



HYLEC CONTROLS

Weighing & Measuring Station - Omron V1

User Manual



Serial No: 2107-22-1

Software Ver: Version 1 /2022

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Introduction

This User manual provides information relevant to the installation and operation of the Hylec Controls Weighing and Measuring Station for cylindrical concrete samples with nominal diameter 100mm and height 200mm. Refer to the 'Appendix' for schematics and technical information on the panel meters, laser sensors and loadcell.

This station can operate in freestanding mode, in which it measures and displays two diameters taken at right angles to one another at the mid height of the cylinder, as well as its height, as dictated by AS 1012.8 and AS1012.9. The station also incorporates an electronic platform scale.

Alternatively, the output from the station may be fed directly into a computerised Lab Information Management System (LIMS), so that all manual recording of data is avoided. We believe this is the only Measuring Station that offers both standalone operation with display and LIMS network capability.

Dimensional measurement in the Hylec station is achieved by using edge-projection, through-beam, laser measuring heads, which afford a high degree of temperature and time stability, as well as making the dimensions relatively immune to surface defects (such as pit marks, air bubbles and nicks) in the surface of the specimens.

Further, the through-beam measurement system ensures that the dimensions recorded are not influenced by the reflectivity and colour of either the concrete specimens or of the calibration (master) cylinders.

The laser measuring heads are based on a CCD (Charge Coupled Device) array, which is an entirely digital system relying on a proportion of the parallel laser beam being blanked out by the specimen placed into the field of view between the laser source and the receiver.

1: Measuring station components

The measuring station consists of an anodised aluminium station and a HDMI Display Panel with integrated PLC controller. The interface is made by 4 only flexible cables with connector links. This allows the Measuring station to be shipped securely.

1.1: Station

The station is manufactured in anodised aluminium. Three pairs of lasers through beam sensors are mounted so that two diameters are measured at 90 degrees apart at the mid-height of the concrete sample and one overall height in the center of the sample, all in accordance with Australian Standards.

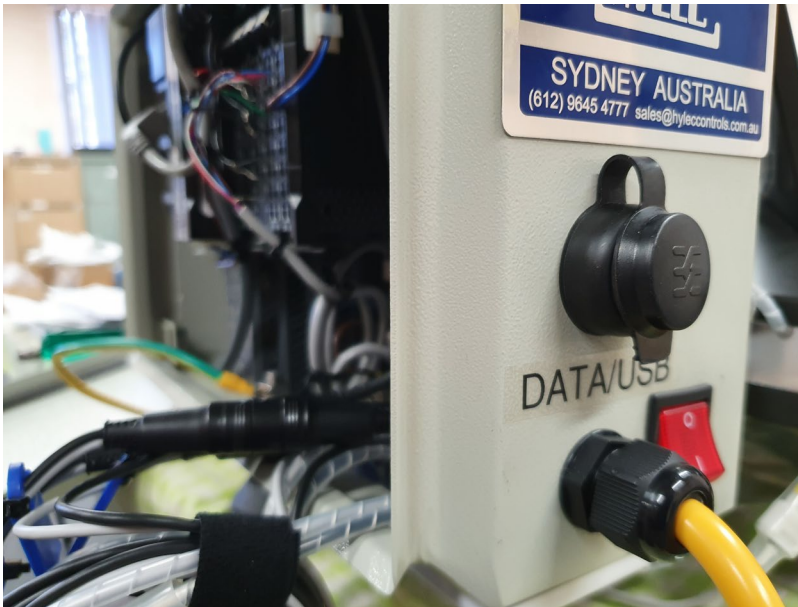
Weight measurement is incorporated into the station with the use of a loadcell mounted between the upper and lower plates. The loadcell is protected from overload by mechanical stops. A temporary spacer is fitted under the load cell during shipping to prevent damage occurring.

1.2: Control Station

The control station consists of a HDMI terminal panel displaying on the home menu screen Diameter 1, Diameter 2, Height, and Weight. And includes a second level Calibration Screen with a user-friendly step through program to complete the task and return to the home screen.

Interconnected to the HDMI Terminal is the latest Omron NX series PLC incorporating interface modules linking I/O's, communication port such as ethernet, RS232C ports and load cell and laser sensors comms.

The RS232C communication interface is supplied for connection to computers using the protocol MODBUS RTU. USB port to located on the left rear side of the station.



2: Traceable Master Cylinder Set

As a recommended option, three dimensionally and weighted steel anodised cylinders, are supplied in a protective case including NATA certification.

These are clearly engraved with their individual size parameters. And cover the lower, middle, and upper range of the laser beam width used to determine the specimen's diameter and height. The cylinder weight is determined from the load cell.

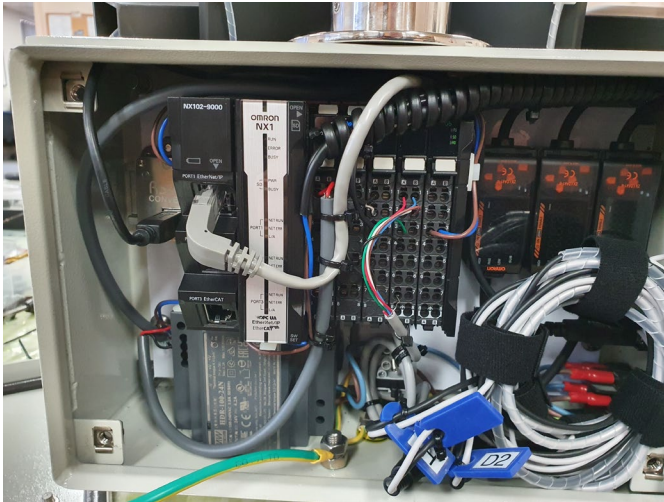


3: Assembly Instructions

- 1) The Weighing and Measuring station are shipped as two separately packaged parts, ie. the station and its control panel.
- 2) A Storage Case contenting 3 NATA certified reference cylinder and Manual are included when ordered together.
- 3) The load cell mounted within the station is locked down for shipment with one bolt, a clamp plate, and a packing block. These must be removed before the station can be used. Turn the station onto its front, then with a 4mm Allen key, remove the bolt and clamp plate in the centre of the bottom of base, as you do, hold the packing block that will now become loose, between the load cell and the base. Save these loose parts in case the station must be sent somewhere later.
- 4) Turn the station right way up and set it up on a bench with the rear side facing you approx. 30 CMS from the front edge.
- 5) Remove the 4 black hex nuts and washers from the 4 studs protruding from the back of the controller assembly and position carefully through the holes on the black angle brackets of the Station.



- 6) Tighten hex nuts until secure, do not overtighten.
- 7) Remove access panel from lower control box.
- 8) Carefully feed the loom of cables through the access point indicated in photo below.

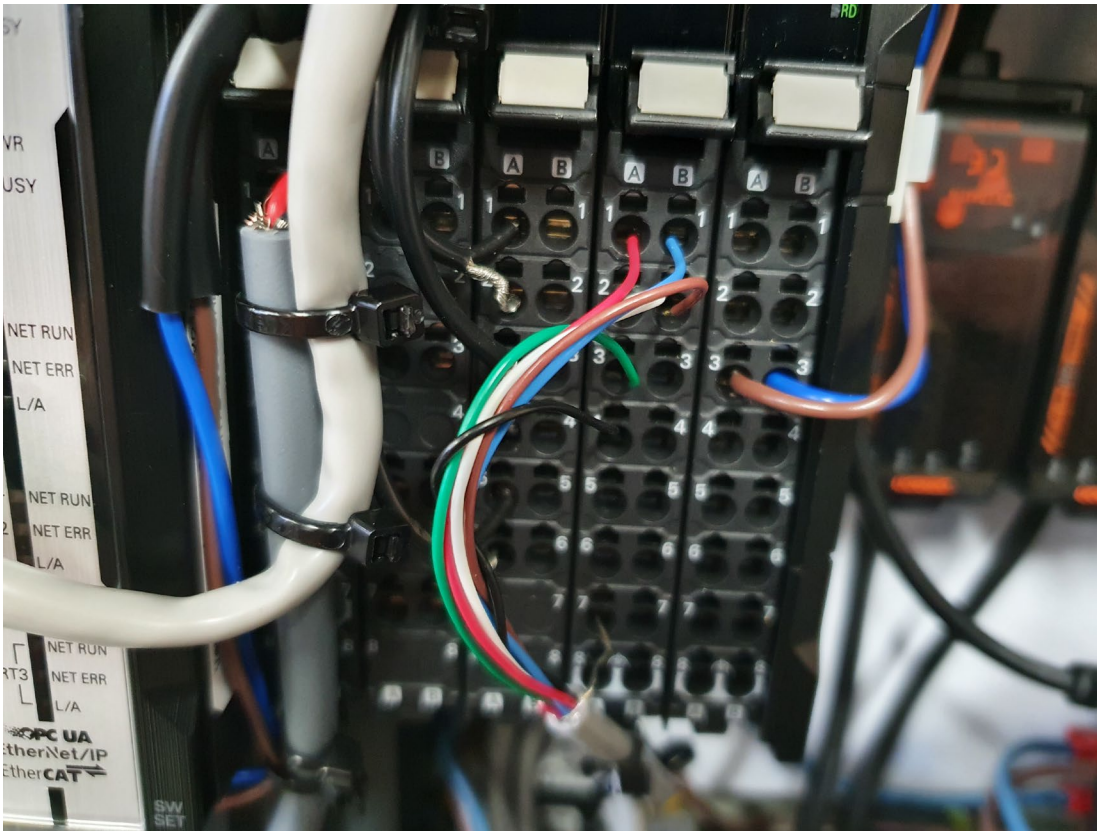


- 9) Each sensor cable is tagged with an ID label and is requires to be connected to its mating cable socket. Pay attention to the white dots indicating orientation of connection.



- 10) The Load cell cable needs to be passed through the same access port on the base of the control box and connected to the terminal block named with ID tagged wires to corresponding terminal position marked.

Refer to wiring schematic for colour code to wire connection points.



- 11) Double check all connections made that they are secure and correctly positioned.
- 12) The power lead can now be plugged in a standard power outlet 10 amps 240V. (refer to warning below)
- 13) Switch ON rocker switch on side of control box and check that the PLC LED lamp indicate a clean boot up condition, photo below indicate what to expect.
- 14) On confirming a good boot up condition, turn OFF and replace access panel.
- 15) Disconnect power cable and carefully manoeuvre the station 180 degrees so as the front side of the station and HDMI terminal screen are facing the correct way.
- 16) For operator convenience, the top of the bench should be approximately 800mm off the floor. The bench should preferably be a heavy, solid, wooden, or steel bench standing on a solid concrete floor. Vibrations in the floor or the bench will upset the measurement process.

- 17) Set up the control panel so its display is easily visible from the operators' position in front of the station.
- 18) Restore power cable and turn ON with rocker switch and allow to warm up for at least 15 mins before attempting to calibrate the Measuring Station.
- 19) During this time, you can level the station by referring to the on-board level bubble device. And adjusting feet in 5 positions



WARNING

Do not connect the 240V power lead before connecting the control panel and station together as damage may occur to the laser sensor amplifiers.

4: CALIBRATION

The two calibration elements that are necessary for a Measuring Station to meet the accuracy prescribed in the Australian Standard AS1012-9 are:

1. Certified Master Gauge/s to determine the continual dimensional reading accuracy of the laser sensors mounted on the station.
 - Height of specimen, to nearest 1 mm.
 - Each measured diameter of the specimen, to nearest 0.2 mm.

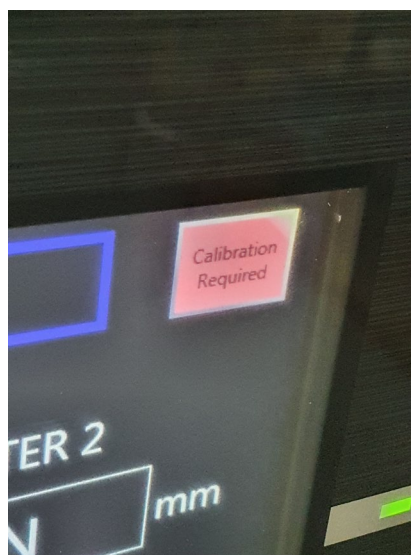
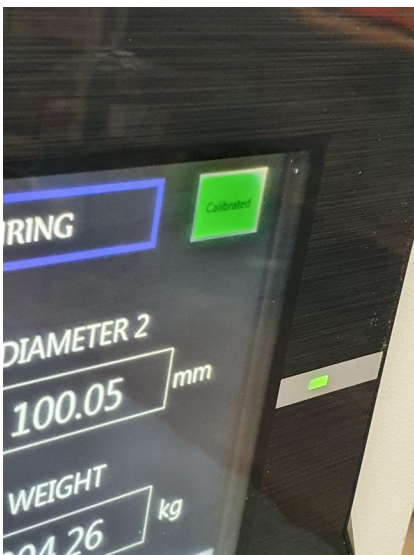
2 Certified Master Weight/s to determine the continual reading accuracy of the mounted Load Cell.

This is achieved by using 3 only precision steel cylinders dimensionally & unit weight certified to directly compare the measured readings devices on the Measuring Station to a traceable National Standard.

The Hylec Measuring Station is equipped with an onboard calibration program that will guide the user through the entire procedure.

Ideally the Measuring Station should be checked prior to use and on conclusion of a day's testing program. Also were you have a reading/s. anomaly.

A visual message will appear in the top right-hand corner of the screen.



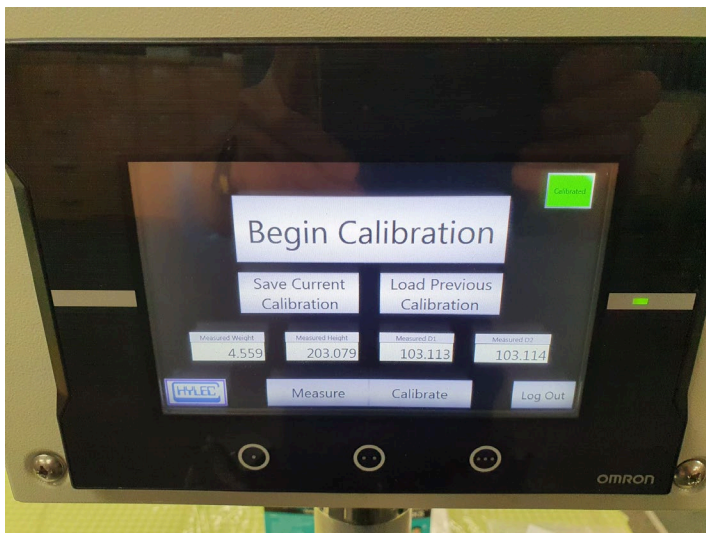
Step1



Home Menu Page> Press Hylec Icon>enter ID & Password

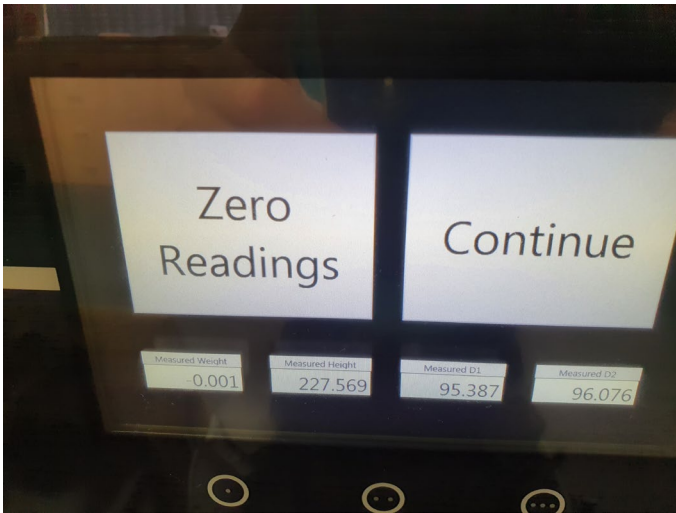
Default ID = Tech Password = 11111111

Log-in and press calibrate button which should be enabled to use.



Step 2

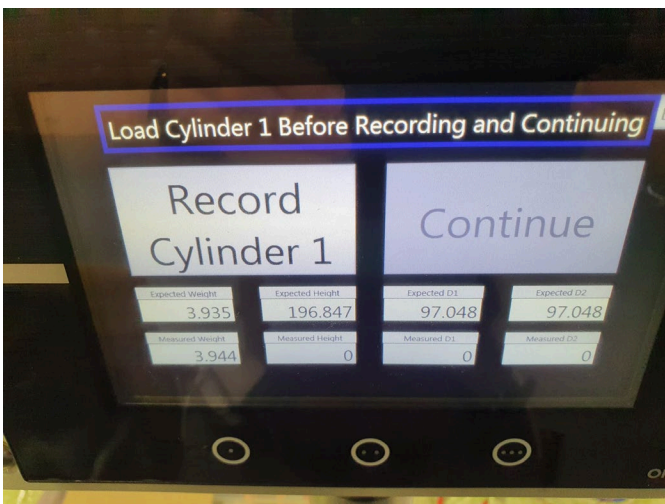
Press Begin to start program.



Step 3

Without any Master cylinder present Press Zero to tare machine.

The live weight reading should be zero with small drift (~ 0.002)



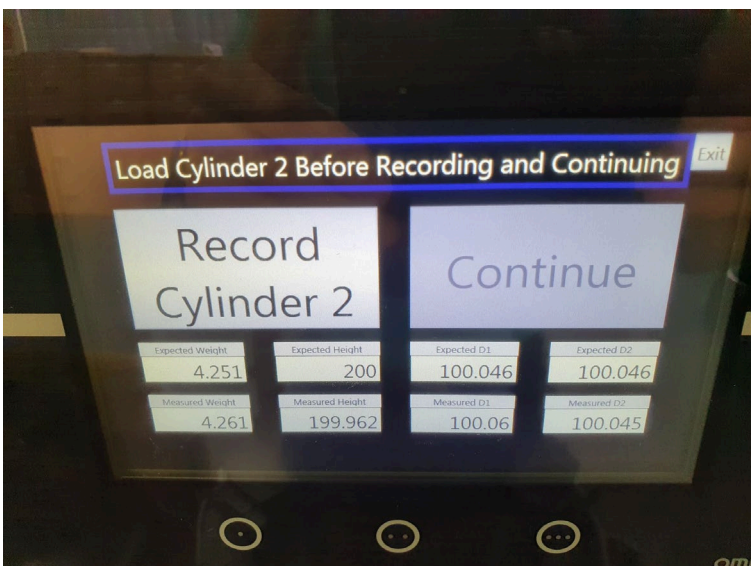
Step 4

Place Master Cylinder 1 (97mm Diameter) on station ensuring sitting on all back tops and rotate slightly



Step 5

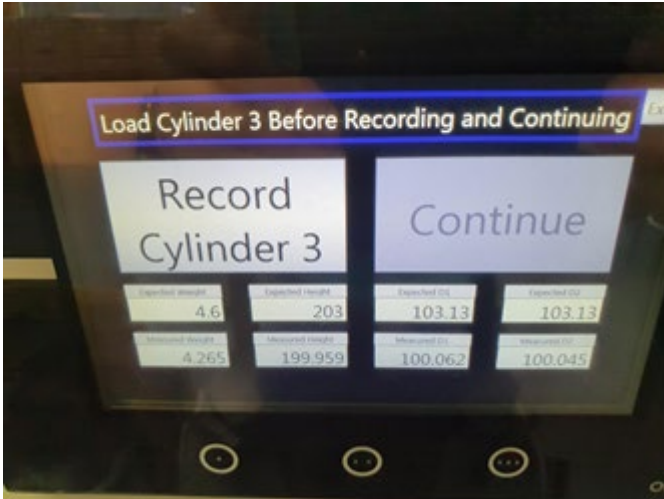
Press expected weight button and enter the value marked on the cylinder then enter
Do the same for D1 & D2 & Height Dimensions and enter
Then press record cylinder 1 and replace cylinder with cylinder 2 (100mm Diameter)



Step 6

Remove Cylinder 1 and replace with Cylinder 2 and

Then repeat Step 5



Step 7

Remove Cylinder 1 and replace with Cylinder 2 and

Then repeat Step 5



Step 8

Once recording cylinder 3 parameters

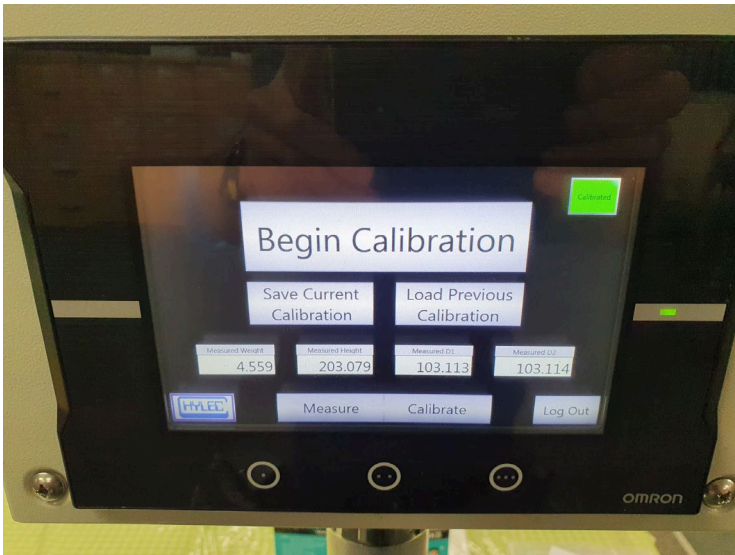
Push FINISH button to return to Calibration start screen. In this screen you are given options

- 1) To save the changes you made in the calibration procedure or load the previous saved calibration.
- 2) You can also double check the changes by pushing MEASURE button and placing the cylinder No 2 on the station before saving the changes
- 3) or if not correct, returning to the calibration program by press CALIBRATION button again.

The top right-hand side of the display screen should show a green calibrated icon.

If red calibration procedure has not been completed and finalised.

Step 9



Log out of calibrate menu access privileges.

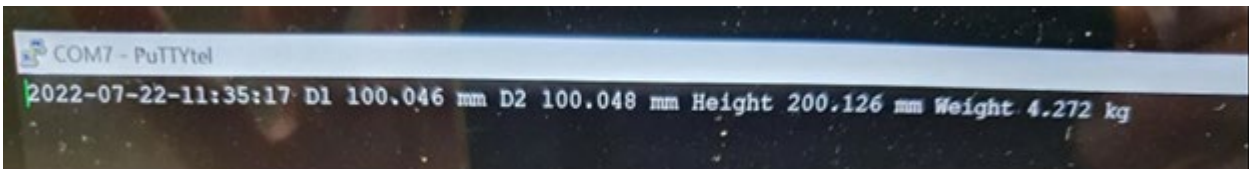
Step 10

Place Cylinder 1/2/3 on station to check accuracy.

Now ready for uses.

5: Data Collection to PC or LIMS

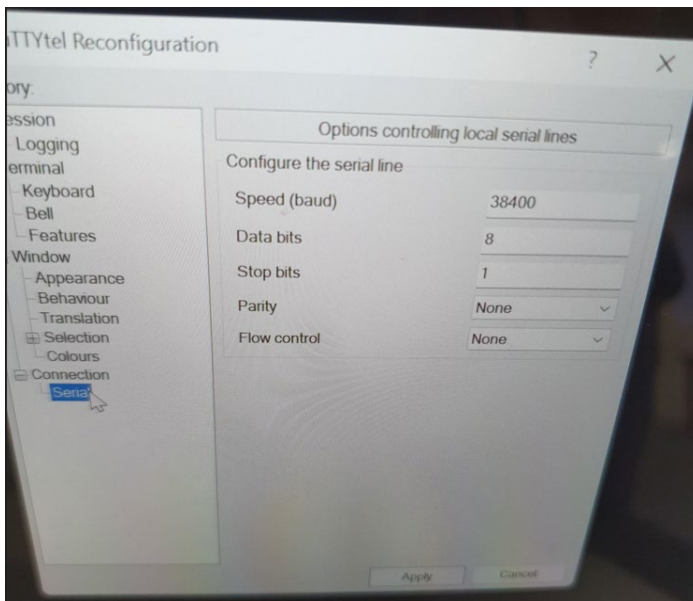
The Measuring Station utilises a MODBUS RTU protocol for exporting DATA collected from D1, D2 and H1 laser sensors and loadcell. And with the aid of a onboard RS232/485 Serial to USB converter transfer the DATA package in the following format



A driver for the Microflex USB to 2 wire RS-485 converter can be downloaded from the Microflx.com

The 101-0019 USB to RS-485 Converter provides the connection interface between a PC or laptop with a USB port and 2-wire RS-485 devices. Universal Serial Bus (USB) drivers make this converter compatible with most software developed for RS-232 serial port interfaces because it appears as an RS-232 port to your...





The converter is the following baud rate setting for correct transfer

6: Using the Measuring Station

Warning – Laser safety

The Omron ZX-LT010-series Smart Sensors radiate class 1 laser beams in the visible light range. Do not expose your eyes directly to the laser radiation. Class 1 lasers are considered safe under reasonably foreseeable conditions.

- 1) Concrete cylinders are loaded into the measuring station with their “rough” ends down.
- 2) The operator should ensure that each cylinder locates against the three pairs of locator buttons at the two uprights of the station.
- 3) All seven threaded locator buttons can be easily rotated to even out wear or be removed and interchanged.
- 4) If new buttons are inserted into the station, or old buttons are rotated to even out wear, the station needs to be recalibrated.

Electronic Loadcell

This weigh and measure station incorporates a loadcell based electronic scale with measurements indicated on the display box. Due to the ergonomic design of the station, samples of greatly different size and shape to a nominal sample (100mm diameter x 200mm length cylinder) may cause erroneous results. This is because, the station was designed to position the centre of gravity of a nominal size sample directly above the loadcell load point.

Samples of greatly different size and shape and their effects on accuracy have not been tested. This is of particular importance when having the station calibrated by a third party.

Auto Tare

Zero offsets occur in all electronic scales due to mechanical characteristics of loadcells and drift in electronics due to environmental conditions. Auto tare is a feature that automatically compensates for zero offsets. Three conditions dictate when auto tare is enabled, as follows:

- i) Weight must be within the range 0.000kg to 0.250kg.
- ii) Weight must not be varying more than 0.005kg/sec.
- iii) Accumulative zero offset must not exceed 1.000kg.

Zero offsets will be removed automatically at the rate of 0.001kg/sec.

7: : Maintenance

- Ensure the laser lenses are kept free of dust and grit to maintain accuracy. Do not use thinners, benzine, acetone, or kerosene for cleaning.
- Use a blower brush (available at photography outlets for cleaning camera lenses) to blow large dust particles from the surface. Do not blow the dust away with your mouth.
- Use a soft cloth (for lenses) with a small amount of alcohol to remove the remaining

ust. Do not use a scrubbing action when cleaning because scratches on the filter could result in sensor inaccuracy.

8: Appendix A - Service contact

For all service matters or support please contact:

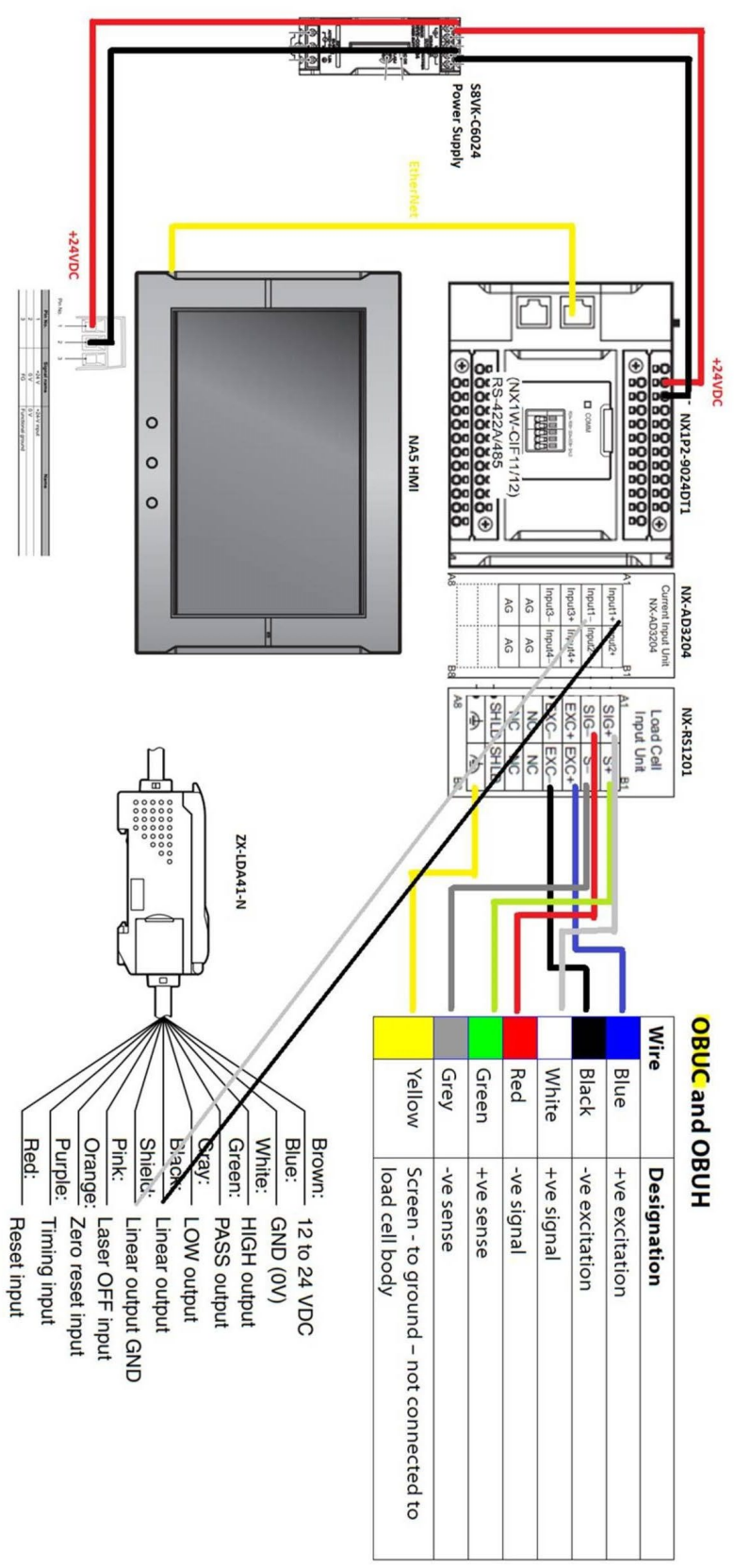
Hylec Controls Pty Ltd
8 Melissa Street, Auburn
NSW 2144

Phone: (02) 9645 4777
Fax: (02) 9645 3480
sales@hyleccontrols.com.au
www.hyleccontrols.com.au

9: Certification & Wiring Schematics

Omron System 1 configuration model Nos

NX1P2-9024DT1 NA5 SYSMAC
NX-AD3204
NX-RS1201
NX Load cell input slice
NX1W-CIF12
NX1P2 Serial Communications Option Board (CPU MAC mount). 1 x Isolated RS422A/485 port.



TEST CERTIFICATE No 2107-22-1

Customer: Elvin Group

Order No:

Machine/Type/Force/Range/No./Year Hylec Digital Concrete Cylinder Measuring Station / 0-30kg/ 100x200mm/2022

No.of/Display/PLC Omron NAS-HMI/NX1P2 9024DTI

Calibration Temperature 22 deg C

Location of Machine Factory

Date of Test 21/07/2022

Tester: Damian Langley

Measure Devices	Manufacturer	Type	Serial No	Cal Cert	valid
Load Cell	Applied Measurement UK	OBUG 30kg -002	X1057393	117337	Jun-23
Measure Amplifiers	Omron Japan	ZX-LDA41-N	multi	Conformity	N/A
Master Cylinders	Moxon Engineering	Steel	A+B+C	778-1227/22	initial only

Step [Kg]	Reference Value	Value 1	Value 2	Value 3	Av Value	Abs Error%	REL Error
Empty Tared	0	0	0	0	0	0	0
Cylinder 1	3.935	3.93	3.94	3.94	3.94	-0.167%	-0.042%
Cylinder 2	4.252	4.26	4.26	4.26	4.26	-1.867%	-0.439%
Cylinder 3	4.587	4.58	4.58	4.59	4.58	1.300%	0.283%

Step [MM]	Reference Value	Value 1	Value 2	Value 3	Av Value	Abs Error%	REL Error	mV/V
Optics (open)								
D1	0							0.042
D2	0							0.082
H1	0							0.22
Cylinder 1								
D1	97.048	97.06	97.06	97.06	97.06	-2.80%	-0.03%	1.548
D2	97.048	97.05	97.05	97.05	97.05	-0.47%	0.00%	1.143
H1	196.847	196.82	196.82	196.81	196.82	6.63%	0.03%	2.17
Cylinder 2								
D1	100.046	100.05	100.05	100.04	100.05	-0.60%	-0.01%	5.119
D2	100.046	100.05	100.05	100.05	100.05	-0.93%	-0.01%	4.45
H1	200.07	200.06	200.09	200.1	200.08	-2.00%	-0.01%	5.803
Cylinder 3								
D1	103.104	103.09	103.09	103.09	103.09	3.27%	0.03%	8.42
D2	103.104	103.11	103.11	103.11	103.11	-1.40%	-0.01%	7.78
H3	203.067	203.09	203.05	203.08	203.07	-1.03%	-0.01%	9.063
Optics (fully closed)								
D1	104.55							9.995
D2	105.15							9.994
H1	203.95							9.992

Remarks : Product tested meets & exceeded performance requirement stated in AS1012.9-8C

The Reference gauges used to measure in this document are traceable to Australian/National standards

'Unless the diameter and the height have been measured and recorded previously, determine the diameter of a cylinder or core specimen by measuring two diameters to the nearest 0.2 mm at right angles to each other, near the centre of the length of the specimen. If electronic measuring devices are used, the angle of measurement shall be in the range of 90° to 120°. In addition, measure the height over the full dimension, including moulded caps, to the nearest 1 mm.'

Authorised Signatory

Damian Langley



APPLIED MEASUREMENTS LTD.

3 Mercury House, Calleva Park, Aldermaston, Berkshire, RG7 8PN

Tel: +44 (0) 1189 817339 | Web: www.appmeas.co.uk

Fax: +44 (0) 1189 819121 | Email: info@appmeas.co.uk

CALIBRATION CERTIFICATE

Calibration of Transducer

Customer:
Hylec Controls PTY Ltd.
8 Melisse Street
Auburn
New South Wales
Australia 2144

Date: 24th June 2021

Customer Ref: 20295

AML Order Ref: 117337

Calibration Results:

Transducer Type:	OBUG-30kg-002-000
Serial No:	X1057466
Rated Capacity:	30kgf
Zero Output:	0.0194mV/V
Calibration Mode:	Compression
Full Scale Sensitivity:	1.9510mV/V
Non-Linearity:	< ± 0.03% / rated capacity
Hysteresis:	< 0.02% / rated capacity
Test Excitation:	10.000Vdc
Creep:	< 0.03% / rated capacity (30 mins)
Insulation Resistance:	20GΩ @ 100Vdc

Electrical Connections:

3m Cable

Red	+ve Excitation
Black	-ve Excitation
Green	+ve Signal
White	-ve Signal
Blue	+ve Sense
Brown	-ve Sense

Applied Measurements Limited hereby certifies that the above items have been inspected, tested and calibrated in all respects with the requirements of the customer's order.



A. C. M. LABORATORY PTY. LTD.

NATA Accredited Laboratory No. 723



21 Teton Court, Highett, Vic. 3190 Australia Ph: +61 3 9555 0671
Web: www.acmlab.com.au Email: sales@acmlab.com.au

METROLOGY REPORT

TEST REPORT NO: 723 1227/22 ISSUED: 25.03.2022 SHEET 1 OF 1

DESCRIPTION: 3 Master Cylinders.

IDENTIFICATION: See below.

DESCR. OF TEST: The diameter, height and weight of each cylinder were calibrated.
ACML traceably calibrated equipment used: 588, 095, 541, 299, 197.

DATE OF TEST: 24.03.2022

CLIENT: HYLEC CONTROLS PTY LTD

ADDRESS: 8 Melissa Street, Auburn, NSW 2144

AUTHORITY OF TEST: Damian Langley

GENERAL INFORMATION: NATA Accreditation No. 723.

Reference temperature 20°C (68°F). ACML standard test method used unless otherwise stated. Uncertainty of Measurement has been estimated at a 95% confidence level with a coverage factor (k) = 2 unless otherwise stated. Results stated in this report refer to date of calibration. This report is issued free of any erasures or corrections and shall not be reproduced except in full.

Specified Dimension (mm)	ID.	Average Measured Size (mm)	U. of M. (mm)
Height	A	200.070 (from 200.044 to 200.120)	±0.025
	B	203.067 (from 202.997 to 203.154)	
	C	196.847 (from 196.820 to 196.871)	
Diameter	A	100.046	±0.010
	B	103.104	
	C	97.048	
Weight	A	4251.82 g	±0.015 g
	B	4587.35 g	
	C	3935.97 g	

REMARKS: Scratches are visible on top and bottom surfaces of each cylinder.

AUTHORISED SIGNATORY

D. ZHAO

Accredited for compliance with ISO/IEC 17025 – Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

\\Server\d\ACM G\WORD\REPORTS\221227.docx (2/31.01.01)