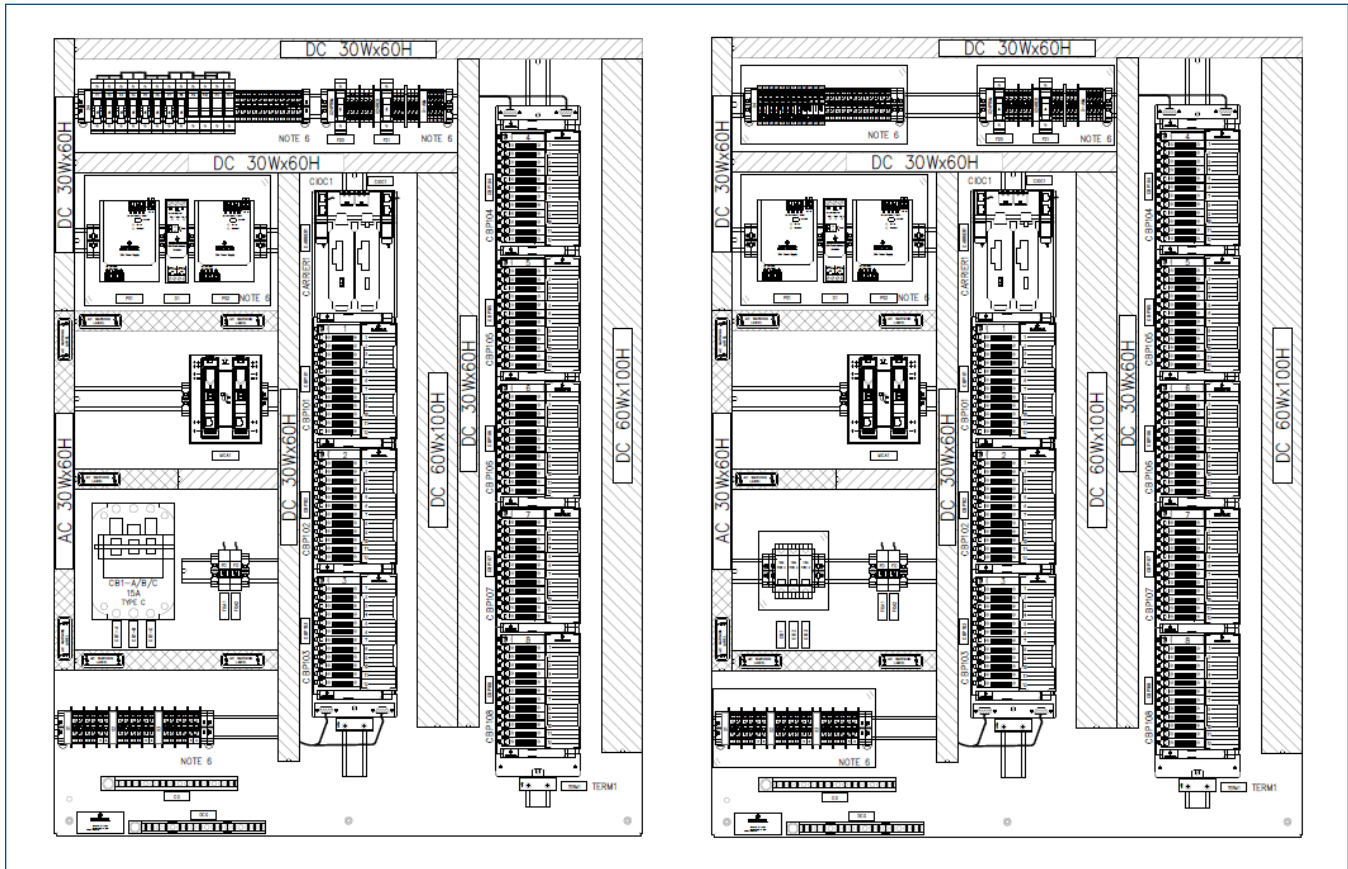


DeltaV™ CTO DCS Smart Junction Box

(cCSAus Ordinary and Hazardous Locations)



DeltaV™ CTO DCS Smart Junction Box (SJB).

- Delivers Electronic Marshalling enabled by CHARacterization Modules (CHARM) technology
- Reduce system footprint
- Eliminate I/O home run cables
- Significantly reduce cabinet design engineering
- Fully documented package

Introduction

The DeltaV™ CTO DCS Smart Junction Boxes provide an off-the-shelf solution for faster project execution and reduced installation costs. SJBs are factory tested products and ready for installation in the field. Electronic Marshalling eliminates traditional I/O design tasks and allows field wiring to start long before control strategies are finalized.

The SJBs are designed for hazardous areas and harsh environments, from extreme temperatures to corrosive gases.

Benefits

Delivers Electronic Marshalling enabled by CHARMs

technology: The CHARM SJBs offer the full benefits of Electronic Marshalling. The individual channels can be defined for any combination of field signal type, as required by the process equipment. This allows for 100% utilization of channels, regardless of the I/O signal mix. Late changes are easily accommodated with minimal re-engineering and no rewiring.

Reduce system footprint: Equipment room footprint is greatly reduced by replacing traditional marshalling cabinets with field mounted I/O cards.

Eliminate I/O home run cables: Field instrumentation wiring is reduced to the signal pair that connects the field device to the SJB. Save on home run multi-core cables, cable trays, associated engineering and documentations.

Significantly reduce cabinet design engineering: The CTO DCS CHARM SJBs are pre-engineered and factory tested. The I/O flexibility allows the same design to serve a wide variety of I/O signals, conditioned individually by the CHARM. Field wiring design is complete at the terminal block.

Fully documented package: Each SJB is supplied with full documentation and engineering drawings showing internal lay-out, bill of materials and internal wiring. They are designed to meet local building code and industry best practices in order to deliver proven functionality with minimal costs.

Product Description

The CTO CHARM SJB offering comprises a range of pre-engineered solutions based on industry standard, wall mounting SJBs that are available in AC-powered version with space up to 96 CHARM I/Os.

The designs have considered specific requirements related to outdoor installation in the field, including environmental protection, heat dissipation, power and grounding requirements and installation in hazardous areas.

All components are pre-wired and tested at the factory. Simply select the required DeltaV Electronic Marshalling equipment and the SJB is ready to install, connect the field wiring, power and network cables. Install needed CHARMs to commission your loops and autosense the hardware into your DeltaV system.

Before delivery, each SJB undergoes a full in-house inspection and test, to assure that it is fully operational before leaving the factory. Electronic Marshalling eliminates the need for custom designs. These SJBs can be ordered, together with the DeltaV Electronic Marshalling equipment and CHARM I/O and delivered directly to site to begin field wiring (Factory Acceptance Test (FAT) with client may be optional).

The SJBs are ordered by selecting a base enclosure model and required options to meet specific project needs.

A range of base enclosure models are available:

- I/O quantities: Up to 96 I/O's
- Distributed CHARM I/Os (combination of Max. 12 / 24 CHARMs inside SJB and external 12 CHARM I/O junction boxes - total I/O count 96).
- For different environmental requirements: Safe Area or Hazardous Area.

Each base SJB model is further explained in the coming sections.

Configurable options include the type of CHARMS (I.S. or non -IS), network (Fiberoptic or Copper), enclosure Material (SS304 / SS316), cable entry, nameplate engraving, injected power, heater, etc.

System Planning

Electronic Marshalling changes the game with respect to control system I/O planning. The field I/O wiring can be designed independently from the control strategy design, allowing E&I engineers to determine the number and type of I/O based on the process design.

- Count the I/O requirements and required quantity of SJBs.
- Determine whether the SJB is required for a safe area or hazardous area installation.
- Plan the power distribution and installation of SJBs.
- Wire the field devices and commission them.
- When control strategies and associated controller hardware is finalized, simply assign the I/O signals to the controllers as needed, no wiring changes. You can change controller I/O assignments with the click of a mouse, without touching a wired connection.

DeltaV CTO DCS Smart Junction Box (SJB)

All SJBs come with the following equipment installed:

- Power distribution and isolation components for primary and secondary 24V DC Power to CHARM I/O Cards
- AC power feeds with redundant AC/DC 24V DC bulk power supplies
- Halogen-Free wire ducts
- Grounding bars for CG (Chassis Ground) and DC Reference Ground
- Name Plate
- Removable Gland Plate
- Breather: Brass Ni plated / SS316L. SJBs are designed for bottom entry for all cables (power, network, and I/O signals)

SJBs are designed for bottom entry for all cables (power, network, and I/O signals).

The CTO SJB supports all available low voltage CHARM I/O types with 24V DC bussed field power and all available CHARM terminal blocks.

CHARM I/O Cards (CIOC2) and IO CHARMs are not included and are to be ordered separately.

CTO Options

For a particular base enclosure model, several pre-engineered CTO options can be specified. These options include:

- No. of Non-IS Baseplates – Can be selected from 0 to 8
- Type of Non-IS Baseplate assembly – Can be selected with 4 different types of CHARM terminals
- No. of IS Baseplates – Can be selected from 0 to 8
- CHARMS I/O Gateway Assembly – Can be selected from 2 different types of Networking topologies
- Non-IS and IS baseplates installation not possible in single column

- **Enclosure Material:** Stainless Steel SS304 or SS316L
- Stainless steel provides protection for corrosive environments (category CSA 4X). SS316L provides superior corrosive protection and is typically applied in offshore applications (salt resistant)
- Pre-drilled bottom entry with cable glands for I/O, power, communications, and grounding cables
- With standard drill pattern (with stop plugs) or cable transit system with flexible cable gland blocks that are installed in a cable entry frame
- Name plate engraved with custom supplied SJB identification information
- **24V DC injected power (optional):** 12 fused circuits, prewired to all non-IS base plates. (This option includes a redundancy diode to bring primary and secondary power feeds to a common injected power distribution)
- Heaters for extreme low temperature installations & condensation management (Optional)
- Blue IS signals Field Cable ducts
- CIOC Network: Fiberoptic / Copper
- Warning label languages other than standard English, French, Spanish, and German

All CTO options are implemented, tested and shipped to site as one package, significantly reducing the required upfront design and certification effort.

The following sections provide a more detailed specification for the CTO DCS Smart Junction Box and available options.

Overview of DeltaV CTO DCS Smart Junction Boxes (SJB) – Base Models

CTO Base Model No.	Description	No. of CHARM I/Os	Power Requirements (Pri. and Sec.)	Permitted Location
NA-FE-96-AC-CIOC-HA	AC Powered Smart Junction Box for 96 CHARM I/O; For Class I, Div 2 Area	96	120V AC	Hazardous Area (US/Canada)
NA-FE-96-AC-CIOC-SA	AC Powered Smart Junction Box for 96 CHARM I/O; For Safe Area	96	120V AC	Safe Area (US/Canada)

The CTO base model reference for Smart Junction Box uses the following naming convention: **NA-FE-96-YY-CIOC-ZZ**, where:

- **NA** = US/Canada Design Standards and Regulations
- **FE** = Smart Junction Box (SJB)
- **96** = Maximum I/O's count in the CTO model
- **YY** = Incoming Power, AC: 120V AC
- **CIOC** = Short description of content and purpose
- **ZZ** = SA: for use in Safe Area, HA: for use in Hazardous Area (Class 1 Div 2; Class I, Zone 2)

Overview of CTO DCS SJB base models and options for Safe Area & Hazardous Area

LEGENDS: • Default option setting ○ Configure to option setting (Different from Default) NA Option setting not possible for SJB Base Model			SJB Base Model		NA-FE-96-AC-CIOC-HA	NA-FE-96-AC-CIOC-SA
					50°C	50°C
SJB Options			SJB Options Setting		50°C	50°C
Enclosure Material	M	7.1	304 Stainless Steel with gland plate, Padlock Ready	•	•	
		8.1	316 Stainless Steel with gland plate, Padlock Ready	○	○	
Cable Entry	E	1.1	Bottom, Undrilled	•	•	
		2.1	Bottom, Roxtec	○	○	
		3.1	Bottom, Cable Gland	○	○	
Temperature Monitoring	T	1.1	No	•	•	
		2.3	Thermocouple wiring with CHARM - SA	NA	○	
		3.2	Thermocouple wiring with CHARM - HA	○	NA	
AC Surge Protection Device	S	1.1	No	•	•	
		2.1	Yes	○	○	
Heaters	H	1.1	No	•	•	
		2.1	Single Heater (for condensation)	○	○	
		4.1	Three Heaters	○	○	
24VDC injected power (Applicable only for Non-IS baseplates)	IJ	1.1	No	○	○	
		2.4	24VDC - 12 Circuits - SA	NA	•	
		3.2	24VDC - 12 Circuits - HA	•	NA	
CIOC Network	N	1.1	Copper Ethernet	○	○	
		3.1	Multi Mode FO Adapter (1xSC, 50/125)	•	•	
		3.2	Multi Mode FO Splice Cassette (6xSC, 50/125)	○	○	
		5.1	Single Mode FO Adapter (1xSC, 9/125)	○	○	
		5.2	Single Mode FO Splice Cassette (6xSC, 9/125)	○	○	
Certification	C	2.1	Standard CSA; Ordinary Location	NA	•	
		2.2	Standard CSA; Class 1 Div. 2 Location	•	NA	

CHARMS I/O Gateway Assembly

1. For distributed CHARM option, CHARM gateway selection “Yes / No option is available under CHARM Flexibility menu.
2. When user selects “Yes” further selection will be available to select Ring type / Star type gateway connection. Accordingly required CHARM gateway module will be added to CCT BOM.
3. Selection of CHARM Gateway will reduce installable CHARM baseplate qty in SJB by 1.

***I/O Type Selection**

1. Selection for required type and qty of CHARM Baseplate is possible in CCT. Selection will be limited to max. installation possible in selected SJB model.
(With CHARM Gateway module max. 7 baseplates can be installed and without CHARM Gateway max. 8 baseplates can be installed inside SJB.)
2. Min. 1 CHARM Baseplate (IS / non-IS) selection is mandatory for connecting SJB’s diagnostic alarms to the CHARMS CBP.
3. Mixing of IS and non-IS CHARMS is not possible in same column. Selected mix non-IS and IS CHARM Baseplate qty will be allocated to separate columns using extenders.
4. Non-IS CHARM Baseplate selection with other types of CHARM Terminal blocks combination is possible.
5. System validations are applied to avoid invalid selections by user.
6. User can refer to “Help” button for notes provided in CCT for CHARM flexibility functionality.

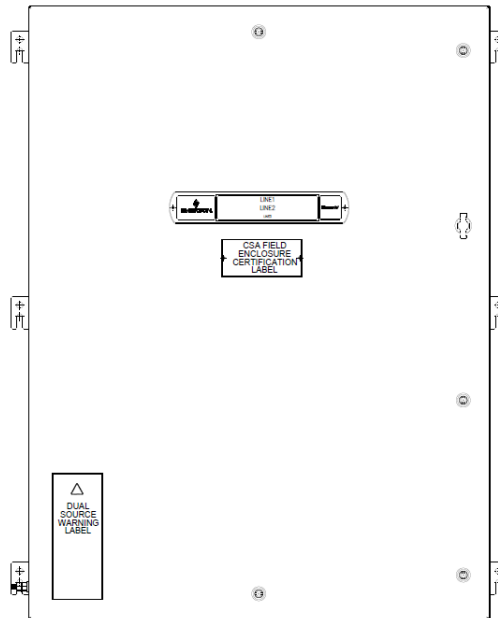
General Specifications for SJB

General Specifications for SJB	
Material (*)	Stainless Steel SS304/ SS316L, Enclosure Thickness 2mm
Dimensions	915mm (W) x 1220mm (H) x 475mm (D) (without eyebolts)
Access	Single door, left hand hinged
Protection Category	Type NEMA 4X / IP 66 (Corrosive Environment)
Cable Entry (*)	Bottom, single gland plate (Thickness 3mm)
Name Plate	Outside Door: Laser engraved plastic
Weight	~ 165 kg (may vary as per hardware added by option selection)
Control Network (*)	<p>Options available for Control Network:</p> <ol style="list-style-type: none"> 1. Redundant Single Mode FO (adapter / Splice cassette) 2. Redundant Multi-Mode FO (adapter / Splice cassette) 3. Redundant Copper (RJ45) <p>Fiber Optic control network Includes:</p> <ul style="list-style-type: none"> ■ FO to Copper Media Converter (MM or SM as per type of FO selected) ■ Media converter has one 100 BASE-FX (SM/MM) port with LC Connector ■ SC Adapters (1xSC, 50/125 – MM) or (1xSC, 9/125 – SM) ■ SC Splice cassettes (6xSC, 50/125 – MM) or (6xSC, 9/125 – SM) ■ SC-LC FO patch cables, Multimode 50/125-micron core/ cladding diameters (OM2) or Single mode 9/125-micron cable
CHARMS I/O Gateway Assembly	<p>The selection is available for CHARM I/O Gateway Assembly with 2 different types of networking topologies.</p> <p>1. Star Topology: Redundant Copper (RJ45) with 8 Ports IOP</p> <p>2. Ring Topology: Redundant Copper (RJ45) with 1 Port IOP</p>
Power Requirements – Internal Power Distribution	<p>Primary and secondary 120 VAC power supply supplied from outside the SJB. Redundant 120 VAC distribution through power terminals, and circuit breakers.</p> <p>24 VDC bulk power supplies: 2 x 10A and full redundant (primary and secondary) 24 VDC distribution (w/o injected Power). 2 x 20A and full redundant (primary and secondary) 24 VDC distribution (with injected Power).</p>
Diagnostic Alarm	Power supplies Fault Alarm
Supply Includes	Mounting plate, Halogen-Free wire ducts, external wall mounting brackets, door clamps, ground bars, external grounding bolt, drip edge, breather-drain.

(*) For available configurable options refer to respective base SJB model & options table.

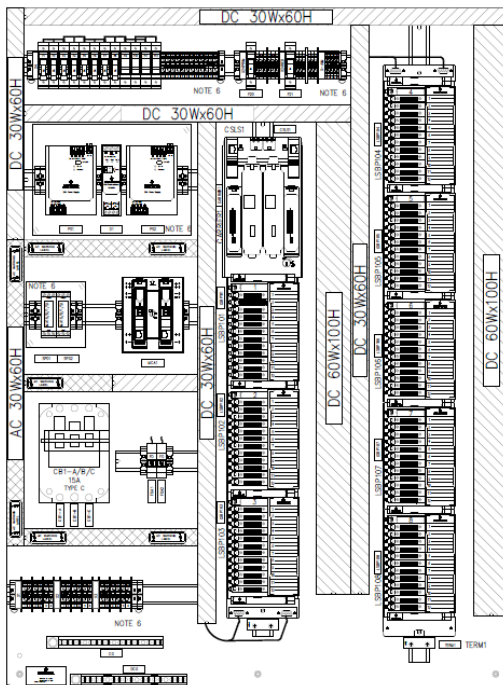
SJB General Arrangement

SJB Outer General Arrangement



915mm (W) x 1220mm (H) x 475mm (D) (without eyebolts)

Haz. Area SJB Internal General Arrangement

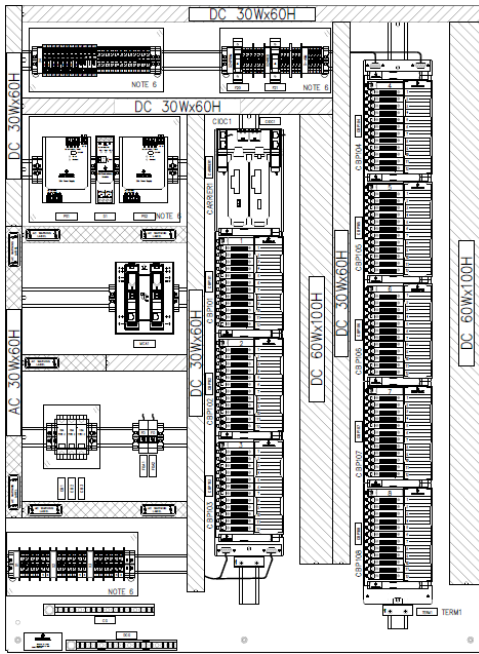


NA-FE-96-AC-CIOC-HA

This SJB has possible options for System Hardware assembly as below:

- 1 x CHARM I/O Carrier with redundant Copper Ethernet connectors
- Max. 8 nos. Non-IS or IS CHARM Base Plate as per user selection
- 1 X CHARM I/O Gateway Assembly (optional)

Safe Area SJB Internal General Arrangement



NA-FE-96-AC-CIOC-SA

This SJB has possible options for System Hardware assembly as below:

- 1 x CHARM I/O Carrier with redundant Copper Ethernet connectors
- Max. 8 nos. Non-IS or IS CHARM Base Plate as per user selection
- 1 X CHARM I/O Gateway Assembly (optional)

Design Considerations

Environmental Specifications

The CTO DCS SJBs are certified for an ambient temperature range of -40 to +50°C.

Caution: Operating any electronics at the higher end of its temperature range for long periods of time will shorten its expected lifetime, see **Effects of Heat and Airflow Inside an Enclosure** white Paper for more information.

The humidity specification for the CTO SJBs is 5-95% relative humidity, non-condensing.

The table below specifies the impact of CTO configurable options on the heat dissipation within the CTO SJBs: assuming wall mount installation (back side not used for heat dissipation), installation in shaded area (no direct sunlight) and an internal heat dissipation not greater than the value specified in the column “Maximum allowed heat dissipation inside the SJB.”

It is advised to calculate the heat dissipation and power consumption for each individual SJB with the actual quantity and mix of CHARM types. In high ambient temperatures the CHARM capacity of the SJB may have to be reduced depending on the type of CHARM types.

Heat & Power Calculations for CTO DCS CHARM Smart Junction Boxes for 50°C Ambient

CTO SJB Model	Maximum allowed heat dissipation for 50°C Ambient	User Configurable Heat contributing options			Total Dissipation	CIOC2 Heat Dissipation (W)	Maximum allowable heat load for CHARM HW
		A	B	C	(A+B+C)		
		CIOC Network	Inj. Power	Power Supply			
NA-FE-96-AG-CIOC-HA NA-FE-96-AC-CIOC-SA	160	FO	NO	10Amp	29	8	123
		FO	YES	20Amp	50		102
		COPPER	NO	10Amp	24		128
		COPPER	YES	20Amp	46		106
NA-FE-96-AG-CIOC-HA NA-FE-96-AC-CIOC-SA (With CHARM Gateway Assembly)	160	FO	NO	10Amp	29	18*	113
		FO	YES	20Amp	50		92
		COPPER	NO	10Amp	24		118
		COPPER	YES	20Amp	46		96

CIOC2 heat dissipation includes CHARM gateway Module heat dissipation value (STAR Gateway model considered here as it has higher dissipation).

Power Calculations

It is advised to calculate power requirements for each individual SJB with the actual quantity and mix of CHARM types.

SJB Location

The ambient temperature specification provided assumes the SJB is not exposed to direct sunlight. It is recommended to mount the SJB in a permanently shaded area.

System Compatibility

CTO SJBs are compatible with DeltaV v11.3.1 or later software.

CHARM I/O cards require S-series Controllers, M-series Controllers or PK Controllers.

Certifications

The CTO CHARM SJBs are designed with components that meet or exceed the following certifications. Depending on the SJB type (see specs):

- cCSAus Ordinary Locations
 - CAN/CSA C22.2 No. 61010-1
 - ANSI/UL 61010-1
- cCSAus Hazardous Locations
 - CAN/CSA C22.2 No. 60079-0
 - CAN/CSA C22.2 No. 60079-1
 - CAN/CSA C22.2 No. 60079-7
 - CAN/CSA C22.2 No. 60079-11
 - CAN/CSA C22.2 No. 60079-15
 - CSA C22.2 No. 213-M1987
 - ANSI/UL 60079-0
 - ANSI/UL 60079-1
 - ANSI/UL 60079-7
 - ANSI/UL 60079-11
 - ANSI/UL 60079-15
 - ANSI/ISA 12.12.01

Refer to the **DeltaV DCS Electronic Marshalling** or to the **DeltaV DCS IS Electronic Marshalling** Product Data Sheet for certification information on the DeltaV DCS CHARM system components.

Ordering Process

CTO DCS CHARM SJBs are pre-engineered solutions developed by Emerson's Project Management Office (PMO) and made available from Emerson Supply Chain.

Basically, the following steps are followed to obtain a CHARM Smart Junction Box:

1. Specify the CHARM SJB by selecting the base model and the options required for the project.
2. A Configuration tool is available to aid in the selection of the right combination of options for CTO CHARM SJB.
3. Based on the cabinet options selections done in Cabinet configuration tool (CCT), you will then receive:
 - A quotation for the fully assembled SJB
 - The detailed specification sheet matching your configuration, including the Bill of Materials
3. Share the generated specification sheet from the Cabinet configuration tool (CCT) with iCenter St. Louis. Based on the selected options, iCenter will provide the drawing package (PDF or AutoCAD).
4. Approve the drawing package for construction.
5. Order the CTO CHARM SJB as per provided quotation and approved drawings.
6. The CTO CHARM SJB is assembled, factory tested and delivered to site. The delivery includes the as-built drawing package (AutoCAD).

For questions related to specific project quotations or order processing, please contact your local Emerson Sales office or your regional Emerson assembly center:

For US/Canada (iCenter ST. Louis):

iCenterSTL.Quotes@Emerson.com

For Middle East, Africa and Asia Pacific (iCenter Nashik):

rfq_icenter.nsk@Emerson.com

Project Customizations

“...What if a CTO SJB is 90% what I need, but I really need my SJB to have...”

For any customizations as a variation or addition to the standard CTO offering can often be developed in such a way that the additional effort is incremental.

In case your project would require a customer witnessed FAT, this can also be accommodated.

Please work with your local Emerson Sales office or regional Emerson assembly center to evaluate any impacts of requested customizations to cost, delivery time and certifications.

Related Products

- CHARM I/O Cards (CIOC2) must be ordered separately.
- Individual IO CHARM modules (including alarm CHARMs) must be ordered separately as per project requirement

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