Intelligent variable frequency drives for water management

Contents

Introduction
– Unlock pumping intelligence 3

iC7-Aqua features
– Intelligent 4
– Efficient 5
– Easy 6
– Reliable 7
– Designed for your needs 8
– Your ambition. Our drive 11

iC7-Aqua ULH 12

Applications 15

Digital tools
MyDrive® Suite 16

DrivePro® services 18

Specifications, ratings, and dimensions

Frequency converters
– Key specifications 20
– Connection diagrams 22
– Drive selection made easy 23
– Quick selection iC7-Aqua 24
– Ratings iC7-Aqua 27
– Quick selection iC7-Aqua ULH 28
– Ratings iC7-Aqua ULH 29
– Dimensions and weight 31
– Model code 32
– Options 34

Unlock pumping intelligence

Innovate flow control with iC7-Aqua, the next-generation variable frequency drive for pumps. Based on decades of experience, it's meticulously designed for optimal water and wastewater management.

Danfoss iC7-Aqua puts you in the driving seat to achieve precise control over motor speed in a wide range of pump, blower, mixer, and dewatering applications. Enhance performance and value while saving energy and costs.

This drive is not only built for today's demands but is also ready for the challenges of tomorrow, with a strong focus on digitalization, cybersecurity, and sustainability.

Whether you are managing municipal water distribution, treating wastewater, performing desalination, or handling industrial water purification, the iC7-Aqua is your trusted partner for optimized operations.

Advanced ultra low-harmonic drive

The iC7-Aqua ULH variant features an active rectifier for superior power quality, minimal losses, and exceptional THDi (<3% at full load). This compact and lightweight design is ideal for environments that demand efficient integration and best-in-class power quality.

Unmatched cybersecurity

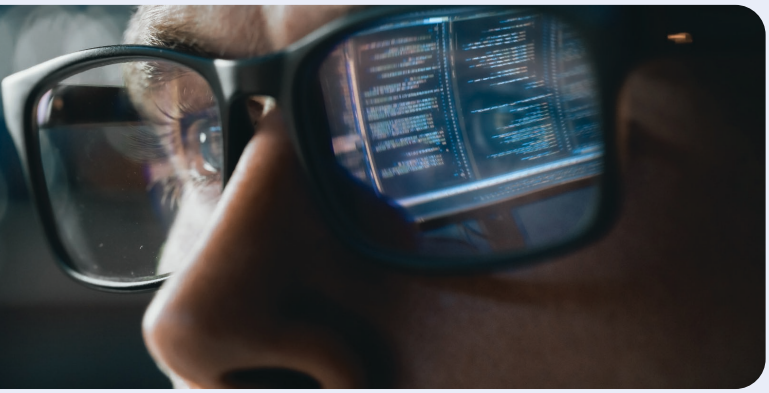
With leading hardware-based cybersecurity, your pumping systems are well protected. A built-in crypto chip on the control unit provides robust defense against unauthorized access.
Data transfer during datalogging and software downloads is fully encrypted to maintain integrity. Malicious firmware is prevented, guaranteeing only authentic versions are used, and encrypted software protects locally stored data.

Drive selection made easy

Highlights

- Water sector focus: Enhanced intelligence with more sensors, analytics, and dedicated functions for optimal pump performance
- Superior design: Highly compact IP20 units optimized for easy cabinet integration
- Ultra low-harmonic: iC7-Aqua ULH variant delivers supreme THDi (<3%) for distortion-sensitive sites
- Cybersecurity: Advanced, hardware-based cybersecurity for decades of protection against unauthorized access
- Integrated fieldbuses: Eliminate hardware options with integrated fieldbuses for seamless communication
- EMC compliance: Built-in EMC filter for categories C1, C2 and C3, ensuring electromagnetic compatibility

Reach <3% THDi
with ULH drives



Mastering the flow in water managment, with integrated intelligence

Intelligent

Use your drive as a sensor
Replace external sensors and even the PLC. Leveraging integrated intelligence and edge computing, the drive functions as a smart sensor and controller, securely connecting to PLCs, SCADA, and cloud systems to provide the essential data for advanced predictive maintenance models.

Integrated sensors to enhance analytics capability
Instantly detects grid disturbances to ensure robust performance during power loss, enhancing system reliability and uptime with integrated analytics.

Prevent clogging of pumps – automatically
The integrated deragging function [1] prevents pump clogging to ensure uninterrupted operation, reduce wear and tear, boost operational efficiency, and ultimately lower maintenance costs. Adapt the programming to meet individual application demands.

Built in pump intelligence
Provides accurate flow measurement reducing system cost and complexity by eliminating the need for additional control hardware.

Integrated features include dry run detection, flow compensation, advanced multi-pump control, and four PID loops, to ensure accurate flow measurement and optimum energy usage, thereby extending pump life and reducing costs by eliminating the need for external controllers and sensors.

Enhanced pump performance and protection
The drive offers a 2-step ramp, check valve mode, and minimum speed monitor, which work together to protect the pump from water hammer and ensure sufficient lubrication, ultimately optimizing flow and pressure management while reducing the cost of external controllers and sensors.

[1] *Pending*

1 The drive acts as a sensor

2 The drive acts as a sensor hub

3 Integrated intelligence

Reduce operating cost via energy efficiency, enhanced design, and reduced maintenance

Efficient

Energy savings with VFD operation
By precisely regulating pump speed and limiting starting current, VFD control enables accurate flow and pressure management, leading to a 20-40% reduction in energy consumption, enhanced process performance, extended equipment life, and lower overall operating costs. By reducing energy consumption you can also reduce dimensioning of other electrical equipment.

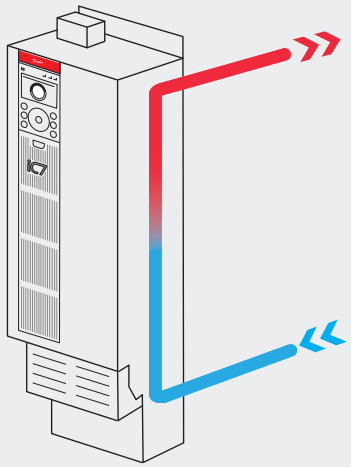
Adapts quickly to optimize performance of any motor technology
An easy motor adaptation process means you are up and running with optimum efficiency for any motor type, in just seconds. The iC7 drive delivers superior shaft performance even at low speed.

Highly efficient ULH drive
The ultra low-harmonic (ULH) variant ensures compliance with standards and reduces energy bills by minimizing heat loss while optimizing harmonic performance. Market-leading efficiency for part-load operation.

Compact design
Saves on system design costs and reduces panel space requirements, allowing for more flexible and economical installation options.

Boosted efficiency
Lowers your energy bill and helps you meet decarbonization targets faster by minimizing energy consumption during full- and part-load operation.

Back-channel cooling
Redirects 90% of heat out of the panel, significantly reducing cooling needs in the control rooms, because the heat can be directed outside. Provides a faster return on investment.



Remove 90% of heat
from the panel or control room
with back-channel cooling

Ease of use saves time and reduces effort throughout product service life

Easy

Connects to any type of motor
Offers the freedom to use your preferred motor technology with an easy setup and motor adaptation process for maximum flexibility.

Intuitive user interface
Enables fast commissioning with an intuitive interface customized to water pumping applications. No special training is required, making setup quick and user-friendly.

Slider terminal and easy-connect power terminal
Simplifies power cable connections, saving significant time during installation and service.

MyDrive® digital tools
Provides a complete suite of tools accessible from any web browser, offering everything you need without requiring software downloads.

Supported by MyDrive® Energy tool
Allows you to know your energy saving potential upfront and easily calculate your system's overall energy efficiency from day one.

Broader hardware portfolio with full range offering
Offers a complete range of hardware options, ensuring easy serviceability and providing the perfect fit for any application requirement.

Disconnect switch and fuse option for IP21, IP54, and IP55 enclosures
Reduces costs by eliminating the need for an additional mains switch and fuse.

Intuitive user interface

- No special training required for programming
- Speaks the language of your applications and processes
- Commissioning in no time

Secure reliable uptime with safe and cyber-secure operation

Reliable

Cybersecure-by-design
Protects against cyber threats with a hardware crypto chip. System level security keeps your operations safe from attacks. Prepared for upgrade to security level 3, SL3.

Wide range of operating temperatures
Ensures reliable performance in extreme climates from -30 °C to 60 °C, allowing for optimized and flexible panel design.

Functional safety with built in diagnostics
Reduce costs by eliminating external safety devices while ensuring safe, reliable operation for critical applications. Achieve STO SIL3/PLe as per EN62061/ISO13849-1.

Protection against harmonic distortion
With total harmonic signature of less than 3% THDi, the iC7-Aqua ULH protects equipment by ensuring near-zero harmonic distortion in the electrical network, even at partial motor loads.

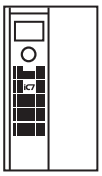
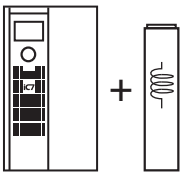
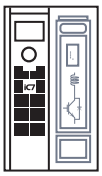
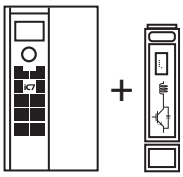
Condition-based monitoring
Maximize uptime securely, with edge computing to monitor and react early on issues in crucial data such as stator winding status and vibration. Learn more

Interference free operations
Best-in-class EMC filter fully compliant with EN/IEC 61800-3 ensures trouble-free operations with motor cables up to 300 m for C3 environments. No need for external filter.

Integrated sensors to enhance analytics capability
Integrated sensors monitor grid parameters in real time and act instantly, for high reliability.

Reliable operation in harsh environments
Coated PCBs ensure the drive can wtihstand harsh and corrosive environments classified as C4 (IEC60721-3-3).

Protect critical equipment, for reliable operation. Wide portfolio of low-harmonic solutions

Standard drive solutions	Low-harmonic solutions	Ultra low-harmonic (ULH) solutions	
			
Drive with traditional built-in choke	Drive + passive filter	ULH drive	Drive + active filter Use one active filter to mitigate multiple drives
~40% THDi	5-10% THDi	3-5% THDi	

Designed for your needs

The iC7 drive is configured and delivered to meet your exact requirements, saving expensive installation time. EMC and harmonic filters are integrated.
Fuse and disconnect are also available built-in, for IP21/UL Type 1 and IP54/IP55/UL Type 12 enclosures.

Control and option boards can be pre-configured at the factory or easily upgraded in the field.

Enclosures fit for installation

Install this space-saving drive easily in cabinets and protected rooms:

- Bookstyle IP20/UL Open Type optimized in width for side-by-side mounting without clearance, to save cabinet space *(Frames FA02-FA12)*
- Designed for flexible installation with minimum use of space
  - IP21/UL Type 1 for frames FK03-FK12
  - IP54/IP55/UL Type 12 for frames FB03-FB12 *(IP55: FB03-FB08 , IP54: FB09-FB12)*

Filters and accessories

For a complete installation, a range of integrated and separate filter options are available.

High power density cooling

You get high power density thanks to superior heat management using heat-pipe technology and high-performance heat sinks. Closed air ducts enable flexible mounting, and back-channel cooling supports removal of heat to the external surroundings without extra cooling equipment. Remove fans easily for cleaning and service.

Fast installation and service

Focus on ease of installation and service has been a key driver during development, with intensive installation testing during the design phase to ensure easy installation and user access.

Easy to use:

- Slider power and motor terminals for ease of connection
- Control connectors are pluggable
- Power and motor connectors are also pluggable for units up to 43 A (IP20, 22 kW)
- Connectors are color-coded and clearly marked for easier identification

Environmental exposure

The iC7 drive delivers exceptional performance under demanding operating conditions, and its design criteria match the environments described in the IEC60721 standard.

This drive operates in a wide temperature range of -30 °C to 60 °C, ensuring consistent performance in any climate. For specific adjustments, refer to the derating guidelines in the Design Guide. With an altitude capability of up to 4400 m (14400 ft) above sea level, you can install this drive in virtually any location, with correct derating.
For additional protection, specify the optional coated printed circuit boards increasing corrosion resistance.

This robust drive matches the required vibration resistance for operation in cabinets, in control rooms and on machines. Designed to meet the vibration levels for environments categorized as 3M12.

Supports these communication protocols with no additional hardware

PROFINET® EtherNet/IP™ Modbus EtherCAT®

Prevent problems and improve uptime with condition-based monitoring (CBM)

Integrated condition-based monitoring (CBM) functionality leverages built-in and connected sensors to deliver real-time data analytics, self-monitoring, and lifetime assessment. This enables proactive maintenance, minimizing downtime and maximizing the lifespan of your equipment, using

- Motor stator winding monitoring
- Vibration monitoring
- Load envelope monitoring

Using edge computing, these functions are performed within the drive, in real time. No Internet or cloud connection is required. This protects the drive from unauthorized access.

Scalable and flexible control

Enjoy a new level of performance thanks to the rapid-response control of iC7 drives.

The control capability is scalable and equipped with RS485 and EtherNet-based fieldbus and STO inputs as standard. Add more I/Os as needed, to match your applications.

For frequency converters, an optional basic I/O board offers typical I/O connectivity, and you can add more options if needed.

Switch fieldbus without changing boards

You can change the fieldbus protocol on your drive without changing the hardware. This gives you the ultimate in drive flexibility.

Supported protocols:

- Modbus RTU OS7MR
- Modbus TCP OS7MT
- PROFINET RT OS7PR
- EtherNet/IP OS7IP
- EtherCAT OS7EC

Connect to a computer via the extra Ethernet port, enabling you to use MyDrive® commissioning or service tools.

Danfoss
BUS
ST
X1
X2
Pump 4
REM
Running
15 kW
2.50 bar
2.46
bar
Feedback Value
WARN
READY
FAULT
OK
REM
LOC
OFF
RUN
iC7
AQUA

Your ambition. Our drive

iC7 series puts you ahead of the competition with premium advantages

Quality in focus

Reliable and predictable operation has been a key driver. With an ISO 9001-certified and IATF 16949-compliant quality system combined with use of 6-Sigma principles, quality and reliability are at absolute market-leading standards.

Reliability is assured by design based on application load profiles and data collected from intensive simulations and feedback from testing.

Automated assembly enables close control and monitoring of critical processes. The finished drives are 100% full-load tested ensuring reliability before leaving the factory.

Engineering support

Danfoss provides an extensive selection of support material and tools to help in engineering, such as:

- Digital tools, such as MyDrive® Select, MyDrive® Harmonics and MyDrive® Energy
- EPLAN P8 macros
- Dimensional and electrical drawings

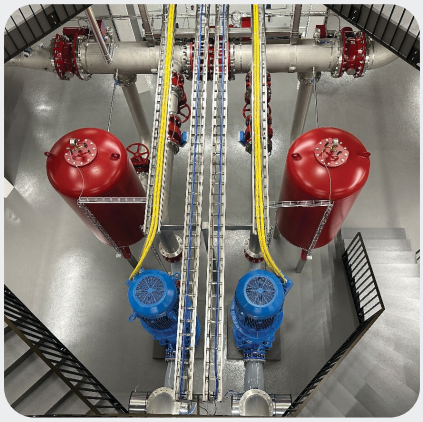
Secure-by-design

Cyber security is vital for ensuring the integrity of water and wastewater facilities. Prevention of unauthoirized access to water infrastructure avoids serious consequences in potential disruption to water supply to communities.

As the frequency of cyber attacks increases, legislation is changing. The iC7 series is ready for these changes.

Your drive is equipped with market-leading hardware-based protection against unauthorized access. A built-in crypto chip on the control unit enables encrypted network connectivity, tamper-proof hardware, trusted firmware operation, and public key certificates – for stronger authentication.

Learn more about security



iC7-Aqua ULH: For compliant systems which are more cost-efficient

Highlights

- Fully integrated and easy-to-use: Single unit 3-wire in, 3-wire out
- Network distortion issues all under control
- Ultra-low harmonics, < 3% THDi
- Low supra harmonics levels
- Generates no additional common-mode voltage
- Power factor of 1.0
- High efficiency, low losses
- Unmatched compactness, less weight, and easy integration
- Compliance-ready for the standards of tomorrow

The intelligent iC7 series includes a fully integrated solution for next-generation harmonic mitigation. The iC7-Aqua ultra low-harmonic drive is free of the shortcomings of traditional ultra low-harmonics solutions. With total harmonic signature of less than 3% THDi, the iC7-Aqua ULH frequency converter brings near-zero distortion to the electrical network, even at partial motor loads.

Zero compromise

Network distortion comes in many forms. With an advanced, next-generation rectifier, iC7-Aqua ULH has a lower common-mode noise signature, a lower high-frequency noise signature (also known as supra harmonics), and greater efficiency (lower losses) than conventional ULH drives. With its power factor of 1.0, there's also no additional reactive power to your network. This combination ensures *ultra-low overall distortion to the supply network – for zero compromise.*

Perform at partial load

The iC7-Aqua ULH performs better than conventional ULH drives at partial loads. It delivers full THDi performance down to ~50% load and maintains excellent THDi performance at even lower loads.

Reduce system cost

Using iC7-Aqua ULH, expensive network components such as supply transformers and backup generators can be specified 10-25% smaller, since oversizing to handle high harmonic distortion is unnecessary. This can bring huge capital investment savings to large infrastructure projects.

No extras are required since *everything is integrated*:
ULH rectifier with associated components and EMC filters in a 3-wire-in, 3-wire-out package. There's no need for power factor correction banks, either.

Next-gen technology for ultra compactness

While electric vehicles already use SiC solid-state electronic switches as standard, most drive manufacturers have been slow to adopt SiC MOSFETs to replace conventional Si IGBTs, due to higher component cost.

Now, by embracing a combination of multi-level rectifiers and SiC solid-state electronic switches, iC7-Aqua ULH achieves a huge increase in switching frequency. In turn, the dimensioning of the drive's LCL input filter is significantly reduced. As a result, the iC7-Aqua ULH delivers superior performance at almost the same cost as conventional ultra low-harmonic drives.

The iC7-Aqua ULH is fully contained within a single wall- or cabinet-mountable frame.

Fewer losses

Losses are significantly lower both at full load and partial load, for iC7-Aqua ULH. Besides reduction of the LCL size, the use of SiC MOSFETs also reduces conduction losses in the switches. Usually traditional ultra low-harmonic drives have twice the losses of standard drives, whereas the next generation iC7-Aqua ULH cuts these losses in half. As a result, the main issue of efficiency degradation when using ultra low-harmonic drives is diminished.

Energy efficient: Ideal for retrofits

It is well known that retrofitting variable speed drives to DOL (or across the line) systems can bring 20-60% energy savings. But adding drives can also overload existing electrical infrastructure to the extent that energy upgrade projects are not feasible.

This is where iC7-Aqua ULH comes into its own. Since the iC7-Aqua ULH brings ultra-low overall distortion, you can retrofit it to existing electrical systems without creating this overload situation, and the energy savings will soon pay back the investment.

Surpasses standards for supra harmonics

Conventional ultra-low-harmonic drives are clean up to the 50th harmonic but can generate high frequency disturbances (supra harmonics) in the 2-9 kHz frequency range.

iC7-Aqua ULH uses higher switching frequencies and therefore limits noise generation in this 2-9 kHz region. Additionally, its THDi performance is improved at the 50th-100th harmonic range, making it well-prepared for future standards.

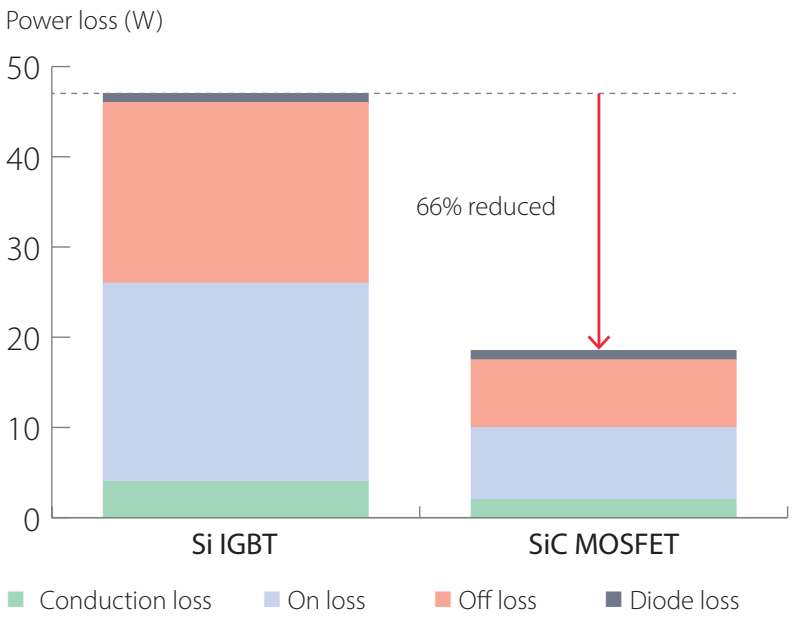


Figure 1
The IGBT and MOSFET transistors are made of silicon (Si) and silicon carbide (SiC), respectively. The choice of transistor material significantly affects conduction losses. The SiC MOSFET has a lower switching loss, enabling operation at a higher switching frequency. This higher switching frequency reduces the LCL dimensioning, making the drive more compact. SiC transistors are used in the power range 22-55 kW.

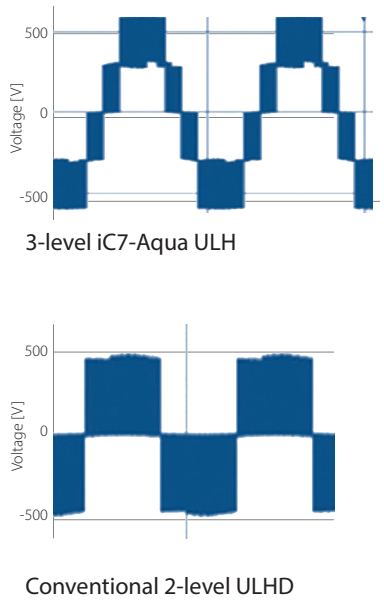
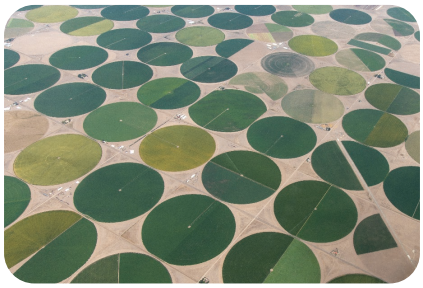


Figure 2
The iC7-Aqua ULH is designed with an innovative multi-stage input topology. The result is a more sinusoidal voltage waveform that requires less filtration by the built-in LCL components. As a result, LCL size can be further reduced.

CIRELL

Applications: Outstanding solutions



	Intelligent	Efficient	Easy	Reliable
Benefits of iC7-Aqua common to all sectors	– Accurate and optimal flow and pressure control with integrated water-dedicated features – Enhanced connectivity: Easy integration with PLC/SCADA and scalability – Analytics powered by integrated sensors: Respond instantly to grid disturbances, to maintain stability – Easy configuration of your choice of motor	– Highly efficient ultra low-harmonic drive – Free up space and reduce operating cost with compact and lightweight design – Boosted efficiency at part load	– No special skills or training required for commissioning or maintenance, thanks to an intuitive interface – Pluggable conectors and slider terminals for hassle-free commissioning and maintenance – End-to-end toolset for smooth workflow from selection to diagnosis, with MyDrive® digital tools	– Cybersecure by design – Reliable operation in extreme environment with wide operating temperature range – Functional safety with built-in diagnostics for safety compliance, at lower cost – Edge computing: Condition-based monitoring improves uptime by up to 45% – Reliable operation with long cables
Extra benefits…				
... in wastewater tratement	– Prevent pump clogging with integrated deragging function[1] – Reduce complexity and external PLC/control I/O components, with Logic function in MyDrive® Insight	– Efficient heat management with back-channel cooling – Automatic Motor Adaptation (AMA) and Automatic Energy Optimization (AEO) features ensure optimal efficiency for your motor type and configuration	– Save time and effort in panel design, with broad hardware portfolio – De-risk and speed up OEM development and testing, with simulation tools	– Enhanced protection against corrosive gases with C3 and C4 coating on PCBs – Best EMC filters for reliable operation free of electrical interference
... in water supply and distribution	– Lower maintenance costs through intelligent pressure management – Reduce complexity and external PLC/control I/O components, with Logic function in MyDrive® Insight	– 20-60% efficiency gains with variable speed control – Automatic Motor Adaptation (AMA) and Automatic Energy Optimization (AEO) features ensure optimal efficiency for your motor type and configuration	– Save time and effort in panel design, with broad hardware portfolio – De-risk and speed up OEM development and testing, with simulation tools	– Best EMC filters for reliable operation free of electrical interference
… in desalination	– Lower maintenance costs through intelligent pressure management – Reduce complexity and external PLC/control I/O components, with Logic function in MyDrive® Insight	– Efficient heat management with back-channel cooling	– MyDrive® Harmonics reduces design effort for power quality compliance with IEEE-519 and other standards	– Best EMC filters for reliable operation free of electrical interference
…in irrigation	– Optimize water flow and pressure using the built-in PID controller – Prevent pump clogging with integrated deragging function[1]	– Efficient heat management with back-channel cooling	– Logic feature in the MyDrive® Insight tool enables easy application customization	– Reliable operation at ambient temperatures up to 60 °C. – Edge computing capacity ensures reliable operation in remote locations, despite vulnerability to communication breakdowns

[1] *Pending*

MyDrive® Suite – Digital tools empower you

Need help to design your application, or select, set up, and maintain your drive? Danfoss provides a pallette of digital tools to give you the information you need, at your fingertips. No matter which stage of the project you are at.

Select and dimension your drives

- Select the right drive based on motor and load characteristics
- Find general product, industry, and application information for drives from Danfoss

MyDrive® Select

Select and dimension your drive and motor based on calculated motor load currents as well as current, temperature and ambient limitations. MyDrive® Select matches your business needs with Danfoss Drives products.

Set up and service your drives

- Set up your drives to operate according to your requirements
- Monitor drive performance throughout the entire lifecycle of your drive

MyDrive® Insight

Get easy access to parametrize your Danfoss drives, locally or remotely.
Use MyDrive® Insight for commissioning, monitoring, and troubleshooting.

The integrated Logic controller provides flexible logic blocks to support customers in programming. Flexible enough to replace a small PLC.

Validate performance of your drives

- Analyze the performance of your drives in relation to harmonics content
- Calculate the energy savings to be achieved when using drives
- Validate compliance to norms and standards

MyDrive® Harmonics

Estimate the benefits of adding harmonic mitigation solutions from the Danfoss product portfolio and calculate predicted system harmonic distortion.
This tool provides a quick indication of installation compliance with the most recognized harmonic norms, and mitigation recommendations.

MyDrive® Energy

Estimate the energy savings and CO_2 reduction achievable by installing Danfoss drives to perform variable speed control of electric motors. Calculate efficiency class and part load efficiency for drives from Danfoss. MyDrive® Energy supersedes the tools MyDrive® ecoSmart and VLT® EnergyBox.

MyDrive Virtual

Want to de-risk while speeding up product development? MyDrive Virtual lets you run high-fidelity simulations in your preferred simulation environment. Use the same control firmware and application software in a 1:1 virtual drive. Choose what you need from a wide variety of drive models

Simulation reduces time to market

Remove the constraints of the physical environment and open up new opportunities using iC7 simulation models which perfectly mirror the inverter or drive.

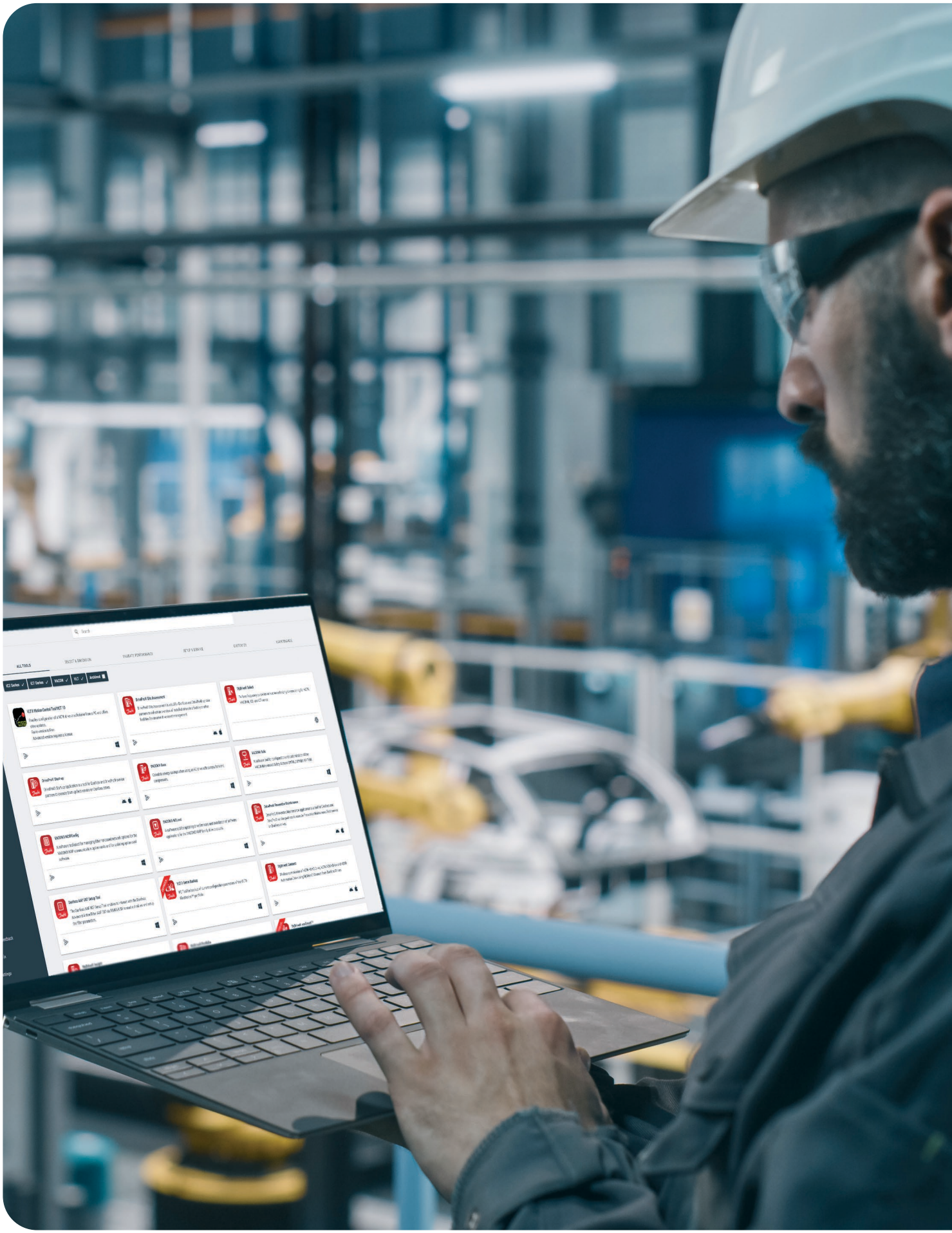
You can predict performance, test scenarios, streamline commissioning, and collaborate across teams and locations in an open environment.

Reliably validate interoperability of systems, using high-fidelity hardware-in-the-loop (HIL) simulation support from Danfoss.

The iC7 platform is founded on model-based design, which ensures the simulation models are always valid: up to date and accurate.

These models comply with the FMI standard and are easy to integrate in your simulation platform.

fmi Functional Mock-Up Interface



DrivePro® Services

Delivering a customized service experience!

Every VFD application is different. DrivePro® Services is a collection of tailor-made products designed around your needs.

From optimized spare part packages to condition monitoring solutions, we deliver customized service offerings to support your business through the different lifecycle stages of your drive.

DrivePro® 360Live
Achieve excellence with precision of maintenance
An installed base management solution to register and effectively optimize drives maintenance.

DrivePro® Extended Warranty
Even the best performing AC drives need protection. DrivePro® Extended Warranty offers a wide range of warranty options and provides the longest coverage in the industry up to 72 months.

DrivePro® Site Assessment
Optimize your maintenance strategy with a complete onsite survey and risk analysis of all your AC drives collected in one detailed report. Together with a Danfoss expert, you can build a tailored plan for future maintenance, retrofits, and upgrades.

DrivePro® Start-up
DrivePro® Start-up includes a full range of operating health checks and parameters adjustments. Based on a manufacturer's commissioning checklist, our experts will inspect and test your AC drive and its motor performance to ensure the best configuration of your AC drives.

DrivePro® Spare Parts
Maximize uptime and maintain peak performance throughout the lifetime of your AC drives with DrivePro® Spare Parts by making sure you are equipped with the original spare parts from Danfoss Drives.

DrivePro® Exchange
Maintain uptime with a fast alternative to repair when there is a time critical situation. If an AC drive fails, the DrivePro® Exchange service can quickly exchange any AC drive to a new unit of the same type to ensure as little production delay as possible.

DrivePro® Preventive Maintenance
Take the guesswork out of your maintenance plan.
With a structured maintenance program tailored to your needs, you can boost operational efficiency and reduce the effects of wear and tear.

To learn which products are available in your region, please reach out to your local Danfoss Drives sales office or visit our website.

Read more about DrivePro®

Local contacts

Key specifications

Input	
Supply voltage	380-480 V AC, -15%/+10%
Supply frequency	45-65 Hz
Output	
Power range	0.37-710 kW (0.5-950 hp)
Output current	3.0-1260 A
Overload ratings	110%: fans, centrifugal pumps, blowers and aerators 150%: piston pumps, high-pressure pumps, mixers, agitators, decanters/ centrifuges
Output frequency	0-590 Hz
Environmental conditions	
Protection ratings and cooling versions	
– Frames Fx02-Fx08 0.37-90 kW (400 V supply)	IP20 (UL Open Type), IP21 (UL Type 1), IP55 (UL Type 12)
– Frames Fx09-Fx12 110-710 kW (400 V supply)	IP20 (UL Open Type), IP21 (UL Type 1), IP54 (UL Type 12), back-channel cooling
Ambient operating temperature [1]	-30 to 60 °C (-22 to 140 °F) *Refer to design guide for derating*
Maximum altitude	4400 m (14400 feet)
Relative humidity	3K22, maximum 95% non-condensing
Chemically active substances (IEC 60721-3-3:2019)	– C3 (P1) – Medium corrosivity – Non coated – C4 (P2) – High corrosivity – Coated
Shock & vibration (IEC 60721-3-3:2019)	3M12
Harmonic mitigation and THDi	
iC7-Aqua	THDi <40% at full load as per IEC61000-3-12
iC7-Aqua ULH	THDi <3% at full load and <5% at part load

EMC protection (EN/IEC 61800-3 compliance class) [2]	**Cable length** [3]
C1	Up to 50 m
C2	Up to 150 m
C3	Up to 300 m
Compliance	
Efficiency class	IE2 as per IEC 61800-9-2. See EcoDesign Directive for a full list of losses at your desired operating point. MyDrive® Energy tool also provides part-load efficiency data.
Approvals	UL: UL61800-5-1 ed. 2.0; CE: IEC 61800-5-1 ed 3.0 For other approvals, contact Danfoss
Functional safety I/O	
STO	SIL3, PL e
Control I/O – standard	
Analog inputs (AI)	2
– Voltage mode	0-10 V, scalable
– Current mode	0/4-20 mA
– Temperature sensor support	Pt1000, Ni1000, KTY81, KTY82, KTY84
Analog outputs (AO)	Voltage mode: 0-10 V Current mode: 0/4-20 mA
Digital inputs (DI)	4+2 (0/24V, selectable PNP or NPN)
Digital outputs (DO)	2 (0/24 V) Digital outputs are reconfigured from digital inputs
Relay outputs (RO)	2 (NO/NC), 250 V AC/2 A, 24 V DC/2A
Auxiliary voltages	10 V output (10 mA), 24 V output (150 mA)
External supply	24 V external supply input (2 A) [4]. Class 2 supply

[1] Rated operating temperature varies between products
[2] Compliance classes:
C1: Intended for residential, commercial and light industrial installations
C2: For commercial installations, only when installed by professionals
C3: For industrial installations
[3] Cable length varies with product size
[4] Not available for standard serial control

Key specifications (continued)

Power options	
Mains input variants	Mains switch, AC fuses
Output filters (external)	dU/dt filters, sine-wave filters, common-mode filters
Functional extension options	
General Purpose I/O OC7C0	General purpose I/O extension board (3xDI, 2xDO, 2xAI, 1xAO, temperature measurement)
Relay Option OC7R0	Relay I/O extension board, with 3 relays (2 NO/NC , 1 NO up to 250 V AC/2 A)
Temperature Measurement OC7T0	Temperature measurement extension board with 5 sensor inputs, Pt100, Pt1000, Ni1000, and KTY81
Fieldbus options (embedded)	
Ethernet	Modbus TCP, EtherNet/IP, PROFINET RT/S2, EtherCAT
Serial	Modbus RTU
Other protocols	OPCUA [1]
Ease-of-use	
Control panel	
– Display	2.8", up to 8 lines, with graphic curves and visuals
– Buttons	"Back", "on-board manual", rem/loc (HOA) etc. Tactile feedback buttons for operation, local/remote control (HOA) and easy navigation
Commissioning	Guided setup and setup assistant
Parameter backup and restore	
Commissioning tools	MyDrive® Insight
Engineering tools	MyDrive® Harmonics, MyDrive® Select, MyDrive® Energy
Easy cable installation	Terminal sliders for 30-90 kW (45 -125 hp) units. Pluggable terminals for IP20 units up to 22 kW (30 hp).

Dedicated pump features	
Dry run detection	Protects the pump
Flow compensation function	Saves energy
2 step ramps (initial/final ramp) and minimum speed monitor	Protects deep well pumps
Check valve ramp	Protects against water hammering and saves installation cost for soft close valves
Pipe fill mode	Eliminates water hammering
Built-in motor alternation feature	Duty stand by operation, cost reduction
Sleep Mode and no/low flow detection	Save energy and protect the pump
End of pump-curve detection	Pump protection, leakage detection
Pump cascade controller	Saves energy and reduces equipment cost
MyDrive® Logic controller	Often makes PLC omissible
Advanced multi-pump control [1]	Fully redundant cascade system for maximum uptime
Deragging	Preventive/reactive pump cleaning
Pre/Post Lubrication	System and pump protection
Free programmable infos/warnings/ alerts	Perfect system integration and adaptation to the application
Flow confirmation	System and pump protection

[1] *Pending*

EMC category (model code)	**Frame**	**EN/IEC 61800-3 compliance class**					
		Conducted emission			**Radiated emission**		
		C1	**C2**	**C3**	**C1**	**C2**	**C3**
		Cable length [m (ft)]					
Combined C1 and C2 filter	**Fx02–Fx08**	50 (164)	150 (492)	150 (492)	No	Yes	Yes
C2 filter	**Fx02–Fx08**	–	150 (492)	150 (492)	No	Yes	Yes
	Fx09-Fx12	–	150 (492)	150 (492)	No	Yes	Yes
C3 filter	**Fx02–Fx05**	–	–	250 (820)	No	No	Yes
	Fx06–Fx08	–	–	300 (984)	No	No	Yes
	Fx09–Fx12	–	–	150 (492)	No	No	Yes

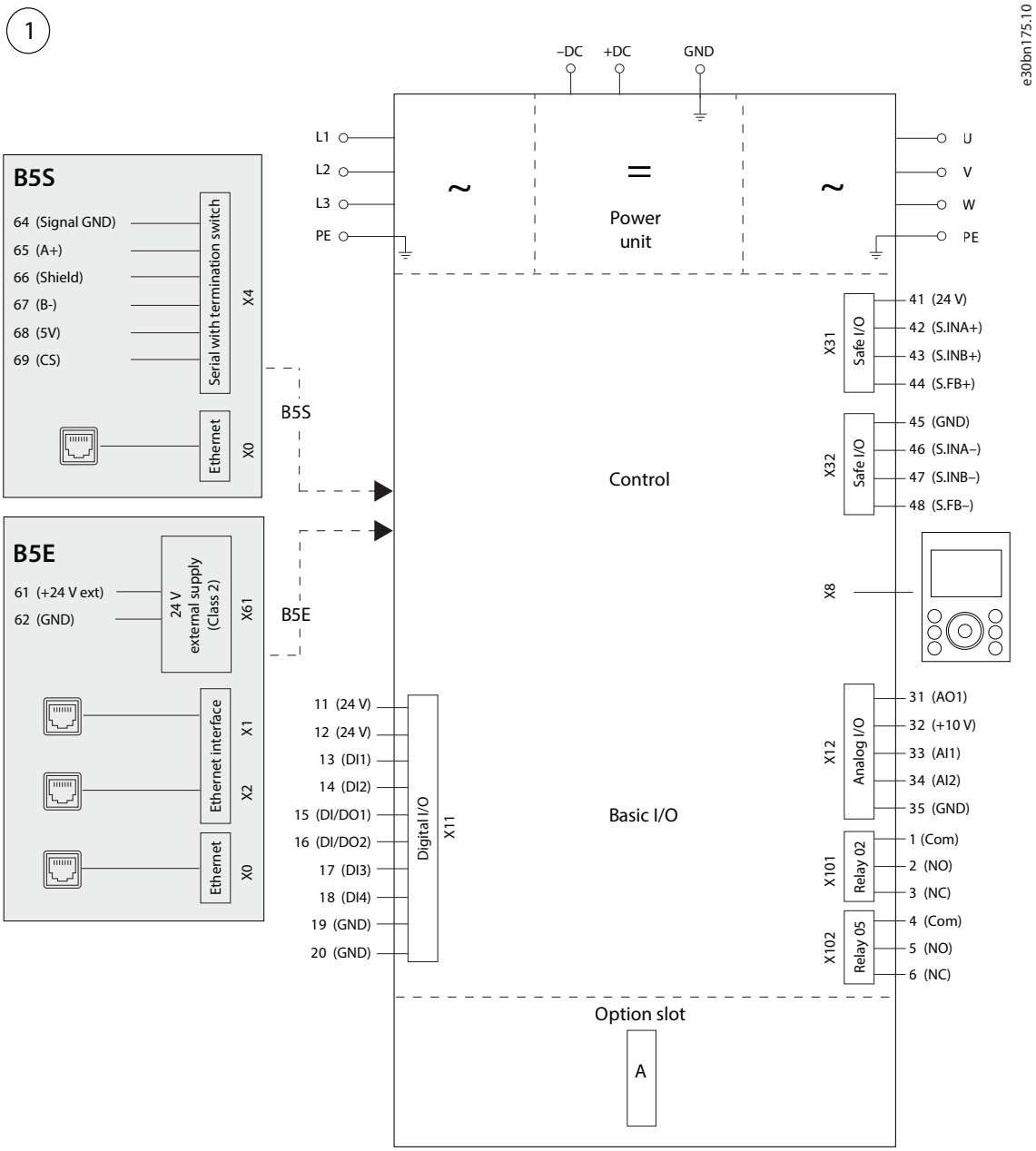
For information on functional extension option slots, go to page 34

Connection diagrams

The numbers represent the terminals on the drive

The drive is built around a power unit, a control unit, and optional I/O options.
The exact configuration depends on the drive model.

Standard control board



Drive selection made easy

How to configure your drive

Thousands of drive variants are available. To configure your drive, you make a series of choices to define the model code. Each model code defines a unique variant with a unique ordering number. To simplify the configuration process, follow this guide for the most commonly used variants.

Follow these steps:

A Check the model code overview, then select:

1. Product type: standard or ultra low-harmonic
2. Voltage rating
3. Nominal motor current
4. Ingress protection rating
5. EMC class required
6. Optional power hardware
7. Control board features
8. Control options, if required

B For standard drives running at ambient temperatures of 40 °C and 110% overload, use the Quick selection table that matches your supply voltage rating:

- Quick selection – IP20/UL Open Type 400 V @ 110 % overload
- Quick selection – IP21/UL Type 1 400 V @ 110 % overload
- Quick selection – IP54/IP55/UL Type 12 400 V @ 110 % overload

In the quick selection table, find the drive variant you need based on

- Power and current rating
- Enclosure type
- EMC compliance required

C For high overload (150%), refer to the ratings tables:

- Ratings iC7-Aqua
- Ratings iC7-Aqua ULH

D Select options, if required. Check the range of hardware extensions and functional extension available for your drive:

- Hardware extensions
- Functional extensions

Model code overview

			1		2		3		4		5		6		7		8	
iC7-30	–	FA	–	3N	–	04	–	-03A0	–	E20	–	F1	–	+Axxx	–	+Bxxx	–	+Cxxx	–	+DAAQ

Basic selection

1 **Product type**

3N	Standard frequency converter
3H	Ultra low-harmonic frequency converter

2 **Voltage rating**

02	200-240 V
04	380-480 V
07	525-690 V

3 **Nominal current rating**

Standard FC	380-480 V – *page 27*
ULH FC	380-480 V – *page 29*

4 **Protection rating (IP class)**

5 **EMC category**

Optional selections

6 **Optional power hardware (+Axxx)** – *page 32*

7 **Control board features (+Bxxx)** – *page 33*

8 **Functional extension options (+Cxxx)** – *page 33*

+DAAQ - Applications dedicated to water pumping

Quick selection iC7-Aqua IP20/UL Open Type

Model code	Output rating 400 V		Output rating 460 V		Dimensions		
	Current	Typical power	Current	Typical power	Frame	Weight kg (lb)	W x H x D mm (in)
	[A]	[kW]	[A]	[hp]			
iC7-30FA3N04-01A3E20Fx	1.3	0.37	1.2	0.5	FA02a	4.7 (10.4)	90 x 270 x 221 (3.5 x 10.6 x 8.7)
iC7-30FA3N04-01A8E20Fx	1.8	0.5	1.6	0.75			
iC7-30FA3N04-02A4E20Fx	2.4	0.75	2.4	1			
iC7-30FA3N04-03A0E20Fx	3.0	1.1	2.7	1.5			
iC7-30FA3N04-04A0E20Fx	4.0	1.5	3.4	2			
iC7-30FA3N04-05A6E20Fx	5.6	2.2	4.8	3			
iC7-30FA3N04-07A2E20Fx	7.2	3.0	6.3	4			
iC7-30FA3N04-09A2E20Fx	9.2	4.0	8.2	5			
iC7-30FA3N04-12A5E20Fx	12.5	5.5	11.0	7.5			
iC7-30FA3N04-16A0E20Fx	16	7.5	14.5	10			
iC7-30FA3N04-24A0E20Fx	24	11	21	15	FA04a	11.6 (25.6)	130 x 399 x 262 (5.1 x 15.7 x 10.3)
iC7-30FA3N04-31A0E20Fx	31	15	27	20			
iC7-30FA3N04-38A0E20Fx	38	18.5	34	25			
iC7-30FA3N04-43A0E20Fx	43	22	40	30	FA05a	14.1 (31.1)	165 x 399 x 269 (6.5 x 15.7 x 10.6)
iC7-30FA3N04-61A0E20Fx	61	30	55	40	FA06	26 (57)	200 x 555 x 294 (7.9 x 21.9 x 11.6)
iC7-30FA3N04-73A0E20Fx	73	37	66	50			
iC7-30FA3N04-90A0E20Fx	90	45	81	60	FA07	38 (84)	230 x 600 x 308 (9.1 x 23.6 x 12.1)
iC7-30FA3N04-106AE20Fx	106	55	96	75			
iC7-30FA3N04-147AE20Fx	147	75	133	100	FA08	55 (121)	255 x 746 x 368 (10 x 29.3 x 14)
iC7-30FA3N04-170AE20Fx	170	90	156	125			
iC7-30FA3N04-206AE20Fx	206	110	196	150	FA09	81 (179)	250 x 889 x 370 (9.8 x 35 x 14.6)
iC7-30FA3N04-245AE20Fx	245	132	240	200			
iC7-30FA3N04-302AE20Fx	302	160	302	250			
iC7-30FA3N04-385AE20Fx	385	200	364	300			
iC7-30FA3N04-395AE20Fx	395	200	364	300	FA10	127 (280)	350 x 1096 x 370 (13.8 x 43.1 x 14.6)
iC7-30FA3N04-480AE20Fx	480	250	456	350			
iC7-30FA3N04-588AE20Fx	588	315	520	450			
iC7-30FA3N04-658AE20Fx	658	355	590	500	FA11	225 (496)	508 x 1578 x 482 (20 x 62.1 x 19)
iC7-30FA3N04-736AE20Fx	736	400	658	550			
iC7-30FA3N04-799AE20Fx	799	450	730	600			
iC7-30FA3N04-893AE20Fx	893	500	784	650	FA12	298 (654)	604 x 1578 x 482 (23.8 x 62.1 x 19)
iC7-30FA3N04-1000E20Fx	1000	560	896	750			
iC7-30FA3N04-1120E20Fx	1120	630	1028	850			
iC7-30FA3N04-1260E20Fx	1260	710	1150	950			

Standard I/O and control panel. Pre-selected configurations see table page 34:
Model code refers to the first 22 charactes of the model code defining the drive. "x" defines the selected EMC Filter level

Quick selection iC7-Aqua IP21/UL Type 1

Model code	Output rating 400 V		Output rating 460 V		Dimensions [1]		
	Current	Typical power	Current	Typical power	Frame	Weight kg (lb)	W x H x D mm (in)
	[A]	[kW]	[A]	[hp]			
iC7-30FA3N04-01A3E21Fx	1.3	0.37	1.2	0.5	FK03	9.6 (21.1)	189 x 504 x196 (7.4 x 19.8 x 7.7)
iC7-30FA3N04-01A8E21Fx	1.8	0.5	1.6	0.75			
iC7-30FA3N04-02A4E21Fx	2.4	0.75	2.4	1			
iC7-30FA3N04-03A0E21Fx	3.0	1.1	2.7	1.5			
iC7-30FA3N04-04A0E21Fx	4.0	1.5	3.4	2			
iC7-30FA3N04-05A6E21Fx	5.6	2.2	4.8	3			
iC7-30FA3N04-07A2E21Fx	7.2	3.0	6.3	4			
iC7-30FA3N04-09A2E21Fx	9.2	4.0	8.2	5			
iC7-30FA3N04-12A5E21Fx	12.5	5.5	11.0	7.5			
iC7-30FA3N04-16A0E21Fx	16	7.5	14.5	10			
iC7-30FA3N04-24A0E21Fx	24	11	21	15			
iC7-30FA3N04-31A0E21Fx	31	15	27	20	FK05	15 (33)	218 x 598 x 228 (8.6 x 23.5 x 9.0)
iC7-30FA3N04-38A0E21Fx	38	18.5	34	25			
iC7-30FA3N04-43A0E21Fx	43	22	40	30			
iC7-30FA3N04-61A0E21Fx	61	30	55	40	FK06	28 (61)	209 x 671 x 303 (8.2 x 26.4 x 11.9)
iC7-30FA3N04-73A0E21Fx	73	37	66	50			
iC7-30FA3N04-90A0E21Fx	90	45	81	60	FK07	38 (84)	239 x 770 x 327 (9.4 x 30.3 x 12.9)
iC7-30FA3N04-106AE21Fx	106	55	96	75			
iC7-30FA3N04-147AE21Fx	147	75	133	100	FK08	62 (137)	267 x 980 x 367 (10.5 x 38.6 x 14.4)
iC7-30FA3N04-170AE21Fx	170	90	156	125			
iC7-30FA3N04-206AE21Fx	206	110	196	150	FK09a	89 (196)	327 x 999 x 378 (12.9 x 39.3 x 14.9)
iC7-30FA3N04-245AE21Fx	245	132	240	200			
iC7-30FA3N04-302AE21Fx	302	160	302	250			
iC7-30FA3N04-385AE21Fx	385	200	364	300			
iC7-30FA3N04-395AE21Fx	395	200	364	300	FK10a	139 (306)	422 x 1230 x 378 (16.6 x 48.4 x 14.9)
iC7-30FA3N04-480AE21Fx	480	250	456	350			
iC7-30FA3N04-588AE21Fx	588	315	520	450			
iC7-30FA3N04-658AE21Fx	658	355	590	500	FK11	244 (538)	602 x 2043 x 510 (23.7 x 80.4 x 20.1)
iC7-30FA3N04-736AE21Fx	736	400	658	550			
iC7-30FA3N04-799AE21Fx	799	450	730	600			
iC7-30FA3N04-893AE21Fx	893	500	784	650	FK12	327 (721)	698 x 2043 x 510 (27.5 x 80.4 x 20.1)
iC7-30FA3N04-1000E21Fx	1000	560	896	750			
iC7-30FA3N04-1120E21Fx	1120	630	1028	850			
iC7-30FA3N04-1260E21Fx	1260	710	1150	950			

Standard I/O and control panel. Pre-selected configurations see table page 34

[1] For frames FK09c, FK10c: The dimensions are provided without disconnect. If disconnect is required, the total height increases. Refer to page 31 for specific dimensions including disconnect.

Quick selection iC7-Aqua IP54/IP55/UL Type 12

Model code	Output rating 400 V		Output rating 460 V		Dimensions		
	Current	Typical power	Current	Typical power	Frame	Weight kg (lb)	W x H x D mm (in)
	[A]	[kW]	[A]	[hp]			
iC7-30FA3N04-01A3E55Fx	1.3	0.37	1.2	0.5	FB03	9.6 (21.1)	189 x 504 x196 (7.4 x 19.8 x 7.7)
iC7-30FA3N04-01A8E55Fx	1.8	0.5	1.6	0.75			
iC7-30FA3N04-02A4E55Fx	2.4	0.75	2.4	1			
iC7-30FA3N04-03A0E55Fx	3.0	1.1	2.7	1.5			
iC7-30FA3N04-04A0E55Fx	4.0	1.5	3.4	2			
iC7-30FA3N04-05A6E55Fx	5.6	2.2	4.8	3			
iC7-30FA3N04-07A2E55Fx	7.2	3.0	6.3	4			
iC7-30FA3N04-09A2E55Fx	9.2	4.0	8.2	5			
iC7-30FA3N04-12A5E55Fx	12.5	5.5	11.0	7.5			
iC7-30FA3N04-16A0E55Fx	16	7.5	14.5	10			
iC7-30FA3N04-24A0E55Fx	24	11	21	15			
iC7-30FA3N04-31A0E55Fx	31	15	27	20	FB05	15 (33)	218 x 598 x 228 (8.6 x 23.5 x 9.0)
iC7-30FA3N04-38A0E55Fx	38	18.5	34	25			
iC7-30FA3N04-43A0E55Fx	43	22	40	30			
iC7-30FA3N04-61A0E55Fx	61	30	55	40	FB06	29 (64)	216 x 672 x 303 (8.5 x 26.5 x 11.9)
iC7-30FA3N04-73A0E55Fx	73	37	66	50			
iC7-30FA3N04-90A0E55Fx	90	45	81	60	FB07	38 (84)	246 x 771 x 327 (9.6 x 30.4 x 12.9)
iC7-30FA3N04-106AE55Fx	106	55	96	75			
iC7-30FA3N04-147AE55Fx	147	75	133	100	FB08	62 (137)	274 x 982 x 367 (10.8 x 38.7 x 14.4)
iC7-30FA3N04-170AE55Fx	170	90	156	125			
iC7-30FA3N04-206AE54Fx	206	110	196	150	FB09a	89 (196)	327 x 999 x 378 (12.9 x 39.3 x 14.9)
iC7-30FA3N04-245AE54Fx	245	132	240	200			
iC7-30FA3N04-302AE54Fx	302	160	302	250			
iC7-30FA3N04-385AE54Fx	385	200	364	300			
iC7-30FA3N04-395AE54Fx	395	200	364	300	FB10a	139 (306)	422 x 1230 x 378 (16.6 x 48.4 x 14.9)
iC7-30FA3N04-480AE54Fx	480	250	456	350			
iC7-30FA3N04-588AE54Fx	588	315	520	450			
iC7-30FA3N04-658AE54Fx	658	355	590	500	FB11	244 (538)	602 x 2043 x 510 (23.7 x 80.4 x 20.1)
iC7-30FA3N04-736AE54Fx	736	400	658	550			
iC7-30FA3N04-799AE54Fx	799	450	730	600			
iC7-30FA3N04-893AE54Fx	893	500	784	650	FB12	327 (721)	698 x 2043 x 510 (27.5 x 80.4 x 20.1)
iC7-30FA3N04-1000E54Fx	1000	560	896	750			
iC7-30FA3N04-1120E54Fx	1120	630	1028	850			
iC7-30FA3N04-1260E54Fx	1260	710	1150	950			

Standard I/O and control panel. Pre-selected configurations see table page 34

[1] For frames FB09c, FB10c: The dimensions are provided without disconnect. If disconnect is required, the total height increases. Refer to page 31 for specific dimensions including disconnect.

Ratings iC7-Aqua

Model code	Rated output current [1] [2] [3]								Frame		
	400 V				460 V						
	I_{LO}	Power	I_{HO}	Power	I_{LO}	Power	I_{HO}	Power			
	[A]	[kW]	[A]	[kW]	[A]	[HP]	[A]	[HP]	IP20	IP21	IP54/55
01A3	1.3	0.37	0.9	0.25	1.2	0.5	0.8	0.33	FA02	FK03	FB03
01A8	1.8	0.5	1.3	0.37	1.6	0.75	1.2	0.5			
02A4	2.4	0.75	1.8	0.55	2.2	1	1.6	0.75			
03A0	3.0	1.1	2.4	0.75	2.7	1.5	2.1	1			
04A0	4.0	1.5	3.0	1.1	3.4	2	2.7	1.5			
05A6	5.6	2.2	4.0	1.5	4.8	3	3.4	2			
07A2	7.2	3.0	5.6	2.2	6.3	4	4.8	3			
09A2	9.2	4.0	7.2	3.0	8.2	5	6.3	4			
12A5	12.5	5.5	9.2	4.0	11.0	7.5	8.2	5			
16A0	16	7.5	12.5	5.5	14.5	10	11.0	7.5			
24A0	24	11	16	7.5	21	15	14.5	10	FA04	FK05	FB05
31A0	31	15	24	11	27	20	21	15			
38A0	38	18.5	31	15	34	25	27	20			
43A0	43	22	38	18.5	40	30	34	25	FA05		
61A0	61	30	46	22	55	40	40	30	FA06	FK06	FB06
73A0	73	37	61	30	66	50	55	40			
90A0	90	45	73	37	81	60	66	50	FA07	FK07	FB07
106A	106	55	90	45	96	75	81	60			
147A	147	75	106	55	133	100	96	75	FA08	FK08	FB08
170A	170	90	147	75	156	125	133	100			
206A	206	110	170	90	196	150	166	125	FA09	FK09	FB09
245A	245	132	206	110	240	200	196	150			
302A	302	160	245	132	302	250	240	200			
385A	385	200	302	160	364	300	302	250			
395A	395	200	302	200	364	300	302	300	FA10	FK10	FB10
480A	480	250	385	200	456	350	364	300			
588A	588	315	480	250	520	450	456	350			
658A	658	355	588	315	590	500	520	450	FA11	FK11	FB11
736A	736	400	658	355	658	550	590	500			
799A	799	450	695	400	730	600	653	550			
893A	893	500	799	450	784	650	700	600	FA12	FK12	FB12
1000	1000	560	880	500	896	750	784	650			
1120	1120	630	1000	560	1028	850	896	750			
1260	1260	710	1100	630	1150	950	1028	850			

[1] *I_{LO}: Low overload current. Rated continuous output current with 110% overload capacity – 1 min every 10 min*
[2] *I_{HO}: High overload current. Rated continuous output current with 150% overload capacity – 1 min every 10 min*
[3] *Power values are based on a typical 4-pole induction motor*

Quick selection iC7-Aqua ULH IP20/UL Open Type

Model code	Output rating 400 V		Output rating 460 V		Dimensions		
	Current	Typical power	Current	Typical power	Frame	Weight kg (lb)	W x H x D mm (in)
	[A]	[kW]	[A]	[hp]			
iC7-30FA3H04-147AE20F2	147	75	133	100	FA10b	155 (342)	351 x 1183 x 500 (13.8 x 46.6 x 19.7)
iC7-30FA3H04-170AE20F2	170	90	156	125			
iC7-30FA3H04-206AE20F2	206	110	196	150			
iC7-30FA3H04-245AE20F2	245	132	240	200			
iC7-30FA3H04-302AE20F2	302	160	292	250			

Standard I/O and control panel. Pre-selected configurations see table page 11

Quick selection iC7-Aqua ULH IP21/UL Type 1

Model code	Output rating 400 V		Output rating 460 V		Dimensions		
	Current	Typical power	Current	Typical power	Frame	Weight kg (lb)	W x H x D mm (in)
	[A]	[kW]	[A]	[hp]			
iC7-30FA3H04-43A0E21F2	43	22	40	30	FK07	38 (83)	239 x 770 x 327 (9.4 x 30.3 x 12.9)
iC7-30FA3H04-61A0E21F2	61	30	55	40			
iC7-30FA3H04-73A0E21F2	73	37	66	50			
iC7-30FA3N04-90A0E21F2	90	45	81	60			
iC7-30FA3H04-106AE21F2	106	55	96	75			
iC7-30FA3H04-147AE21F2	147	75	133	100	FK10b	158 (348)	422 x 1183 x 535 (16.6 x 46.6 x 21.1)
iC7-30FA3H04-170AE21F2	170	90	156	125			
iC7-30FA3H04-206AE21F2	206	110	196	150			
iC7-30FA3H04-245AE21F2	245	132	240	200			
iC7-30FA3H04-302AE21F2	302	160	295	250			

Standard I/O and control panel. Pre-selected configurations see table page 11

Quick selection iC7-Aqua ULH IP54/IP55/UL Type 12

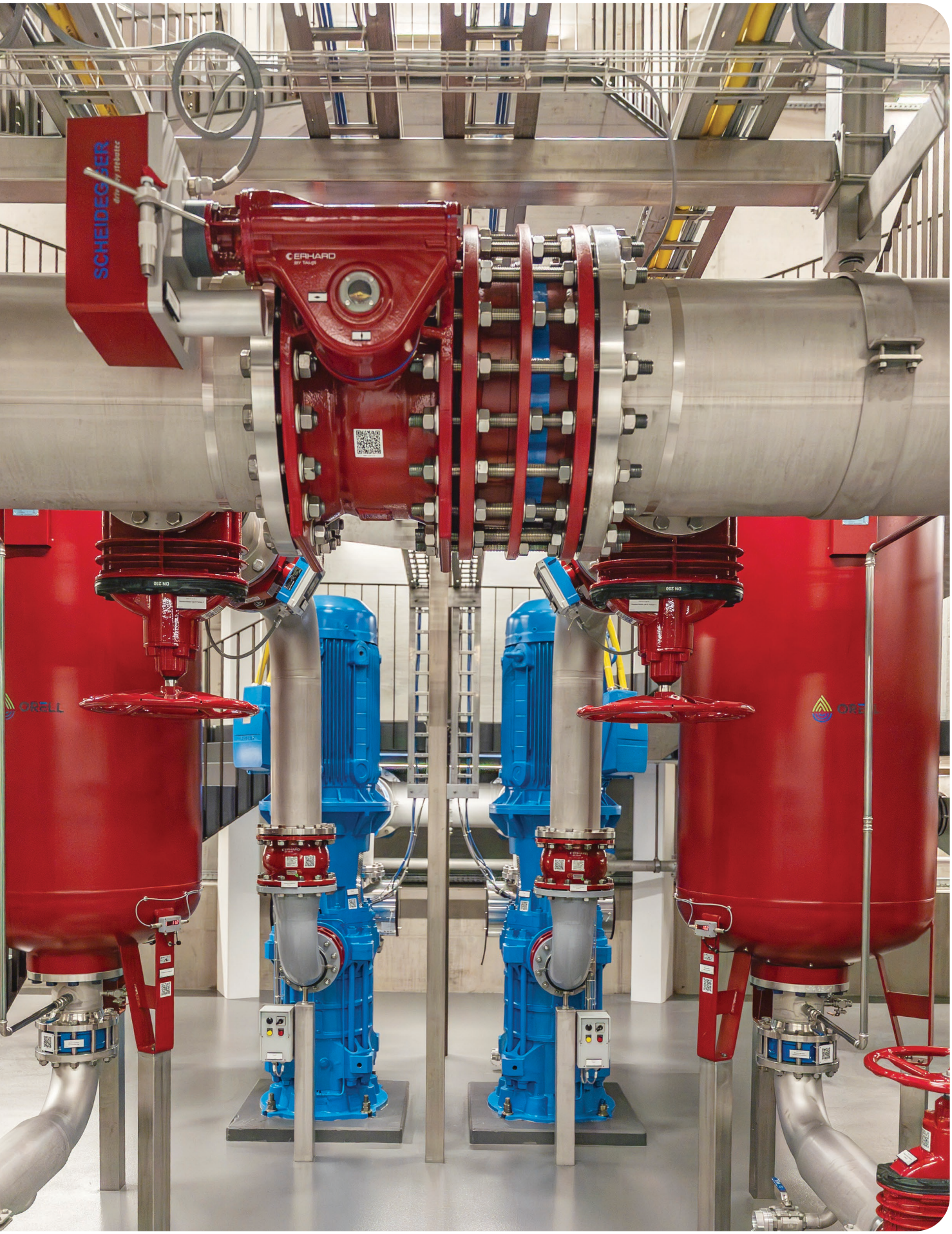
Model code	Output rating 400 V		Output rating 460 V		Dimensions		
	Current	Typical power	Current	Typical power	Frame	Weight kg (lb)	W x H x D mm (in)
	[A]	[kW]	[A]	[hp]			
iC7-30FA3H04-43A0E55F2	43	22	40	30	FB07	38 (83)	246 x 771 x 327 (9.6 x 30.4 x 12.9)
iC7-30FA3H04-61A0E55F2	61	30	55	40			
iC7-30FA3H04-73A0E55F2	73	37	66	50			
iC7-30FA3N04-90A0E55F2	90	45	81	60			
iC7-30FA3H04-106AE55F2	106	55	96	75			
iC7-30FA3H04-147AE54F2	147	75	133	100	FB10b	158 (348)	422 x 1183 x 535 (16.6 x 46.6 x 21.1)
iC7-30FA3H04-170AE54F2	170	90	156	125			
iC7-30FA3H04-206AE54F2	206	110	196	150			
iC7-30FA3H04-245AE54F2	245	132	240	200			
iC7-30FA3H04-302AE54F2	302	160	295	250			

Standard I/O and control panel. Pre-selected configurations see table page 11

Ratings iC7-Aqua ULH, ultra low-harmonic drive

Model code	Rated output current								Frame
	400 V				460 V				
	I_{LO}	Power	I_{HO}	Power	I_{LO}	Power	I_{HO}	Power	
	[A]	[kW]	[A]	[kW]	[A]	[HP]	[A]	[HP]	
43A0	43	22	38	18.5	40	30	34	20	**FK07 FB07**
61A0	61	30	43	22	55	40	40	30	
73A0	73	37	61	30	66	50	55	40	
90A0	90	45	73	37	81	60	66	50	
106A	106	55	90	45	96	75	81	60	
147A	147	75	106	55	132	100	96	75	**FA10b FK10b FB10b**
170A	170	90	147	75	166	125	132	100	
206A	206	110	170	90	196	150	166	125	
245A	245	132	206	110	240	200	206	150	
302A	302	160	245	132	295	250	245	200	

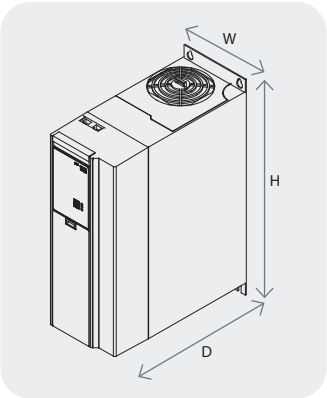
I_{LO}: Low overload current. Rated continuous output current with 110% overload capacity – 1 min every 10 min
I_{HO}: High overload current. Rated continuous output current with 150% overload capacity – 1 min every 10 min


SCHEIDEGGER
ERHARD
ORELL

Dimensions and weight

iC7-Aqua standard frequency converter

Protection rating		IP20		IP21/IP55	IP20		IP21/IP55
Frame		**FA02a**	**FA03a**	**FK03/FB03**	**FA04a**	**FA05a**	**FK05/FB05**
[mm]	Width	90	114	189	130	165	218
	Height	270	270	504	399	399	598
	Depth	221	221	196	262	269	228
[kg]	Weight	4.7	5.7	9.6	11.6	14.1	15
[in]	Width	3.5	4.5	7.4	5.1	6.5	8.6
	Height	10.6	10.6	19.8	15.7	15.7	23.5
	Depth	8.7	8.7	7.7	10.3	10.6	9.0
[lb]	Weight	10.4	12.6	21.1	25.6	31.1	33



Frames FA02b to FA05b: Add 26 mm (1 in) to depth.
Outer dimensions include mounting flange, without EMC shield plates.
Weight is maximum weight.

Protection rating		IP20	IP21	IP55	IP20	IP21	IP55	IP20	IP21	IP55
Frame		**FA06**	**FK06**	**FB06**	**FA07**	**FK07**	**FB07**	**FA08**	**FK08**	**FB08**
[mm]	Width	200	209	216	230	239	246	255	267	274
	Height	555	671	672	600	770	771	743	980	982
	Depth	294	303	303	308	327	327	368	367	367
[kg]	Weight	26	28	29	35	38	38	55	62	62
[in]	Width	7.9	8.2	8.5	9.1	9.4	9.6	10.0	10.5	10.8
	Height	21.9	26.4	26.5	23.6	30.3	30.4	29.3	38.6	38.7
	Depth	11.6	11.9	11.9	12.1	12.9	12.9	14.0	14.4	14.4
[lb]	Weight	57	61	64	77	84	84	121	137	137

Outer dimensions include mounting flange, without EMC shield plates.
Weight is maximum weight.

Protection rating		IP20	IP21/IP54	IP21/IP54	IP20	IP21/IP54	IP21/IP54	IP20	IP21/IP54	IP20	IP21/IP54
Frame		**FA09**	**FK09a/ FB09a**	**FK09c/ FB09c**	**FA10**	**FK10a/ FB10a**	**FK10c/ FB10c**	**FA11**	**FK11/FB11**	**FA12**	**FK12/FB12**
[mm]	Width	250	327	327	350	422	436	508	602	604	698
	Height	889	999	1423	1096	1230	1779	1578	2043	1578	2043
	Depth	370	378	378	370	378	378	482	510	482	510
[kg]	Weight	81	89	107	127	139	174	225	244	298	327
[in]	Width	9.8	12.9	12.9	13.8	16.6	17.2	20	23.7	23.9	27.5
	Height	35	39.3	56	43.1	48.4	77.8	62.1	80.4	62.1	80.4
	Depth	14.6	14.9	14.9	14.6	14.9	14.9	19	20.1	19	20.1
[lb]	Weight	179	196	236	280	306	384	496	538	654	721

Weight is maximum weight.

iC7-Aqua ULH frequency converter

Protection rating		IP20	IP21	IP55	IP21/IP54
Frame		**FA10b**	**FK07**	**FB07**	**FK10b/FB10b**
[mm/in]	Width	351/13.8	239/9.4	246/9.6	422/16.6
	Height	1183/46.6	770/30.3	771/30.4	1183/46.6
	Depth	500/19.7	327/12.9	327/12.9	535/21.1
[kg/lbs]	Weight	155/342	38/83	38/84	158/348

Weight is maximum weight.

Model code overview: Model code iC7-Aqua and ULH variants

For more detailed information, refer to the iC7-Aqua Design Guide

[1-6]		[7]		[8]		[9-10]		[11-12]		[14-17]		[18-20]		[21-22]		[23-28]
iC7-30	–	F	–		–		–		–		–		–		–	

[1-6] Product group *(character 1-6)*	
iC7-30	Indication of product group
[7] Product category *(character 7)*	
F	Frequency converter
[8] Cooling method *(character 8)*	
A	Air-cooled
[9-10] Product type *(character 9-10)*	
3N	Three-phase 6-pulse
3H	Three-phase ultra low-harmonic
[11-12] Voltage rating *(character 11-12)*	
04	380-480 V AC
[14-17] Nominal Amp rating [2] *(character 14-17)*	
01A3	1.3 A
01A8	1.8 A
02A4	2.4 A
03A0	3.0 A
04A0	4.0 A
05A6	5.6 A
07A2	7.2 A
09A2	9.2 A
12A5	12.5 A
16A0	16 A
24A0	24 A
31A0	31 A
38A0	38 A
43A0	43 A
61A0	61 A
73A0	73 A
90A0	90 A
106A	106 A
147A	147 A
170A	170 A
206A	206 A
245A	245 A
302A	302 A
385A	385 A
395A	395 A
480A	480 A
588A	588 A
658A	658A
736A	736 A
799A	799 A
893A	893 A
1000	1000 A
1120	1120 A
1260	1260 A

[1] +codes identifying options
[2] See rating tables on pages 9-10

[18-20] Protection rating *(character 18-20)*		**Fx02-05**	**Fx06-08**	**Fx09-12**
E20	IP20/Open Type	•	•	•
E21	IP21/UL Type 1		•	•
E54	IP54/UL Type 12			•
E55	IP55/UL Type 12	•	•	
[21-22] EMC Class *(character 21-22)*				
F1	C1 and C2 category	•	•	
F2	C2 category	•	•	•
F3	C3 category	•	•	•
[23-28] +code group				
+Axxx	Optional power hardware			
+Bxxx	Control hardware			
+Cxxx	Functional extension options			
+Dxxx	Application software and additional functionality			
+Exxx	Customized settings, for Danfoss use only			

+Axxx Optional power hardware IP20

Function	Model code	Selection description	Fx02-05	Fx06-08	Fx09-12
Extra environmental protection	+AGXX	None	X	X	–
	+AGCX	Coated boards	O	O	X
Mains input device	+AJXX	None	X	X	X
	+AJFX	AC fuses	–	–	O
DC terminals	+ALXX	None	–	X	X
	+ALDC	Yes	X	O	O
Heat sink access panel	+APXX	None	X	X	X
	+APHS	Yes	–	–	O

+Axxx Optional power hardware IP21 and IP54/55

Function	Model code	Selection description	Fx02-05	Fx06-08	Fx09-12
Cable entry and EMC plate	+AAST	Standard, no holes	–	X	X
	+AAME	Input plate, metric holes	–	– [1]	–
	+AAIM	Input plate, imperial holes	O	– [1]	–
Extra environmental protection	+AGXX	None	X	X	–
	+AGCX	Coated boards	O	O	X
Humidity protection device	+AHXX	None	X	X	X
	+AHHX	Space heater	–	–	O
Mains input device	+AJXX	None	X	X	X
	+AJFX	AC fuses	O	O	X
	+AJXD	Mains switch	O	O [2]	–
	+AJFD	AC fuses and mains switch	– [1]	O [2]	O
DC terminals	+ALXX	None	–	X	X
	+ALDC	Yes	X	O [2]	O
Touch protection	+AMXX	None	X	X	X
	+AMMX	Yes	–	–	O
Heat sink access panel	+APXX	None	X	X	X
	+APHS	Yes	–	–	O

[1] Pending
[2] DC terminals cannot be combined with mains switch
Options availability may differ for the ULH variant. For details, please contact your local Danfoss team

***X** indicates a standard selection*
***O** indicates an optional selection*
A dash (–) indicates that the selection is not available

+Bxxx Control board features

Function	Model code	Selection description	Note
Communication interface	+BAMR	Modbus RTU OS7MR	Serial control board
	+BAMT	Modbus TCP OS7MT	EtherNet control board
	+BAPX	PROFINET RT OS7PR	Ethernet based control board. Can be reconfigured to other Ethernet-based protocols
	+BAIX	EtherNet/IP OS7IP	Ethernet based control board. Can be reconfigured to other Ethernet-based protocols
	+BAEX	EtherCAT OS7EC	Ethernet based control board. Can be reconfigured to other Ethernet-based protocols
Functional safety	+BEG1	Safe Torque Off	
Standard I/O	+BDBA	Basic I/O (4 x DI, 2 x combined DI/DO, 2 x AI, 1 x AO, 2 x relay)	Integrated in control board
Control panel	+BF00	Blind Panel OPX00	Not available in Fx09-12
	+BF20	Control Panel 2.8 OPX20	

+Cxxx Functional extension options

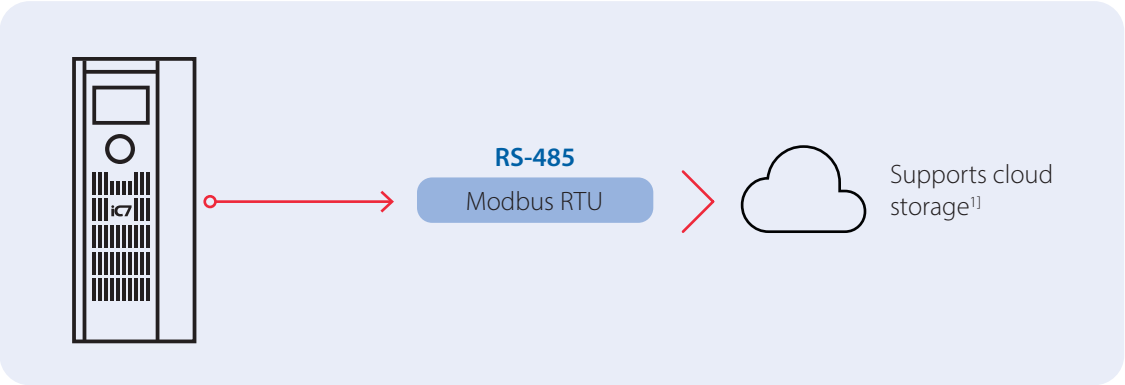
Control options	Description
+CAX0	None
+CAC0	General Purpose I/O OC7C0
+CAR0	Relay Option OC7R0
+CAT0	Temperature Measurement OC7T0 [1]

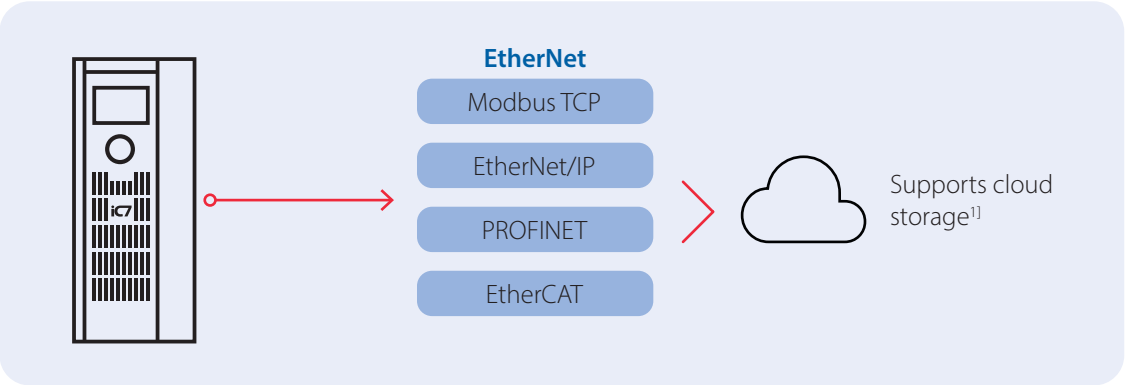
[1] *Pending*

Options

Functional extensions	Description
General Purpose I/O OC7C0	General purpose I/O extension board: 3 digital inputs 2 digital outputs 2 analog inputs 1 analog output
Relay Option OC7R0	Relay I/O extension board, with 3 relays
Temperature Measurement OC7T0	The Temperature Measurement option adds 5 temperature sensor inputs with compensation input. Supported sensors are Pt100, Pt1000, Ni1000, and KTY81

Fieldbus





[1] *Pending*

Explore our solutions
danfoss.com

Your ambition. Our drive. Meet iC7 series

iC7-Automation | iC7-Marine | iC7-Hybrid | iC7-HVACR | iC7-Aqua

Imagine versatile and highly secure motor control and power conversion. The iC7 series puts this capability securely in your hands. Intensely powerful and compact variable frequency drives and converters built to optimize a vast range of systems, while giving you the flexibility to distribute intelligence the way you want.
Paving the way for new ambitions, where intelligent, efficient, and connected systems are the new reality.

Danfoss Drives A/S
Ulsnaes 1
6300 Graasten
Denmark
CVR reg. no. 19883876

Any information, including, but not limited to information on selection of product, its application or use, product design, weight, dimensions, capacity or any other technical data in product manuals, catalogues descriptions, advertisements, etc. and whether made available in writing, orally, electronically, online or via download, shall be considered informative, and is only binding if and to the extent, explicit reference is made in a quotation or order confirmation. Danfoss cannot accept any responsibility for possible errors in catalogues, brochures, videos and other material. Danfoss reserves the right to alter its products without notice. This also applies to products ordered but not delivered provided that such alterations can be made without changes to form, fit or function of the product. All trademarks in this material are property of Danfoss A/S or Danfoss group companies. Danfoss and the Danfoss logo are trademarks of Danfoss A/S. All rights reserved.

© Danfoss 2026.10

Some functionalities listed in this document are for future implementation