

GENERAL SPECIFICATIONS

Features

- Small form factor
- Easy integration
- High Speed
- High resolution
- Loss detection
- Absolute single-turn resolver cycle

Inputs

- Resolver
- Motor temperature sensor
- Halls for pass-through
- Shield

Outputs

- Clock and Data
- Motor temp
- Halls
- Shield

Applications

- Serial encoder drives to resolver motors
- CSR Adapts resolvers to panel drives
- CSR-MOD adapts resolvers to modules
- Harsh environment tolerant
- Ruggedized for defense and aerospace

Compatible Drives

- Xenus XTL, XSJ; Rugged Xenus R10, R11
- Accelnet ADP, ACJ; Rugged Accelnet R20, R21
- 1-Axis Plus drives (B*L, X*L)

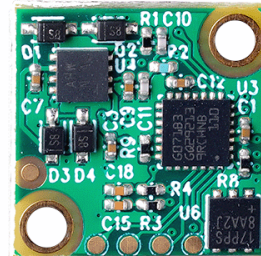
* *EtherCAT or CANopen*

Dimensions:

- CSR: 49.1 x 23.6 x 13.2 mm [1.93 x 0.93 x 0.52 in]
- CSR-MOD: 15 x 15 x 4.12 mm [0.59 x 0.59 x 0.16 in]



MODEL	APPLICATION
CSR	PANEL DRIVES



MODEL	APPLICATION
CSR-MOD	MODULE DRIVES

Description

The CSR *Copley Serial Resolver* is an adapter that utilizes Clock and Data signals to allow non-resolver drives to control resolver motors. The CSR is available for use with ARM and FPGA-based drives that have support for SSI encoders. The CSR-MOD is a module designed to be mounted on OEM mounting boards when Copley drives are used.

GENERAL SPECIFICATIONS

MODEL	CSR	CSR-MOD	
INPUT POWER			
5 V	+/- 5%	+/- 5%	Tolerance
No load Current	<5 mA	<5 mA	Quiescent
Resolver Current	100 mA	100 mA	Maximum
Input Power	< 1 W	< 1	Watts
OUTPUTS			
Serial Position	Clock & Data		
Pass-through	Halls and Motor Temp		
RESOLVER			
Type Brushless, single-speed, 1:1 to 2:1 transformation ratio			
Resolution 16 bits (65,536 counts/rev)			
Excitation frequency 8.0 kHz			
Reference voltage 2.8 Vrms			
Reference maximum current 100 mA			
Maximum RPM 25 krpm			
MECHANICAL & ENVIRONMENTAL			
Size	CSR: 49.1 x 23.6 x 13.2 mm [1.93 x 0.93 x 0.52 in] CSR-MOD: 15 x 15 x 4.12 mm [0.59 x 0.59 x 0.16 in]		
Weight	CSR: 0.36 oz [10 gm], CSR-MOD: TBD		
Ambient temperature	-40 to +85 °C operating, -40 to +85 °C storage in accordance with IEC 60068-2-1 and IEC 60068-2-2		
Humidity	0 to 95% RH, non-condensing per IEC 60068-2-78		
Altitude	≤ 2000 m (6,500 ft) per IEC 60068-2-13		
Vibration	2 g peak, 10~500 Hz (Sine) per IEC 60068-2-6		
Shock	50 g, 11 ms, half-Sine pulse per IEC 60068-2-27		
Contaminants	Pollution degree 2 per IEC 60664-1		
AGENCY STANDARDS CONFORMANCE			
<i>In accordance with EC Directive 2014/30/EU (EMC Directive)</i>			
EN 55032	Electromagnetic compatibility of multimedia equipment. Emission Requirements		
EN 55032	Electromagnetic compatibility of multimedia equipment - Immunity Requirements		
<i>In accordance with EC Directive 2014/35/EU (Low Voltage Directive)</i>			
IEC 62368-1	Audio/video, information and communication technology equipment - Part 1: Safety requirements		
<i>Underwriters Laboratory Standards</i>			
UL 62368-1, 3rd Ed.	Audio/video, information and communication technology equipment - Part 1: Safety requirements		

RoHS Directive 2011/65/EU and amendment 2015/863 is now part of the CE marking procedure



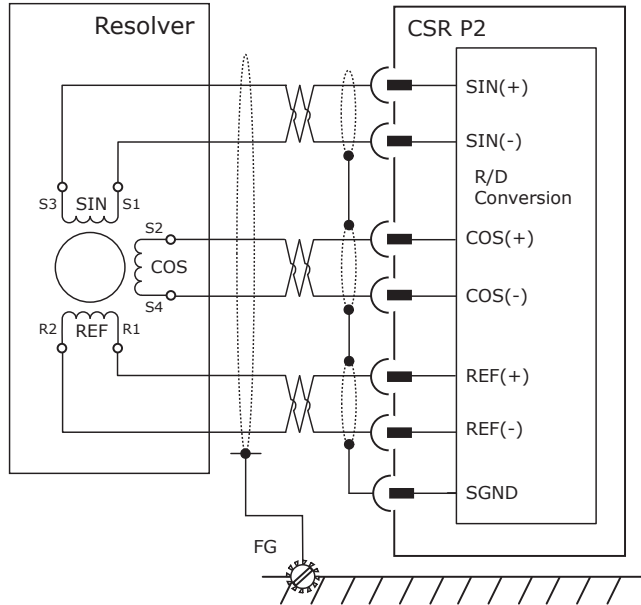
All of the agency standards are pending at this time

CSR ARCHITECTURE

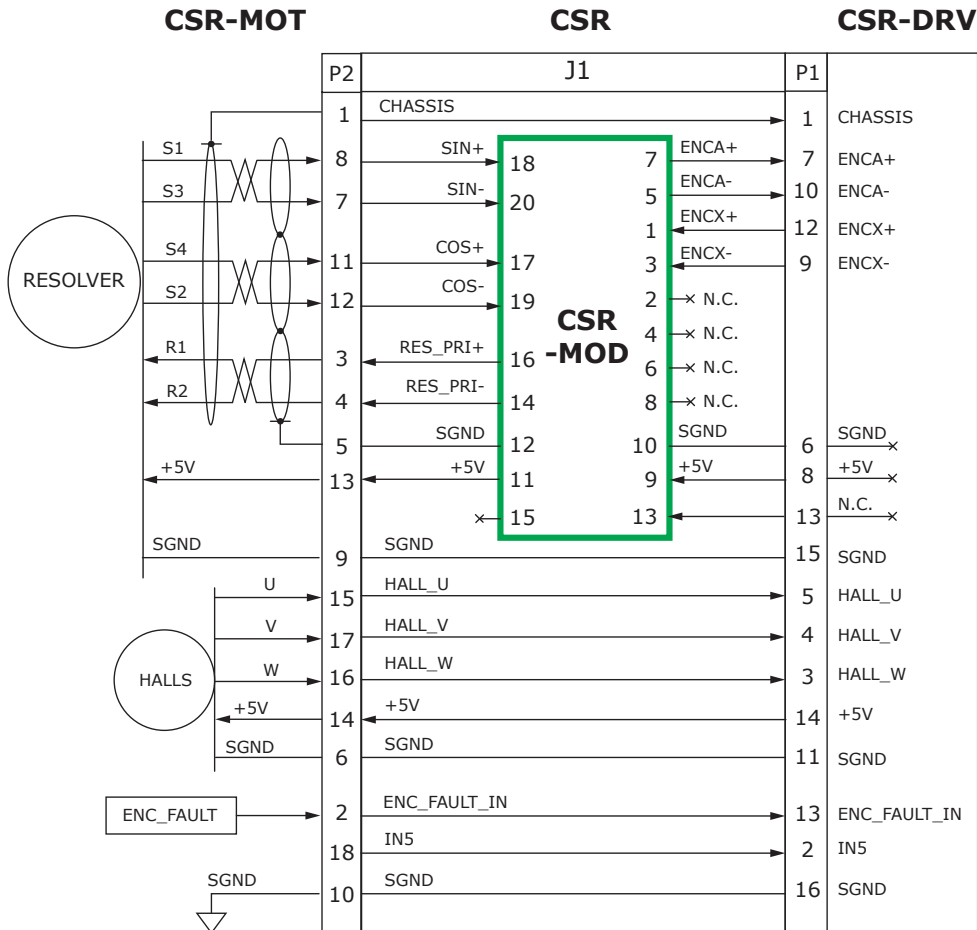
This diagram shows how a resolver motor connects to the CSR

RESOLVER

Connections to the resolver should be made with shielded cable that uses three twisted-pairs. Once connected, resolver set up, motor phasing, and other commissioning adjustments are made with CME software. There are no hardware adjustments.

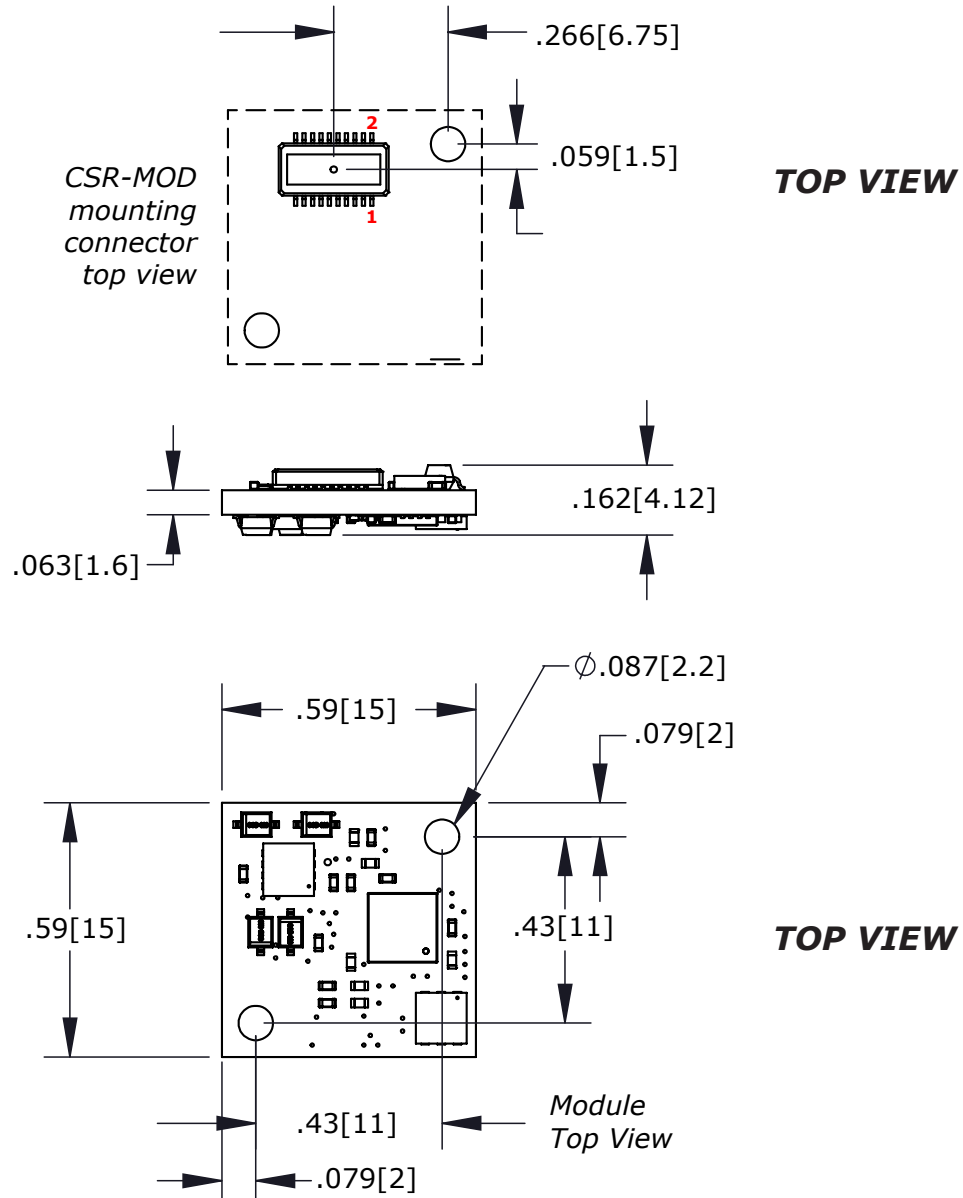


This diagram shows all of the connections from the motor resolver to the drive using cables shown on pages 7~10



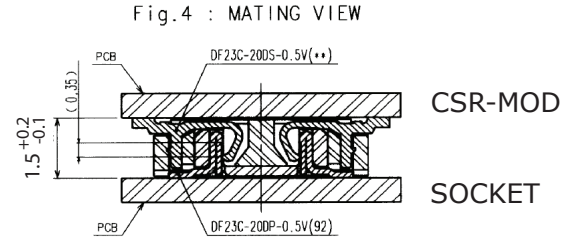
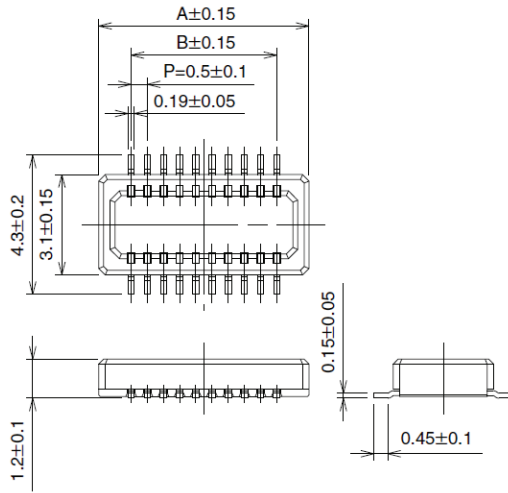
CSR-MOD DIMENSIONS IN [MM]

Below is the side view and top views of the CSR-MOD.
The dashed line shows the position of the connector on the user's mounting board.



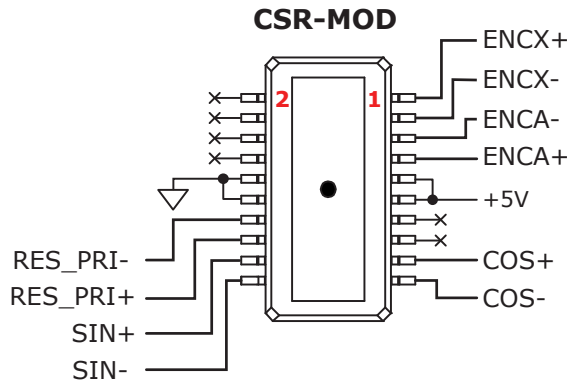
CSR-MOD CONNECTIONS

These are the dimensions of the socket that receives the CSR-MOD mounting connector (see previous page) It is a Hirose DF23C-20DP-0.5V(92) and is soldered to the mounting board.

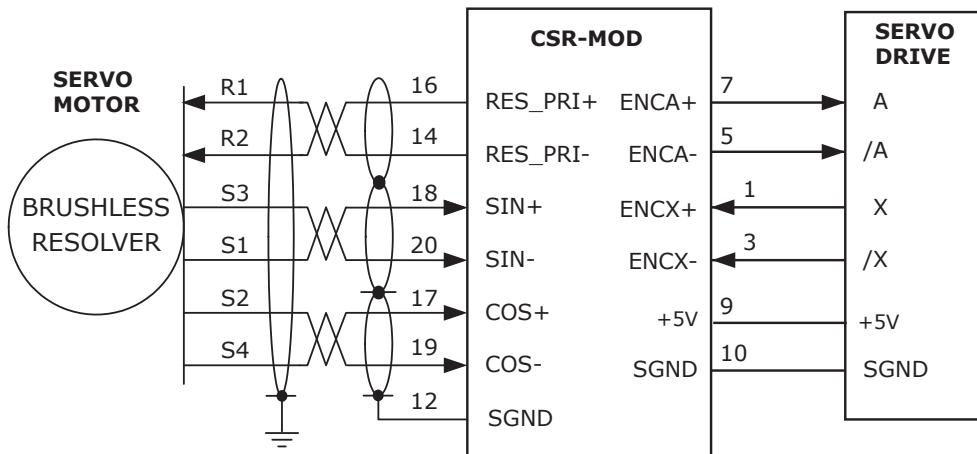


Note: dimensions are in mm

These are the connections when the CSR-MOD is inserted into the socket

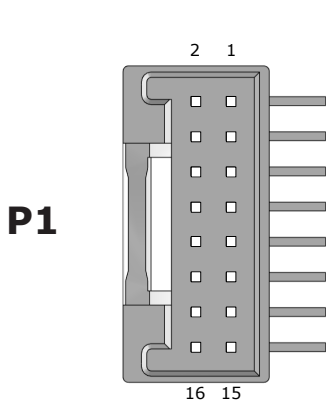


This is the circuit when the CSR-MOD is connecting to a resolver and a servo drive. The encoder interface is the type used for absolute encoders.



CSR CONNECTIONS

The two adapter connectors listed below connect the CSR to a resolver and to a servo drive. The 16 PIN connector links a servo drive to the CSR module and the 18 PIN connector links the CSR to a resolver. Connector Kit CSR-CK contains plugs and terminals for both of the adapter connectors.



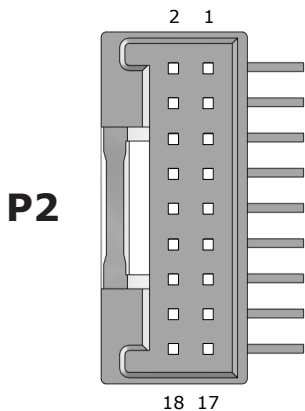
P1

16P, Molex connector

Drive Feedback Connector CSR-DRV

PIN	SIGNAL	PIN	SIGNAL
2	IN5	1	CHASSIS
4	HALL_V	3	HALL_W
6	SGND	5	HALL_U
8	+5V	7	ENCA+
10	ENCA-	9	ENCX-
12	ENCX+	11	SGND
14	+5V	13	ENC_FAULT_IN
16	SGND	15	SGND

Molex, 2mm pitch, 16 PIN, iGrid Dual-Row Wire-to-board connectors with positive lock.
Mating connector Molex part number 501646-1600.
Female Crimp terminal pins Tin (Sn) Plating, 22-26 AWG.
Molex part number 501647-1000, 2mm pitch.
Hand Crimp tool for iGrid female terminals, 22-26 AWG and 0.30-0.20mm² wire.



P2

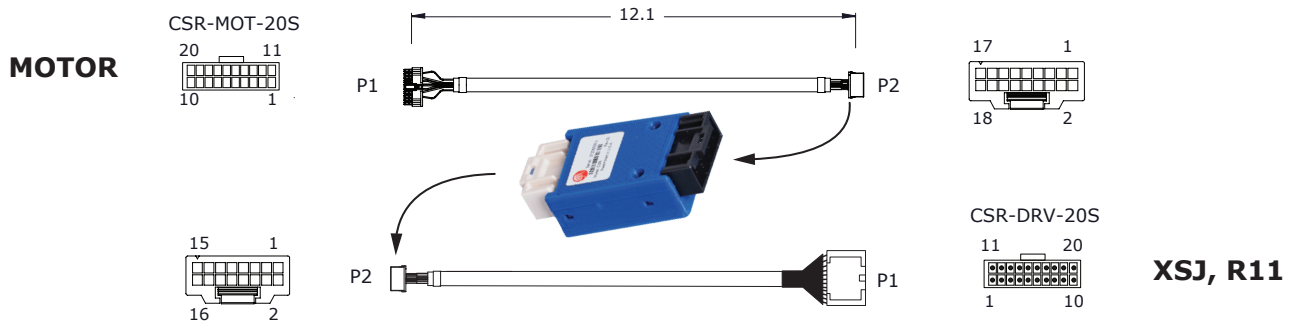
18P, Molex connector

Motor Resolver Connector CSR-MOT

PIN	SIGNAL	PIN	SIGNAL
2	ENC_FAULT_IN	1	CHASSIS
4	R2 RES_PRI-	3	R1 RES_PRI+
6	SGND	5	SGND
8	S3 SIN+	7	S1 SIN-
10	SGND	9	SGND
12	S4 COS-	11	S2 COS+
14	+5V	13	+5V
16	HALL_W	15	HALL_U
18	IN5 Motor Temp Input	17	HALL_V

Molex, 2 mm pitch, 18 PIN, iGrid Dual-Row Wire-to-board connectors with positive lock.
Mating connector Molex part number 501646-1800.
Female Crimp terminal pins Tin (Sn) Plating, 22-26 AW G.
Molex part number 501647-1000, 2 mm pitch.
Hand Crimp tool for iGrid female terminals, 22-26 AWG and 0.30-0.20 mm² Wire.

CONNECTIONS to XSJ, R11



CSR-MOT-20S CABLE

Wiring Table Motor: 105-132256-02			
Wire Pairs	SAMTEC 20M (P1)		MOLEX-18 (P2)
Black/Red	1/4/7/10/11/14/17		1
Red	N.C.		N.C.
Black/White	N.C.		N.C.
White	N.C.		N.C.
Black/Green	3/6		5
Green	N.C.		N.C.
Black/Blue	20		18
Blue	N.C.		N.C.
Black/Brown	15	S1 Sin(-)	7
Brown	5	S3 Sin(+)	8
Black/Yellow	18	Cos (-)	12
Yellow	8	Cos (+)	11
Black/Orange	12	Ref(-)	4
Orange	2	Ref(+)	3
Red/Green	9/13	SGND	9
Green	16/19	SGND	10

CSR-DRV-20S CABLE

Wiring Table Drive: 105-132256-01			
Wire Pairs	SAMTEC 20F (P1)		MOLEX-16 (P2)
Black/Red	10	Frame Gnd	1
Red	18	S4 Cos(-)	5
Black/White	8	S2 Cos(+)	4
White	9	SGND	3
Black/Green	3	SGND	6
Green	13	SGND	8
Black/Blue	20	IN14 Motemp	2
Blue	N.C.		N.C.
Black/Brown	16	SGND	9
Brown	6	SGND	12
Black/Yellow	4	FGND	10
Yellow	14	FGND	7
Black/Orange	N.C.		N.C.
Orange	17	FGND	14
Red/Green	7	FGND	15
Green	19	SGND	16

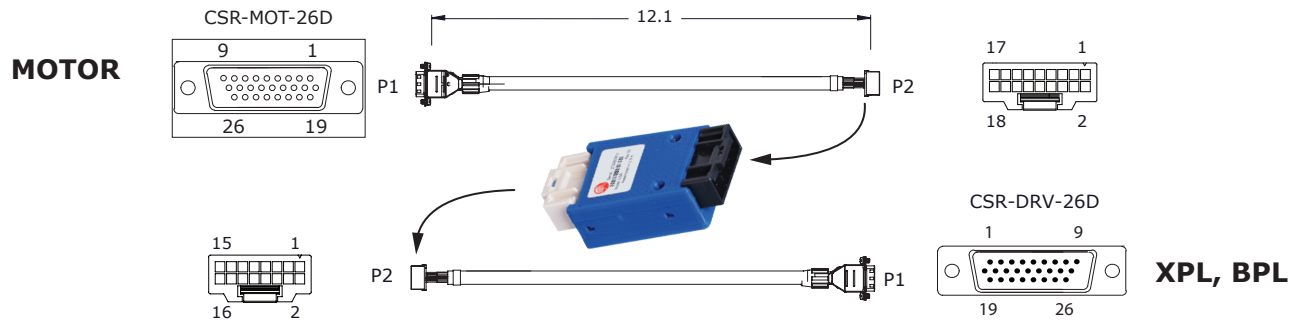
CSR-MOT-20S CONNECTOR PARTS

Item	Parts for Motor: 105-132256-02		
1	SAMTEC #IPM1-10-D	1	Mini Mate 20 Pin 132330
2	Alpha Wire #5478C	AR	16 Conductor AWG 24 Wire 155-000256
3	SAMTEC #TIM74-L-02-F	14	Crimps 132328
4	Alpha Wire #FIT-221-1/2-BLK	AR	Heat Shrink Tubing 152-000251
5	Molex #501646-1800	1	18 Pin Receptacle 132407
6	Molex #501647-1000	16	Crimps 153-002766

CSR-DRV-20S CONNECTOR PARTS

Item	Parts for Drive: 105-132256-01		
1	SAMTEC #IPD1-10-D	1	Mini Mate 20 Pin CC47-00113-000
2	Alpha Wire #5478C	AR	16 Conductor AWG 24 Wire 155-000256
3	SAMTEC #CC79L-2024-01-F	14	Crimps 153-003595
4	Alpha Wire #FIT-221-1/2-BLK	AR	Heat Shrink Tubing 152-000251
5	Molex #501646-1600	1	16 Pin Receptacle 132400
6	Molex #501647-1000	16	Crimps 153-002766

CONNECTIONS to XPL, BPL



CSR-MOT-26D CONNECTOR

Wiring Table Motor: 105-132260-02		
Wire Pairs	DB26F (P1)	MOLEX-18 (P2)
Black/Red	1	1
Red	2	15
Black/White	3	17
White	4	16
Black/Green	5/16	5
Green	6/17	13
Black/Blue	7	18
Blue	24	2
Black/Brown	18	7
Brown	19	8
Black/Yellow	20	12
Yellow	21	11
Black/Orange	22	4
Orange	23	3
Red/Green	25	9
Green	26	10

CSR-DRV-26D CONNECTOR

Wiring Table Drive: 105-132260-01		
Wire Pairs	DB26M (P1)	MOLEX-16 (P2)
Black/Red	1	1
Red	2	5
Black/White	3	4
White	4	3
Black/Green	5	6
Green	6	8
Black/Blue	7	2
Blue	24	13
Black/Brown	8	9
Brown	9	12
Black/Yellow	14	10
Yellow	15	7
Black/Orange	16	11
Orange	17	14
Red/Green	25	15
Green	26	16

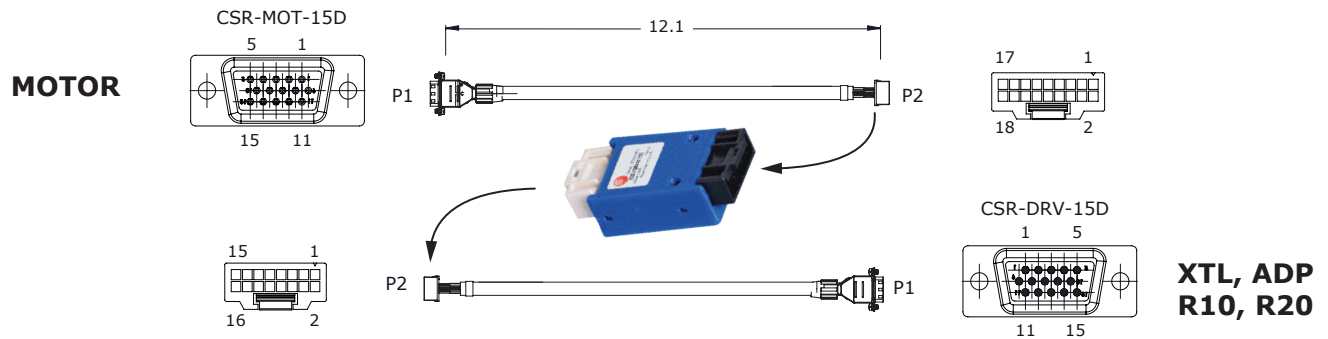
CSR-MOT-26D CONNECTOR PARTS

Item	Parts for Motor: 105-132260-02		
1	Dsub 180-026-203L001	1	26 HD # 153-003245
2	Alpha Wire # 5478C	AR	16 Conductor AWG 24 Wire 155-000256
3	3M Shell 3357-9215	1	Emi Shell # 15-330303
4	Alpha Wire # FIT-221-1/2-BLK	AR	Heat Shrink Tubing 152-000251
5	Molex # 501646-1800	1	18 Pin Receptacle 132407
6	Molex # 501647-1000	16	Crimps 153-002766

CSR-DRV-26D CONNECTOR PARTS

Item	Parts for Drive: 105-132260-01		
1	Dsub 180-026-103L001	1	26 HD # 153-003258
2	Alfa Wire # 5478C	AR	16 Conductor AWG 24 Wire 155-000256
3	3M Shell 3357-9215	1	Emi Shell # 15-330303
4	Alpha Wire # FIT-221-1/2-BLK	AR	Heat Shrink Tubing 152-000251
5	Molex # 501646-1600	1	16 Pin Receptacle 132400
6	Molex # 501647-1000	16	Crimps 153-002766

CONNECTIONS to XTL, ADP, R10, R20



CSR-MOT-15D CONNECTOR

CSR-DRV-15D CONNECTOR

Wiring Table Motor: 105-132259-02		
Wire Pairs	DB15F (P1)	MOLEX-18 (P2)
Black/Red	1/6/11	1
Red	N.C.	N.C.
Black/White	N.C.	N.C.
White	N.C.	N.C.
Black/Green	5	5
Green	N.C.	N.C.
Black/Blue	10	18
Blue	N.C.	N.C.
Black/Brown	7	7
Brown	8	8
Black/Yellow	12	12
Yellow	13	11
Black/Orange	2	4
Orange	3	3
Red/Green	15	9
Green	N.C.	N.C.

Wiring Table Drive: 105-132259-01		
Wire Pairs	DB15M (P1)	MOLEX-16 (P2)
Black/Red	1	1
Red	3	5
Black/White	6	4
White	9	3
Black/Green	5	6
Green	2	8
Black/Blue	10	2
Blue	N.C.	N.C.
Black/Brown	7	9
Brown	8	12
Black/Yellow	13	10
Yellow	14	7
Black/Orange	N.C.	N.C.
Orange	4	14
Red/Green	15	15
Green	N.C.	N.C.

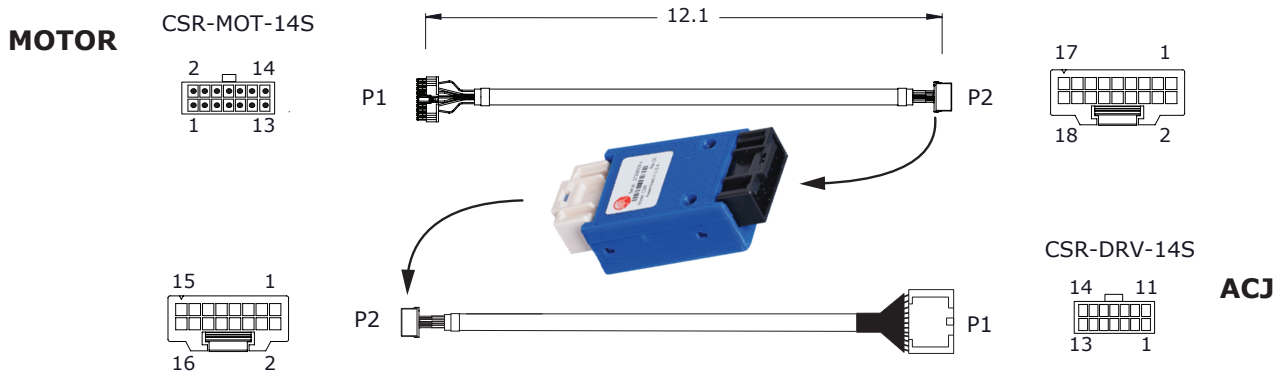
CSR-MOT-15D CONNECTOR PARTS

Item	Parts for Motor: 105-132259-02		
1	CONEC 163A 11279X	1	15 HD PLUG DSUB 114380
2	Alpha Wire #5478C	AR	16 Conductor AWG 24 Wire 155-000256
3	3M SHL 3357-9209	1	EMI SHELL # 15-320305
4	Alpha Wire #FIT-221-1/2-BLK	AR	Heat Shrink Tubing 152-000251
5	Molex #501646-1800	1	18 Pin Receptacle 132407
6	Molex #501647-1000	16	Crimps 153-0002766

CSR-DRV-15D CONNECTOR PARTS

Item	Parts for Drive: 105-132259-01		
1	DSUB 180-015-103L001	1	15HD 153-003276
2	ALPHA WIRE # 5478C	AR	16 CONDUCTOR 24 AWG WIRE 155-00256
3	3M SHL 3357-9209	1	EMT SHELL # 15-320305
4	ALPHA WIRE # FIT-221-1/2-BLK	AR	HEAT SHRINK TUBING 152-000251
5	MOLEX # 501646-1600	1	16 PIN RECEPTACLE 132400
6	MOLEX # 501647-1000	16	CRIMPS 153-0002766

CONNECTIONS to ACJ



Wiring Table Motor: 105-133744-02		
Wire Pairs	SAMTEC 14	MOLEX-18
Black/Red	14	1
Red	5	15
Black/White	12	17
White	13	16
Black/Green	11	5
Green	4	13
Black/Blue	7	18
Blue	NC	NC
Black/Brown	1	7
Brown	8	8
Black/Yellow	2	12
Yellow	9	11
Black/Orange	3	4
Orange	10	3
Red/Green	6	9
Green	NC	NC

Wiring Table Drive: 105-133744-01		
Wire Pairs	SAMTEC 14	MOLEX-16
Black/Red	14	1
Red	5	5
Black/White	12	4
White	13	3
Black/Green	6	6
Green	4	8
Black/Blue	7	2
Blue	NC	NC
Black/Brown	3	9
Brown	10	12
Black/Yellow	1	10
Yellow	8	7
Black/Orange	11	11
Orange	NC	NC
Red/Green	NC	NC
Green	NC	NC

**CSR-MOT-14S
CONNECTOR
PARTS**

Item	Parts for Motor: 105-133744-02		
1	Alpha Wire #5478C	AR	16 Conductor AWG 24 Wire 155-000256
2	Alpha Wire #FIT-221-1/2-BLK	AR	Heat Shrink Tubing 152-000251
3	Molex #501646-1800	1	18 Pin Receptacle 132407
4	Molex #501647-1000	16	Crimps 153-0002766

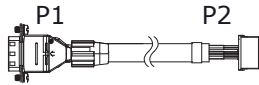
**CSR-DRV-14S
CONNECTOR
PARTS**

Item	Parts for Drive: 105-133744-01		
2	ALPHA WIRE # 5478C	AR	16 CONDUCTOR 24 AWG WIRE 155-00256
4	ALPHA WIRE # FIT-221-1/2-BLK	AR	HEAT SHRINK TUBING 152-000251
5	MOLEX # 501646-1600	1	16 PIN RECEPTACLE 132400
6	MOLEX # 501647-1000	16	CRIMPS 153-0002766

CSR CONFIGURATIONS



COPLEY CSR-DRV

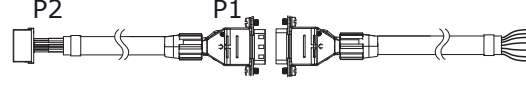


UPGRADE



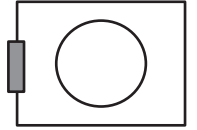
CSR

COPLEY CSR-MOT

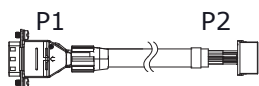


CUSTOMER CABLE

RESOLVER



COPLEY CSR-DRV

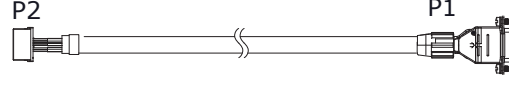


RETROFIT

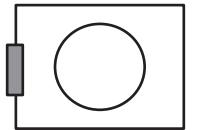


CSR

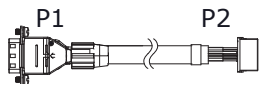
CUSTOMER CABLE



RESOLVER



CUSTOMER CABLE

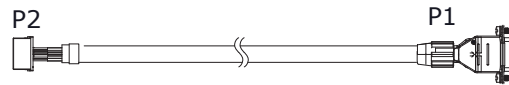


OEM CABLE DESIGN

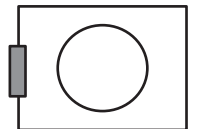


CSR

CUSTOMER CABLE



RESOLVER

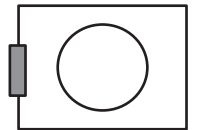


OEM MODULE DESIGN

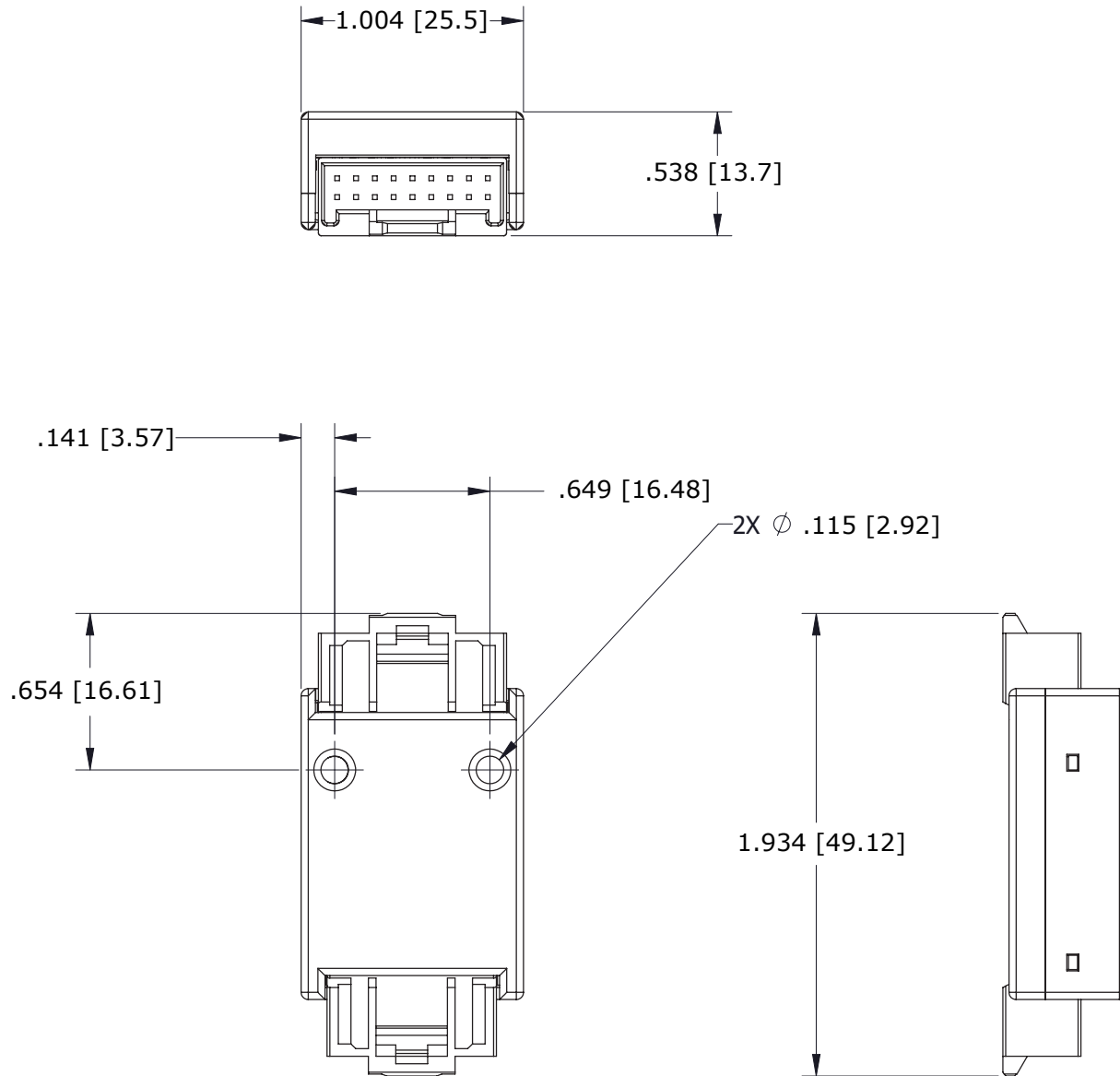
Customer PCB with Module and CSR-MOD



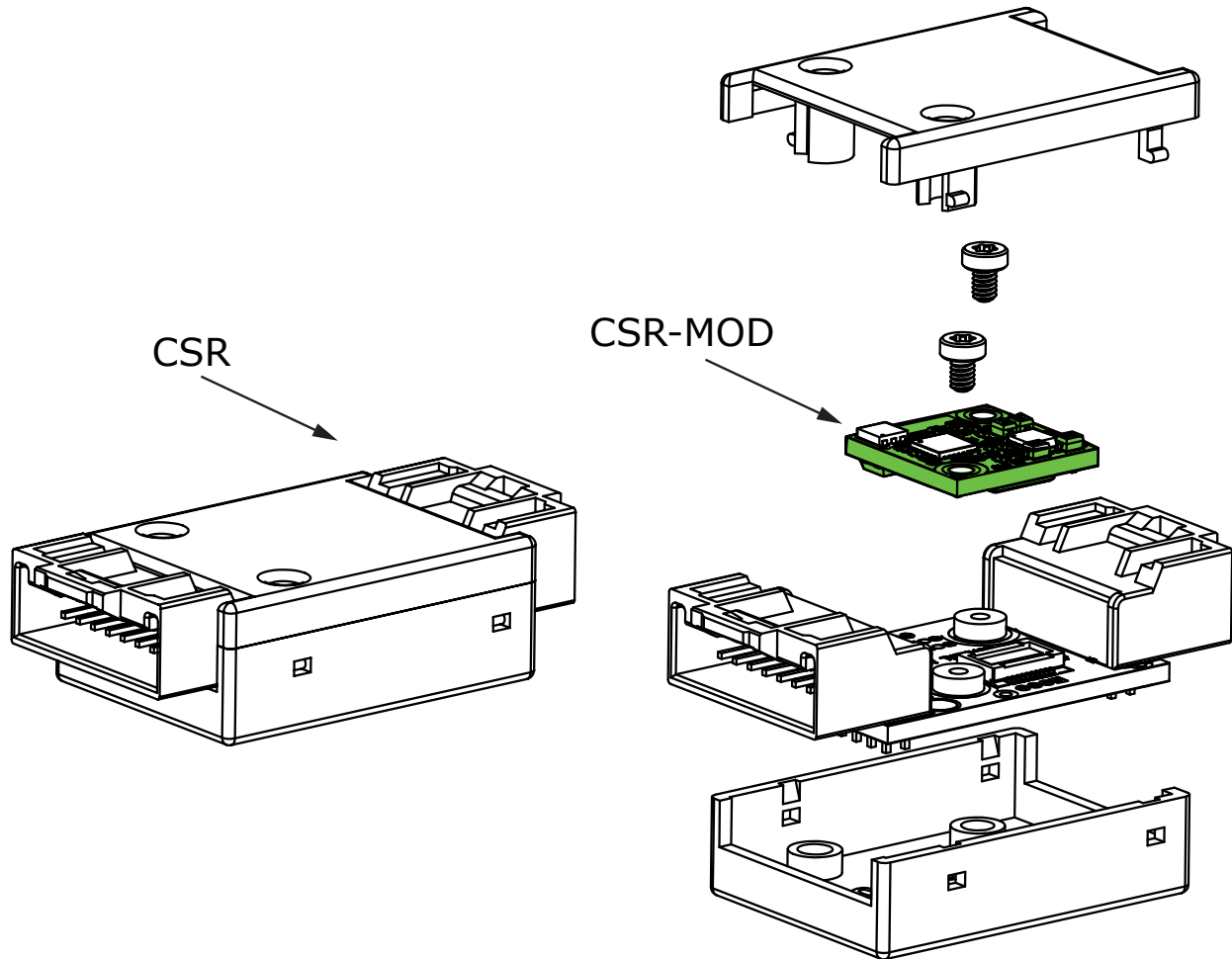
RESOLVER



CSR DIMENSIONS IN [MM]



The 2x are mounting holes.



ORDERING GUIDE

CONVERTER

CSR	Copley Serial Resolver adapter for drives
CSR-MOD	Copley Serial Resolver module for mounting boards

CONNECTOR KIT FOR CSR

	QTY	NAME	DESCRIPTION	MFGR: PART NUMBER
CSR-CK Connector Kit	1	Connector	CONN WIRE-MT HSG RCPT 2X9P 2X2MM LKG NYL NAT	Molex: 501646-1800
	1	Connector	CONN TH HDR R/A 2X8P SHRD LKG NYL-GF NAT SN	Molex: 501646-1600
	40	Pins	Crimp Terminal, 2.00 mm pitch, tin, 22~26 AWG	Molex: 501647-1000

This kit has connectors and contacts that enable the user to make their own cables that plug into the CSR.

ADAPTER CABLES

Model #	Description	Drive Connections
CSR-DRV-15D	Cable assembly for CSR to Standard 15P D-Sub drive, 12in	XTL, ADP, R10, R20
CSR-MOT-15D	Cable assembly for CSR to Resolver for Standard 15P D-Sub motor, 12in	
CSR-DRV-20S	Cable assembly for CSR to Standard 20P Samtec drive, 12in	XSJ, R11
CSR-MOT-20S	Cable assembly for CSR to Resolver for Standard 20P Samtec motor, 12in	
CSR-DRV-26D	Cable assembly for CSR to Standard 26P D-Sub drive, 12in	XEL, XPL, BEL, BPL
CSR-MOT-26D	Cable assembly for CSR to Resolver for Standard 26P D-Sub motor, 12in	
CSR-DRV-14S	Cable assembly for CSR to Resolver for Standard 14P Samtec drive, 12in	XSJ
CSR-MOT-14S	Cable assembly for CSR to Resolver for Standard 14P Samtec motor, 12in	

16-131524 Document Revision History

Revision	Date	Remarks
AA	August 20, 2021	Initial pre-production release
AB	October 15, 2021	Added mechanical drawing, connector tables, and updated ordering guide
AC	November 22, 2021	Added block diagram, and updated connector kit and ordering guide
AD	March 9, 2022	Corrected CSR graphic on p. 3

Note: Specifications subject to change without notice