S331
22 May 2002

National Standards Commission

12 Lyonpark Road, North Ryde NSW

Cancellation

Supplementary Certificate of Approval

No S331

Issued under Regulation 60
of the
National Measurement Regulations 1999

This is to certify that the approval for use for trade granted in respect of the

Yokogawa Model Centum CS Bulk Flowmetering System Controller

submitted by Yokogawa Australia Pty Ltd
25-27 Paul Street North
North Ryde NSW 2113

has been cancelled in respect of new instruments as from 1 June 2002.

Signed by a person authorised under Regulation 60 of the National Measurement Regulations 1999 to exercise the powers and functions of the Commission under this Regulation.

National Standards Commission

Supplementary Certificate of Approval

No S331

Issued under Regulation 9
of the
National Measurement (Patterns of Measuring Instruments) Regulations

This is to certify that an approval for use for trade has been granted in respect of the

Yokogawa Model Centum CS Bulk Flowmetering System Controller

submitted by Yokogawa Australia Pty Ltd
25-27 Paul Street North
North Ryde NSW 2113.

NOTE: This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety.

CONDITIONS OF APPROVAL

This approval becomes subject to review on 1 April 2001 and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked NSC No S331 and only by persons authorised by the submittor.

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Instruments incorporating a component purporting to comply with this approval shall be marked NSC No S331 in addition to the approval number of the instrument.

It is the submittor's responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the Commission and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with the Commission's Document 106.

The Commission reserves the right to examine any instrument or component of an instrument purporting to comply with this approval.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificate No S1/0/A.

DESCRIPTIVE ADVICE

Pattern: provisionally approved 12 March 1996
approved 19 September 1997

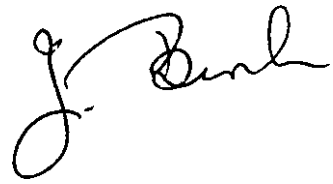
- A Yokogawa model Centum CS control system for use in a Commission-approved liquid measuring system.

FILING ADVICE

The documentation for this approval comprises:

Supplementary Certificate of Approval No S331 dated 30 December 1997
Technical Schedule No S331 dated 30 December 1997 (incl. Test Procedure)
Figures 1 to 3 dated 30 December 1997

Signed and sealed by a person authorised under Regulation 9 of the National Measurement (Patterns of Measuring Instruments) Regulations to exercise the powers and functions of the Commission under this Regulation.



TECHNICAL SCHEDULE No S331

Pattern: Yokogawa Model Centum CS Bulk Flowmetering System Controller.

Submittor: Yokogawa Australia Pty Ltd
25-27 Paul Street North
North Ryde NSW 2113.

1. Description of Pattern

A Yokogawa model Centum CS control system for use in a Commission-approved liquid measuring system.

1.1 The System

The pattern (Figure 1) is a Centum CS Distributed Control System (DCS) comprising the Field Control Station and the Information and Command Station. The system is designed to receive and process signals from measuring instruments in a petroleum measurement installation and to control the volume measurement procedure.

The equipment is designed for an environment between 5°C and 40°C.

1.2 Field Control Station (FCS)

The Field Control Station (Figure 2) comprises modules for accepting signals from various measuring and control devices. The following devices are covered by this approval:

- Temperature and pressure transducers that are compatible for use with signals of from 4 to 20 mA; and
- Compatible Commission-approved bulk flowmeters with a pulse output not exceeding 900 Hz.

1.3 Information and Command Station (ICS)

The Information and Command Station (Figure 3) provides a means of monitoring and controlling the measurement process, and provides the measurement data. The measured volume is available at both the operating conditions and at reference standard temperature at 15°C and absolute pressure of 101.325 kPa.

The ICS also has provision for data logging the changes made to the K-factor and to the meter-factor.

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1.3.1 Power Supply

The instrument operates on 110 V AC (nominal) power supply.

1.3.2 Volume Conversion Facility

The volume conversion facility is used to convert the measured volume to volume at 15°C and at 101.325 kPa, of generalised petroleum products of density between 638 and 1074 kg/m^3 at liquid temperatures between 0°C and 50°C. Volume conversion is based on Table 54B (generalised products) of the ASTM-IP *Petroleum Measurement Tables*. Pressure conversion is based on Chapter 11.2.1M of the ASTM-IP-API *Manual of Petroleum Measurements Standards*.

The converted volume, temperature, pressure and density setting may be viewed on the Yokogawa Centum visual display unit.

Details of converted and unconverted volume are clearly differentiated or identified.

1.4 Pulse Generator

The pulse generator of the flowmeter shall be interfaced in accordance with the manufacturer's recommendations, and the maximum flow rate (L/min) of the flowmeter shall be no greater than the equivalent of 900 Hz produced by the pulse generator.

1.5 Markings

Instruments carry the following markings, in the form shown at right:

Manufacturer's mark, or name written in full	
Model number	
Serial number	
Year of manufacture	
Pattern approval mark for the instrument	NSC No S331
Accuracy class	0,3
Minimum measured quantity	 L
Liquid temperature range	0°C to 50°C
Liquid pressure range	0 kPa to 2500 kPa
Liquid density range	638 kg/m^3 to 1074 kg/m^3
Ambient temperature range	5°C to 40°C
Power supply voltage (AC)	100 V to 120 V
Input pulse rate range	0 Hz to 900 Hz

1.6 Verification/Certification and Sealing Provision

Provision is made for the application of a verification/certification mark.

No sealing is required.

TEST PROCEDURE

Instruments should be tested in accordance with any tests included in the approval documentation for the flowmeter/s to which the pattern is connected, as appropriate, and in accordance with any relevant tests specified in the Inspector's Handbook.

Maximum Permissible Error
The maximum permissible error applicable at verification/certification and reverification is ±0.1%.

Instruments may be verified using the following procedure:

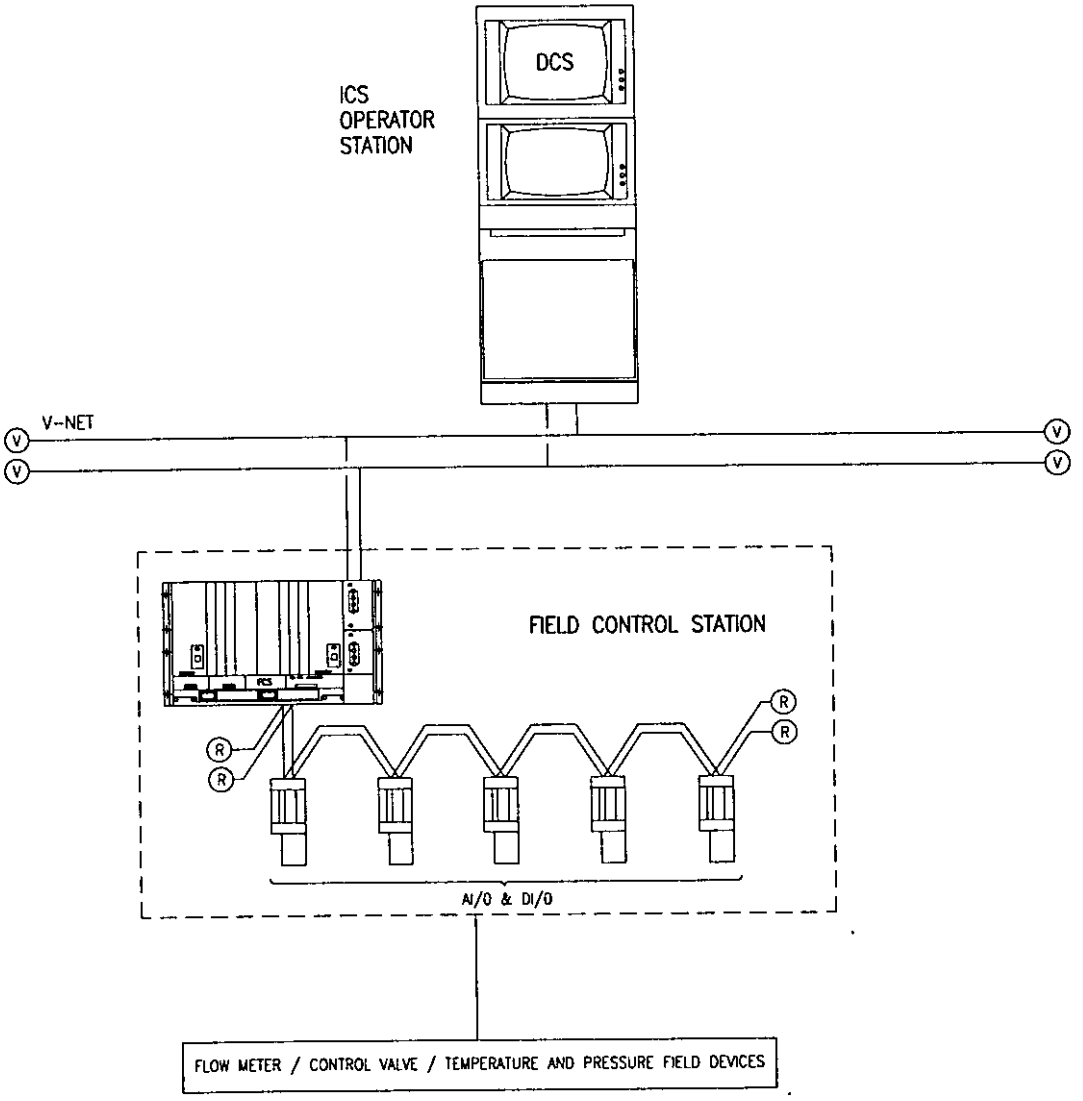
1. Using a certified counter, count the meter pulses interfaced to the Yokogawa controller.
2. Use certified instruments to measure the temperature and pressure of the liquid used by the Yokogawa controller for converting metered volume to base conditions, i.e. 15^0C and 101.325 kPa.
3. Obtain from the Yokogawa controller the K-factor, meter-factor and density settings.
4. Calculate the expected metered volumes at base conditions using the following equation (Refer to Australian Standard AS4250.5-1995, *Liquid Hydrocarbons – Dynamic measurement – Proving systems for volumetric meters. Part 5: Dynamic measurement for calculation of meter factors.*)

$$\text{Meter Base Volume} = \frac{\text{Pulses Counted} \times \text{Meter-factor} \times C_{tl} \times C_{pl}}{\text{K-factor}}$$

5. Compare the calculated meter base volume with the base volume displayed by the Yokogawa controller. The maximum permissible error is ±0.1%

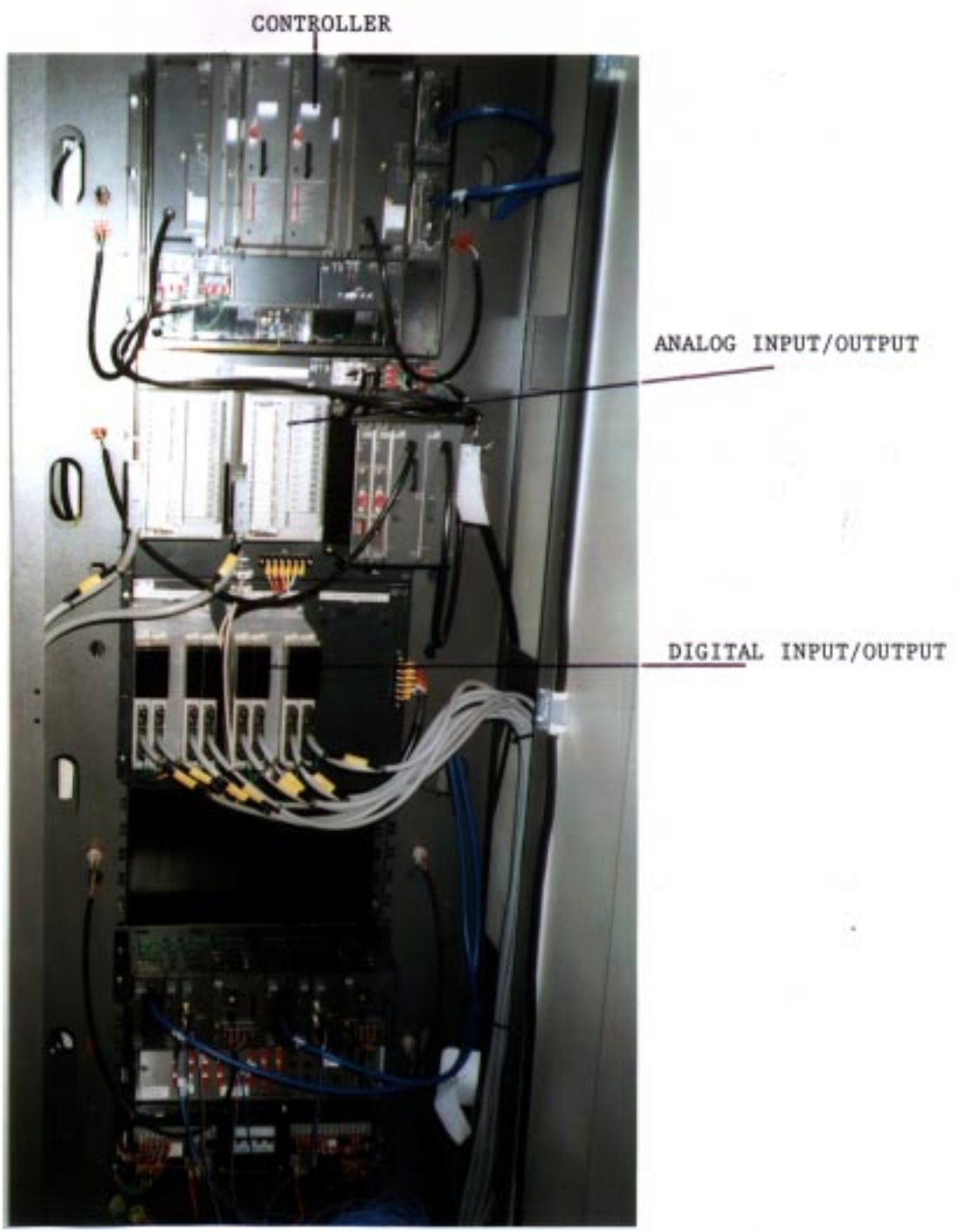
Note: The Yokogawa controller can display the temperature, pressure and density of the liquid as well as the meter pulse count, metered volume at operating conditions, metered volume at base condition and the conversion factors C_{tl} and C_{pl}.

FIGURE S331 - 1



Yokogawa Model Centum CS Control System

FIGURE S331 - 2



Field Control Station

FIGURE S331 - 3

Information and Command Station