

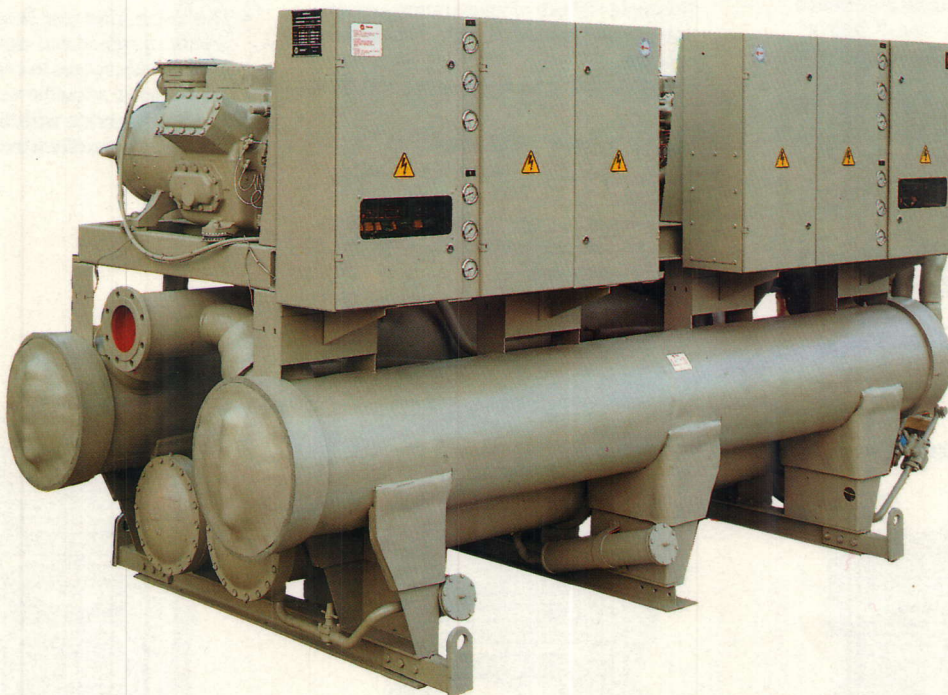


**TRANE™**

# CGWD 400 Series

Reciprocating liquid chillers,  
water cooled

- Nominal cooling capacities : 700 to 1200 kW (50Hz).  
6 sizes.
- 4 independent refrigerant circuits.
- 4 semi-hermetic, industrial type Trane, reciprocating compressors with ring type valves, removable cylinder liners and spring loaded heads.
- 8-step PID microprocessor-based leaving chilled water temperature controller.
- Multiple remote control and communication capabilities.
- Factory run tested.
- Designed and manufactured in accordance with the Trane Quality Management System approved to B.S. 5750, Part 1.



## QUALITY ASSURANCE



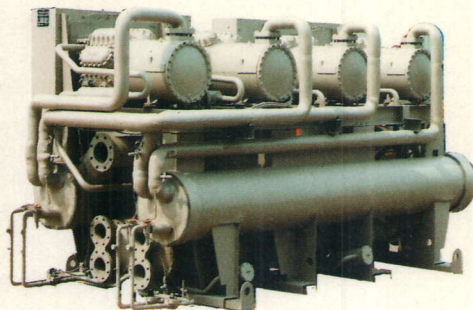
APPROVALS  
B.S. 5750Pt1  
ISO 9001  
NEN 2646

B47 CA 002 E

Reciprocating liquid chillers, water cooled  
CGWD 400 series. 700 to 1200 kW (50Hz).



**S**eries CGWD 400 reciprocating liquid chillers make use of proven components in particular industrial-type Trane semi-hermetic compressors, which have contributed to establish the reputation of superior reliability and performance of the Trane reciprocating chillers. The series 400 chillers are equipped with the latest microprocessor control technology providing smooth accurate and logical chiller control which in turn translates into increased reliability and chiller performance.



## CGWD 400 Series

### Proven components combined with microprocessor-based control

- Heavy duty industrial-type compressors, both efficient and reliable.
  - Proven heat exchangers designed for long life.
  - Reduced number of compressor starts through intelligent, programmed operating mode control.
  - Load limiting of each compressor when working at critical conditions.
- Increased efficiency and reliability.**

### Extensive communication capabilities

- Display of operating status and chilled water temperature. In case of fault, a diagnostic code indicates precisely the nature of the problem.
  - Low cost remote control including chilled water temperature setpoint reset, on/off control and chiller status information.
  - Easy integration into a Building Management System via the serial communication port.
- Full supervision of the chiller with local, remote, parallel or serial communication.**

### Leaving water temperature control

- PID (Proportional + Integral + Derivative) control taking into account leaving water temperature of both evaporators.
  - 8-step capacity control as standard (12 or 16-step optional).
- Accurate and responsive control of the chilled water temperature.**

### True standby capability

- 4 independent refrigerant circuits : avoids cross contamination in case of motor failure of one circuit maintaining 75 % of the nominal capacity.
  - 2 independent control circuits : in case of a major problem on one control module (example : failure of temperature sensor) unit can still operate at 50 % of its nominal capacity.
- Ensures safe and continuous operation.**

### Trouble free installation

- Every chiller is factory run tested before shipment.
  - The compact design facilitates rigging on site without compromising accessibility of major components.
- Reduced installation and maintenance costs.**

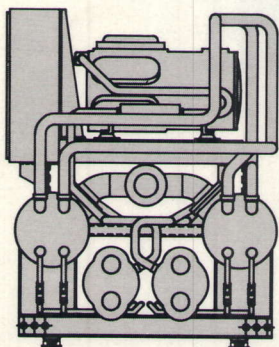
### Total quality system

- Numerous tests and controls at each step of manufacturing and assembly.
  - Factory run-test including performance verification before shipment.
  - Design and manufacturing in accordance with the Trane Quality System approved to BS 5750 Part 1, ISO 9001 and NEN 2646.
- Guarantees the conformity of the product with the technical specifications.**

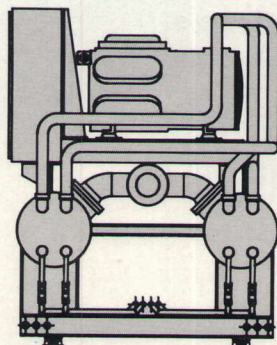
### The Trane organization at your service

- More than 50 Sales Offices all over Europe.
  - The Trane After Sale-Service, staffed by mobile, qualified and experienced technicians with access to complete spare parts stocks, available worldwide.
- Efficient service with the backup of a leading manufacturer.**

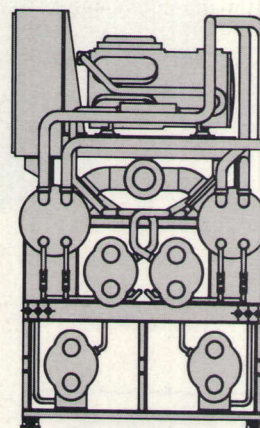
### The 400 series range of chillers :



- **CGWD** : Packaged water cooled liquid chillers.

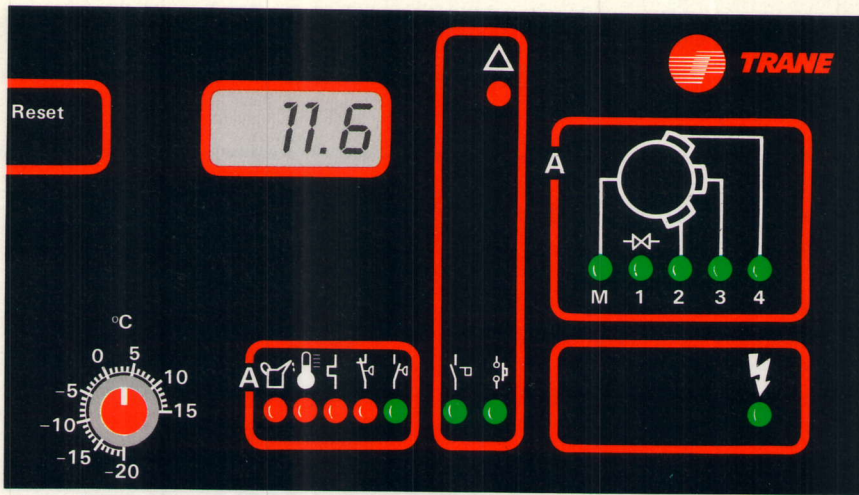


- **CCUD** : Compressor-chiller units (for installation with a remote air cooled condenser).



- **CGHD** : Packaged water cooled liquid chillers with auxiliary condensers for heat recovery applications.





Central control modul

## RCM Microprocessor control system

Precise PID-type leaving chilled water temperature control, advanced operating mode control and system protection, local and remote control and communication capabilities

### Microprocessor based chilled water control

The RCM controls from the leaving or supply water side of the chiller. With this temperature as a component of input, its programmed logic establishes the appropriate control response needed to produce a stable and accurate leaving water temperature condition. PID control produces accurate, responsive control action, eliminating steady state error from the chiller leaving water temperature.

### Operating mode control

Programmed, «intelligent» multiparameter operating mode control assures safe and continuous operation even at marginal operating conditions.

Operating mode control includes :

- Anti-recycle timing between compressor starts, capacity steps and circuits.
- Low pressure start logic.
- Automatic restart after a power loss.
- Operating time balancing of compressors.

### System protection

All safety parameters are automatically checked before the chiller is allowed to start and also periodically during operation. The RCM system includes an auto-diagnostic routine which also covers the sensors.

The essential safety parameters are :

- Evaporator pressure
- Condensing pressure
- Motor winding temperature
- Leaving chilled water temperature
- Motor current

### Communication

The RCM system offers as standard different possibilities and levels of communication and remote control thus providing complete status information and simplified fault diagnostic.

### Operator interface

A four-digit liquid crystal display on the front cover indicates the actual leaving chilled water temperature and the set point temperature. In case of an operational problem, 17 different fault diagnostic codes can be displayed indicating precisely the nature of the problem.

LED indicating lights on the front cover provide detailed operating status information and the input status of the major safety devices.

### Parallel mode communication and remote control

The RCM accepts the following input from a remote location and thus allows remote control of the chiller :

- On/off control by means of a volt-free contact,
- Remote reset of the chilled water temperature set point with a 0 to 10 Volts signal.

Optional relay cards provide volt-free contacts for remote status and failure indication.

### Serial communication and remote control

The RCM is fitted as standard with a serial communication port which allows the chiller to communicate in the binary mode and to be integrated into a computerized Building Management system.

The RCM is a «slave system» controlled from a higher level system which can send the following commands via the serial link :

- Start/stop the chiller
- Change of chilled water set point.

The higher level system can also extract from the RCM operating and status information as well as coded diagnostic and fault indication. The information obtained through the serial communication link can be displayed on the screen of a computer or monitor.



**Table 1 - Electrical and general data (50Hz)**

Model	CGWD	420R	422R	424R	426E	428E	430E
Nominal cooling capacity (50Hz) (1)	kW	705	755	775	945	1050	1210
Nominal compressor power input (50Hz) (1)	kW	151	165	166	193	228	265
Number of compressors/circuits		4/4	4/4	4/4	4/4	4/4	4/4
Capacity control (number of steps, standard/option)		8/12	8/12	8/12	8/16	8/16	8/16
Rated load amps (2)	A	382	424	424	452	534	616
Starting amps (3)	A	634	676	676	759	931	1013
Full load amps (4)	A	424	472	472	496	588	680
Evaporator water content	litre	264	264	656	656	656	506
Condenser water content	litre	104	104	124	124	124	146
R22 operating charge	kg	120	136	148	160	216	240
Unit operating weight (5)	kg	4700	4750	5500	6000	7100	7500
Unit shipping weight (5)	kg	4650	4700	5000	5500	6600	7200

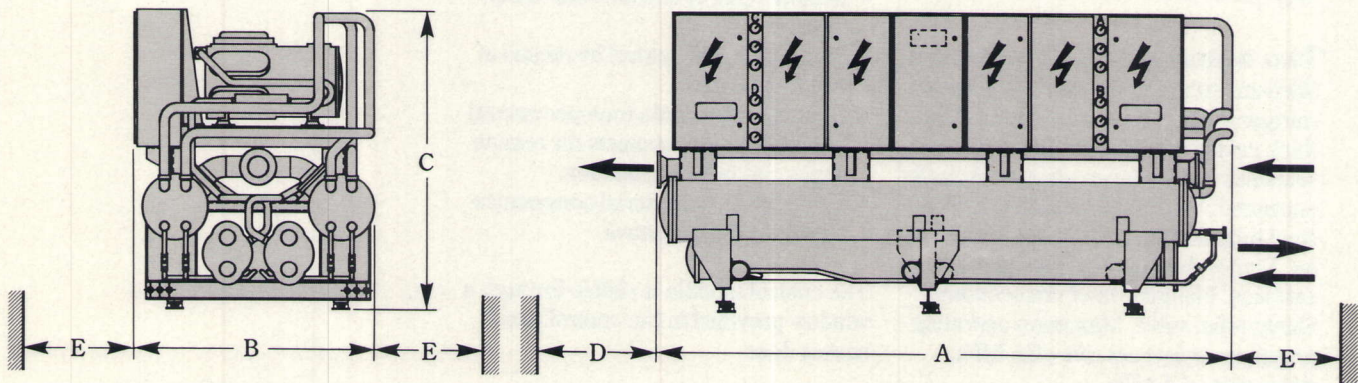
(1) Ratings are based on following conditions : leaving chilled water temperature : 7°C, leaving condenser water temperature : 32°C.

(2) At 415/3/50, 5 bar suction pressure, 25 bar discharge pressure.

(3) Part-winding start at 415/3/50, under the most critical conditions, i.e. 3 compressors running at full load and the fourth one starting.

(4) At 6 bar suction pressure and 26 bar discharge. To be used for sizing of cables, and fused disconnect switch. Corresponds to compressor operating limits.

(5) All capacity and weight data apply to CGWD chillers only and are subject to modifications. Certified drawing are available on request. For CCUD compressor-chiller units and CGHD heat recovery chillers, contact your local Trane sales office for information.



**Table 2 - Dimensions**

Model	CGWD	420R	422R	424R	426E	428E	430E
Length	A	mm	3150	3150	4150	4150	4150
Width	B	mm	1700	1700	1930	1930	1930
Height	C	mm	1900	1900	2180	2180	2180
Clearance (2)	D	mm	3700	3700	4500	4500	4500
Clearance (3)	E	mm	800	800	800	800	800
Evaporator water connections		inch	6"	6"	6"	6"	6"
Condenser water connections		inch	4"	4"	5"	5"	5"

(1) Dimensions approximate. Certified drawing available on request.

(2) Minimum clearance on one side of the unit to allow tube removal from the heat exchangers.

(3) Recommended clearance for maintenance and service access.



# Mechanical specifications

Water cooled reciprocating liquid chiller units, with four completely independent circuits factory assembled and wired, consisting of :

## Four compressors

Semi-hermetic reciprocating compressors, 1450 rpm, with suction gas cooled motor, multi-step capacity control and reduced load start. Built-in suction plenum chamber and suction screens, spring-loaded cylinders, circular non-flexible suction and discharge valves and removable cylinder liners. Forged steel crankshaft statically and dynamically balanced cast aluminium pistons, high strength heat-treated aluminium connecting rods. Lubrication system including self-reversing positive displacement oil pump, oil strainer, magnetic filters, foam breakers, oil level sight glass and crankcase heater. Part-winding start. Motor protected by sensors in the motor windings. Internal relief bypass valve, discharge backseating type service valve.

## Two water cooled condensers

Shell-and-tube design with two separate refrigerant circuits each, separated by a thick centre tube sheet into which the seamless copper tubes are mechanically expanded. Steel shell welded to heavy steel tube sheets. Built in liquid subcooler. Removable heads of closed grain cast iron. Flanged water connections. Safety relief valve. Maximum operating pressure refrigerant side : 2.5 MPa, water side : 1.4 MPa.

## Two evaporators

Two shell and tube design evaporators with manifolded flanged water connections and two separate refrigerant circuit each. Steel shell welded to heavy steel tube sheets. Seamless copper tubes mechanically expanded into grooved tube sheets. Removable heads of high strength cast steel bolted to the tube sheets. Self-energising type seal requiring low bolt torque. Thermal insulation of elastomer closed cell foam. Maximum operating pressure, refrigerant and water side : 1.4 MPa.

## Four independent refrigerant circuits.

Each circuit including filter dryer, hot gas muffler, sight glass, solenoid valve,

compressor discharge service valve, liquid line shut-off valve and thermostatic expansion valve.

Refrigerant circuits factory pressure and leak tested, dehydrated and charged with a refrigerant operating charge.

## Starter and control panels

Two panels each with separate compartments for motor starters and controls. Starter panel with part-winding contactors, overload relays and main power terminal strips. Control panel includes high pressure, low pressure and oil pressure switches and microprocessor control system with following functions :

- PID type leaving chilled water control.
- 4 digits liquid crystal display indicating chilled water outlet temperature or fault status indicating precisely the nature of the problem encountered.
- Remote reset of chilled water temperature .
- Remote On/Off control by means of volt free contacts.
- Optional relay cards (one per circuit) provide volt free contacts for remote status and failure indication.
- TTY port allowing serial communication and remote control.

The control module is visible through a window provided in the control panel access door.

## Accessories

- Rubber-in-shear or spring type isolators.
- Factory installed compressor sound attenuating enclosure.
- Fused disconnect switch.
- Counter-flanges.

## Factory run test

All units are fully factory run tested. Unit operation, controls and performance are thoroughly checked out.

## Shipment

Shipment on a wooden skid. Lifting provisions provided. Units contain their refrigerant and oil operating charge.

## Quality assurance

The products described in this catalogue are manufactured and tested in accordance with the system requirements as defined by the Trane Quality Manual. The Quality Management System applied by Trane has been subject to independent third party assessment and approval to BS 5750 Part 1, I.S.O. 9001, and N.E.N. 2646.

## Heat recovery version

CGHD 400 chillers are fitted with two auxiliary heat recovery condensers without subcooler in addition to the standard heat rejection condensers.

## Split air cooled version

CCUD 400 compressor-chiller units are designed for installation with a remote air cooled condenser. Units are not factory run tested, but undergo a detailed sequence test. Units shipped with oil operating charge and refrigerant holding charge.



# Trane : The winning technology

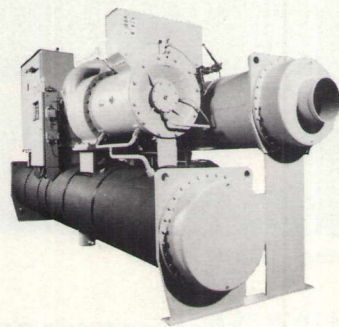
The complete range of large capacity water cooled liquid chillers.

In addition to the large capacity reciprocating liquid chillers, Trane manufactures :

## CVGD

Two-stage hermetic centrifugal liquid chillers, water cooled.

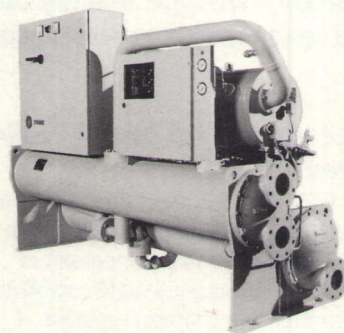
Capacity range : 900 to 3000 kW



## RTHA

Packaged, hermetic screw compressor liquid chillers, water cooled.

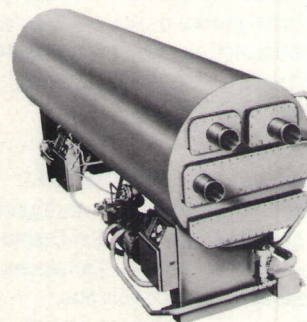
Capacity range : 350 to 900 kW



## ABSC

Absorption liquid chillers, hot water or steam powered.

Capacity range : 360 to 6000 kW.



Subject to modifications.

### Sales offices in United Kingdom and Eire

#### Birmingham

24, New John Street West,  
Newtown, Birmingham B19 3NB  
Phone : (021) 359 6354 - Telex : 336 995 G  
Fax : (21) 3598370

#### Bristol

Dockgate House,  
151 Hotwell Road,  
Hotwells  
Bristol BS8 4RU  
Phone : (272) 29 77 61 - Telex : 44 241 G  
Fax : (272) 21 45 74

#### Dublin

8, The Mall  
Lucan, co Dublin, Ireland  
Phone : (1) 28.29.65 - Telex : 31 082 EI

#### Glasgow

10 Napier Court, Wardpark North  
Cumbernauld G68 OLG  
Phone : (02367) 36927 - Telex : 779 361 G  
Fax : (2367) 36929

#### London

162 Windmill Road West  
Sunbury-on-Thames TW16 7HB  
Phone : (0932) 780 321 - Telex : 927 357 G  
Fax : (0932) 765938

#### Manchester

Enterprise Trading Estate, Guinness Road,  
Trafford Park - Manchester M17 1SD  
Phone : (061) 848 0491 - Telex : 973400 ONECOM G  
Fax : (61) 873 7303

#### Newcastle

218 Rothburry Terrace, Heaton  
Newcastle upon Tyne NE6 5DF  
Phone : (091) 276 2000 - Telex : 537 259 G  
Fax : (91) 276 2933

#### Nottingham

60 Lenton Boulevard  
Nottingham NG7 2EN  
Phone : (0602) 41 22 12 - Telex : 377 552 G

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