



## **Main features**

## Connectors compliant with DESINA® standard

DESINA® (which stands for **DE**centralised and Standardised **IN**stAllation technology) is an innovative installation concept behind a study headed by the German manufacturers of machine tools association (VDW), with the co-operation of users (including German automotive manufacturers) and component manufacturers, which has led to the introduction of a specification aimed to standardise electrical, hydraulic and pneumatic components and their interconnection on common platform for CNC controlled machine tools and manufacturing lines.

In the last few years, the DESINA® specification has been successfully enclosed in the ISO TC 184/SC 1 "Industrial automation systems and integration / Physical device control" as an ISO standard.

This work has recently been completed, and the following standards have now become available:

**ISO 23570-1** Industrial automation systems and integration – Distributed installation in industrial applications: Part 1 – Sensors and actuators. **ISO 23570-2** Industrial automation systems and integration – Distributed installation in industrial applications: Part 2 – Hybrid communication bus. **ISO 23570-3** Industrial automation systems and integration – Distributed installation in industrial applications: Part 3 – Power distribution bus.

Normally, production systems are controlled by various field buses available on the market such as PROFIBUS, CAN, INTERBUS, etc. DESINA® decentralised approach and interface and connector standardisation, which allows a single distributed control system to be independent from the bus communication protocol selected by the final user, ensure lower installation costs.

The availability of diagnostic capabilities in all the system components ensures a speedier diagnosis in the event of faults and an easier and quicker reset operation, which may be carried out by less specialised staff. DESINA $_{\odot}$  connection topology requires a **control bus** and a **power bus**.

The hybrid (optical/electrical) control bus provides a serial connection for the devices by using a cable consisting of two fibre optics and four power lines. The devices are fitted with 2 hybrid connectors (and matching flush mounted enclosures) for bus entry and exit. The hybrid connectors include an interface circuit which

turns the TX electrical signal to optical signal with TTL levels and the RX signal from optical to electrical signal with TTL levels.

In other words, the interface is independent from the selected field bus protocol, and simply converts the electrical signals into optical signals and vice versa; by doing so, the physical connection between the devices can be used for different bus protocols and can reach a 50 m range by using POF plastic fibres or 300 m by using HCS<sub>®</sub> fibreglass (Hard Clad Silica – Spectran Corporation registered trademark). The highest baud rate is 12 Mbit/s, compatible with the most advanced field buses.

Another variance is also available, which is based on transmitting data on a pair of screened copper cables (instead of fibre optics); in this case, however, the system can only be used for PROFIBUS or CAN buses with RS 485 TX signals.

In both cases, the connector is fitted with housings for 5, 10A auxiliary contacts (CD series crimp contacts), which allow all connected devices to receive a permanent direct voltage of 24V (to supply circuits) and a 24V non permanent power supply (only used to open the contactors after operating an emergency switch or a safety switch), as well as a contact available for an optional earth.

The **power bus** provides a serial connection for drives, controls and power supplies and, more specifically, is suitable to supply power to motors and to their control units.

The standard connector to control motors is the **CQM/F 08** which, with 8 poles +  $\oplus$  16A 500V, and CC series crimp contacts, not only provides a power connection, but also connects the motor brake and safety thermistor.

Another variant is available in the same sizes as the enclosure: **CQM/F 04/2** featuring 4 poles +  $\oplus$  40A 400/690V and 2, 10A 250V auxiliaries.

For the motor side connection, the connector **CNEM/F 10** (10P +  $\oplus$  16A 500V 6kV 3, with screw terminals) should be used; with the option to make a star or a delta connection on the connector, the **CSSM/F 10** connector (10P +  $\oplus$  16A 500V 6kV 3, with spring terminals, two per pole) should be used.

ILME connectors are manufactured to DESINA® specifications and in compliance with ISO 23570-2 and 23570-3 standards.



ISO 23570-3 standard and DESINA® specification compliant



## Main features

## Hybrid socket and plug connectors for field buses compliant with DESINA® specifications and with ISO 23570-2 standard

Material: PLASTIC

CK 03 IN

CKG 03 CN

electrical auxiliary female contacts

CXL 2/4 PF (for plastic fibre optics POF) CXL 2/4 PFH (for glass fibre optics HCS®) CXL 2/4 SF

The hybrid connectors for field buses are listed below:

- optical field bus plug

- optical field bus socket

The hybrid inserts for **socket** type optical field buses can only be fitted inside **fixed enclosures**. The **plug** types, on the other hand, can only be fitted inside **portable enclosures**.

The enclosures and matching accessories available are listed below:

Construction details

- fixed, flush mounted enclosure:

- portable, straight enclosures:

- portable, angled enclosures:

- cover:

The portable enclosures and the covers are fitted with an additional seal in order to achieve **IP65/IP67** (IEC/EN 60529) protection rating. With these accessories, the enclosures achieve **IP69K** protection rating (tightness to pressurised hot water jets) established by the German standard DIN 40050-9 for use on board of road vehicles, currently being approved to be included in ISO standards and being studied by IEC.

### 1 Specifications

## 1.1 Interface

hybrid electrical-optical connector insert consisting of 2 connectors for fibre optics and 4 contacts for electrical wires; an interface circuit built into the optical socket converts the electrical signals into optical signals and vice versa. 1.2 Optical parts

Insulati	on displacement connector	(IDC) for r	ibbon flat cable	on printed circuit		
					· ·	
4:	+ 24V switched	.,				
2: 3:	0V (reference for contact 0V (reference for contact	1) 4)				
<b>Pos.</b> 1:	Function + 24V not switched			optical 🛶 🎼		
Socket	connector with female auxi	liary electr	ical contacts C)	(L 2/4 SF		I
3. 4:	+ 24V switched	4)		electrical 🔶 ቮ		
2:	OV (reference for contact	1)				
Pos.	Function			antical	MINTI	
Socket	connector with male auxilia	ary electric	al contacts CXL	2/4 SM		
<b>Designa</b> designa	tion of auxiliary electrical (	contacts acts (male a	ind female) in the	hybrid socket connector with	optical TX syst	em:
Data tra	Insmission/reception rate (I	Jata rate):	up to 12 Mbit/s			
Tempera	ature range: -40 °C / +70 °C		up to 10 Mbit/-			
_	IP69K compliant	with DIN 40	050-9 (with suita	ble cable clamp)	<b>0</b> ,	
Protect	ion ratings: IP65 / IP67 comp	bliant with E	N 60529 (if a cab	e clamp with IP67 protection	rating is used)	
4 maxir	num current 10A, gold or silve	r plated bra	ss crimp contacts	, cable section 0,142,5 mm	2 (CD series); I	ive wire end temale. Nominal voltage
Electric	al contacts					
H Ontical r	CS <sup>®</sup> is a Hard Clad Silica glas	s fibre optic	with a 200 µm c	liameter for red light with wav	elength = 660 r	ım.
note: P	OF is a plastic fibre optic with	a 1000 µm	diameter for red	light and wavelength = 660 n	m.	
		HFBR-45	31, or equivalent,	Simplex snap-in type (withou	It crimping) for	POF plastic fibre optics;
receiver male op	(R): tical contact:	Agilent (H Agilent (H	IP) Versatile Link IP) Versatile Link	HFBR-2525, or equivalent		
uansinu		Agilont	D Versetile Link	LIEDD 0505, or equivalent		

RXD I ĂL 7: 8: 9: 2:3:4:5: earth +5V DC +5V DC RXD earth 10 earth

The contacts in the hybrid socket connector are numbered in a clockwise direction.

With reference to this, the contacts in the field bus hybrid plug connector are numbered anticlockwise. "R" Data reception (beam exit) "T" Data transmission (beam entry).

0

Π

RX

### electrical auxiliary male contacts

CXL 2/4 PM (for plastic fibre optics POF) CXL 2/4 PMH (for glass fibre optics HCS®) CXL 2/4 SM

CKG 03 VN (Pg 11) MKG VN20 (M 20) CKG 03 VAN (Pg 11) MKG VAN20 (M 20)

Material: METAL **CKAX 03 I** CKAX U3 I CKAG 03 V (Pg 11) MKAG V20 (M 20) CKAG 03 VA (Pg 11) MKAG VA20 (M 20) **CKAG 03 C** 

## Main features

## Socket and plug connectors for power buses compliant with DESINA® specifications and with ISO 23570-3 standard

The connector inserts on the power bus for a motor controller are as follows:

COM 08 plug - COF 08 socket

The connector inserts for the motor controller may be fitted inside the following enclosures: Construction details

- flush mounted fixed enclosure:

- portable straight enclosure:

- portable angled enclosure:

- socket cover: plug cover:

CQ 08 I CQ 08 V (Pg 21) CQ 08 VA (Pg 16) CO 08 C CO 08 CA

Material: PLASTIC

The enclosures ensure **IP65/IP67** protection rating (IEC/EN 60529) as well as **IP69K** protection rating (tightness to pressurised hot water jets) required by the DIN 40050-9 German standard for use on board of road vehicles, currently being approved as ISO standard and being studied by IEC.

#### 1 Specifications

1.1 Connection

9 contacts (8 + 1)

The male connectors (plugs) are used for termination of connecting cables; the female connectors (sockets) are fitted on the motor controller.

### 1.2 Electrical contacts

9 maximum current 10A, gold or silver plated crimp contacts, cable section 0,5...2,5 mm<sup>2</sup> (20 AWG -14 AWG) CC series.

- 1.3 Protection ratings: IP65 / IP67 compliant with EN 60529 standard (if a cable clamp with IP67 protection rating is used) IP69K compliant with DIN 40050-9 standard (with suitable cable clamp)

### 1.4 Temperature range: -40 °C / +125 °C

1.5 Electrical data compliant with EN 61984: 16A 500V 6kV 3

1.6 Self extinguishing properties 94V-0 compliant with UL 94 standard glow-wire 960 °C compliant with IEC/EN 60695-2-11 standard

#### **Designation of contacts** 2

The designation of contacts for motor controller outlet is as follows:

#### contact designation live L' 6kV 3 ( live L3 brake (0 V) 5 6 7 temperature sensor brake (+24V c.c.) live L2 8 PE temperature sensor earth CQF 08

## Socket and plug connectors for power buses in compliance with DESINA® specifications and with ISO 23570-3 standard

The connector inserts on the power bus for a motor controller are as follows:

- CQM 08 plug

23

4

- CQF 08 socket

These connector inserts can be fitted inside the following enclosures: Construction details

- flush mounted fixed enclosure:

- portable straight enclosure: - portable angled enclosure:



The enclosures ensure **IP65/IP67** protection ratings (IEC/EN 60529) as well as **IP69K** protection rating (tightness to pressurised hot water jets) required by DIN 40050-9 German standard for use on board of road vehicles, currently being approved as ISO standard and being studied by IEC.

#### 1 **Specifications**

1.1 Connection

- socket cover:

- plug cover:

5 (4 + (1) power contacts + 2 auxiliary contacts

The male connectors (plugs) are used for termination of connecting cables; the female connectors (sockets) are fitted on the motor controller.

**1.2 Electrical contacts:** 5 maximum current 40A (3P+N+) gold or silver plated crimp contacts, cable section 1,5...6 mm<sup>2</sup> (16 AWG -10 AWG) CX series. 2 maximum current 10A, gold or silver plated crimp contacts, cable section 0,14...2,5 mm<sup>2</sup> (26 AWG -14 AWG) CD series.

1.3 Protection ratings: IP65 / IP67 compliant with standard EN 60529 (if a cable clamp with IP67 protection rating is used) IP69K compliant with DIN 40050-9 standard (with suitable cable clamp)

1.4 Temperature range: -40 °C / +125 °C

1.5 Electrical data compliant with EN 61984: 40A 400/690V 6kV 3.



## Main features

1.6 Self extinguishing properties 94V-0 compliant with UL 94 standard glow-wire 960 °C compliant with IEC/EN 60695-2-11 standard

## 2

**Designation of contacts** The designation of contacts for motor controller outlet is as follows:



F



## Socket and plug connectors for power buses compliant with DESINA® specifications and with ISO 23570-3 standard

The connector inserts on the power bus for a motor controller are as follows:

	screw type with cover	spring type dual terminal for pole
- plug	CNEM 10 T	CSSM 10
- socket	CNEF 10 T	CSSF 10

To be installed in the enclosures illustrated in this catalogue or equivalent, with single lever (directed towards the motor).

The enclosures ensure IP65/IP67 protection rating (IEC/EN 60529) as well as IP69K protection rating (tightness to pressurised hot water jets) required by the DIN 40050-9 German standard for use on board of road vehicles, currently being approved as ISO standard and being studied by IEC.

#### **Specifications** 1

- 1.1 Connection 10 contacts + 🕀
- **1.2 Electrical contacts**
- 10 screw type contacts (CNE series) or spring type (CSS series), maximum current 16A, silver plated, wire section 0,5...2,5 mm<sup>2</sup> (20 AWG -14 AWG) 1.3 Protection ratings

F

IP65 / IP67 compliant with EN 60529 standard (if a cable clamp with IP67 protection rating is used) IP69K compliant with DIN 40050-9 standard (with suitable cable clamp)

## **1.4 Temperature range** -40 °C / +125 °C

1.5 Electrical data

### compliant with EN 61984: 16A 500V 6kV 3

1.6 Self extinguishing properties 94V-0 compliant with UL 94 standard glow-wire 960 °C compliant with IEC/EN 60695-2-11 standard

### 2

**Designation of contacts** The designation of contacts for motor connector is as follows:

contact	designation
1	winding U1 - L1
2	winding V1 - L2
3	winding W1 - L3
4	brake (0 V)
5	brake (+24V cc)
6	winding W2
7	winding U2
8	winding V2
ğ	temperature sensor
10	temperature sensor
	earth
	calui





## Feature of inserts for multipole connectors

inserts series	No. of poles		EN 61984 (2 pollution deg	EN 61984 (2001-11) pollution degree 3		EN 61984 (2001-11) pollution degree 2			certification UL/CSA
code	main contacts	auxiliary contacts	rated voltage	rated impulse withstand voltage	pollution degree	rated voltage	rated impulse withstand voltage	pollution degree	rated voltage AC or DC
CXL 2/4	2		contacts for p	lastic fibr	e opt	ics (POF) Ø 1m	m		
		4 (+⊕)	25V	0,8kV	3				50V
CXL 2/4H	2		contacts for H	ICS <sup>®</sup> fibre	e optio	cs ø 200 µm			•
		4 (+⊕)	25V	0,8kV	3				50V
CQ 08	8 (+⊕)		500V	6kV	3	400/690V	6kV	2	600V
CQ 04/2	4		400/690V	6kV	3				600V
		2	250V	4kV	3				600V
CNE	10 (+⊕)		500V	6kV	3	400/690V	6kV	2	600V

## Nominal Data

Nominal data complies with requirements of EN 61984 standard.

Marking example to be applied only in a mains power supply with insulated neutral or with neutral to earth in a corner (see Table 5, EN 61984):

	10A	400/690V	4kV	3
Rated current				
Rated voltage line-to-neutral Rated voltage line-to-line				
Rated impulse withstand voltage				
Pollution degree				

Marking example to be applied in any mains power supplies, including those with insulated neutral and the delta power supplies with earth in a corner (see Table 5, EN 61984):

	16A	500V	6kV	3
Rated current				
Rated voltage				
Rated impulse withstand voltage				
Pollution degree				

## Feature of inserts for multipole connectors

inserts				ambien	t ature	protection	rating		wirer	connecti	on <sup>2)</sup>		certifications
code	max rated current <sup>1)</sup>	contact resistance IA	insulation resistance IV	limit (°C	max	with enclosures	without enclosures	screw	spring	connection block at 45°	crimp	snap-in	
CXL 2/4				-40	+70	IP65/IP67	IP20					1	
	10A	3 mΩ	10 GΩ	-40	+70	IP65/IP67	IP20				1		cUL <sup>A)</sup> , UL, EAC
CXL 2/4H				-40	+70	IP65/IP67	IP20				1		
	10A	3 mΩ	10 GΩ	-40	+70	IP65/IP67	IP20				1		cUL <sup>A)</sup> , UL, EAC
CQ 08	16A	1 mΩ	10 GΩ	-40	+125	IP65/IP67	IP20				1		cUL <sup>A)</sup> , CSA, CCC, EAC
CQ 04/2	40A 10A	0,3 mΩ 3 mΩ	10 GΩ 10 GΩ	-40	+125	IP65/IP67	IP20				1		cUL <sup>A)</sup> , CSA, EAC
CNE	16A	1 mΩ	10 GΩ	-40	+125	IP65	IP20	1					dUL <sup>4)</sup> , CSA, CCC, GL, EAC

1) See the insert load curves to establish the actual maximum operating current according to the ambient temperature

2) For the wire electrical connection data, see from page 30

A) UL for USA and Canada

10A max contacts - CD serie						
conductor secti (mm <sup>2</sup> )	identification number					
0,14 - 0,37	26 - 22					
0,5	20	2				
0,75	18					
1	18	3				
1,5	16	4				
2,5	14	5				

Contacts can be supplied in the silver or gold plated version

## 16A max contacts - CC serie

TUA IIIda CUIIldula - CU SCIIC						
conductor section (mm <sup>2</sup> )	AWG	throat identification				
0,14 - 0,37	26 - 22					
0,5	20					
0,75	18					
1	18					
1,5	16					
2,5	14					
3,0	12					
4	12	•				

Contacts can be supplied in the silver or gold plated version.

Male contacts can also be supplied in the "advanced" version and iron/constantan contacts for thermocouples type J.

40A max contacts - CX serie						
conductor se (mm <sup>2</sup> )	ection AWG	identification				
1,5	16	hole Ø 1,75 mm				
2,5	14	hole Ø 2,25 mm				

12

10

4

6

Contacts are supplied in the silver plated version only

hole Ø 2,85 mm

hole Ø 3,5 mm