or a Pt1000 sensor). One analogue 0/4-20 mA input for an additional sensor.

## Motor filters

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All CUE frequency converters deliver a non-sinusoidal voltage to the motor. In some cases it is required or desired to filter the output voltage to make it more sinusoidal, because:

- It reduces the  $dv/dt$  and the peak voltage delivered to the motor
- It reduces the acoustic noise generated in the motor windings
- It allows the use of long motor cables

The following motor filters are available:

### dU/dt-filters

Split on 16 different filters covering:

Power range: 11 to 250 kW  
Voltage range: 3x380-500 V and 3x525-690 V  
Insulation class: IP20  
Ambient temperature: Max. 45°C

### Sine wave filters

Split on 23 different filters covering:

Power range: 0.55 to 250 kW  
Voltage range: 1x200-240 V, 3x200-240 V, 3x380-500V and 3x525-690 V  
Insulation class: IP20  
Ambient temperature: Max. 45°C

## Sensors

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The following sensors can be used in connection with CUE. All sensors are with 4-20 mA output signal.

- Pressure sensors - up to 25 bar
- Temperature sensors
- Differential pressure sensors
- Differential temperature sensors
- Flow meters
- Potentiometer box for external setpoint setting

## Gateways

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CUE is equipped with a standard RS485 GENIbus interface. Gateways to convert to other bus standards can be delivered as an accessory.

The CIU family can convert to the most common fieldbuses in the world:

- CIU100 converts from GENIbus to LonWorks
- CIU150 converts from GENIbus to Profibus
- CIU200 converts from GENIbus to Modbus
- CIU250 is a GSM modem which can send SMS messages in case of alarms, etc.

## Other accessories

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- Dry-running protection sensor LiqTec
- Control MPC – a multi-pump control system for control of parallel-connected CUE pump solutions.

BE > THINK > INNOVATE >

Being responsible is our foundation  
Thinking ahead makes it possible  
Innovation is the essence

**GRUNDFOS Management A/S**  
Poul Due Jensens Vej 7  
DK-8850 Bjerringbro  
Tel: +45 87 50 14 00  
[www.grundfos.com](http://www.grundfos.com)

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