Automation for a Changing World

**Delta Motion Control Solution Based on CODESYS**

[Image of Delta Motion Control Solution with Delta Motion Control logo and CODESYS logo]
Delta Motion Control Solution Based on CODESYS

Automation and digitalization play important roles in smart manufacturing. To enhance competitiveness, machine makers around the world are seeking solutions to quickly expand equipment development and applications, and save construction time and labor.

Delta is cooperating with CODESYS® group to utilize its motion control development system to offer a brand new motion control solution based on CODESYS. The CODESYS platform is a user-friendly integration interface compliant with IEC 61131-3 standards. It provides a wide range of applications for global users with strong motion control functions, and can be easily implemented into existing equipment.

Delta’s motion control solution based on CODESYS integrates the control functions of PLCs, HMIs, and motion controllers into one platform, and features a variety of new products, including the PC-based Host Motion Controller AX864E Series and Extended Motion Controller DXMC Series.

The solution also supports EtherCAT communication to simultaneously control field devices, such as the Delta AC Servo Drive ASDA-A2-E Series, High Performance Compact Drive MH300 Series, Compact Drive MS300 Series, General Vector Control Drive C2000 Plus Series and Remote Module R1-EC Series. Delta’s motion control solution based on CODESYS fulfills various application demands with its complete and integrated offerings.
# Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motion Control Solution Based on CODESYS</td>
<td>4</td>
</tr>
<tr>
<td>Products for Motion Control Solution Based on CODESYS</td>
<td>6</td>
</tr>
<tr>
<td>Motion Controllers</td>
<td>6</td>
</tr>
<tr>
<td>Field Devices</td>
<td>10</td>
</tr>
<tr>
<td>Software</td>
<td>12</td>
</tr>
<tr>
<td>Product Information Dimensions / Product Parts</td>
<td>16</td>
</tr>
<tr>
<td>Hardware Specifications</td>
<td>20</td>
</tr>
<tr>
<td>Global Operations</td>
<td>22</td>
</tr>
</tbody>
</table>

## PC-Based Motion Controller
**AX864E**

## Extended Motion Controllers
**DXMC-2S / DXMC-2P**
Delta Motion Control Solution Based on CODESYS

Motion Software

Motion Controllers

PC-Based

PLC-Based

Servo Drives

Remote I/O Modules

ASDA-A2-E

DXMC

R1-EC
Features

► **Standardized programming:**
IEC 61131-3 compliant software provides standardized programming and controller development platform

► **Unified integrated software:**
Programs all Delta's automation products in a single platform to shorten development time and cost

► **Open and modular platform:**
 Allows secondary development for customized functionalities and components by users with industry know-how

► **Single PLC/Motion platform:**
CODESYS runtime supports Windows, VxWork, and Linux operating systems, and provides a unified IEC 61131-3 compliant software and editing platform with different (PC-based or PLC-based) controllers

► **Supports EtherCAT high-speed fieldbus:**
Highly efficient, precise and instant motion control enhances productivity

► **Tag sharing between HMI and controllers based on CODESYS:**
Easy and simple variable sharing saves editing time and labor

► **Various peripheral devices for applications:**
Suitable for industrial robots, woodworking, printing and packaging applications
Products for Motion Control Solution Based on CODESYS

Motion Controllers

PC-Based Host Motion Controller AX864E

Supports EtherCAT communications and CODESYS-based program to provide a comprehensive and integrated motion control solution for multiple industrial applications

- Based on CODESYS SoftPLC program (compliant with the IEC 61131-3 standard) and SoftMotion
- Up to 64 axes servo control
- Fan-less and compact design
- Intel x86 CPU
- Built-in security IC system for enhanced software and hardware security
- Low-voltage detection and data duplication functions
- 8 high-speed digital local inputs / outputs
- Provides a wide range of practical accessories, meeting requirements of robot arms, woodworking, printing, packaging, printing, packaging, and various applications
Extended Motion Controllers
DXMC

Provides a real-time, high speed, high precise, and flexible motion solution for various applications with CODESYS-based SoftPLC programming software and SoftMotion programming; various communication ports for host computer via EtherNet, servo motor drives with EtherCAT, and extension I/O modules via EtherCAT / CANopen

Standard Type
DXMC-2S

- Based on CODESYS SoftPLC program (compliant with the IEC 61131-3 standard) and SoftMotion
- Up to 32 axes servo control
- Supports EtherCAT, Modbus TCP and OPC UA
- Execution cycle: 125μs, 250μs, 500μs, 1ms
- 16 high-speed digital inputs / outputs, and 1 RS485 serial port
- Supports 1-CH SSI absolute encoder & 2-CH pulse encoder

Panel Type
DXMC-2P

- Motion controller integrated with HMI (7" / 10")
- Based on CODESYS SoftPLC program (compliant with the IEC 61131-3 standard) and SoftMotion
- Up to 8 axes servo control
- Supports EtherCAT, Modbus TCP and OPC UA
Products for Motion Control Solution Based on CODESYS

Motion Controllers

Human Machine Interface
DOP-100

Tag Sharing with the CODESYS-Based Controller
Adopts the latest Cortex-A8 / Dual Core high-speed processor, multimedia functions and built-in Ethernet communication to help customers to build an IoT structure for smart machines and smart manufacturing

- Various display dimensions: from 4.3” to 15.1”
- Building connection with the CODESYS-based controllers
- Able to access the controllers based on CODESYS for variable value exchange
- Compact and narrow frame design to save installation space
- VNC function enables remote control via remote devices such as mobile phones and laptops
- Supports PDF documents
- Robust hardware protection: power, power board and communication isolation
- Multimedia functions: analog and IP camera connections, video play and event trigger functions
- Supports 2D and 3D recipe grouping, flexible in building recipe database
- Supports 8 levels of authorities, and allows 8 accounts (account name/password) for each level
- Supports 16 languages input to achieve localized operation for global customers
Tag Sharing between HMI and Controllers based on CODESYS

**PC-Based Controller**

- Monitor
- AX864E
- Servo Drive
- Motor Drive
- Remote IO Modules
- HDMI

**Extended Motion Controller**

- DOP-100
- DXMC-2S
- Servo Drive
- Motor Drive
- Remote IO Modules
- Ethernet

**Extended Panel Motion Controller**

- DXMC-2P
- Servo Drive
- Motor Drive
- Remote IO Modules
- EtherCAT
AC Servo Drive  
**ASDA-A2-E**

Compliant with IEC 61158 and IEC 61800-7; supports all the modes of the CoE device profile based on CiA402 and all command types of EtherCAT

- Power range: 200V 100W ~ 3KW, and 400V 400W ~ 7.5KW
- Supports EtherCAT communication
- Integrated Safe Torque Off (STO) safety function according to the standard of SIL2 (IEC EN 61508 & IEC 62016) / Cat.3 PL d (ISO 13894-1)
- Supports absolute type and incremental type servo motors
- Supports high speed position latch (Capture) function

Remote I/O Module  
**R1-EC**

Rugged and compact gateway type E-bus slave modules for high precision and demanding industrial applications

- Power coupler: connects EtherCAT slave module with 100baseTX EtherCAT
- Digital input module: 16 ports Sink/Source DI module; provides 1ms and 2ms response time models
- Digital output module: 16 ports DO module; output current: 0.5A/each port for sink type model and 0.25A/each port for source type model
- ADC module: 4-channel 16-bit A/D input; DAC module: 4-channel 16-bit D/A output
- Motion module: single-axis pulse output
- MPG input module: one channel MPG input, 4/6 axis control
High Performance/Standard Compact Drive  
**MH300/MS300**

Compact size with built-in STO function, EMC filter and integrated PLC, and supports various communications and I/O expansion modules

- **Power range:** 115V 0.2KW~0.75KW, 230V 0.2KW~15KW and 460V 0.4KW~22KW
- **Supports IM and PM motors, open/closed loop control**
- **Max. output frequency:** up to 2000Hz/1500Hz
- **Built-in Safe Torque Off (STO) safety function according to the standard of SIL2 (IEC EN 61508 & IEC 62016) / Cat.3 PL d (ISO 13894-1)**
- **Integrated PLC program with 5K/2K steps capacity**
- **Various communications:** Modbus, CANopen, EtherCAT, PROFIBUS DP, DeviceNet, Modbus TCP, EtherNet/IP

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High Performance Vector Control Drive  
**C2000 Plus**

Features precise speed/torque/position control functions and built-in PLC functions, suitable for sensors/sensorless synchronous/asynchronous motors

- **Power range:** 230V 0.75KW~90KW, 460V 0.75KW~560KW
- **Heavy duty overload capability:** 150%/60 sec, and 180%/3 sec., suitable for constant torque applications
- **Integrated PLC 10k steps program capacity**
- **Supports point-to-point function**
- **Enhanced protections and adaptation with PCB coating, compliant with 3C3 standard**
- **Built-in Modbus and optional communication cards:** EtherCAT, PROFINET, EtherNet/IP, PROFIBUS DP, DeviceNet, Modbus TCP, CANopen
Products for Motion Control Solution Based on CODESYS Software

Comprehensive functions for configuring, programming, compiling, and debugging; seamlessly integrated for both classic and systematically supported programming

Standard IEC 61131-3 Programming

- Instruction List (IL)
- Structured Text (ST)
- Ladder Programming (LD)
- Function Chart Programming (FBD)
- Sequential Function Chart (SFC)

Tasks and Debugger

- Display of application data at runtime in simulation mode on SoftPLC and discrete controllers
- Monitoring of specific values in watchlists
- Reading, writing, and forced setting of variable values, directly in the respective editor
- Execution of code in single step or single cycle
Motion Control Software Based on CODESYS- Softmotion

- Supports single-axis and coordinated multi-axis traversing motion (e.g. master/slave functions and cams) control
- Library available to use in POUs and programming of motion functions
- Motion control function is connected with other functions based on CODESYS
- Graphical planning with CAM editor
- Numerous POU-specific visualization templates for easy commissioning with the development system based on CODESYS
- Additional visualization templates for online editing of cams in runtime mode with HMI, such as TargetVisu and WebVisu
Products for Motion Control Solution Based on CODESYS Software

Features

- Creates structured and efficient applications from configuration to commissioning with one tool
- Optional object-oriented programming according to IEC 61131-3 (3rd edition), also blended with functional programming within the project
- Description document directly integrated into the tried and tested library for easy development

Benefits

Standard PLCopen
- Single or multi-axis movements with PLCopen motion POU}s

Electronic CAM
- Provides E-Cam synchronous control function
- Graphical interface for programming E-Cam curves
- Each E-Cam chart supports 65,535 points
- Multi-platform development and application reusability with exchangeable target system descriptions for all CODESYS-compatible devices
- Versatile extensibility with modular design and available add-ons
- Clear user interface and user-defined windows

**Real-Time System**
- 1ms synchronous cycle to control a total of 64 real and virtual axes

**Multi-Axis Function Block**
- Motion control using IEC 61131-3 function blocks
Product Information

PC-Based Host Motion Controller
AX864E

Product Type
PC-based Controller
AX Series

Control Axes
64: 64 Axes

Communication
E: EtherCAT

Hardware Version

<table>
<thead>
<tr>
<th>1st Digit</th>
<th>2nd Digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>P: Intel Celeron Series</td>
<td>0: First Version</td>
</tr>
</tbody>
</table>

I/O: (Transistor)
T: NPN
P: PNP

Software & Firmware Version

<table>
<thead>
<tr>
<th>1st Digit</th>
<th>2nd Digit</th>
<th>3rd Digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>M: CODESYS SoftMotion</td>
<td>B: B Type (Win10 IoT 64bit + QT HMI)</td>
<td>1: First Version</td>
</tr>
</tbody>
</table>

Dimensions Unit: mm

137.4(5.41") 166.8(6.57") 141(5.55") 164(6.46") 153.2(6.03") 54.2(2.13")
Product Parts

- SD Card
- HDMI
- Modbus TCP / OPC UA
- USB
- ABS SSI Encoder Input
- INC Encoder Input (OA/OB/OZ signal)
- 8DI/8DO
- Power Input (DC 24V (±15%))
- EtherCAT
  Field Devices
Product Information

Extended Motion Controllers

DXMC

DXMC - 2 S 32 T E - 00

Product Name
DXMC: Delta Extended Motion Controller

Product Series
2: 2000 Series (CODESYS SoftPLC)

Display Type (S) / Panel Size (P)
Code=S(Standard) Code=P(Panel Size)
00: N/A A0: 10" 16:9 LCM
01: VGA A1: 10" 4:3 LCM
02: HDMI

Communication
E: EtherCAT
D: DMCNET

I/O: (Transistor)
T: NPN
P: PNP
N: N/A

Control Axes
08: 8 Axes 32: 32 Axes
16: 16 Axes 64: 64 Axes

Dimensions Unit: mm

Standard Type
DXMC-2S

Panel Type
DXMC-2P

10-inch

7-inch
**Product Parts**

**Standard Type**

**DXMC-2S**

- SD Card
- DI/DO Status
- Mini USB
  - PC / USB Disc
- CANopen
- EtherCAT
- Field Devices
- Power Input
  - DC 24V (±15%)
- EtherCAT
- SSI Interface
- Encoder
- Pulse Train Input
  - A/B/Z signal
- RS-485
- 16DI/16DO

**Panel Type**

**DXMC-2P**

- COM 1
  - RS-232
- COM 2 / COM 3
  - RS-232 / RS-422 / RS-485
- SD Card
- USB Host
  - USB Disc
- USB Slave
  - Connected PC
- Power Input
  - DC 24V (±15%)
- EtherCAT
- Field Devices
- Ethernet
# Hardware Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>AX864E-P0MB1T(P)</th>
</tr>
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<tbody>
<tr>
<td><strong>Processor System</strong></td>
<td><strong>CPU</strong></td>
</tr>
<tr>
<td></td>
<td>Intel® Celeron J1900 2.4 GHz Quad. Core</td>
</tr>
<tr>
<td><strong>Monitor</strong></td>
<td><strong>Display Type</strong></td>
</tr>
<tr>
<td></td>
<td>HDMI 1.4a × 1</td>
</tr>
<tr>
<td><strong>Monitor</strong></td>
<td><strong>Colors</strong></td>
</tr>
<tr>
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<td>N/A</td>
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<tr>
<td><strong>Monitor</strong></td>
<td><strong>Resolution (pixels)</strong></td>
</tr>
<tr>
<td></td>
<td>1,024 × 600</td>
</tr>
<tr>
<td><strong>Monitor</strong></td>
<td><strong>Backlight Luminance (cd/m²)</strong></td>
</tr>
<tr>
<td></td>
<td>450</td>
</tr>
<tr>
<td><strong>Input / Output</strong></td>
<td><strong>Standard I/O</strong></td>
</tr>
<tr>
<td></td>
<td>8 DI / 8 DO</td>
</tr>
<tr>
<td><strong>Input / Output</strong></td>
<td><strong>Transistor</strong></td>
</tr>
<tr>
<td></td>
<td>PNP ; NPN</td>
</tr>
<tr>
<td><strong>Encoder Input</strong></td>
<td><strong>Pulse Input</strong></td>
</tr>
<tr>
<td></td>
<td>A± / B± / Z±</td>
</tr>
<tr>
<td><strong>Encoder Input</strong></td>
<td><strong>Communication Type</strong></td>
</tr>
<tr>
<td></td>
<td>SSI × 1</td>
</tr>
<tr>
<td><strong>Hardware Expansion</strong></td>
<td><strong>Module of Expansion</strong></td>
</tr>
<tr>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Hardware Expansion</strong></td>
<td><strong>DI/DO Module</strong></td>
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<td>N/A</td>
</tr>
<tr>
<td><strong>Hardware Expansion</strong></td>
<td><strong>AD/DA Module</strong></td>
</tr>
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</tr>
<tr>
<td><strong>Storage</strong></td>
<td><strong>HDD</strong></td>
</tr>
<tr>
<td></td>
<td>M.2 module × 1</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td><strong>USB Host</strong></td>
</tr>
<tr>
<td></td>
<td>USB 2.0 × 4</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td><strong>SD</strong></td>
</tr>
<tr>
<td></td>
<td>SD card slot × 1</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td><strong>Input Voltage</strong></td>
</tr>
<tr>
<td></td>
<td>24Vdc, -15 % / +20%</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td><strong>Rated Power</strong></td>
</tr>
<tr>
<td></td>
<td>48 W</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td><strong>Max. Curr. Consumption</strong></td>
</tr>
<tr>
<td></td>
<td>2 A</td>
</tr>
<tr>
<td><strong>RTC Backup Battery</strong></td>
<td><strong>3V lithium battery CR2032 × 1 for BIOS</strong></td>
</tr>
<tr>
<td><strong>Dimensions (W)×(H)×(D) mm / Weight</strong></td>
<td><strong>54.2 × 141 × 137.5 / 700g</strong></td>
</tr>
<tr>
<td><strong>Cooling Method</strong></td>
<td><strong>Natural</strong></td>
</tr>
<tr>
<td><strong>Axes of Control</strong></td>
<td><strong>Max. 64 axes</strong></td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td><strong>Network Interface</strong></td>
</tr>
<tr>
<td></td>
<td>Ethernet × 2</td>
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<tr>
<td><strong>Communication</strong></td>
<td><strong>Motion Control (High Speed)</strong></td>
</tr>
<tr>
<td></td>
<td>N/A</td>
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<tr>
<td><strong>Communication</strong></td>
<td><strong>Motion Control (Low Speed)</strong></td>
</tr>
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<tr>
<td><strong>Communication</strong></td>
<td><strong>Serial Port</strong></td>
</tr>
<tr>
<td></td>
<td>RS-485 / RS-422</td>
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<tr>
<td><strong>Communication</strong></td>
<td><strong>USB Slave</strong></td>
</tr>
<tr>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td><strong>Operating Temperature</strong></td>
</tr>
<tr>
<td></td>
<td>-30°C ~ 85°C</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td><strong>Storage Temperature</strong></td>
</tr>
<tr>
<td></td>
<td>-30°C ~ 85°C</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td><strong>Humidity</strong></td>
</tr>
<tr>
<td></td>
<td>2 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 hr/axis</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td><strong>Vibration</strong></td>
</tr>
<tr>
<td></td>
<td>2 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 hr/axis</td>
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<tr>
<td><strong>Environment</strong></td>
<td><strong>Shock</strong></td>
</tr>
<tr>
<td></td>
<td>75G IEC 60068-2-27, half sine, 11G</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td><strong>Protection Rating</strong></td>
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<tr>
<td></td>
<td>IP20</td>
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<tr>
<td><strong>Environment</strong></td>
<td><strong>Certification</strong></td>
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<td></td>
<td>CE</td>
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<td>DXMC-2S32E-00</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Processor System CPU</td>
<td>Intel® Celeron J1900 2.4 GHz Quad. Core</td>
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<tr>
<td>N/A</td>
<td>10.1&quot; TFT LCD</td>
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<tr>
<td></td>
<td>LED Back Light</td>
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<tr>
<td></td>
<td>450</td>
</tr>
<tr>
<td></td>
<td>16 DI / 16 DO</td>
</tr>
<tr>
<td></td>
<td>PNP ; NPN</td>
</tr>
<tr>
<td></td>
<td>A0± / B0± / Z0± ; A1± / B1± / Z1±</td>
</tr>
<tr>
<td></td>
<td>SSI ×1</td>
</tr>
<tr>
<td></td>
<td>Max. 4 modules</td>
</tr>
<tr>
<td></td>
<td>16 IN / 16 OUT</td>
</tr>
<tr>
<td></td>
<td>4 AD / 4 DA</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>USB 2.0 ×1</td>
</tr>
<tr>
<td></td>
<td>SD card slot ×1</td>
</tr>
<tr>
<td></td>
<td>24VDC, ±10 %</td>
</tr>
<tr>
<td></td>
<td>10 W</td>
</tr>
<tr>
<td></td>
<td>500 mA</td>
</tr>
<tr>
<td></td>
<td>3V lithium battery CR2032 ×1</td>
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<td>120 × 130 × 108 / 780g</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Natural</td>
</tr>
<tr>
<td></td>
<td>Max. 32 axes</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ethernet ×1</td>
</tr>
<tr>
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</tr>
<tr>
<td></td>
<td>EtherCAT ×1</td>
</tr>
<tr>
<td></td>
<td>CANopen ×1</td>
</tr>
<tr>
<td></td>
<td>RS-485</td>
</tr>
<tr>
<td></td>
<td>1 (communication with PC)</td>
</tr>
<tr>
<td></td>
<td>0 ~ 50° C</td>
</tr>
<tr>
<td></td>
<td>-25° C ~ 70° C</td>
</tr>
<tr>
<td></td>
<td>10 ~ 90% RH (non-condensing)</td>
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<tr>
<td></td>
<td>IEC61131-2 compliant 5 Hz ~ 8.3 Hz 3.5 mm, 8.3 Hz ~ 150 Hz 1G</td>
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<tr>
<td></td>
<td>IEC60068-2-27 compliant 11ms, 15G Peak, X, Y, Z direction for 6 times</td>
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<tr>
<td></td>
<td>IP65 / NEMA4 / UL Type 4X (indoor use only)</td>
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<tr>
<td></td>
<td>CE</td>
</tr>
</tbody>
</table>
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